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Notes of military interest for 1900

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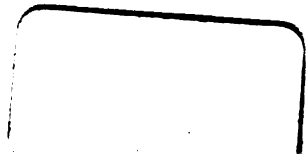

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No. XXXII.

NOTES OF MILITARY INTEREST

FOR 1900.

JANUARY, 1901.

WASHINGTON:
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NOTES OF MILITARY INTEREST FOR 1900.

CHAPTER I.

SYNOPSIS OF LATEST MILITARY BUDGETS OF VARIOUS POWERS.

The budgets of different countries vary much in form and completeness of detail. Some give, in addition to the proposed expenditures, the strength of the army on which the estimates are based, while others do not. In the latter case the strength and composition of the military forces have been compiled from other sources.

AUSTRIA-HUNGARY.

(See accompanying map for military territorial division.)

MILITARY BUDGET FOR 1900.

Ordinary expenditures (compared with 1899).

Branches of service.	Crowns (1 crown = $0.203).		
	1900.	1899.	Increase.
Central administration	979,416	849,048	130,368
Territorial and local headquarters, and officers in local positions	3,326,984	2,754,408	572,576
Intendance and auditing department	2,490,368	2,048,124	442,244
Army chaplains	382,166	321,614	60,552
Administration of military justice	757,238	627,696	129,542
Commanding officers and staffs	4,917,051	4,066,746	850,305
Pay and allowances of troops:			
Infantry — 33,791,452			
Rifles — 3,629,399			
Cavalry — 9,569,502			
Artillery — 8,705,058			
Pioneers — 2,112,736			
Railroad and telegraph regiment — 424,264			
Train — 1,334,992			
— 59,567,403			
Other expenditures on troops, such as schools, drills, transportation, etc. — 8,014,279			
	67,581,682	61,450,866	6,130,816
Military educational institutions	3,612,420	3,349,762	262,658
Military technical board	195,730	179,758	15,972
Subsistence magazines	1,533,762	1,354,658	179,104
Bed magazines	94,910	88,310	6,600
Clothing administrative establishments	366,358	320,374	45,984
Ordnance department	9,000,820	8,576,532	424,288
Depots of train matériel	195,266	190,438	4,828
Depots of pioneer matériel	298,252	295,744	2,508
Bureaus of military construction	8,620,264	7,445,936	1,174,328
Military geographical institute	560,442	492,042	68,400

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Ordinary expenditures (compared with 1899)—Continued.

Branches of service.	Crowns (1 crown = $0.203).		
	1900.	1899.	Increase.
Medical service	8,748,476	7,993,424	755,052
Maintenance (pension, etc.)	25,002,830	24,989,340	13,490
Military prisons	214,828	194,044	20,784
Miscellaneous expenditures (military attachés, special traveling expenses, etc.)	1,053,429	1,010,000	43,429
Subsistence in kind	38,702,386	39,009,016	*306,630
Victualling of troops	39,937,300	38,408,934	1,528,366
Clothing and bedding	18,907,720	18,899,276	8,444
Quarters	28,590,320	28,505,974	84,346
Remount service	6,266,536	6,194,410	72,126
Rewards to noncommissioned officers	5,320,000	5,320,000	
Total	277,656,964	264,936,474	12,720,480

* Decrease.

Extraordinary expenditures, 1900.

	Crowns.
(*a*) ARMY.	
Replenishment of warlike stores	1,953,000
Buildings, quarters, and drill grounds	2,858,000
Transient extraordinary expenditures	7,725,474
Extraordinary expenditures for carrying out changes in organization	1,536,054
Total extraordinary expenditures for army	14,072,528
(*b*) HEADQUARTERS, TROOPS, AND ESTABLISHMENTS IN THE TERRITORY OF OCCUPATION.	
Pay and subsistence of troops, purchase of horses, armament, train, engineering and construction, equipment, medical service, etc.	7,382,000

Comparative table of the new and old salaries of officers, etc., belonging to the army.

Rank.	Salaries in crowns.	
	Old.	New.
Field marshal	21,000	24,000
War minister	20,000	20,000
Army corps commander (general of cavalry)	16,800	16,800
Lieutenant field marshal	12,600	14,016
Major general	8,400	11,400
Colonel	6,000	7,200
Lieutenant colonel	4,200	6,000 / 5,400
Major	3,360	4,008
Captain, first class	2,400	3,000
Captain, second class	1,800	2,400
First lieutenant	1,440	2,040
Second lieutenant	1,200	1,680

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Comparative table of the budgetary strengths for 1900 and 1899.

Branch of the service.	1900.		All ranks.	
	Officers.	Men.	1900.	1899.
Central administration (war ministry, etc.)	200	59	259	259
Territorial and local headquarters, and officers in local positions	976	1,059	2,035	2,022
Military intendancies and auditing department	830		830	820
Chaplain service	120	117	237	237
Administration of military justice	201	254	455	455
Headquarters and other staffs	889	867	1,756	1,746
Infantry:				
1 company bodyguard	4	129	133	
102 regiments of the line	8,816	161,002	169,818	169,806
Rifles:				
42 battalions	974	16,491	17,465	17,465
Cavalry:				
1 squadron bodyguard	4	132	136	136
42 regiments (15 dragoon, 16 hussars, and 11 uhlan)	1,764	45,726	47,490	47,544
Artillery:				
56 regiments field artillery	1,583	25,502	27,085	27,093
6 regiments and 3 battalions of fortress artillery	398	7,762	8,160	8,160
Pioneers:				
15 battalions	480	8,430	8,910	8,910
Railroad and telegraph regiment:				
3 battalions	86	1,487	1,573	1,573
Train:				
85 squadrons	417	3,309	3,726	3,726
Officers and men permanently detailed and not available for duty with troops	372	694	1,066	1,078
One-year volunteer veterinarians		45	45	45
Firing schools of troops, aeronautic establishments, remount depots, etc.	42	328	370	350
Military educational institutions	132	2,468	2,600	2,459
Military technical board	17	126	143	140
Subsistence magazines	388	1,007	1,395	1,384
Bed magazines	15	88	103	103
Clothing administration establishments	108	494	602	602
Ordnance department ("technical artillery")	288	1,396	1,684	1,684
Depots of train matériel	9	78	87	87
Depots of pioneer stores	13	171	184	187
Bureaus of military construction	378	272	650	646
Military geographical institute	173	122	295	295
Medical service	1,415	4,207	5,622	5,618
Maintenance (soldiers' homes)	7	774	781	787
Military prisons	96	31	127	127
Miscellaneous (military attachés)	8		8	8
Total active list	21,203	284,627	305,830	305,552
Total increase over 1899			278	

Composition of the general staff.

	Number.
Feldzeugmeister	1
Lieutenant field marshal	1
Major general	1
Colonels	23
Lieutenant colonels	41
Majors	47
Captains, first class	141
First lieutenants	172
Armee-diener and accountants	7
Total	434
Enlisted personnel	555
Total officers and men	989

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BELGIUM.

MILITARY BUDGET FOR THE FISCAL YEAR 1901.

Branch of the service.	Amounts asked for 1901.	Amounts appropriated in 1900.
ORDINARY EXPENDITURE.		
	Francs.	*Francs.*
Central administration	517,700.00	517,700.00
Pay and allowances	24,494,888.14	24,396,719.93
Hospitals and military pharmacies	849,135.00	849,135.00
Institutions of higher instruction	214,975.00	220,375.00
Ordnance department	1,889,944.05	1,889,944.05
Engineering material	1,574,125.00	1,574,125.00
Bread, meat, forage, and other allowances	18,771,592.85	18,752,697.83
Various money allowances and fees	427,754.68	397,754.68
Pensions and relief	407,100.00	407,100.00
Unforeseen expenses	58,149.00	52,149.00
EXTRAORDINARY EXPENDITURES.		
Various services	6,133,945.00	5,270,253.20
Total	55,339,315.72	54,327,953.69

Effective strength.

Arm of the service.	Officers.	Men.
General staff	80	
Provincial and garrison staffs	39	
Intendancy	39	
Medical officers at hospitals	95	
Infantry (19 regiments*)	1,921	27,788
Cavalry (8 regiments*)	370	5,770
Artillery (8 regiments, 4 special companies*)	633	8,682
Engineers (1 regiment, 5 companies*)	152	1,703
Administrative battalion	78	963
Total	3,407	44,906

* In 1899, taken from Statesman's Yearbook.

Composition of the general staff.

	Number.
Great general staff:	
Lieutenant generals	10
Major generals	18
Staff corps:	
Colonels	5
Lieutenant colonels	5
Majors	10
First captains	16
Second captains	10

FRANCE.

(See accompanying map for military territorial division.)

MILITARY BUDGET FOR 1900.

The law of April 13, 1900, fixed the ordinary expenditures of 1900 for the war department at 633,093,750 francs, as against 624,552,286 in 1899, and the extraordinary expenditures at

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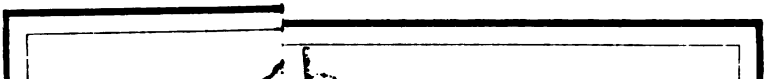

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26,143,750 francs, as against 24,943,750 in 1899, making a total for 1900 of 659,237,500 francs, distributed as follows:

Ordinary expenditures.

		Home.	Algeria.	Tunis.	Total.
		Francs.	*Francs.*	*Francs.*	*Francs.*
Salary of war minister and personnel of central administration		2,443,479			2,443,479
Officers detailed to central administration		1,433,886			1,433,886
Expenses for matériel of central administration		317,020			317,020
Colonial medal and Exposition exhibit		37,000			37,000
Printing		547,352			547,352
Geographical service		808,142	119,000		927,142
General staff (archives, library, and historical museum)		134,400			134,400
Military telegraphy		457,400	49,000	13,500	519,900
Department of military railroads		99,000			99,000
General staff and staff service		10,236,320	791,025	198,335	11,225,680
Various departments and special staffs (personnel of contrôle service, intendance department, and artillery and engineer staffs)		12,655,602	1,176,061	324,811	14,156,474
Military schools, personnel:					
Prytanée militaire	363,852				
Polytechnic school	691,058				
Special military school (St. Cyr)	821,906				
School of application of artillery and engineers	1,417,882				
Superior war school	1,106,806				
School of application of cavalry	1,204,054				
School of application of medicine and military pharmacy	438,655				
Administrative school	85,002				
Normal school of gymnastics	284,515				
Normal school of musketry of Camp de Châlons	190,364				
Schools of application for infantry fire	456,619				
Infantry school	603,017				
Artillery and engineer school	288,904				
Preparatory school of infantry	516,376				
Preparatory school of cavalry	143,612				
Preparatory school of artillery and engineers	148,800				
Hériot orphan asylum	24,327				
Medical school	140,610				
		8,926,359			8,926,359
Military schools, matériel:					
Prytanée militaire	307,285				
Polytechnic school	538,950				
Special military school (St. Cyr)	884,920				
School of application of artillery and engineers	174,350				
Superior war school	58,200				
School of application of cavalry	80,350				
School of application of medicine and military pharmacy	35,630				
Administrative school	8,525				
Normal school of gymnastics	32,480				
Normal school of musketry of the Camp de Châlons	29,816				
Schools of application for infantry fire	20,180				
Infantry school	47,460				
Artillery and engineer school	39,500				
Preparatory schools of infantry	172,985				
Preparatory schools of cavalry	38,740				
Preparatory schools of artillery and engineers	39,230				
Hériot orphan asylum	30,000				
Medical school	329,471				
Regimental schools of infantry, cavalry, artillery, engineers, and gendarmery and republican guard	230,077				
		3,098,149			3,098,149

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Ordinary expenditures—Continued.

	Home.	Algeria.	Tunis.	Total.
	Francs.	*Francs.*	*Francs.*	*Francs.*
Personnel hors cadres or not classed in troop units	7,560,608	2,535,299	488,143	10,584,050
Pay of infantry	101,655,439	12,365,911	2,887,689	116,909,039
Pay of administrative troops	3,687,285	808,467	112,686	4,608,438
Pay of cavalry	24,406,839	4,515,222	721,998	29,644,059
Pay of artillery	28,979,023	625,086	240,571	29,844,680
Pay of engineers	4,443,396	179,119	66,033	4,688,548
Pay of train	3,123,111	506,621	174,675	3,804,407
Departmental and African gendarmery	33,150,902	2,287,783		35,438,685
Republican guard	4,697,937			4,697,937
Provisions	36,156,022	5,042,205	1,187,805	42,386,032
Meat (fresh, canned, and salted)	54,307,221	5,251,661	1,398,507	60,957,389
Forage	65,892,620	5,548,089	1,500,100	72,940,809
Medical service	7,334,303	1,447,803	260,267	9,042,373
Department of military convoys	1,754,500	1,129,500	333,500	3,217,500
Travel allowances and special journeys	10,779,353	898,880	201,500	11,879,733
Extraordinary traveling expenses and extraordinary missions	584,300	13,000	4,000	601,300
Clothing and camp equipage	48,056,502	5,028,559	1,358,335	54,443,396
Military bedding	10,307,639	1,068,136	255,340	11,631,115
Special transportation (magazine stores and bodies of deceased soldiers)	604,900	500,000	97,000	1,201,900
Recruiting	395,910			395,910
Reserve and territorial army	272,500	5,520	1,270	279,290
Military justice and prisons	1,004,590	162,405	21,440	1,188,435
Workhouses and military penitentiaries	59,990	72,780		132,770
General remount service	14,782,230	1,004,950	330,150	16,117,330
Census of horses and mules	93,500			93,500
Horse equipment	3,548,441	326,848	116,648	3,991,937
Artillery establishments (personnel, general expenses, transportation)	8,366,970	242,345	40,910	8,650,225
Artillery establishments, purchase and manufacture of matériel and ammunition (new)	14,921,490	1,000,000	500,000	16,421,490
Government explosive factories	4,554,194			4,554,194
Engineer establishments	13,444,750	2,253,150	676,510	16,374,410
Fuel and light	336,800	29,200	5,300	371,300
Disabled soldiers	309,025			309,025
Unemployed and reduced pay	817,303			817,303
Relief and bounties	6,117,360			6,117,360
New special allowances to veterans	650,000			650,000
Secret expenditures	530,000			530,000
Pay of general officers and assimilated persons of the reserve cadre	2,669,700			2,669,700
Expenditures to be restored—Tunis gendarmery			323,960	323,960
Expenses of minister and various departments at Exposition of 1900	218,380			218,380
Removal of military establishments from Karguentah to Oran (in Algeria)		500,000		500,000
Totals	561,769,142	57,483,625	13,840,983	633,093,750

Extraordinary expenditures.

	Francs.
Siege train:	
Manufacture of elongated shell	225,000
Manufacture of smokeless powder	29,000
Manufacture of platform carriages	246,000
Powder magazines	40,000
Field equipment:	
Artillery matériel	120,000
Train matériel	600,000
Horse equipment for train	80,000
Armament of garrisons	430,000
Armament of coasts:	
Manufacture of elongated shell	272,000
Manufacture of guns, carriages, etc	1,588,350

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Extraordinary expenditures—Continued.

	Francs.
Small arms:	
Manufacture of muskets and carbines	3,189,800
Manufacture of revolvers	370,000
Ammunition	1,800,000
Artillery experiments	300,000
Buildings and machinery:	
Field equipment	300,000
Armament of garrisons	300,000
Armament of coasts	400,000
Defenses of Cherbourg	1,000,000
Barracks:	
Eastern frontier	1,200,000
Hygienic improvement of present barracks	100,000
Regional drill and firing grounds	1,000,000
Construction of strategic roads	100,000
Improvements on isolated forts	650,000
Telegraphy	100,000
Military ballooning	350,000
Fortifications:	
Land defense	3,200,000
Coast defense	1,700,000
Bridge matériel for engineers	200,000
Reserve—Engineers	100,000
Reorganization of the defense of Bizerte:	
Artillery	1,942,000
Engineers	2,224,000
Subsistence	150,000
Clothing	242,000
Medical service	100,000
Improvements to military hospitals in the departments	455,600
Horse equipment	40,000
Railways:	
Organization of railways and waterways	420,500
Material for operating same	225,000
Railways in Algeria	10,000
Special organization of certain railroad stations (as soldiers' eating houses)	44,500
Expenses of studies, experiments, instruction of troops, miscellaneous	300,000
Total	26,143,750

The effective strength which served as a basis for the budget for 1900 differs as follows from that of 1899:

	Active army.		Gendarmery.	
	Officers.	Men.	Officers.	Men.
1899	28,683	561,234	742	25,179
1900	28,998	561,521	742	25,214
Increase	315	287		35

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The following tables show the distribution of staff, military schools, arms of the service, etc.:

Staff.

	Home.			Algeria and Tunis.			Total.		
	Officers.	Noncommissioned officers.	Total.	Officers.	Noncommissioned officers.	Total.	Officers.	Noncommissioned officers.	Total.
Generals of division	107	------	107	6	------	6	113	------	113
Generals of brigade	204	------	204	16	------	16	220	------	220
Officers of the general staff service	749	------	749	63	------	63	812	------	812
Archivists	163	------	163	17	------	17	180	------	180
Officers of the contrôle service	52	------	52	------	------	------	52	------	52
Intendance officers	269	------	269	46	------	46	315	------	315
Special artillery staff	882	422	1,304	78	48	126	960	470	1,430
Special engineer staff (officers, adjoints, etc)	859	280	1,139	137	71	208	996	351	1,347

Reserve cadre.

Generals of division	133
Generals of brigade	155
Contrôleurs general	12
Military intendants	37
Inspecting physicians and pharmacists	14

Personnel hors cadres or not classed in troop units.

Branch of service.	Home.			Algeria and Tunis.			Total.		
	Officers.	Noncommissioned officers.	Total.	Officers.	Noncommissioned officers.	Total.	Officers.	Noncommissioned officers.	Total.
I.—PERSONNEL HORS CADRES.									
Recruiting service	178	------	178	5	------	5	183	------	183
Penitentiaries and prisons	5	------	5	15	------	15	20	------	20
Native affairs	------	------	------	73	------	73	73	------	73
II.—PERSONNEL NOT CLASSED IN TROOP UNITS.									
Medical personnel:									
Surgeons	292	------	292	149	------	149	441	------	441
Pharmacists	75	------	75	39	------	39	114	------	114
Administrative officers of the medical service	224	------	224	126	------	126	350	------	350
Total medical personnel	591	------	591	314	------	314	905	------	905
Administrative personnel	900	253	1,153	192	223	415	1,092	476	1,568
Veterinarians	32	------	32	7	------	7	39	------	39
Military interpreters	1	------	1	61	------	61	62	------	62
Total personnel hors cadres and not classed in troop units	1,707	253	1,960	667	223	890	2,374	476	2,850

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Military schools.

Name of school.	Officers.	Noncommissioned officers, corporals, and men.	Total.
Prytanée militaire (preparatory school for sons of officers without means)	8	45	53
Polytechnic school	----------	38	38
Special military school (St. Cyr)	65	1,326	1,391
School of application for artillery and engineers	183	42	225
Superior war school	96	292	388
School of application for cavalry	59	251	310
School of application of medicine and military pharmacy	9	26	35
School of administration	----------	59	59
Normal school of gymnastics	----------	141	141
Normal school of musketry	----------	79	79
School of application for infantry fire	----------	93	93
Infantry school	----------	285	285
Artillery and engineer school	----------	94	94
Preparatory school of infantry	----------	240	240
Preparatory school of cavalry	----------	67	67
Preparitory school of artillery and engineers	----------	60	60
Hériot orphan asylum	----------	40	40
Medical school	----------	46	46
Totals	420	3,224	3,644

NOTE.—This table is as it is given in the budget. In cases in which no officers are given, the officers are probably included in regimental strength.

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Infantry.

	Home.			Algeria and Tunis.			Grand total.		
	Officers.	Noncommissioned officers, corporals, and men.	Total.	Officers.	Noncommissioned officers, corporals, and men.	Total.	Officers.	Noncommissioned officers, corporals, and men.	Total.
163 regiments of infantry of the line of 4 battalions each, less 104 companies	11,080	285,509	296,589	----------	----------	----------	11,080	285,509	296,589
30 battalions of rifles of 6 companies each	1,002	28,770	29,772	----------	----------	----------	1,002	28,770	29,772
4 regiments of zouaves of 5 battalions of 4 companies each, plus 2 depot companies, of which 1 regiment is in Tunis and 4 battalions at home	70	2,272	2,342	344	11,149	11,493	414	13,421	13,835
5 battalions of light infantry of Africa, of which 2 are in Tunis	----------	----------	----------	165	7,675	7,840	165	7,675	7,840
4 companies of disciplinary fusiliers, of which 1 company is in Tunis	----------	----------	----------	16	1,000	1,016	16	1,000	1,016
2 foreign regiments of 6 battalions of 4 companies each, plus 2 depot companies	----------	----------	----------	202	10,386	10,588	202	10,386	10,588
4 regiments of Algerian sharpshooters of 6 battalions of 4 companies each, plus 1 depot company, 1 regiment being in Tunis	----------	----------	----------	496	20,484	20,980	496	20,484	20,980
1 company of Saharian sharpshooters	----------	----------	----------	11	275	286	11	275	286
Total infantry	12,152	316,551	328,703	1,234	50,969	52,203	13,386	367,520	380,906

Administrative troops.

21 sections of staff and recruiting secretaries, one being in Algeria, with a detachment in Tunis	----------	1,849	1,849	----------	229	229	----------	2,078	2,078
25 sections of military administrative clerks and workmen, 3 being in Algeria, with a detachment in Tunis	----------	7,014	7,014	----------	1,706	1,706	----------	8,720	8,720
25 sections of military-hospital attendants, 3 being in Algeria, with a detachment in Tunis	----------	3,018	3,018	----------	2,111	2,111	----------	5,129	5,129
Total administrative troops	----------	11,881	11,881	----------	4,046	4,046	----------	15,927	15,927

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Cavalry.

79 regiments of 5 squadrons each (13 of cuirassiers, 31 of dragoons, 21 of rifles, and 14 of hussars)	3,463	61,157	64,620				3,463	61,157	64,620
6 regiments of African rifles of 5 squadrons each, 1 regiment being in Tunis				258	4,722	4,980	258	4,722	4,980
8 companies of remount cavalry	9	2,021	2,033	18	848	866	27	2,872	2,899
3 regiments of spahis of 5 squadrons each				123	2,361	2,484	123	2,361	2,484
One regiment of Tunisian spahis of 5 squadrons				41	926	967	41	926	967
Remount service	18		18	5		5	23		23
Saharian spahis				6	142	148	6	142	148
Total cavalry	3,490	63,181	66,671	451	8,999	9,450	3,941	72,180	76,121

Artillery.

18 battalions of foot artillery	532	13,962	14,494	8	258	266	540	14,220	14,760
40 regiments of field artillery	3,220	53,932	57,152				3,220	53,932	57,152
African batteries				64	3,124	3,188	64	3,124	3,188
Musicians of artillery schools	19	741	760				19	741	760
10 companies of workmen	48	2,887	2,935	2	253	255	50	3,140	3,190
3 companies of artificers	12	303	315				12	303	315
Mountain batteries	60	2,053	2,113				60	2,053	2,113
Total artillery	3,891	73,878	77,769	74	3,635	3,709	3,965	77,513	81,478

Engineers.

6 regiments of engineers (sappers and miners)	419	9,780	10,199	17	1,110	1,127	436	10,890	11,326
1 regiment of 3 battalions of railroad sappers	65	2,035	2,100				65	2,035	2,100
Total engineers	484	11,815	12,299	17	1,110	1,127	501	12,925	13,426

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Train.

	Home.			Algeria and Tunis.			Grand total.		
	Officers.	Noncommissioned officers, corporals, and men.	Total.	Officers.	Noncommissioned officers, corporals, and men.	Total.	Officers.	Noncommissioned officers, corporals, and men.	Total.
20 squadrons at home and 12 mixed companies in Algeria and Tunis	360	5,495	5,855	52	2,260	2,312	412	7,755	8,167
Orderlies of staff officers		2,664	2,664		516	516		3,180	3,180
Total train	360	8,159	8,519	52	2,776	2,828	412	10,935	11,347

Recapitulation.

Infantry	12,152	316,551	328,703	1,234	50,969	52,203	13,386	367,520	380,906
Administrative troops		11,881	11,881		4,046	4,046		15,927	15,927
Cavalry	3,490	63,181	66,671	451	8,999	9,450	3,941	72,180	76,121
Artillery	3,891	73,878	77,769	74	3,635	3,709	3,965	77,513	81,478
Engineers	484	11,815	12,299	17	1,110	1,127	501	12,925	13,426
Train	360	8,159	8,519	52	2,776	2,828	412	10,935	11,347
Total	20,377	485,465	505,842	1,828	71,535	73,363	22,205	557,000	579,205

NOTE.—There are also included in the budget the gendarmery and the Garde Republicaine. The former consists of 26 legions in France (624 officers and 21,571 men), 4 companies in Algeria (31 officers and 1,161 men), and a Tunisian detachment (4 officers and 139 men). The latter consists of a legion of 3 battalions of infantry of 4 companies each, and 4 squadrons of cavalry (total strength, 83 officers and 2,967 men).

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Y.

ry territorial division.)

R 1899 AND 1900.

rious branches of the service for between the two years.

	Marks (1 mark = $0.238).		
	1899.	1900.	Increase.
	2, 895, 363	2, 928, 342	32, 979
	429, 545	429, 785	240
	2, 977, 266	3, 017, 756	40, 490
	976, 962	1, 019, 362	42, 400
	852, 329	1, 240, 573	388, 244
	3, 372, 411	3, 485, 757	113, 346
	650, 018	662, 918	12, 900
	1, 195, 626	1, 211, 226	15, 600
	2, 825, 251	2, 841, 461	16, 210
	2, 345, 148	2, 353, 181	8, 033
	126, 230, 476	129, 740, 135	3. 509, 659
	134, 640, 204	138, 080, 273	3, 440, 069
	29, 397, 575	30, 788, 647	1, 391, 072
	53, 864, 462	55, 958, 687	2, 094, 225
	1, 486, 730	1, 578, 124	91, 394
	9, 350, 054	9, 780, 915	430, 861
	1, 173, 856	1, 688, 048	514, 192
	3, 850, 456	3, 853, 678	3, 222
	10, 317, 864	10, 745, 730	427, 866
	3, 068, 026	3, 153, 044	85, 018
	8, 869, 953	9, 108, 278	238, 325
	7, 302, 813	7, 490, 924	188, 111
	878, 185	873, 088	* 5, 397
	33, 168, 751	39, 140, 492	5, 971, 741
	1, 068, 272	1, 164, 796	96, 524
	2, 953, 313	2, 947, 187	* 6, 126
	10, 561, 077	10, 818, 331	257, 254
	813, 356	825, 885	12, 529
	2, 904, 472	3, 024, 712	120, 240
	1, 274, 477	1, 277, 445	2, 968
	58, 304, 623	60, 266, 883	1, 962, 260
	519, 999, 214	541, 495, 663	21, 496, 449
	122, 894, 067	124, 484, 807	1, 590, 740
	642, 893, 281	665, 980, 470	23, 087, 189

the colonies.

	Marks.
	2, 221, 540
	214, 569
	32, 700
	1, 194, 980
	1, 864, 404
	5, 531, 193

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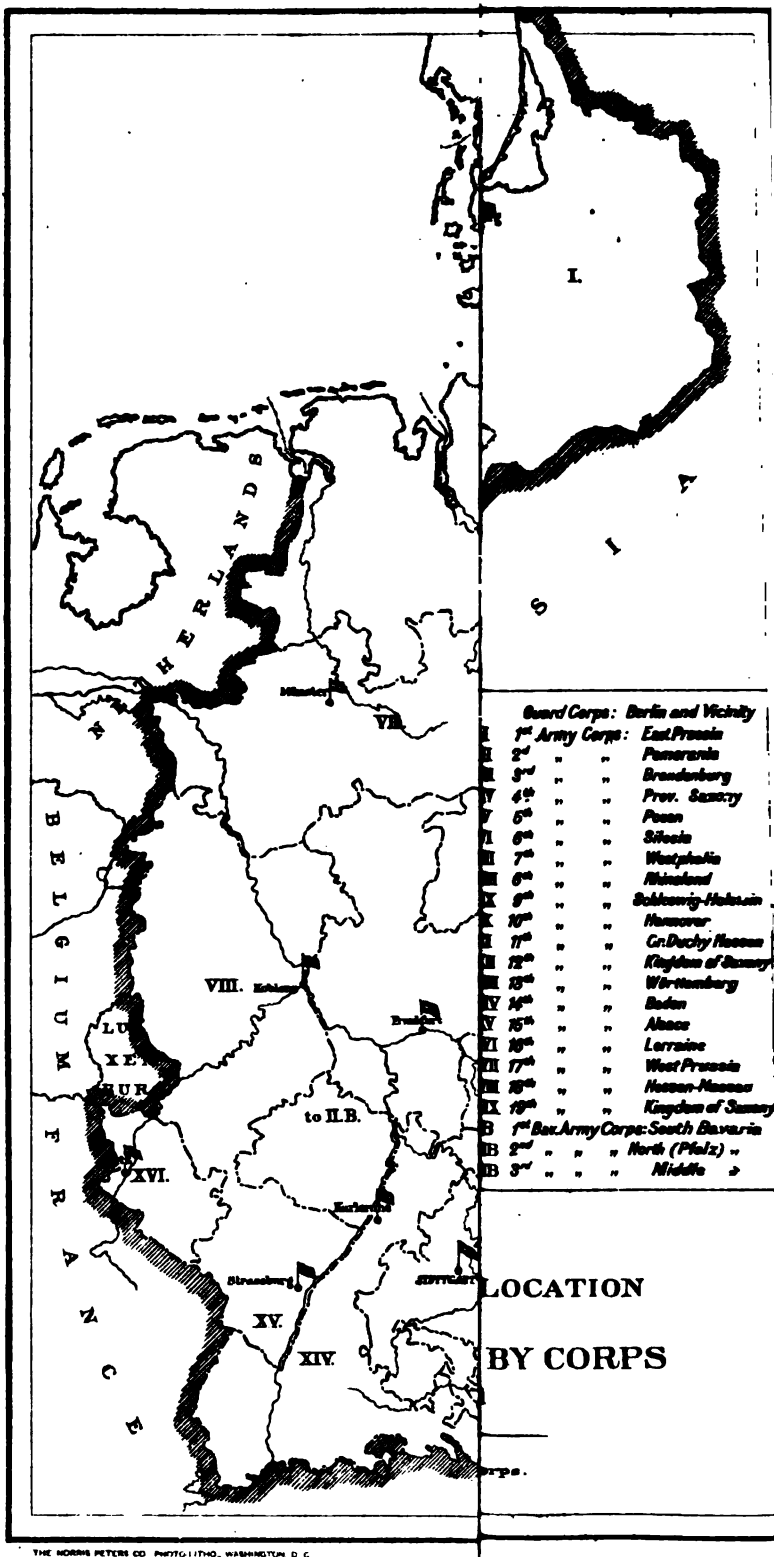

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GERMANY.

(See accompanying map for military territorial division.)

MILITARY BUDGETS FOR 1899 AND 1900.

Table showing appropriations for the various branches of the service for 1899 and 1900, and differences between the two years.

Branch of service.	Marks (1 mark = $0.238).		
	1899.	1900.	Increase.
Current expenses:			
War ministry	2,895,363	2,928,342	32,979
Military chests	429,545	429,785	240
Supply department	2,977,266	3,017,756	40,490
Military chaplains	976,962	1,019,362	42,400
Administration of military justice	852,329	1,240,573	388,244
Higher troop commanders	3,372,411	3,485,757	113,346
Governors of fortified places, garrison commanders, and their aids	650,018	662,918	12,900
Aids-de-camp and officers in special positions	1,195,626	1,211,226	15,600
General staffs and national survey	2,825,251	2,841,461	16,210
Engineers and pioneers	2,345,148	2,353,181	8,033
Pay of troops	126,230,476	129,740,135	3,509,659
Allowances in kind	134,640,204	138,080,273	3,440,069
Clothing and equipment of troops	29,397,575	30,788,647	1,391,072
Garrison administration and commutations	53,864,462	55,958,687	2,094,225
Garrison construction	1,486,730	1,578,124	91,394
Medical service	9,350,054	9,780,915	430,861
Administration of train depots and care of field matériel	1,173,856	1,688,048	514,192
Subsistence of replenishment and reserve troops	3,850,456	3,853,678	3,222
Purchase of remounts	10,317,864	10,745,730	427,866
Administration of remount depots	3,068,026	3,153,044	85,018
Traveling allowances, and allowances for relays and transportation	8,869,953	9,108,278	238,325
Military education and training	7,302,813	7,490,924	188,111
Military prisons	878,485	873,088	*5,397
Artillery and ordnance	33,168,751	39,140,492	5,971,741
Technical artillery establishments	1,068,272	1,164,796	96,524
Construction and maintenance of forts	2,953,313	2,947,187	*6,126
Extra allowances for quarters	10,561,077	10,818,331	257,254
Reliefs and extra indemnities to active military persons and civilians not provided for elsewhere	813,356	825,885	12,529
Extra allowance to military widows' fund	2,904,472	3,024,712	120,240
Miscellaneous expenditures	1,274,477	1,277,445	2,968
Military administration of Bavaria (separate)	58,304,623	60,266,883	1,962,260
Total	519,999,214	541,495,663	21,496,449
Extraordinary expenses	122,894,067	124,484,807	1,590,740
Total current and extraordinary expenditures	642,893,281	665,980,470	23,087,189

* Decrease.

Military budget for the colonies.

	Marks.
East African Protectorate	2,224,540
Cameroon Protectorate	214,569
Togo Protectorate	32,700
Southwest African Protectorate	1,194,980
Kiautschou Protectorate	1,864,404
Total	5,531,193

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The following are the more important changes in the current expenditures of the budget for 1900:

Three squadrons of mounted rifles, 19 field batteries, and 1 instructional section for the field artillery firing school have been formed in accordance with the changes prescribed in the law of March 25, 1899, on the organization of the German army.

In the ordnance department 2,500,000 marks in addition have been appropriated for the replenishment of small arms and 2,300,000 marks more for ammunition.

Two hundred thousand marks are appropriated for the first time for the purchase of remounts for the train. The average price of a horse, including the costs of purchase, is reckoned at 830 marks.

Three staff officers are to be permanently appointed as instructors at the war academy after October 1, 1900.

On October 1, 1900, when the new code of military criminal procedure takes effect, 265 additional court officials are to be appointed.

The following are the new appropriations in the extraordinary budget:

For the purchase of 831 draft horses, 817 riding horses, and 29 pack horses or mules, 1,897,000 marks. The pack horses or mules are to be used in supplying ammunition to the rifle battalions garrisoned in Alsace.

For purposes of foot artillery, 9,500,000 marks.

For small-arm experiments, 600,000 marks.

A new drill ground is to be located, presumably at Bitsch, for the fifteenth army corps.

A special sum of 10,000,000 marks is allotted for the completion of important fortifications.

Budgetary strength of the German army for 1900.

Arm of the service.	Officers.	Noncommissioned officers, men, etc.
Infantry (216 regiments of infantry, 18 battalions of rifles, and 293 recruiting headquarters)	13,314	386,865
93 regiments of cavalry	2,406	67,046
105 regiments of artillery	3,852	88,619
25 battalions of pioneers	571	14,913
Communication troops (3 regiments, 2 companies, and 1 battalion of railroad troops, 2 balloon sections, and 3 battalions, 1 company, and 1 detachment of telegraph troops)	237	6,121
23 train battalions	322	8,039
Special formations	544	4,682
Officers, etc., not attached to regiments	2,604	381
Total	23,850	576,666

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Increases or decreases with respect to the strength for 1899.

Arm of the service.	Increase.		Decrease.	
	Officers.	Noncommissioned officers and men.	Officers.	Noncommissioned officers and men.
Infantry	69	369		
Cavalry	21	527		
Artillery	90	3,005		
Pioneers		12		
Communication troops	1			3
Train			2	302
Special formations	13	167		
Officers not attached to regiments	46	22		
Military court, including Bavarian Senate	6			
	246	4,102	2	305
Total increase	244	3,797		

Composition of the general staff.

PRUSSIA.

	Number.
Chief of the general staff of the army	1
Aids	2
Generalquartiermeister	1
Oberquartiermeisters	3
Chiefs of section in the great general staff, or chiefs of the general staffs at general headquarters and in large fortresses	31
Captains and field officers	181
Railroad commissioners:	
Field officers with rank and allowances of regimental commanders	3
Field officers (with lesser rank)	15
Captains, first-class	3
Retired (pensionirte) officers, field officers, or captains	4

SAXONY.

Chiefs of the central section, or chiefs of the general staff at general headquarters	3
Captains and field officers	15
Railroad commissioners: Field officers	2

WURTEMBERG.

Chief	1
Captains and field officers	4
Railroad commissioner: Field officer	1

GREAT BRITAIN.

MEMORANDUM OF THE SECRETARY OF STATE RELATING TO THE ARMY ESTIMATES FOR 1900-1901.

The army estimates of 1900–1901 have been framed under the following abnormal conditions:

(*a*) Provision has to be made for carrying on the war in South Africa.

(*b*) It has been decided to make at once an addition to the permanent strength of the army.

(*c*) Temporary measures have been authorized for the purpose of increasing the numbers and efficiency of the force available for the defense of the United Kingdom.

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With regard to (*a*), it is of interest to compare the regimental numbers of all ranks serving with the colors at home and abroad on the 1st of January, 1899, and 1st of January, 1900.

	1899.	1900.
Home and colonies:		
Household cavalry	1,238	1,327
Cavalry of the line	12,169	18,890
Royal artillery, horse and field	10,195	18,803
Royal artillery, mountain and garrison	15,722	18,119
Royal engineers	7,637	10,210
Foot guards	7,249	12,008
Infantry	87,185	133,743
Colonial corps	7,242	8,778
Army service corps, etc	9,266	13,085
Total	157,863	234,963
India (all arms)	74,467	66,581
Total	232,330	301,544

The above numbers do not include the militia, the whole of which has been or will be embodied (about 100,000 men), the imperial yeomanry (about 10,000 men), the enlisted volunteers (about 9,000 exclusive of the waiting companies), or a large force of colonial troops, which may be estimated at about 35,000 men.

The number with the colors is constantly increased by recruiting for existing units and for others to be raised, by the recall from time to time of men from the remainder of the reserve, and by the enlistment of men for the royal reserve battalions to be referred to hereafter.

Taking all these together, and deducting the force remaining in India, the full pay and subsistence of about 500,000 men has to be provided for.

The decrease in the force in India on the 1st of January, 1900, as compared with the 1st of January, 1899, is due to the fact that 4 cavalry regiments, 2 royal horse artillery batteries, 3 royal field artillery batteries, 4 infantry battalions, and 3 mounted infantry companies have been temporarily withdrawn from the Indian establishment for the purpose of the war, and brought on to the British establishment.

(*b*) The measures in contemplation for permanently adding to the strength and efficiency of the army, as well as those intended to meet special and temporary requirements, have already been made known, and it is only necessary to recapitulate them briefly.

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The following are the chief permanent additions to our military forces:

Seven batteries of royal horse artillery and 36 batteries of royal field artillery will be raised, so as to provide the artillery for 2 more army corps and 2 more cavalry brigades. Three howitzer batteries for each army corps (12 in all) will also be formed.

In time of peace the new horse and field batteries will be retained on a reduced establishment.

The formation of new depots for the field artillery will enable reservists of that arm to rejoin and be equipped at their depots like infantry reservists.

Additions will be made to the royal engineers amounting to a total of 2,038 of all ranks.

The growth of our imperial responsibilities and, in particular, the course of events in South Africa, render it necessary to increase the force of infantry available to furnish garrisons for colonial stations.

In June last, before the war broke out, the number of battalions at home and abroad was as follows:

India	52
Colonies and Egypt	16¼
South Africa	6¼
Crete	1
Total	76
At home	69
Authorized, but not yet raised	3
Total	72

At that time the garrison of Malta was short by one battalion of its authorized strength. This deficiency may be taken as balanced by the presence of a battalion in Crete.

There was, therefore, an excess of battalions abroad over battalions at home of four. When a third battalion of guards is stationed at Gibraltar, this deficiency will be reduced to two.

To make this deficiency good, and to meet the certain need for the prolonged maintenance of an increased force abroad, it is proposed to raise 12 new line battalions, attaching them as third and fourth battalions to existing regiments.

An endeavor will be made to add to the number of men engaged for three years' service with the colors in each battalion of infantry serving at home.

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It has not, however, up to the present time, been found possible to obtain the full number authorized for each battalion.

An addition of 29 companies (2,220 of all ranks) will be made to the army service corps; of 8 companies (450 of all ranks) to the army ordnance corps, and of 260 of all ranks to the army medical corps. Provision is also made for the pay of 2 native Indian infantry regiments for the garrison of Mauritius, one of these to replace the British Central African regiment, recently sent to Somaliland. Two more native Indian battalions have been temporarily borrowed to replace British battalions withdrawn from Ceylon and Singapore.

The messing allowance given to militia during embodiment will henceforth also be given to them during the ordinary annual training.

The militia, yeomanry, and volunteers will be provided with regimental transport.

The whole of the volunteer artillery will be rearmed, part with semimobile guns, 4.7-inch, part with 15-pounder field guns. A large number of guns of the former class have been ordered; the rearmament of the batteries now armed with 16-pounders can probably be best carried out by placing in their hands the 15-pounders now with the royal field artillery, and supplying the latter with a new gun, either of the design according to which the field batteries now under construction are being manufactured, or of any still later type suggested by the experience of the war.

(*c*) The chief temporary measures for increasing the numbers and efficiency of the forces in the United Kingdom are these:

The noncommissioned officers and men of the squadron sent to South Africa from the household cavalry regiments will be treated as supernumeraries, and their places filled up by enlistment.

Four cavalry regiments will be formed from men of the reserve squadrons, now in this country, of cavalry regiments abroad.

Officers and men who have served in the regular forces have been invited to return to the colors on a short engagement, the men receiving a bounty of £22; officers and men of the infantry will be formed into reserve battalions, to be designated royal reserve battalions.

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Officers and men of artillery and cavalry will be utilized with their own arms of the service.

The whole of the militia will be embodied in the spring, and advantage will be taken of this to give the force special training in large camps.

It has been decided to increase, in cases of protracted embodiment, the gratuity paid to militiamen, and to offer bounties of £5 to men reengaging while in the militia, or reenlisting after they have left the force.

Provision is made for giving the yeomanry special training in camp during the summer. The contingent allowance will be increased from £3 to £5 a man to meet the exceptional expenses involved. Every yeoman will receive the sum of £5 in consideration of his bringing a horse to camp for this special training.

Like the militia and yeomanry, the volunteers will be afforded special opportunities of training in camps during the coming summer under suitable conditions as to pay and allowances. The details of these are under consideration.

The number of recruits raised during the year 1899 was 42,700, as compared with 40,729 in 1898, 35,015 in 1897, and 28,532 in 1896. Taking the number of British recruits alone, 40,207 were raised last year, as against 38,418, 33,722, and 27,809 in the three preceding years. The percentage of "specials" was 34.2, as against 33.8 in 1898, 29.0 in 1897, and 18.0 in 1896.

The sum taken in the estimates for warlike stores represents a small part only of the expenditure which will have to be incurred on this account.

The war in South Africa has involved the employment on active service of a force exceeding in number that which has been contemplated in the schemes of mobilization for service abroad. The equipment of this force and of the colonial contingents has made large inroads upon our reserves, and not only will the stores taken from these have to be replaced, but the reserves themselves must be largely augmented. The extent to which such an increase is necessary forms the subject of investigations which are still proceeding.

It has been decided to accelerate the completion of the programme for the rearmament of the fortresses at home and

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abroad which, as was stated in the Memorandum on Army Estimates for 1899–1900, was adopted last year after a general revision of our schemes of defense.

The total of the army estimates for 1900–1901 amounts to £61,499,400, while the number of men to be voted is 430,000.

The following table shows the comparison with the figures for the current year.

	1899–1900.			1900–1901.
	Original estimate.	Supplementary estimate.	Total.	
Vote A (number of men)	184,853	155,000	339,853	430,000
Votes 1–16	£20,617,200	£23,000,000	£43,617,200	£61,499,400

As regards the total of vote A (men), 212,449 may be regarded as permanent, the balance due to the war in South Africa and to special measures for home defense. The estimates show in detail only the normal or permanent establishment.

The £61,499,400 is accounted for as follows:

1. Normal estimate	£21,777,700
2. Permanent additions to the army	1,925,000
3. Special temporary measures for home defense	6,228,000
4. War charges	31,568,700
Total	61,499,400

The normal estimate of £21,777,700 shows an increase of £1,160,500 as compared with the original estimate for 1899–1900; this is mainly due to the provision made for further installments of the increases to the army commenced in previous years, to the provision for the full volunteer capitation grant, to the rise in prices, and to an additional annuity required under the Barracks Act.

The war charges are based on the assumption that the full field force will be maintained in South Africa till the 30th of September and a reduced force for the remainder of the year, but the estimates contain no provision for terminal charges, such as the transport home of the troops and gratuities on demobilization.

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This vote shows an excess of £8,691,000 over the original vote for 1899–1900, due (1) to permanent increases of establishment, (2) to temporary increases for home defense, (3) war charges.

In addition to the measures already enumerated for the permanent and for the temporary increase of the army, vote 1 provides for the completion of the programmes of increases to the army commenced in 1897, 1898, and 1899.

The principal war charges provided for in this vote are the pay of the army reserve recalled to the colors, the pay, etc., of the troops borrowed from India, of the South African local forces, of contingents from colonies outside South Africa, of the corps of imperial yeomanry, the volunteer companies attached to regular units in South Africa and the City of London imperial volunteers, and the wages of the large number of civilians necessarily employed in South Africa as muleteers and on other miscellaneous duties.

This vote has been nearly doubled owing to the war. All the available officers of the royal army medical corps ordinarily on the home establishment have been sent to South Africa, and their places at home have been filled by the employment of retired officers and civil medical practitioners. In addition a large number (223) of civil surgeons have been sent to the seat of war. The services of seven surgeons of eminence have been accepted as "consulting surgeons" to the army in the field. The army nursing reserve, which was constituted in 1897, has been largely drawn upon to supplement the army nursing service in the field and at home, and the services of members of the St. John's ambulance brigade have been largely utilized. Provision has been made for a large increase of officers of the royal army medical corps, and a further addition has been made to the establishment of non-commissioned officers and men.

Provision has been made for the embodiment for the greater part of the year of the whole militia, and for the already explained increase in the bounties. Money has been taken in other votes for the supply of regimental transport.

It has been assumed that the places of the members of the yeomanry who have joined the imperial yeomanry will be filled by recruiting. Provision has been made for this and for the training of the whole yeomanry force for a period not

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exceeding a month. Provision is also made for an increase in the contingent allowance and in the allowances of officers under instruction.

The increase of this vote is partly due to provision being made for the full capitation allowances, the vote for 1899–1900 having been relieved of half the charges by means of a supplementary estimate in 1898–99. A large sum has been taken with the object of enabling the volunteers to carry out an extended training in camp. Volunteer corps will be entitled to the ordinary efficiency grants in respect of the officers and men who have been withdrawn for service in South Africa. It is hoped that not only will their places be filled, but that advantage will be taken of the permission to recruit above the present regimental establishments. An addition has been made to the sum allotted for traveling allowance for attendance at shooting practice, to admit of a more extended use of the ranges. The provision which was made last year on a small scale to enable volunteer corps to hire horses and wagons in order to practice transport duties in camp has been considerably extended, and a large addition has been made to the grants for the movement of guns of position. An additional amount is taken for an increase of volunteer officers attending schools of instruction.

Very large amounts are required for land and sea transport, a large portion of the latter being to meet liabilities incurred during the present financial year. Arrangements have been made for the retention of a number of transports, partly in South African waters for the transfer of troops from one portion of the seat of war to another, and partly for the conveyance home of invalids and wounded, and for the dispatch of reenforcements, and of drafts to make good the waste among the troops in the field. It is also necessary to provide for the conveyance of further consignments of supplies, stores, and animals to South Africa. The item for land transport provides not only for the conveyance of troops and stores by railway, but also for the hire of ox transport in the field. The vote includes sums for the purchase of horses and mules to make good the waste occurring in the large number of animals in South Africa, and for the purchase of horses for the additions to the artillery and other arms of the service. Money

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has also been taken under this vote for regimental transport for the militia and yeomanry.

The increase on the supply vote, apart from the war and the special augmentation of the army, would have been about £200,000, due to a rise in the cost of the bread and meat ration, and in the price of coal, and to increases of the army authorized in former years. The maintenance of the field force in South Africa demands an expenditure of nearly £7,500,000. Field rations are provided not only for the troops, but for nearly 30,000 civilians employed as drivers of transport wagons, laborers, etc., and forage is supplied for some 80,000 horses and mules, as well as for draft oxen. The colonial allowance granted to officers serving in South Africa has been practically doubled. A four months' supply of food and forage is being maintained in South Africa as a reserve. The rate of separation allowance to the families of reservists, embodied militia, and others who are not in occupation of public quarters has been increased by about one-third. There is also provision under this vote for the half wages paid to the families of men in Government employment before the war.

Nearly £2,200,000 is required to provide supplies and allowances for the royal reserve battalions, the new units of artillery, and other increases to the army, as well as for the embodied militia.

The increase on the clothing vote, apart from the special provision for the war and the increase to the army, is due chiefly to a rise in the price of wool.

Nearly £2,800,000 is required for the war, a considerable portion of which is to meet liabilities incurred for clothing the field force, but which will probably not be brought into payment before the close of 1899–1900, and also for the necessary reserves of clothing to meet the issues to the troops in the field. Issues of clothing are also provided for the special increases to the army and for the embodied militia.

The increase on the vote for warlike stores, apart from war charges and other special services, amounts to £719,000, provision being made for the equipment of the force to be permanently added to the army. About £750,000 is also taken for the purchase of a number of semimobile guns of position; £4,750,000 is provided for services in connection with the war

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and the measures temporarily adopted to increase the force at home.

Provision is also made for the more rapid completion, already alluded to, of the programme for the rearmament of our fortresses.

The increase on vote 10 is partly automatic, owing to the necessity of providing for a further annuity in repayment of sums borrowed under the Barrack Act of 1890. The building of barracks for a second infantry battalion which it has been decided to station at Bermuda will be begun. Additional accommodation will be provided for the inspection department at Woolwich Arsenal.

The increase in connection with the war is £1,300,000; £500,000 is provided for huts required for the temporary accommodation of the troops to be added to the army at home, and the same amount for hutting, which has been ordered for the troops who may be retained in South Africa after the conclusion of active operations. A scheme is in preparation for providing the barracks necessary for the forces which will be permanently added to the army; £300,000 is provided for engineer services in the field, and hospitals, storehouses, etc., in South Africa, and also for the increased hospital accommodation which will be required in this country for the invalids and wounded.

The increase on the war office vote is almost entirely due to the war, and more than half is due to the charge for foreign telegrams; the remainder provides for additional temporary staff, and for the appointment of a military transport officer, who is stationed at the admiralty; it is proposed also to appoint a member of the headquarters' staff who will be specially charged with business connected with the auxiliary forces.

The increase in the noneffective votes is mainly due to the war. There is an increase of about £100,000 in the provision for pensions and gratuities to wounded officers, and to widows and children of officers who lose their lives on service, but this is discounted to a large extent by the cessation of the retired pay and half pay of officers who are employed owing to the war and the suspension of voluntary retirement; £50,000 additional is provided for Chelsea pensions for the non-commissioned officers and men disabled by the war. Officers

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and men of all the colonial and local forces in Imperial pay, as well as civilian surgeons, etc., are eligible for these pensions and gratuities.

LANSDOWNE.

27th February, 1900.

Abstract of army estimates, 1900-1901.

Vote Nos.		Net estimate 1900–1901.	Net estimate 1899–1900.
	I.—NUMBERS.		
A.	Number of men on the home and colonial establishments of the army, exclusive of those serving in India	430,000	184,853
	II.—EFFECTIVE SERVICES.	*Pounds.*	*Pounds.*
1	Pay, etc., of army (general staff, regiments, reserve, and departments)	15,200,000	6,509,000
2	Medical establishment, pay, etc	555,000	305,800
3	Militia: Pay, bounty, etc	2,288,000	571,000
4	Yeomanry cavalry: Pay and allowances	144,000	75,000
5	Volunteer corps: Pay and allowances	1,230,000	624,200
6	Transport and remounts	10,000,000	790,000
7	Provisions, forage, and other supplies	13,100,000	3,425,500
8	Clothing establishments and services	4,680,000	1,086,800
9	Warlike and other stores: Supply and repair	8,000,000	2,531,000
10	Works, buildings, and repairs: Cost including staff for engineer services	2,670,700	1,211,900
11	Establishments for military education	113,800	111,100
12	Miscellaneous effective services	66,900	60,200
13	War Office: Salaries and miscellaneous charges	275,000	251,500
	Total effective services	58,323,400	17,553,000
	III.—NONEFFECTIVE SERVICES.		
14	Noneffective charges for officers, etc	1,611,000	1,555,000
15	Noneffective charges for men, etc	1,379,000	1,325,500
16	Superannuation, compensation, and compassionate allowances	186,000	183,700
	Total noneffective services	3,176,000	3,064,200
	Balances irrecoverable and claims abandoned		
	Total effective and noneffective services	61,499,400	20,617,200

Composition of the general staff.

	Numbers.	
	1900–1901.	1899–1900.
Generals	3	3
Lieutenant generals	7	7
Major generals	25	26
Brigadier generals	7	7
Colonels on the staff	34	31
Deputy adjutants general	3	3
Assistant adjutants general	31	30
Deputy assistant adjutants general, including district inspectors of musketry	80	82
Brigade majors	18	19
Senior aids-de-camp and assistant military secretaries	5	6
Aids-de-camp	41	41
Staff captains	14	13
Garrison and camp quartermasters	4	4
	272	272
Aids-de-camp to the Queen	6	6
Lieutenant of the Tower of London	1	1
Major of the Tower of London	1	1

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Composition of the general staff—Continued.

	Numbers.	
	1900–1901.	1899–1900.
RECRUITING STAFF.		
Chief recruiting staff officer	1	1
Recruiting staff officers, Class I	3	3
Recruiting staff officers, Class II	8	8
Conducting staff sergeants, etc	30	30

Number of men on the regular establishment, exclusive of India.

Regiments.	Officers.	Warrant officers, sergeants, and other enlisted men.	All ranks.	
			1900–1901.	1899–1900.
Cavalry:				
Household—3 regiments	551	13,687	14,238	14,233
Line—19 regiments				
Artillery:				
Horse artillery—18 batteries	1,473	37,512	38,985	30,458
Field artillery—114 batteries				
Mountain artillery—4 batteries				
Garrison artillery—83 companies				
Engineers:				
Field units—28	683	9,274	9,957	7,919
Telegraph divisions—3				
Fortress units—25				
Submarine mining—14				
Railway companies—3				
Survey companies—4				
77				
Infantry:				
Foot guards*—9 battalions	3,382	111,755	115,137	103,355
Line—108 battalions				
Line depots—68 battalions				
Army service corps	490	6,614	7,104	4,884
Royal army medical corps	550	3,045	3,595	3,335
Colonial corps	350	11,840	12,190	9,934
Departmental corps	243	2,403	2,646	2,191
Total regimental establishments	7,722	196,130	203,852	176,309
Staff of auxiliary forces:				
Honorable artillery company	1	4	5	5
Yeomanry cavalry	19	148	167	167
Light horse volunteers	1	3	4	4
Militia artillery†	55	694	749	750
Volunteer artillery	66	335	401	402
Militia engineers‡	(§)	118	118	101
Volunteer engineers	(¶)	79	79	77
Militia infantry	257	3,525	3,782	3,766
Volunteer infantry	213	1,187	1,400	1,398
Militia medical staff corps		17	17	13
Volunteer medical staff corps	1	13	14	14
Total staff of auxiliary forces	613	6,123	6,738	6,697
Total regimental and auxiliary forces	8,335	202,253	210,588	183,006
General and departmental staff:				
General staff (including headquarters' staff)	354	136	490	487
Army pay department	209		209	209
Army veterinary department	70	7	77	72
Chaplains' department	86		86	86
Army medical staff (including headquarters' staff)	96		96	97
Total staff and departments	815	143	958	951

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Number of men on the regular establishment, exclusive of India—Cont'd.

Regiments.	Officers.	Warrant officers, sergeants, and other enlisted men.	All ranks.	
			1900–1901.	1899–1900.
Miscellaneous establishments (exclusive of officers and men included under "Regiments"):				
Staff of schools for instruction in gunnery	29	187	216	214
Staff of school of musketry	7	52	59	60
Gymnastic staff	16	119	135	134
Royal military academy	20	26	46	45
Royal military college	28	35	63	64
Other colleges and schools	38	49	87	85
Army school establishments	16	192	208	207
Ordnance factories	15	----------	15	14
Miscellaneous establishments	46	28	74	73
Total miscellaneous establishments	215	688	903	896
Grand total	9,365	203,084	212,449	184,853
Additional numbers, imperial, colonial, and irregular forces, during the war in South Africa	----------	----------	217,551	----------
Number to be voted	----------	----------	430,000	184,853

*Since this budget was presented to Parliament an Irish regiment of foot guards has been organized.
† Including Channel Islands and colonial militia.
‡ Including submarine mining militia for Malta and Bermuda.
§ The 3 officers are included in establishment of royal engineers.
¶ The 19 adjutants are included in establishment of royal engineers.

Establishment of British regiments serving in India.

	Officers.	Warrant officers, sergeants, and other enlisted men.	All ranks.	
			1900–1901.	1899–1900.
Cavalry of the line, 9 regiments	261	5,356	5,617	5,617
Artillery:				
11 horse batteries				
42 field batteries	487	12,912	13,399	13,403
8 mountain batteries				
27 garrison companies				
Infantry, 52 battalions	1,508	52,174	53,682	53,682
Engineers	330	3	333	343
Army medical corps	332	----------	332	332
Inspectors ordnance machinery, armorers, etc	6	115	121	118
Total	2,924	70,560	73,484	73,495

In addition to the British army stationed in India, there is a native army, consisting, according to the latest returns at hand, of 1,671 European officers and noncommissioned officers and 141,519 native officers and men. The expense of maintenance of these troops is borne by the revenues of India. It is not included in the British army estimates unless these troops are used for service in the British Empire outside of India.

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Approximate normal distribution of regimental establishments.

	Cavalry.		Artillery.					Engineers.		Infantry. (Excluding colonial corps.)		Army service corps.	Army medical corps		Colonial and native Indian corps.				Ordnance and pay corps, all ranks.	Total, all ranks.
	Number of regiments.	All ranks.	Number of batteries or companies.				All ranks.	Number of companies.	All ranks.	Number of battalions.	All ranks.		Officers.	Men.	Number of companies.			All ranks.		
			Horse.	Field.	Mountain.	Garrison.									Infantry.	Artillery.	Engineers.			
Home	19	12,684	18	110	2	45	30,787	57	7,696	85	87,776	6,637	397	2,375	----	----	----	-------	2,157	150,509
Colonies and Egypt:																				
Mediterranean: Gibraltar	----	-------	----	----	----	7	1,764	4	412	3	3,027	89	16	80	----	----	----	-------	62	5,450
Mediterranean: Malta	----	-------	----	----	----	9	2,274	3	338	6½	7,057	71	24	141	----	7	----	852	60	10,817
Mediterranean: Cyprus	----	-------	----	----	----	----	-------	----	1	½	123	1	1	5	----	----	----	-------	4	135
Africa: Cape and Natal	2	1,186	----	3	1	2	1,078	2	312	12	12,169	125	26	170	----	----	----	-------	88	15,144
Africa: Mauritius	----	-------	----	----	----	2	346	1	148	1	1,012	5	5	35	16	2	----	2,042	14	3,576
Africa: St. Helena	----	-------	----	----	----	1	159	----	-------	----	-------	4	1	4	4	----	----	517	7	723
Africa: Sierra Leone	----	-------	----	----	----	1	110	----	10	----	-------	5	14	6	12	1	1	1,717	9	1,871
Africa: Egypt	1	539	----	1	1	----	280	1	112	3	3,080	100	16	94	----	1	----	124	66	4,411
America: Halifax	----	-------	----	----	----	2	534	2	176	1	1,012	13	5	14	----	----	----	-------	28	1,782
America: Esquimault	----	-------	----	----	----	1	207	1½	95	----	-------	5	1	6	----	----	----	-------	6	320
America: West Indies	----	-------	----	----	----	5	1,130	3	360	2	2,029	26	23	61	19	2	2	2,661	75	6,365
Asia: Ceylon and Straits Settlements	----	-------	----	----	----	4	679	1	211	2	2,024	12	12	40	----	4	2	556	38	3,572
Asia: Hongkong	----	-------	----	----	----	3	662	1	196	1	1,012	7	9	41	8	4	1	1,538	29	3,494
Asia: Wei-hai-wei	----	-------	----	----	----	1	128	½	57	----	-------	4	1	3	8	----	----	1,063	3	1,279
Total, Colonies and Egypt	3	1,725	----	4	2	38	9,351	20	2,428	32	32,545	467	154	700	67	21	6	11,090	489	58,949
India	9	5,617	11	42	8	27	13,399	1	333	52	53,682	-------	332	-------	----	----	----	-------	121	73,484
Grand total	31	20,026	29	156	12	110	53,537	78	10,457	169	174,003	7,104	883	3,075	67	21	6	11,090	2,767	282,942

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HOLLAND.

MILITARY BUDGET FOR 1901 COMPARED WITH THAT FOR 1900.

Section.	Branch of the service.	Florins (1 florin = $0.402).	
		1901.	1900.
I.	Expenses of the war department	162,550.00	162,550.00
II.	Salaries and allowances, together with indemnities for changes in uniform and for loss of baggage, for the purchase and loss of service horses, and for quarters in garrison, of the great general staff, the general staff, the intendance department, and the provincial and local staffs	249,100.00	248,600.00
III.	Salaries, allowances, and indemnity for changes in uniform and loss of baggage, for the purchase and loss of service horses, and for quarters in garrison, of the staffs of the various arms and of line officers; indemnity for the repair of officers' bicycles; allowances to reserve officers for first purchase of uniforms; and daily wages of military watchmen	3,213,249.00	3,254,815.00
IV.	Pay and other expenses of the various staffs, departments, and arms of the service mentioned in sections II, III, and V, except the costs mentioned in sections IX and XII, including, however, the expenses of instructors below the rank of officer in the militia and volunteer drill assemblies and of volunteers of the reserve cadre	6,652,301.00	6,587,534.00
V.	Medical service	832,363.00	840,063.00
VI.	Study and instruction	377,656.00	338,162.00
VII.	Ordnance department	2,156,885.00	1,928,672.00
VIII.	Engineer service	948,320.00	888,955.00
IX.	Commissary department	2,429,693.00	2,576,711.00
X.	Clothing and equipment	461,650.00	467,780.00
XI.	Topography and reconnoissance service	66,830.00	66,530.00
XII.	Transportation of personnel and matériel	348,900.00	327,900.00
XIII.	Various expenditures	94,908.40	93,300.00
XIV.	Pay of noncombatants, pensions, etc	2,558,319.00	2,557,651.00
XV.	Unforeseen expenditures	50,000.00	50,000.00
XVI.	The Maréchaussée	784,465.00	760,041.00
XVII.	Extraordinary expenditures	479,240.00	2,143,750.00
XVIII.	Completion of the system of fortification	850,000.00	851,000.00
	Total	22,716,429.40	24,144,014.00

The total peace strength of the Dutch army on June 1, 1898, was 25,753 men and 1,943 officers.

The army of Dutch East Indies at the end of 1897 consisted of 1,421 officers and 41,157 noncommissioned officers and men.—*Statesman's Yearbook.*

*Composition of the general staff.**

	Number.
Lieutenant generals	2
Major general	1
Colonel	1
Lieutenant colonels	2
Majors	5
Captains	16

*Taken from the Dutch army list for 1901.

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ITALY.

MILITARY BUDGET FOR THE FISCAL YEAR BEGINNING JULY 1, 1900, AND ENDING JUNE 30, 1901.

Ordinary expenditures.

Branch of the service.	Lire (1 lira = $0.193).
War ministry	2,494,540.00
Pensions	35,286,000.00
Staffs and inspection departments	3,914,600.00
Infantry	65,085,400.00
Cavalry	12,032,100.00
Artillery and engineers	23,698,100.00
Royal carbineers	26,400,100.00
Corps of invalids and veterans	171,900.00
Medical service	5,232,500.00
Commissariat, subsistence companies, and accountants in administrative departments	2,601,400.00
Military schools	2,468,000.00
Sum spent on pupils of military schools	300,000.00
Disciplinary companies and military penal establishments	989,700.00
Military geographical institute	490,100.00
Judge-advocate general's department	395,600.00
Allowances to officers in waiting, en disponibilité, or in auxiliary positions	852,500.00
Indemnities	4,119,000.00
Clothing and equipment	18,415,300.00
Provisions	13,330,600.00
Forage	17,149,200.00
Quarters	3,917,400.00
Keeping in repair of mobilization stores, etc	87,000.00
Remount service	4,628,000.00
Ordnance department	6,706,000.00
Engineer stores and works	5,594,200.00
Rent of real estate and water mains for military use	1,040,000.00
Expenses of military justice	27,000.00
Expenses for the Savoy and other military orders	110,500.00
Reimbursements for transfers and special missions	79,000.00
Expenses of litigation	39,000.00
Periodical bounties to engineer officers depending on the Henry legacy	1,260.00
National target practice	600,000.00
Total	258,256,000.00

Extraordinary expenditures.

Allowances to civilian employees en disponibilité and supernumerary	16,000.00
New military institutes and establishments	250,000.00
Fortifications and works of defense	6,000,000.00
Rent of government property in use or in the service of governmental departments	6,637,677.73

BUDGETARY STRENGTH OF THE ARMY.

The strength of the Italian army varies during the course of a year between a minimum maintained in winter and a maximum reached in summer. The mean budgetary strength for the year 1899–1900 was fixed at 13,500 officers and 212,000 men. These figures do not comprise the carbineers or gendarms (about 24,600 men), the customs guard (about 16,000 men), or the colonial troops maintained in Erythrea.—*L'État militaire des principales Puissances étrangères en 1900.*

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The number of regiments, etc., of the principal arms is as follows:

Infantry—
- 48 brigades of 2 regiments of 3 battalions each.
- 12 regiments of bersaglieri of 3 battalions each.
- 7 Alpine regiments.

Cavalry—
- 4 regiments of heavy lancers.
- 6 regiments of light lancers.
- 14 regiments of light cavalry (cavalleggieri).

Artillery—
- 24 regiments field artillery.
- 1 regiment horse artillery.
- 1 regiment mountain artillery.
- 22 brigades of coast and fortress artillery (a total of 78 companies).

Engineers—
- 2 regiments of sappers.
- 1 regiment of telegraphists.
- 1 regiment of pontoniers.
- 1 regiment of sappers and miners.
- 1 railroad brigade.

Strength of the permanent army under arms June, 1898.

(From the Statesman's Yearbook, 1900.)

Officers:	
Effective	13,834
Half pay	250
Troops:	
Carbineers	26,594
Infantry	162,174
Bersaglieri	17,665
Alpine troops	15,976
Military districts	1,396
Cavalry	24,760
Artillery	38,703
Engineers	13,963
Military schools	1,345
Sanitary corps	2,891
Commissariat	2,206
Invalid and veteran corps	161
Penal establishments and disciplinary companies	2,400
Depot for horses	368
Total	324,686

Composition of the general staff and staff corps (in active service and unemployed), according to the army list for 1900.

	Number.
General staff:	
Lieutenant generals	57
Major generals	85
Staff corps:	
Colonels	23
Lieutenant colonels	39
Majors	20
Captains	37

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MEXICO.

MILITARY BUDGET FOR THE FISCAL YEAR 1900-1901.

Expenditures (including expenditures for the navy).

Branch of the service.	Amounts (in Mexican money).
Office of secretary of war	$62,085.90
General staff and dependencies	452,924.60
Military justice	474,252.90
Comandancias militares (military headquarters), jefaturas de zonas, de armas, forts and prisons	221,696.85
Department of engineers and dependencies	716,337.29
Department of artillery and dependencies	961,867.76
Bureaus of construction	257,125.75
Medical corps and dependencies	478,158.04
Department of infantry and dependencies	4,829,426.34
Department of cavalry and dependencies	2,325,445.46
Department of marine and dependencies	893,052.20
General expenses	1,460,000.00
War expenses in Yucatan	500,000.00
Total	$13,632,373.09

Peace strength of the army after July 1, 1901.

Arm of the service.	Officers.	Non-commissioned officers and men.
Infantry (28 battalions, 4 skeleton battalions, 2 regional companies)	850	18,116
Cavalry (14 regiments and 4 skeleton regiments)	364	6,938
Artillery (2 regiments field, 1 regiment mountain, 1 regiment horse artillery, 1 machine-gun company, and 1 squadron small-caliber rapid-fire guns)	128	2,079
Engineers (1 company, 1 battalion, 1 engineer park, 1 pontonier train, 1 company of telegraphers)	34	807
Transport service (1 company, 1 squadron)	9	119
Medical corps	140	281
Military gendarmery (1 squadron)	5	116
Veterinary corps	19	----------
Total	1,549	28,456

COMPOSITION OF THE GENERAL STAFF.

The number of officers in the general staff in peace or war is not fixed, but will depend upon the exigencies of the service according to the judgment of the war department, it being taken into consideration that there should always be enough officers to supply four divisions, over and above the number necessary in the geographical service.

The grades in the general staff are colonel, lieutenant colonel, major, first and second captain, and lieutenant.

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NORWAY.

MILITARY BUDGET FOR THE YEAR 1899-1900.

Branch of the service.	Crowns (1 crown = $0.268).
Pay and allowances:	
Army administration	67,800
General staff	74,300
Engineers, 1 line and 1 landwehr battalion	174,800
Artillery:	
Field artillery, 3 line and 3 landwehr battalions; mountain artillery, 2 line and 2 landwehr battalions	297,900
Coast artillery	305,000
Technical artillery (ordnance department)	188,400
Cavalry	197,900
Guards	53,300
Infantry, 5 brigades	1,566,200
Medical corps	189,100
Veterinary corps	34,000
Intendancies	120,400
Train	58,000
Military justice	16,400
Recruiting service	38,200
Fortress officers and servants	10,000
Extra age allowance	406,700
Extra pay	68,400
Landsturm	83,400
Various	441,700
	4,391,900
Educational institutions	984,200
Drills and maneuvers	927,100
Maintenance, subsistence, equipment, etc	4,473,800
Engineer department	313,700
Miscellaneous	575,200
Extraordinary	483,400
National survey	390,600
Total	12,539,900

COMPOSITION OF THE ARMY ACCORDING TO THE ARMY LIST OF 1896.

General staff; war school.

Engineers:

1 corps of 1 line and 1 landwehr battalion.

Artillery:

3 field artillery corps of 1 line and 1 landwehr battalion each.

1 fortress and mountain artillery corps, of 1 line and 1 landwehr battalion.

Cavalry:

3 corps of 3 squadrons each, and 1 orderly squadron.

Infantry:

5 brigades of 4 line and 4 landwehr battalions each.

Composition of the general staff according to the army list of 1896.

	Number.
Major general, chief	1
Colonel	1
Lieutenant colonels	4
Captains	5

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PORTUGAL.

MILITARY BUDGET FOR 1900-1901.

Ordinary military budget for the fiscal year 1900–1901 compared with that for 1899–1900.

Branch of the service.	Milreis (1 milreis = $1.08.)	
	1900–1901.	1899–1900.
War ministry	21,074.970	22,274.970
Great general staff and military household of El-Rei	41,904.000	41,340.000
General and headquarters' staffs and governments of fortifications	71,811.500	68,100.200
Pay and allowances of the army	2,354,193.157	2,388,524.522
Pay of noncombatant officers	252,852.500	244,070.900
Administrative and medical services and various establishments	369,140.145	359,358,635
Military instruction	163,499.700	161,708.401
Military justice and establishments connected therewith	37,448.485	42,901.560
Auxiliary cadres and inactive personnel	856,914.545	842,843.233
Provisions and forage	1,236,274.820	1,241,190.954
Clothing	226,119.975	231,219.025
Miscellaneous expenditures	301,132.100	300,817.520
Expenditures for expired fiscal years	16,300.000	28,778.595
Total	5,948,665,897	5,973,128.515

Extraordinary military budget for 1900–1901.

	Milreis.
Construction of defensive works of Lisbon and harbor	50,000.000
Construction and enlarging of quarters and other military buildings	30,000.000
Payment on the royal military college property	2,038.019
Total	82,038.019

Budgetary strength for 1900–1901, according to law of September 7, 1899.

Branch of the service.	Officers.	Noncommissioned officers and men.
1 regiment of engineers	48	795
Artillery (4 regiments field, 2 batteries each of horse and mountain, and 2 regiments of garrison artillery)	298	4,419
8 regiments of cavalry	276	4,020
Infantry and chasseurs (including reserves), 27 regiments of infantry and 4 of chasseurs	1,172	20,209
Train	4	126
Subsistence company	3	273
Medical company	3	158
Total	1,804	30,000

Composition of the general staff.

	Number.
Great general staff:	
Marshal of the army	1
Generals of division	6
Generals of brigade	20
Staff service:	
Colonels	6
Lieutenant colonels	6
Majors	6
Captains	20
Lieutenants	10

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RUSSIA.

(See accompanying map for military territorial division.)

MILITARY BUDGETS FOR 1900 AND 1899.

Branches of the service.	Rubles (1 ruble = $0.515).	
	1900.	1899.
Central administration	2,591,801	2,527,237
Local administration	9,064,623	8,991,396
Technical departments and schools	9,043,353	9,480,725
Medical service and hospitals	4,358,563	4,205,891
Clothing and equipment	26,402,036	24,644,533
Provisions	45,621,560	47,290,272
Forage	18,251,521	18,561,586
Pay	71,006,763	67,700,610
Rent and maintenance of real property	20,853,021	19,968,376
Works of construction	24,635,895	25,716,913
Manufacture of ordnance; improvements	7,877,331	9,133,754
Field and fortress artillery; firing exercises	2,889,632	2,980,271
Transportation, changes of station, couriers, dispatches	11,192,261	11,498,570
Expenses of receiving the annual contingent	1,290,000	1,351,676
Drills of reserve and militiamen	3,810,492	2,959,460
Expenses of the general government of Turkestan	1,276,523	1,244,171
Special corps of gendarmes	3,696,887	3,658,620
Gratuities and reliefs	3,734,860	3,649,684
Sums to be turned into the retirement fund, together with government subsidies therefor	5,270,099	4,913,886
Extraordinary expenditures	616,127	635,897
Kwan-Tung peninsula	5,000,000	5,000,000
Transformation of armament	24,220,773	19,220,773
Miscellaneous expenditures	3,205,704	2,223,691
Reserve credit	9,838,861	12,538,247
Credit for the needs of 1901	8,595,000	8,595,000
Total	324,343,686	318,691,539

Peace strength as existing December, 1900.

Arm of the service.	Officers.	Men.
1,177 battalions of infantry and 139 detachments and 31 Cossack sotnias	25,037	637,500
Cavalry:		
730 squadrons and 28 cadres	5,600	141,936
Artillery:		
461 field batteries		
15 mountain batteries		
30 horse batteries		
21 horse batteries (Cossack)		
27 howitzer batteries		
5 sortie batteries	5,430	149,600
Total 3,052 guns.		
56 fortress battalions		
75 flying parks		
16 companies		
Engineers, etc.:		
30 battalions sapper and telegraph, including 92 sapper and 28 telegraph companies and 1 detachment		
7 parks, field engineers		
2 parks, siege engineers		
7 sections, fortress telegraph		
6 companies balloonists		
7 battalions R. R. troops	1,700	31,200
8 battalions pontooniers		
14 companies submarine mining, of which 2 are river submarine mining companies		
11 companies fortress sappers		
1 company electrical instruction		
1 instructional balloon park		
Topographical corps		
A total of 175,000 horses.		
Total	37,767	1,010,236

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In addition to the above active troops there are employed in peace time—

Gendarmerie, 10,000; frontier guards, 1,500 officers and 40,000 men; 10,000 civil officials; commissioners, 3,300 doctors, 250 druggists; 10,800 hospital stewards, and 400 veterinarians.

COMPOSITION OF THE GENERAL STAFF.

According to the "Razvietchik" the general staff in 1897 was composed of 40 generals of infantry, 116 lieutenant generals, 92 major generals, 249 colonels, 124 lieutenant colonels, 189 captains, 5 staff captains, and 65 other officers detailed to the staff.

SPAIN.

MILITARY BUDGET FOR 1900.

Branch of the service.	Pesetas (1 peseta = $0.193).
Central administration:	
Personnel	2,982,948.00
Matériel	333,600.00
Provisional administration:	
Personnel of army units, bureaus, and establishments	10,023,390.00
Matériel of army units, bureaus, and establishments	362,957.00
Personnel of permanent units	88,043,222.58
Personnel of penal establishments	123,915.32
Administrative services:	
Subsistence, quarters, light and fuel, camp equipage, and hospitals	21,485,533.00
Military transportation	1,031,000.00
Horse breeding and remounts	2,258,444.00
Artillery matériel	5,600,000.00
Engineer matériel	4,809,000.00
Various and unforeseen expenditures	310,000.00
Pensions to military orders	295,210.00
Enlistment and reenlistment bounties	5,000,000.00
Rent of military buildings	308,607.75
Civil guard:	
Personnel of the general headquarters, staffs, regiments, and colleges of officers	21,650,988.00
Matériel of the general headquarters	12,000.00
Fiscal years closed:	
Obligations lacking an appropriation	1,343,515.00
Total	165,974,330.65

Effectives upon which the estimates of 1900 were based.

Enlisted personnel:	
Corps of halberdiers	255
Royal élite squadron	150
Infantry (64 regiments, 88 rifle, reserve, etc., battalions)	45,581
Cavalry (including 28 line and 14 reserve regiments, special squadrons, depots, etc.)	12,388
Artillery (including 14 field and 3 mountain regiments, 9 fortress battalions, etc.)	12,834
Engineers (including 4 engineer and 1 pontonier regiment, and telegraph, railroad, balloon, etc., companies)	4,277
General staff	386
Administrative corps	1,460
Medical corps	881
Ceuta volunteer militia	178
Melilla marine company	90
Military educational establishments	504
Orphan asylums, soldiers' homes, military penitentiaries, etc	1,016
Total	80,000

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Officers and persons with rank of officers:	
General staff	179
Halberdiers	40
Infantry, and garrison staffs	5,036
Cavalry	1,232
Artillery	953
Engineers	404
Civil guard	896
Carbineers (customs guard)	658
Judge advocate's department	64
Administrative corps	727
Medical corps	527
Veterinary corps	148
Equitation	69
Auxiliary corps of military bureaus	258
Topographical brigade and general staff	14
Aids of the medical brigade	25
Special engineer employees (celadores de fortificación)	88
Marine companies	5
Aids-de-camp	297
Positions that may be filled indiscriminately from any unit	60
Army chaplains	222
Total	11,902

COMPOSITION OF THE GENERAL STAFF.

The general staff consists of 19 colonels, 33 lieutenant colonels, 33 majors, and 94 captains.

SWEDEN.

MILITARY BUDGET, ACCORDING TO THE LAW OF REORGANIZATION, FOR 1902.

Branch of expenditure.	Crowns (1 crown=$0.268).
Pay and allowances:	
General staff	287,767.50
Infantry	6,457,043.90
Cavalry	2,041,700.70
Artillery	2,363,912.25
Fortress troops	640,478.00
Train	605,613.00
Other services	1,223,850.14
Remount service	1,484,128.00
Schools for officers, noncommissioned officers, and surgeons	426,280.00
Subsistence in kind, hospitals, drills, and matériel	13,663,626.51
Diminution of taxes and allowances to holders of estates	4,465,900.00
Various expenditures	104,700.00
Total	33,765,000.00

Peace strength of the army according to the law of 1892.

Arm of the service.	Officers.	Noncommissioned officers and men.
Generals	9	
General staff, staff college, etc	39	2
Infantry	1,220	26,212
Cavalry	232	4,977
Artillery	303	3,733
Engineers	77	900
Train	66	670
Total	1,946	36,494

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COMPOSITION OF THE ARMY.*

General staff.

Infantry:

5 regiments bodyguard, 22 regiments line, 1 rifle corps, 2 battalions.

Cavalry:

3 regiments bodyguard, 5 regiments line.

Artillery:

6 regiments, 3 corps.

Train:

4 battalions.

Medical corps.

Intendance corps.

Veterinary corps.

*Composition of the general staff.**

	Number.
Lieutenant general, chief	1
Colonels	3
Lieutenant colonels	4
Majors	10
Captains	16
Lieutenants	8

SWITZERLAND.

MILITARY BUDGET FOR 1900.

		Francs.	Francs.
I.	Secretary's Office		66,125
II.	Administration:		
	A. Personnel of administration	818,620	
	B. Personnel of instruction	1,338,880	
	C. Instruction	12,276,487	
	D. Clothing	3,520,724	
	E. Armament and equipment	2,053,933	
	F. Indemnities to officers for equipment	483,085	
	G. Cavalry horses	2,340,782	
	H. Subsidies to military and shooting societies	816,800	
	I. War material	2,164,780	
	K. Military establishments and fortifications	862,500	
	L. Fortifications	955,547	
	M. Topographical office	285,125	
	N. Allowances of pay after deaths	25,000	
	O. Commissions and experts	15,000	
	P. Printing	120,000	
	Q. Landsturm	32,000	
	R. Cost of administration and care of wheat	35,000	
	S. Allowances for care of horses	60,991	
	T. Insurance against accidents	80,000	
	U. Recensus of horses	50,000	
	V. Unforeseen expenses	2,500	
			28,337,754
	Total		28,403,879

COVERED BY RECEIPTS.

III.	Powder works	1,365,220
IV.	Care of horses	615,991
V.	Construction shops	516,600
VI.	Manufacture of munitions	3,672,000
VII.	Manufacture of arms	1,805,000
	Total	7,974,811

*From the army list, 1900.

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The items III, IV, V, VI, VII, amounting to 7,974,811 francs, are offset by receipts from the products of three establishments, leaving the net expenses of the military department of Switzerland 28,403,879 francs.

The fundamental laws of the Republic forbid the maintenance of a standing army within the limits of the Confederation. The federal army consists of all men liable to military service, and both the army and war material are at the disposal of the Confederation. * * * The Confederation enacts all laws relative to the army, and watches over their due execution; it also provides for the education of the troops, and bears the cost of all military expenditure which is not provided for by the legislatures of the cantons. To provide for the defense of the country every citizen has to bear arms, in the use of which the children are instructed at school, from the age of 8, passing through annual exercises and reviews. Such military instruction is voluntary on the part of the children, but is participated in by the greater number of pupils at the upper and middle class schools.

Every citizen of the Republic of military age, not exempt on account of bodily defect or other reason, is liable to military service. On January 1, 1898, the number thus liable to serve was 535,781, and the number actually incorporated was 246,809. Those who are liable but do not perform personal service are subject to a tax, half the amount of which goes to the Confederation. The contingent of recruits for 1899 numbered 17,851. Recruits are primarily liable to serve in the infantry, the best fitted physically and by education and pecuniary means being selected for other arms. In the first year of service every man undergoes a recruit's course of training, which lasts from forty-two to eighty days, and during the remainder of his service in the élite, he is called up every other year for sixteen days' training; rifle practice and cavalry exercises being, however, annual. The landwehr forces are also called together periodically for inspection and exercise, and once or twice a year the troops of a number of the cantons assemble in general muster.

The troops of the republic are divided into three classes, viz:

1. The élite (auszug), consisting in general of all men able to bear arms, from the age of 20 to 32.

2. The landwehr, comprising all men from the thirty-third to the completed forty-fourth year. The first ban of the

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landwehr consists of men from 33 to 40 years of age, and the second ban of men from 40 to 44.

3. The landsturm, which can only be called out in time of war, consisting of all citizens not otherwise serving, between the ages of 17 and 50, or, in the case of ex-officers, 55.—*Statesman's Yearbook, 1900.*

While Switzerland has, in fact, no standing army as such, it has a small corps of instructors employed and under pay all the year, and a small number of men, called "garnison de sureté," for the fortifications. This number is not constant, but according to the last reports there were:

At Ste. Maurice	109 enlisted men.
At Ste. Gothard	128 enlisted men.
Total	237 enlisted men.

This is about the average strength of these "gardes de sureté."

They are regularly enlisted, and are commanded by officers of the corps of instructors. Though enlisted for a specific period, a man in good standing may be discharged at any time by making application therefor to the military department. They form at each place a small garrison for the care of the fortifications and matériel, and are instructed in the service of the guns mounted there. In addition to that, they are utilized in the instruction of the troops destined to defend these plans in time of war. There are also employed there, as elsewhere under the military department, a number of officers of high rank in the military establishment, but they are employed as civil functionaries and do not wear uniforms. There are a number of these officers so employed in the different bureaus of the military department, at the powder works, arms factory, ammunition factory, and ordnance shops, but, as just stated, they are employed as civilians.

The following table shows the authorized corps of instructors and the number borne on the rolls December 31, 1900:

Arm.	Authorized by law.	In office Dec. 31, 1900.
Infantry	128	126
Cavalry	15	13
Artillery	37	35
Engineers	16	12
Sanitary troops	11	11
Administration	4	4
Gothard and Ste. Maurice	7	7
Totals	218	208

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In addition to these, a varying number of aspirant instructors are employed and paid for the time so employed according to their grade. Of these last, about twenty are named by the military department and five or six by the chef d'armes.

The senior instructor of each arm has his office at the military department and is responsible for the instruction of that arm.

A large part of the officers of high rank belong to or have come from the corps of instructors, and the schools are invariably commanded by them. All are apparently zealous students of their profession.

For the first year's instruction of the recruits, before their embodiment in the élite of their arm, which takes place on the 1st of January of each year, for each batch or school, cadres composed of officers, noncommissioned officers newly appointed or promoted or designated for promotion, for each company, troop, or battery are summoned for duty.

In the infantry these cadres report eight days before the recruits and are instructed by the instruction officers in their duties before the arrival of the recruits. The schools proper are for forty-five days, really forty-six, including the days of arrival and departure of the recruits.

The cavalry schools are for periods of eighty days, for which the cadres are similarly summoned.

For the artillery and engineers the law makes special provision for the cadres, calling:

1. Lieutenants proposed for captains. (These command the batteries and companies.)
2. Lieutenants newly appointed.
3. Noncommissioned officers newly appointed.

The artillery schools are of fifty-six days' duration.

The engineers' schools last fifty days, plus twenty-eight days for the cadres.

A certificate of special efficiency and aptitude at these recruit schools is a prerequisite to advancement in the several grades, and only those securing these certificates are sent forward to the aspirants' schools to compete for the higher places, and only the best of these are advanced to the lower commissioned grades. In this way the instruction officers, who are themselves the best judges of fitness, are able to maintain an effective check upon favoritism and to secure the best available material for officers for duty with

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the smaller units. To this careful mode of selection of men for officers is attributed, in great measure, the proficiency found to exist in the Swiss militia. No attempt to compare it with regular troops is made, but it undoubtedly represents the best militia anywhere to be found, and after a very short time in the field it would become remarkably efficient and a foe by no means to be despised. The people are naturally orderly, and discipline is not difficult; and thus instruction is fairly good, being entirely devoted to the useful rather than the ornamental. What they would lack most is the necessary cohesion for the successful conduct of a campaign, yet their preparation is so far advanced that this difficulty may be to a great extent overcome within a very short time. First of all, the officers must demonstrate their capacity for the positions they occupy, and then the men will trust and follow them and thus establish the necessary cohesion in all properly organized bodies. This is the more difficult in militia because of the intimate associations between the officers and their men in their civil intercourse, sometimes leading to distrust when called for military service.

Target practice is universal in Switzerland for all men of military age, and nearly every town has a shooting society, with its target range, subsidized by the confederation, where the men contest for medals, prizes, etc., and where all can have their practice required each year at the time that suits them best. The Swiss are generally good shots.—*Report of Capt. G. R. Cecil, 13th Infantry, Military Attaché.*

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EUROPEAN ARMIES—STRENGTH AND COST.

The following table, showing the relative cost, etc., of the principal continental armies of Europe, has been taken from the "Popolo Romano." In each case the mean of the last ten years has been taken as a basis.

Country.	Population.	War budget.	Effectives	Expense per capita.	Number of soldiers per 1,000 inhabitants.	Horses.	Guns.	Proportion per 1,000 men in—			Expense per one soldier one year.
								Officers.	Horses.	Guns.	
		Francs.		*Francs.*							*Francs.*
Austria	44,288,587	407,864,306	350,657	9.21	7.92	58,864	1,048	61.92	167.58	2.98	1,008
France	37,490,484	645,033,692	589,215	17.25	15.71	141,593	3,048	49.33	240.30	5.17	1,024
Germany	52,279,901	736,137,430	562,187	14.08	10.75	96,298	3,444	43.20	164.17	6.13	1,043
Italy	31,667,946	236,480,127	221,388	7.47	6.63	46,695	872	61.67	210.92	3.93	996
Russia	128,981,828	732,605,304	908,075	5.63	7.04	163,500	3,194	43.34	180.05	3.51	807

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CHAPTER II.

FIELD ARTILLERY.

In no direction, in recent years, has more activity been shown, more expense incurred, more experiments made, than in the development of field artillery. In the race for military superiority among the great military powers of the world, it has been generally conceded that the ordinary breech-loading field gun of some years back was not good enough, and they have vied with each other in their efforts to obtain a gun which should have great range and great rapidity of fire. The result is the rapid-fire gun of the present day. When it is considered that the number of these guns deemed necessary by the great military powers runs up into the thousands, and that the cost of a single gun complete, with limber and caisson, is about $5,000, it will be seen that the resultant expense is enormous; but the fact that a single gun of the new type can fire more aimed shots in a given time than a whole battery of guns of the old type justifies the great expenditure.

In working out a system of field artillery, the first thing to be considered is the maximum weight to be drawn by six horses; this weight being that of the gun and its carriage complete, with limber loaded with ammunition. For European service, from 1,600 to 1,750 kilograms (say from 3,500 to 3,800 pounds) would be about the limit. The limits of weight fixed for the piece being determined, the problem is to get the greatest rapidity of fire, the highest ballistic power, and the most effective projectile possible within these limits. A reduction in weight would make a smaller muzzle velocity necessary, and would diminish the efficiency of the gun.

Below will be found a résumé of the field artillery status in different countries. This has been compiled from various technical publications (especially the "Journal des Sciences Militaires"), the reports of military attachés, and other available sources. No attempt has been made to include any information which, in one way or another, has not been open to the public.

Germany and France are the only countries that have definitely adopted for their armies a complete system of rapid-fire

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field artillery. In other countries the matter is yet in the experimental stage.

GERMANY.

Germany was the first country to adopt, definitely, a new system of field artillery. An imperial order of March 27, 1897, prescribed the adoption, for the German army, of a new system of field artillery, to be designated by the name of "model '96." Up to that time there had been, to be sure, similarity of model for this artillery, but it included three kinds of guns and two kinds of carriages and limbers. At present there is but a single model, the horse-battery piece being distinguished from the field-battery piece only by the absence of the gunner's seat, which results in a dimunition of 30 kilograms in the weight of the former.

THE GUN.—The barrel, made of nickel steel (Krupp metal), consists of a tube reenforced in the rear by a jacket. The latter is prolonged to the rear in such a way as to form a case for the breech mechanism. The whole left side of the breech is hollowed out to facilitate loading. The barrel carries a trunnion cast together with the jacket, and which fits into a cradle which is attached to the carriage (fig. 1).

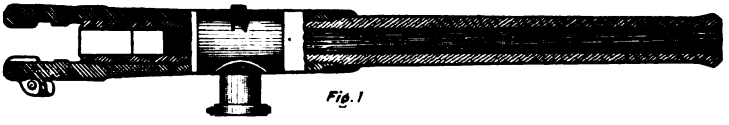

Fig. 1

Rifling: Thirty-two grooves, increasing twist, with a muzzle inclination of 7°. The shot chamber, rifled, is connected with the powder chamber by a junction cone, against which bears the rifling band of the shell.

The caliber is 77 millimeters, and the total length of the tube 27 calibers (2.079 meters). The slot of the rear sight is arranged so as to correct automatically for normal drift at every range.

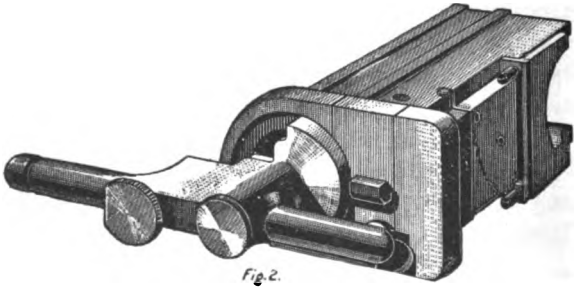

Fig. 2.

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BREECH MECHANISM (fig. 2).—This consists of a flat wedge which moves horizontally in the wedge slot. The wedge is provided on the inside with a mechanism operating a firing pin, which is cocked automatically upon the breech being opened. The obturation is secured by the metallic cartridge case, the rear end of which, when the breech is closed, rests against a steel plate carried on the wedge and pierced in the center by a hole for the passage of the firing pin. The cartridge case is seized in front of the rim by the claws of an extractor. The breech is opened by sliding the wedge to the right (instead of sliding it to the left, as before).

The wedge is operated by means of a breech screw, as in the case of the old gun. On the large arm of the crank is a safety button for the purpose of keeping the breech closed during changes of position, and of preventing the firing pin from being accidentally disturbed.

The gun is loaded by inserting the projectile from the rear in the direction of the axis of the gun. The cartridge, being inserted from the side, is thrust in by hand until the rim of the case bears against the claws of the extractor.

A breech cover protects the breech mechanism from dust during marches.

THE CRADLE (fig. 3).—The cradle being intermediate between the gun and the carriage, enables slight lateral movement to be given without moving the trail.

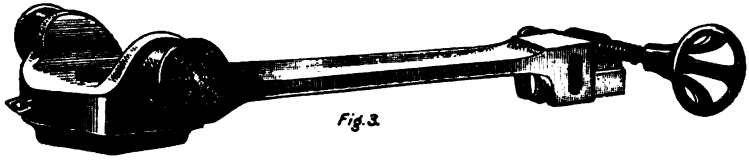

Fig. 3.

The traversing gear consists of a screw which, by its horizontal movement in a screw box joined to the cradle, carries the gun along with it and causes the gun to pivot on the cradle. Both the traversing and elevating gears are worked by handwheels placed immediately under the hands of the gunner.

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CARRIAGE.—It is a rigid carriage with a trail spade (fig. 4). The convergent sheets are of sheet steel. The axle is hollow. The wheels have a diameter of 1.20 meters, being 0.20 meter less than those of the model '73 carriage. The

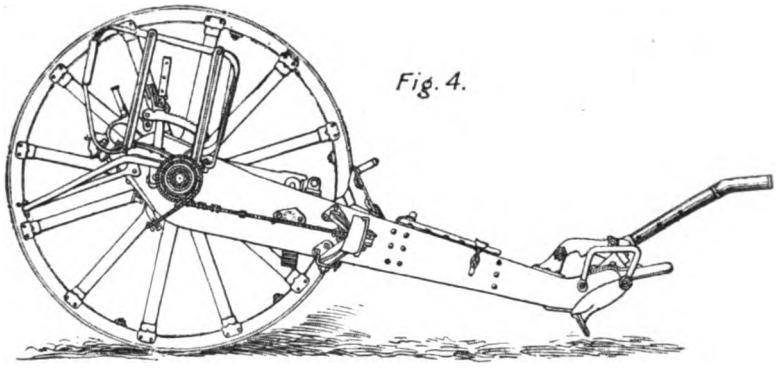

Fig. 4.

lowering of the axle insures a greater stability for the carriage. The carriage has on it a chest for holding accessories, and which serves at the same time as a seat for the gunner.

The recoil of the gun is checked by a rope brake similar to the Lemoine brake, and which may also serve as a road brake. In case this brake is insufficient, and whenever rapid fire is used, a folding trail spade is used. The right arm of this spade has on it a chain which is engaged, when the spade is lowered, in a hook fixed in the right cheek. The adoption of this brake arrangement is possible on account of the low initial velocity of the projectile (less than 480 meters).

AMMUNITION.—Separate metallic case ammunition is used. The projectile is not fixed in the case, but is transported and loaded separately, an arrangement which does not conduce to increase rapidity of fire. The war cartridge consists of a brass case, with a rim and primer at the base. The charge is composed of 580 grams (instead of 640 grams) of powder whose external aspect resembles that of filite or cordite. This powder is less sudden in its action than that previously used, on account of the diminished size of the charge. The empty case is not ejected automatically as a result of the discharge, it being drawn toward the rear and seized by a cannoneer who throws it over the left wheel of the carriage. The two projectiles adopted, shrapnel and common shell, have the same external form, practically the same length—about 4 calibers (instead of 2½ calibers as previously), and the same

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weight—about 6.8 kilograms. The shrapnel, in a steel casing, has a rear bursting charge of fine-grained powder. The bullets, mixed with a smoke-generating compound, are 300 in number, of a total weight of 3 kilograms. The fuze is a combination one, and is graduated for ranges from 400 to 5,000 meters. It is provided with a safety pin, which is removed by means of a ring before loading. When stored or in transport the ring is pressed down over the fuze. The fuze is set by turning a dial, and the setting can be changed at will. This possesses a great advantage over a fuze set by punching, as the latter can not be changed to work at a greater range.

LIMBER.—There is but one model of limber for both the gun and the caisson. The axle and the wheels of this limber are similar to those of the carriage.

The limber chest is opened behind by means of a door which lets down, forming a shelf. The chest is divided into three compartments, the two lateral ones containing together 36 rounds distributed in ammunition baskets holding 4 each, while the middle compartment is reserved for accessories. The total supply of a 6-gun battery is 1,008 rounds, of which 216 are carried in the limbers and 792 in the caissons.

FIRE.—While a much greater rapidity of fire is possible, the maximum rapidity of fire permitted for a battery has been limited to 30 shots per minute, or 5 rounds per gun, for the purpose of reducing the consumption of ammunition. The trajectory is flatter than that of the former model. At 2,000 meters the maximum ordinate of the trajectory, which was formerly 48 meters, is now only 36 meters, while the ranges have increased by distances varying from 600 to 1,000 meters. The new gun is consequently more efficient than the old, while its weight is less.

Ballistic data.

Caliber of the gun	millimeters	77	= inches	3.03
Length of the barrel	meters	2.70	= inches	106
Number of grooves		32		
Diameter of wheels of the carriage	meters	1.20	= inches	47+
Weight of the carriage and limber	kilograms	925	= pounds	2,035
Weight of the piece, complete	kilograms	1,670 to 1,700	= pounds	3,674 to 3,740
Weight of shrapnel	kilograms	6.8	= pounds	15
Length in calibers		4		
Number of bullets		300		
Weight of the charge	grams	580	= pounds	1.276
Initial velocity	meters	465	= f. s.	1,525
Number of rounds per gun		168		

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NEW FIELD HOWITZERS.—The Germans have also adopted a new field howitzer, combining power with accuracy of fire. Its caliber is 10.15 centimeters (3.96 inches) and the weight of projectile, 16 kilograms (35.3 pounds). The projectiles used are shrapnel and high-explosive shells. The fuze is combination, dial-set, and has delayed action, so that the shell does not explode until it has partially or entirely penetrated the target, and much greater destructive effect is thus secured. The model of the gun is similar to that of the field gun.

REORGANIZATION.—Simultaneously with the remodeling of her artillery matériel, Germany is preparing a complete reorganization of her field artillery. The tendencies that apparently prevail in this respect may be summed up as follows: The organization in time of peace should approach as nearly as practicable the organization in time of war, whence the necessity of increasing the number of regiments. The abolition of corps artillery and the incorporation of the artillery into divisions are desirable for the sake of assuring an intimate connection of this arm with the infantry. Thus may be facilitated the entering into immediate action of all the artillery of the various army corps of the first line, the artillery would be familiarized with the infantry formations, and the commanders would be afforded the means of preparing themselves for the commands which they are to exercise.

This would allow the artillery associated with the infantry of the first line to come into action early. Artillery commanders would be more familiar with infantry formations, and better prepared to cooperate understandingly with the infantry.

FRANCE.

In no country has greater attention been given to the development of rapid-fire guns than in France. The work has been carried on with great secrecy, and but little authentic information has been accessible. Now that a gun has been adopted and issued to the army, the veil of secrecy has to some extent been raised. The following notes, taken from various publications, appear in the "Journal des Sciences Militaires," June, 1900:

"The new gun, of the Deport system, is made of nickel steel, with a caliber of 75 millimeters. There is no longer a special model for the artillery batteries attached to cavalry

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divisions. In reality the new gun, weighing no more than the old 80-millimeter gun, and having greater efficiency, fully meets all requirements of horse artillery. There may be found in this respect an advantage from the standpoint of the facility of ammunition supply, since the projectiles will be the same as for the field artillery proper (artillerie montée).

"(The question of choosing a gun to take the place of the present 80-millimeter gun of the mountain batteries has also been under consideration. Experiments have been made for this purpose with a 75-millimeter rapid-fire gun, intended for Alpine batteries, for units stationed in Algeria and Tunis, and for marine troops stationed in the colonies.)

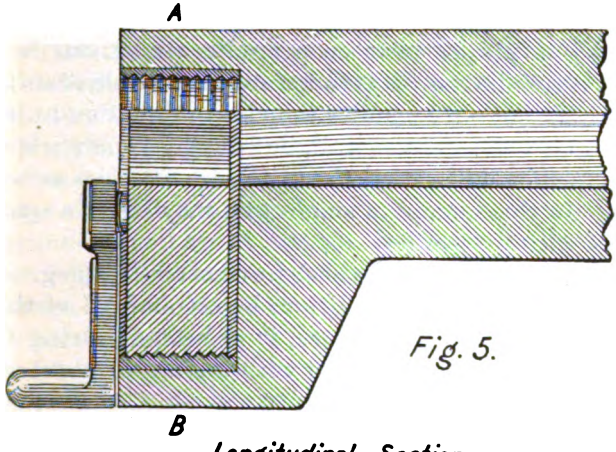

Fig. 5.

Longitudinal Section.

"The breech closure is of the Nordenfeldt system. It is a marvel of simplicity and perfect action. The following is the principle upon which it works: It consists of a screw

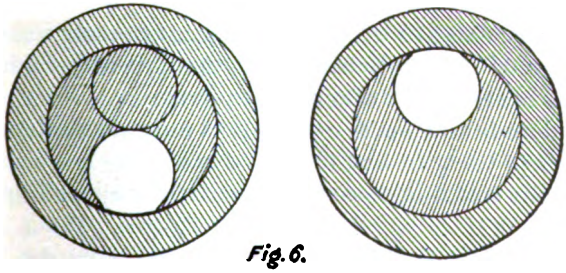

Fig. 6.

Breech Closed. Breech Open.

whose section perpendicular to the axis presents the form of a crescent. As the axis of the screw does not coincide with

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that of the gun, the movement is eccentric, and a simple rotation of 180° closes or uncovers the bore of the gun. Fig. 5 shows a diagram of the gun; fig. 6, cross sections of the breech when opened and when closed.

"The model of carriage adopted shows notable improvements over that of the 120-millimeter howitzer, which will be treated of further on. The carriage of the new gun has a hydropneumatic brake, supplemented by a spring. The release of the air and spring returns the carriage into position. Once the trail spade is embedded in the ground, the gun remains stationary. Two gunners seated on the piece attend to serve it. They are protected by a shield of sheet steel.

"The gun proper rests on a cradle, which can be moved about a vertical axis. It is therefore susceptible of a displacement which not only enables the aim in direction to be rectified without touching the trail, but during rapid shrapnel fire it enables the aim to be shifted little by little, so as to sweep a zone. In this manner a single gun may cover a space of 2 hectares with projectiles.

"The caisson is placed wheel to wheel with the gun. The gunner serving the ammunition, being charged at the same time with graduating the fuse, is protected, during fire, by the caisson, which is provided with a plate of sheet steel on the face turned toward the enemy.

"The projectiles are, first, a melinite shell, used against inanimate targets, such as houses, walls, etc.; second, a steel shrapnel, with rear burster, containing 250 bullets, according to some authorities, and 300 according to others. The shrapnel is said to produce a thick cloud of smoke which prevents the enemy from seeing and aiming.

"The gun can fire 22 shots per minute (according to the Russian general Engelhardt), and the initial velocity of the projectile is said to be about 480 meters.

"Fixed ammunition is used. It is only necessary to insert the load into the gun and close the breech to be ready to fire. The metallic cartridge case is automatically ejected by opening the breech.

"THE 120-MILLIMETER HOWITZER.—For curved fire, i. e., in order to reach an adversary sheltered behind breastworks, recourse can not be had to the ordinary direct-fire gun with a flat trajectory. Besides, the ordinary field gun of 75 milli-

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meters, or thereabouts, has not always the power necessary to destroy the material obstacles, such as houses, intrenchments, etc., which oppose the march of troops. For this reason there has quite recently been adopted a 120-millimeter rapid-fire howitzer, capable of throwing at great angles powerful projectiles which enter every fold of the terrain, burst behind any kind of sheltering mass where an enemy might seek protection, and constitute a torpedo-shell fire against obstacles of great resistance. This howitzer has sufficient mobility to cross over fields and it is a rapid-fire piece by reason of the suppression of the recoil, as will be told further on.

"The gun proper is of steel, with a jacket screwed on about the middle of the tube and supported against shoulders rising toward the rear of the tube, and with a breech hoop.

"The breech mechanism consists of a breech plug which serves to close the breech; a carrier ring which supports and directs the plug while the breech is being opened or closed; and an obturating device, carried on the plug, which prevents the escape of gas to the rear.

"A trunnion jacket, of bronze, envelops the gun at the middle. It is joined to the gun by means of the hydropneumatic brake, and to the carriage by the trunnions.

"The carriage consists of two principal parts: First, the lower carriage, which carries the axle, and, so to speak, acts as a platform. A spade is riveted to the trail of this lower carriage, for the purpose of preventing its displacement and of opposing its recoil by means of the pressure which the action of the brake exerts on the trail. Second, a top carriage, or carriage proper, which rests on the lower carriage, and has a lateral motion along the curved axles, pivoting at the end of the trail.

"A hydro-pneumatic brake serves to suppress almost completely the recoil of the gun. It consists of a steel pump cylinder containing mineral oil and connected with the gun by the assembling hoop of the breech band, and of an air reservoir or recuperator, of bronze, screwed to the assembling hoop of the trunnion jacket. Upon discharge, the gun recoils in the trunnion jacket, carrying with it the pump cylinder. The brake is so arranged inside that this movement presses on the liquid contained in the pump cylinder, forcing it to flow and raise a loaded valve, at the same time compressing the air in the recuperator, which limits the recoil at the

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maximum to 0.475 meter. At the end of the recoil, the compressed air exerts a pressure on the liquid so as to force it back through the small orifices into the pump cylinder, to bring the latter forward again, and the gun into position.

"The traversing gear enables the top carriage to be turned on the lower carriage. The aiming is also done very quickly, for the lower carriage is practically not displaced and the gun is always nearly aimed at the moment it returns into position.

"The 120-millimeter howitzer fires a special shrapnel, called 'obus à balles, model 1891,' having a length of about 4 calibers. It is of steel and has a large hollow space in the interior, filled with melinite. It has a front fuze. The number of bullets is about 630, of hardened lead, weighing 12 grams each. These bullets are bedded in rosin and are covered over with a mixture of rosin and beeswax. The elongated shells are capable of producing considerable effects of impact and especially of explosion against obstacles offering great resistance.

"The cartridge consists of a charge of BC powder, called smokeless powder (powder in small horny disks joined together in a bundle), and a priming of C[9] powder (coarse-grained black powder) for the purpose of facilitating the ignition of the smokeless powder. This charge is inclosed in a sack of silk cartridge cloth, which burns in the bore of the gun without leaving a trace."

Numerical data of the 120-millimeter howitzer.

Diameter of the bore	millimeters	120	= inches		4.72
Total length of the gun	meters	1.70	= feet		5.58
Number of grooves		36			
Total weight of gun	kilograms	690	= pounds	1,521	
Weight of gun and carriage (without limber)	do	1,475	= do	3,252	
Weight of limber	do	890	= do	1,962	
Weight of projectile	do	20.35	= do		44.86
Number of bullets		630			

For the first time, the French, at their autumn maneuvers in 1900, allowed foreign officers to see the new artillery matériel. This permission gave opportunity to see how it looked and worked in the field, but not for an examination of the mechanism for taking up recoil, the details of which are still kept secret.

The following notes were made by the military attaché of the United States from such observation as was allowed him:

"The field artillery was a matter of keen curiosity to all the foreigners who followed the maneuvers, and in conversation

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with them I gathered that they actually thought that the French had made an enormous advance in their matériel and their tactics.

"The dog-ear pieces of metal fastened to the muzzle which give it such a characteristic appearance carry lugs intended to catch in the grooves of the cradle near the end of the long recoil to relieve the strain on the front part of the tongue working in the groove of the cradle. The gun, of course, has no trunnions, but recoils and returns in a trunnioned cradle guided by a tongue and groove. The motion is a rolling one, the grooves being furnished with rollers to avoid friction.

"The breech mechanism is operated by a single motion of a hand lever. The action resembles that of the Vickers-Maxim 75-millimeter quick-fire gun. It is very quick; the gun is fired, recoils, returns to battery, the breech is opened by the cannoneer, and the cartridge case flies out, all so rapidly as to make it difficult from a little distance to follow the successive steps.

"I have been unable to learn the dimensions or ballistic data of the piece.

"RECOIL DEVICE.—This is housed under the gun in a box, which is part of the cradle, and a vertical cross section of which looks about like fig. 7. There seems little doubt that

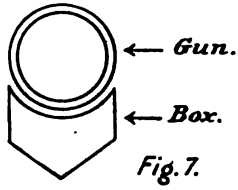

Fig. 7.

it is an hydraulic buffer and pneumatic return device, and, I believe, has one cylinder only. This box contains the great 'secret' of the gun, and I am unable to give any reliable indication as to its peculiarities.

"However, the following description of the recoil device of the 120-millimeter short gun, which was tried some years ago, may serve to indicate the principle of the mechanism. Some assert that this (perhaps with improvements and modifications) is the recoil device used in the present field gun, but it is impossible to verify this supposition. At any rate it is sufficiently interesting to describe.

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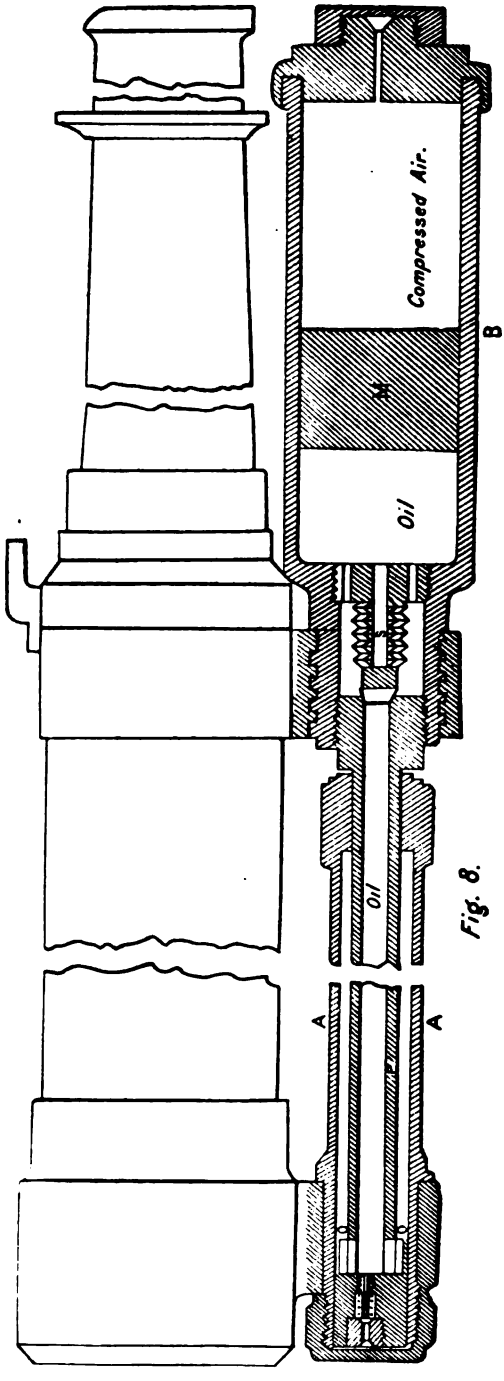

Fig. 8.

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"*Description of the hydropneumatic brake.*—The brake consists (see fig. 8) essentially of a steel pump barrel, *A*, attached to the piece by a ring on the breech hoop and of a bronze air reservoir or recuperator, *B*, screwed into a ring on the trunnion hoop. The pump barrel contains a piston, *P*, whose rod, bored hollow throughout its length and rigidly fixed to the recuperator, gives a communication between this latter and the pump barrel. At the point where it opens into the reservoir the cavity in the piston rod is closed by a weighted valve, *S*. A movable diaphragm, *M*, divides the reservoir into two parts, of which one, that situated in front, contains compressed air at a pressure of 100 atmospheres.

"The rear part of the reservoir, the hollow piston rod and the pump barrel, are filled with liquid (mineral oil).

"The system works as follows:

"When the gun is fired, the piece recoils in the trunnion hoop, carrying back with it the pump barrel. The liquid contained in the cylinder is forced into the rear part of the recuperator, passing through the orifices *O O* in the piston rod and lifting the valve *S*, and pushes the diaphragm *M* back upon the compressed air, thus increasing the pressure in the recuperator. At the end of the recoil the compressed air reacts and forces the liquid back into the pump barrel, which it reaches by passing through three small orifices made around the valve *S*, and the piece returns to its original position.

"The hydropneumatic brake with the trail spade prevents any recoil of the carriage; the firing causes merely a greater or less digging of the wheels and the spade into the ground; it is no longer necessary to run the piece forward into battery, and the original lateral laying having been inappreciably affected it is only necessary after each shot to rectify the vertical laying.

"The battery wagon carries a spare hydropneumatic brake, a can containing 6 kilograms of oil, and a pump mounted complete.

"Instructions for recharging the brake will be found in the air-pump box.

"*Description of the recoil indicator.*—The recoil indicator consists of a small brass rod held in a stud on the steel chase hoop which strikes against a steel pointer carried by the trunnion hoop when the extent of the recoil becomes too great and indicates that the brake should be recharged.

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"*Motion in azimuth.*—Another peculiarity of the French field gun is the method of support of the system whereby the original direction of fire is changed without moving the wheels or trail. The cradle supporting the gun has a movement in azimuth along the axle, and it is stated by some that the axle is not a straight line but the arc of a circle in order to permit this and to keep the line of recoil normal to the axle. This movement in azimuth is controlled by means of a hand wheel which the gunner manipulates with one hand while the elevating screw is manipulated with the other.

"The Russian field gun is arranged for this movement of the cheeks along the axle, but it does not seem to me wholly good. The Darmancier-Dalzon carriage (patent used also by Vickers-Maxim) has a different method of accomplishing the movement, but neither, as far as can be seen, is as effective or as simple as the French.

"*Wheel brake.*—This is so arranged that when unpinned the two shoes drop on the tire; the trail is then raised, the shoes taking a lower relative position on the tire, and then the trail is dropped to the ground, digging the trail spade into the soil.

"This movement also causes the wheels to revolve backward and mount up on the shoes of the brake. The gun is then in its firing position, the wheels rigid and resting on two shoes while the trail forms the third point of support of the whole system.

"The wheel brakes are so arranged as to be used also as a traveling brake.

"The action of the brake seems to be identical with that of the Schneider-Canet system; in both the trail is raised to cause the brake to engage, and in both the wheels are held rigid and off the ground resting on the shoes.

"SHIELD.—Two bullet-proof steel shields are bolted to the axle, one on each side of the piece, as shown in accompanying photograph (fig. 9). They extend above and below the axle far enough to protect most of a man's body.

"It was not observed that any trail hand spike was used with the gun unlimbered, though one may be carried.

"The limber offers no special peculiarities. The seat for cannoneers on the limber chest has a high back, and on this is generally strapped their packs. The ordinary pintle and lunette are used. As no ammunition was served from the

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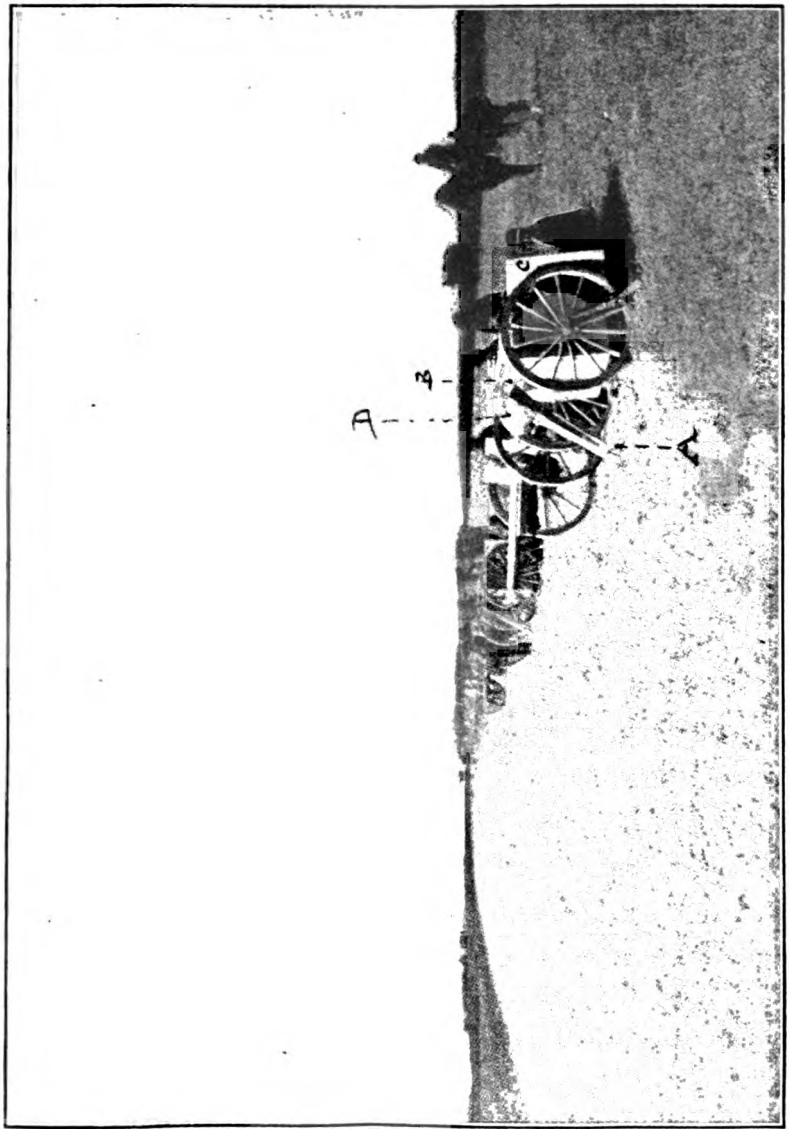

Fig. 9.—Battery of New Model Rapid-fire Guns.

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limbers it was impossible to see how the rounds were packed in the chest.

"The position of gun and caisson 'in battery' is shown in the photograph above. This photograph shows the peculiarity of the caisson very well. The trail is a hollow flask hinged at *B*, where it joins the chest. In coming into battery, the caisson halts, is unlimbered, and the trail immediately revolved upward until nearly vertical, when a step strikes the ground and prevents further revolution. The hinge at *B* is then unpinned and the trail revolved down till its lunette *A* strikes the ground. The two doors constituting the lid of the chest are then opened, as shown at *C*, until they touch the wheels and the ammunition can be reached at once. The cartridges are packed so as to travel point down. When 'in battery' the cartridges lie horizontal. *D* is a water bucket, which is always carried on the top of the trail, as shown.

"The bottom, now become the front side of the chest, is a bullet-proof plate, and protects the ammunition and the two men who cut the fuzes and pass the cartridges to the men at the gun. The fuze cutter is said to be automatic and attached to the chest, so that once set for a given range the fuzes can be cut with the greatest rapidity.

"TACTICS.—The tactics adopted for this new gun seem to be a complete departure from the old lines in the method of coming into battery and the service of ammunition. One caisson is always with the gun. In route marches its normal position is in front of or alongside the gun. When the command 'in battery' is given the caisson halts, is unlimbered, revolved to the rear, trail broken down, and chest opened. The limber moves off to the rear and seeks shelter. The gun comes up on the right of the caisson, is unlimbered and reversed. In its normal position 'in battery' its left wheel and the right wheel of the caisson are nearly touching. Its limber and the horses of mounted officers and men move off and join the caisson limber. The whole thing is simple and practical; indeed it is so simple that one is likely to underrate the importance of the change from the old method. Without adding much weight to the caisson or complicating its parts except to the extent of hinging the trail and adding a prop at the back of the chest, excellent protection against infantry fire is provided for all cannoneers, the number of men needed for the service of the piece is reduced, the fatigue

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of their work lessened, the ammunition supply is within a few feet of the gunner and his instructions as to fuze, kind of shell, etc., can be given with the utmost ease to a man at his elbow and without the chances of mistake which are so great when a third canonneer has to transmit these instructions. The cartridges can be furnished as rapidly as the gun can fire them and the length of fuze changed at once. I have noticed in other systems, as the Russian and St. Chamond, that to provide for the fleeting occasions when a very rapid fire may be needed, the cartridges are packed in light iron cases of six rounds. But this increases the unproductive weight behind the team and the question of fuze cutting becomes complicated, for if cut at the limber all the shell in a case must be cut alike, and it may be desired to change after firing a round or two. A fuze requiring no cutter or punch can of course be set with a wrench at the gun perhaps as conveniently as at the limber.

"It seems hard to find a single objection to the arrangement adopted by the French, and from all the visiting officers I heard expressed only admiration and the usual wonder that a thing so simple had not been thought of before.

"It may be said that the ammunition is upon the line of guns and much exposed, but it is largely protected from bullet fire by the steel bottom of the caisson, and a limber 22 yards in rear of the gun or even a caisson 39 yards in rear (as in normal formation in battery) is about as much exposed. The French system puts the horses under cover when such is to be found within a few hundred yards, but under the old system the piece horses must be near the gun. There is no running from the gun to the limber for ammunition, and even under a hot infantry fire the cannoneers could continue to serve the piece until actually overwhelmed by a charging enemy.

"The ammunition used from the caisson chest is replaced from the limber chests at the first opportunity.

"Each battery has an excellent telescope mounted on a light tripod. This instrument is provided with micrometer wires for judging lateral errors and height of burst.

"No spare wheels are carried.

"The harness is provided with breast straps instead of collars, the chief reason being the difficulty of keeping up anything like a constant fit of collar in a hard campaign.

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This was favorably remarked upon by an English officer just back from South Africa. He said that they had experienced great trouble with all their draft animals on account of using collars instead of breast straps. The horses and mules started out in good condition of flesh with collars fitting correctly; but after a few weeks of hard work and often little food they fell off so that the collars were hopelessly too large.

"It has been claimed that the French carriage is rigid under the recoil of the gun and that successive shots can be fired without relaying. I am not able to say how true this is, though everything goes to indicate that French artillery officers are satisfied on this point. I watched the guns attentively from about 50 yards' distance firing blank cartridges and invariably observed a slight jerk of the wheels. They revolved to the rear 5° or 10° and immediately returned to their original position. It is true that the soil of the maneuver ground was invariably the lightest kind of loam, so that the spade and wheel brakes did not have the best conditions, but it is likewise true that only blank cartridges were used, and the force of recoil with shell would of course be much greater.

"The gunner and the man who manipulated the breech block sat on the seats bolted to the trail while the gun fired, without apparent inconvenience.

"The powder was almost wholly smokeless, but the dust raised by the blast was nearly great enough to give the effect of black powder.

"The French artillery have a sort of converter table or board whereby when only one battery or gun can see the target the others get from it the necessary elements for laying. Each battery has this arrangement, and it is claimed that it is effective and the calculations can be readily made for the varying conditions; but the system is kept secret."

ENGLAND.

The field artillery question in England is far from being settled and no uniform type has yet been adopted. New models have been tried, while the old have still been retained in the service. While making experiments themselves, they have purchased several batteries of Vickers-Maxim and of Ehrhardt rapid-fire guns. These guns, it is believed, are for equipment of batteries newly organized, while the old batteries have, to a great extent at least, retained the 15-pounder field gun.

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This, like the other English guns of larger caliber, is a wire-wound gun. Various modifications, devised by Sir George Clarke, have been introduced to increase the rapidity of fire. A brief description of gun as it is at present is given below.

Length	inches	92.35
Weight (average)	pounds	784
Bore:		
Diameter	inches	3
Length	calibers	28
Chamber:		
Diameter	inches	3.625
Length	inches	11
Capacity	cubic inches	117
Means of rotation		Copper rifling band.
Vent		Radial.

There are different systems of rifling. All guns of future manufacture are to have the Mark III rifling, which is:

Twist: Straight from breech end of rifling to 53.6 inches from muzzle, the remaining 53.6 inches increasing from 0 to 1 turn in 30 calibers at muzzle.

Grooves:		
Number		18
Depth	inch	0.04
Width	inch	0.265

The gun is made entirely of steel, and consists of an A tube over which is shrunk a jacket with trunnions, secured longitudinally by interlocking, and prolonged at the breech for the reception of the screw. In front of the jacket is shrunk the C hoop, secured to the A tube by a set screw. To the breech end is screwed a hood which gives protection to the breech fittings and carries the elevating bolt and sockets for the tangent sights.

The chamber is cylindrical, slightly coned at the entrance, and terminating in front with a curved slope.

The breech is closed by a screw having three portions of the screw thread removed longitudinally, each one-sixth of the circumference. The interior of the gun at the breech being prepared in a similar manner admits of the screw, when the raised portions are placed opposite the smooth surfaces in the gun, being pushed home and locked by the sixth of a turn.

The screw has hinged to it a cam lever, by which it is locked and unlocked, the cam portion of this lever (when the breech screw is locked) falls into a recess in the carrier ring, and so prevents any movements of the breech screw during firing. In depressing the cam lever, after the breech screw is unlocked, the cam acting upon the surface of the carrier ring starts the first movement to the rear of the breech screw and obturator.

Passing through the breech screw is a solid spindle, having at its inner end a mushroom head, behind which are placed

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the obturating pad and disks, and at the outer end a removable spring clip that secures it in the breech screw.

Encircling the rear end of the breech screw, and hinged to the "hood," is a carrier ring which supports the screw when withdrawn.

The carrier ring is held to the gun during the withdrawal of the breech screw by a "clip," pivoted within the left side of the ring, engaging with a recess in the hood.

A stop bolt in the right side of the carrier ring prevents the breech screw being disengaged from the carrier when withdrawn; at the same time the clip is disengaged from the recess in the hood by means of a spring, which forces its opposite end into a recess in the breech screw, thus securing the latter in the carrier ring. When in this position the whole can be swung clear of the breech opening to admit of loading.

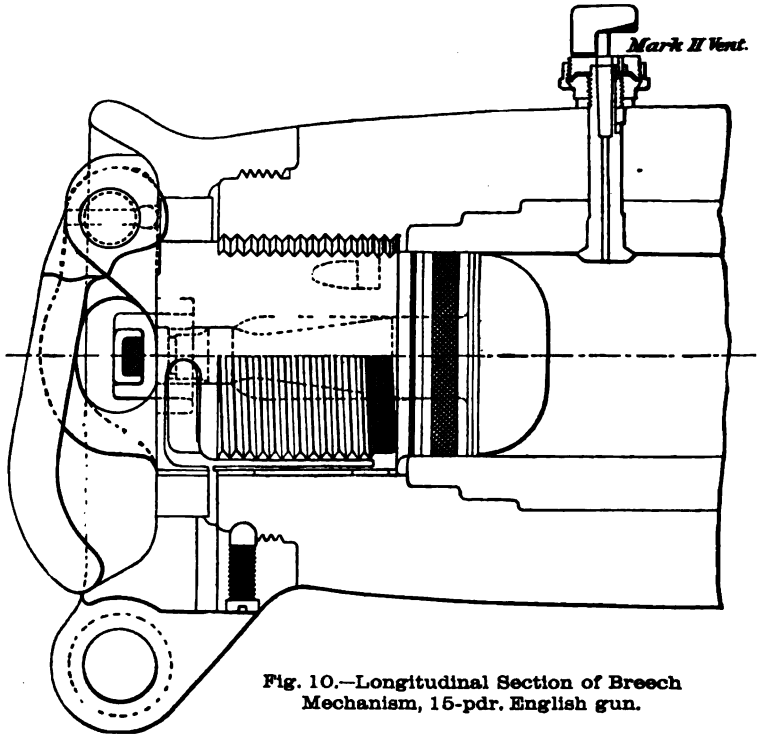

Fig. 10.—Longitudinal Section of Breech Mechanism, 15-pdr. English gun.

CARRIAGE.—There are three types of carriage for the 15-pounder gun, known as Mark I*, II*, and III. The Mark I* carriage is provided with a spade attachment and a tire brake.

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CARRIAGE, FIELD, B. L. 15 PR., MARK II.

SCALE 1/20.

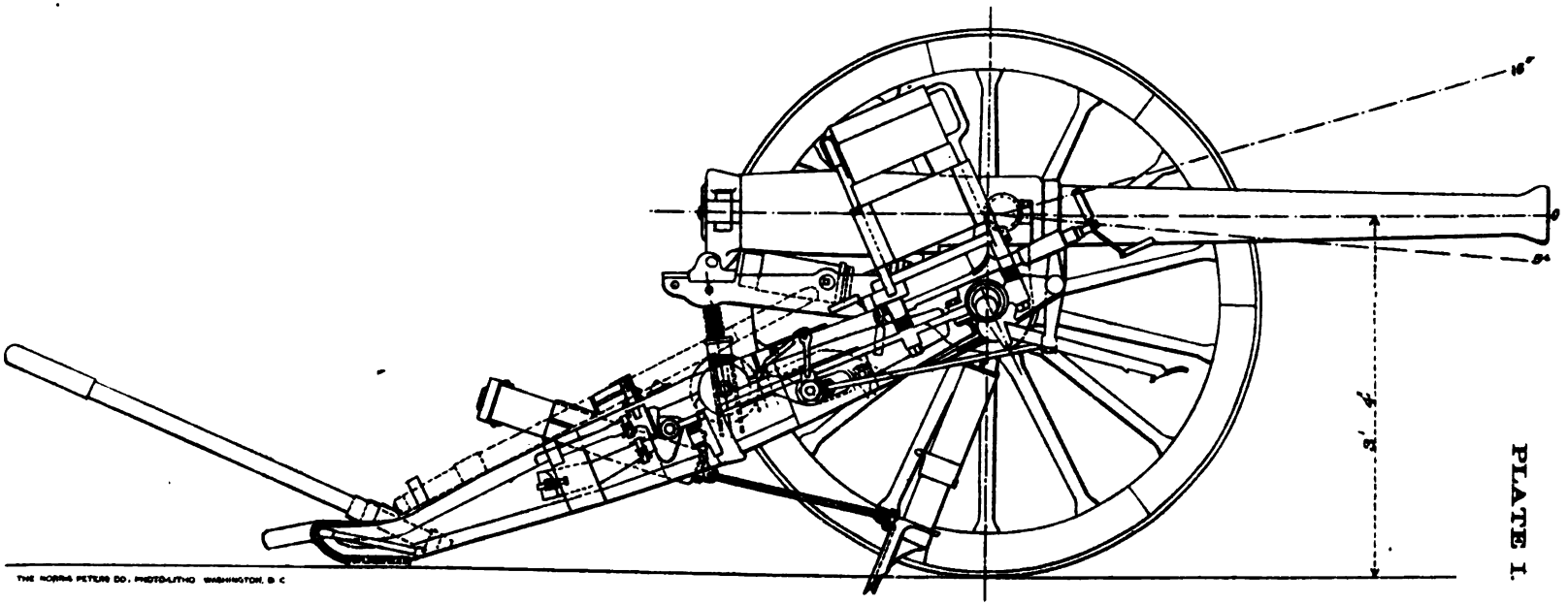

PLATE I.

THE HORRIS PETERS CO. PHOTO-LITHO WASHINGTON, D. C.

WHEEL 5 FEET DIAMETER 2ND CLASS "C" NO 258

TRACK 5' 8".

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The spade attachment consists of a spade-shaped toothed blade, suspended under the axle by a telescopic spring case, which is hinged to a bracket fitted to the underside of the carriage below the axletree. The blade is also attached by a wire rope to another spring case fixed obliquely between the side brackets near the trail eye.

When not in use the spade is raised under the trail and secured by a clip, the handle of which is at the right side of the trail, and can be locked by a pin.

When in action the spade is released and touches the ground slightly in rear of the axle. When the gun is fired and the carriage recoils, the teeth of the spade catch in the ground, the carriage moving over the spade, the wire-rope attachment drawing out the spring in the trail, and the shaft of the spade compressing the upright spring; after recoil the springs return the carriage to its former position.

The tire brake, which can be used as a recoil brake, or when traveling, or for controlling the return of the gun into the firing position after recoil (if required), consists of a tubular cross shaft, passing through openings in the side brackets of the trail and suspended by tension links from the top of the trail. The shaft is fitted at each end with arms for the reception of wooden brake blocks, which act on the wheels. It is actuated either from the front or rear of the carriage by means of handles, which are fixed one on each end of a spindle, supported in brackets on the right side of the carriage. The brake blocks can be reversed when required for traveling on heavy clay ground, in order to give a greater clearance between the brake and the wheels. When used for checking the recoil of the gun, the brake blocks are brought into contact with the wheels, and the brake arms released by means of a handle, which sets free the retaining catch on the side of the carriage.

The Mark II* carriage (see Plate I) has, in addition to the spade attachment and tire brake possessed by Mark I* carriage, a top carriage with hydraulic buffer.

The top carriage consists of two steel guides connected by transom guides and a tubular stay. It is pivoted at the front to the axletree, and supported at the rear by the elevating screw. The gun is a close fit in the gun cradle, to which it is secured by cap-squares fitting over the trunnions. The breech of the gun is connected with a rear sliding bracket, which, together with the cradle, slides in guides formed on the upper

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part of the top carriage. The top carriage is fitted with a hydraulic buffer to admit of the gun recoiling axially, and so to lessen the shock due to firing on the main carriage. The hydraulic buffer is connected to the top carriage by trunnions, and the piston rod, which passes through both glands of the hydraulic buffer, is attached to the rear sliding bracket. The gun recoils about 4 inches on the top carriage, during which the motion is gradually imparted to the whole structure, thus lessening the strains upon it due to firing. The gun is returned to the firing position by volute springs on the front part of the piston rod.

The hydraulic buffer consists of a cylinder, a piston with rod, and front and rear glands. Each end of the cylinder is formed to take a U-leather, metal ring, cotton packing, and gland. A small spring bolt fitted to the buffer engages the rear gland to prevent it working loose, the front gland being held in position by the pressure of the volute springs. The bore of the cylinder is slightly tapered, so that the space around the piston, for the flow of the liquid, varies during recoil. By this means an approximately constant pressure is maintained in the buffer throughout its stroke. The front gland is made to fit into a recess in the piston, so as to form a small hydraulic cushion, which prevents injury to the buffer by concussion caused by the return of the gun.

The Mark III carriage is somewhat similar to the Mark I*.

The construction of the limber does not call for special remark. The ammunition box is of wood, strengthened with steel plates. The box is fitted internally with partitions arranged to carry 46 shrapnel-shell, 2 case shot, 48 cartridges, and a supply of fuzes and friction tubes. The projectiles are carried upright, their bases resting on wood trays in the bottom of the box. They are steadied at the top by removable wooden blocks, which fit between their heads, and are held in recesses formed in aluminium strips attached to the top of the partitions and the ends of the box by wood battens attached to the lid. The cartridges are carried in eight tin boxes (6 cartridges in each box), and the fuzes in four fuze boxes.

The shrapnel (Mark II*) weighs 14 pounds, filled and fuzed. The body is of forged steel and contains 200 balls, weighing 35 to the pound. The cartridge contains 15¾ ounces of cordite. The fuze is combination, dial-set. The sights are graduated to 5,100 yards.

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RUSSIA.

Experiments with a view to obtaining the best type of rapid-fire gun have been going on for some years past under the direction of General Engelhardt. In his opinion the type of breech, metallic case cartridge, and time fuze is a matter of taste, the principal requisite of rapid-fire artillery being a gun carriage without recoil. Having experimented with rubber for over twenty-five years he considered that material as best suited for springs in Russia. He was afraid to adopt steel springs, which were not always reliable, or pneumatic buffers, on account of the perplexing novelties of such appliances in Russia, and the influence which the severe climate of Russia might have upon them.

The Nordenfeldt type of gun carriage was most favorably considered.

An imperial order of April 30, 1900, appointed a commission to consider the whole subject of rapid-fire guns. The tests with the Engelhardt gun gave such good results that the government decided to order 1,000 of them, while the tests with foreign models were continued. In case the Engelhardt gun should not be finally adopted the 1,000 already provided could be supplied to the Asiatic troops.

It is supposed that the question of the adoption of a rapid-fire gun for Russia will soon be settled, and the Russian Government contemplates having its army supplied by the end of 1903 with 1,000 batteries of 6 guns each.

SWITZERLAND.

The Swiss have for some years been experimenting with rapid-fire guns. In 1898 some experiments were made at the Thoune firing grounds in the presence of a special committee, with models of guns offered by the Creusot, St. Chamond, Krupp, and Cockerill shops.

As a result of these experiments the committee favored the Krupp gun, and a battery of 6 guns was ordered for the purpose of carrying out experiments on a large scale.

On account of the mountainous character of the country in Switzerland, where mountain passes are filled with deep snow, the questions of lightness and mobility deserve special consideration.

As a result of its experiments so far the committee is not satisfied with the system of taking up the recoil, as in

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executing very rapid firing great inaccuracy results from the displacement of the carriage.

The Krupp gun furnished was similar to the latest model in use in Germany. While the committee was pleased with the gun, it decided to obtain a battery of Cockerill-Nordenfeldt guns to test in comparison with the Krupp battery. No report has yet been received as to the conclusions reached as a result of these tests.

In August, 1900, the Swiss Government stated that the question of the adoption of a rapid-fire gun was still in the experimental stage, and that pending a final decision no definite information on the subject could be furnished.

The Federal Council considers that seventeen or eighteen millions will be required to furnish the field and mountain artillery with rapid-fire guns and the first supply of ammunition. The war department expects to complete the rearmament of the present 56 field and 4 mountain batteries in four years.

These 60 batteries will be distributed among 8 regiments of division artillery of 4 batteries each, 4 corps regiments of 6 batteries each, and 1 mountain regiment of 4 batteries.

AUSTRIA-HUNGARY.

The technical military committee has been experimenting with a new field matériel, which, according to the "Armeeblatt," will comprise two sorts of steel guns, viz, a flat-trajectory gun and a curved-trajectory gun. The former is a 7-centimeter rapid-fire gun, the latter a 12-centimeter field howitzer. The "Armeeblatt" adds that the experiments being made by the technical committee are about to be terminated. It seems that the difficulty which has hitherto retarded the final conclusion lay in the construction of the carriage. It is desired that the latter fulfill the conditions necessary to enable the new gun to preserve, with the necessary rapidity of fire, sufficient lightness and mobility, so that sudden changes of position may be made. This lightness and mobility are recognized as necessary for rapid-fire guns, so that they may assert their superiority, at the desired moments, over the small-caliber repeating rifles.

Some time will probably elapse, however, before the war minister can obtain the necessary appropriations for the manufacture of all the new matériel and before the troops can be

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supplied with it. Under these circumstances, therefore, it is likely that the matériel now in use will not be replaced very soon.

Pending a complete transformation of its field guns, the Austrian artillery has modified its present type so as to enable it to cope under acceptable conditions with rapid-fire artillery. Modifications have been made on the 9-centimeter, model 1875, field gun, which, at a slight expense and in a short time, have enabled a notable increase in the rapidity of fire to be attained. All the guns thus transformed gave very satisfactory results in firing during 1898. The improvements made have as their object, on the one hand, to notably increase the rapidity of fire, and, on the other hand, to render the service of the piece more easy and less laborious, while at the same time preventing premature discharges.

The various modifications made cover the following points:

1. The adoption of a spur brake for the purpose of diminishing the recoil, which is reduced by means of this device from 2 or 3 meters to 0.40 or 0.30 meter. The device consists of a spur, or trail spade, surmounted by a brace joined to the top plate of the trail. Before firing, the spade is more or less embedded in the ground, according to the nature of the soil. At the moment of firing the carriage recoils and the spade pivots about its edge, becoming more deeply embedded in the ground. From the middle of the brace of the spur there extends forward a strong horizontal rod with a series of Belleville springs on it. Threaded onto the rod in front of the springs is a metallic ring-shaped buffer fixed in the carriage. During recoil the trail spade is carried along until the friction on the ground has annulled the motion of the carriage—that is, from 0.80 meter to 1 meter. The effect of the release of the Belleville springs is to bring the gun forward to within 0.80 meter of its original position. The fire is thus rendered more rapid, so that 6 shots per minute may be easily obtained. The total weight of the brake is 22 kilograms.

2. The addition of a vent cover for the purpose of stopping up the vent and preventing the friction primer from being put in place before the breech is completely closed, in order to avoid accident during the execution of rapid fire.

3. The use of the model 1896 obturator, of the same power, but of less dimensions than the old one. The object of this

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obturator is to insure a complete obturation with the smokeless powder recently adopted.

4. The adoption of the new model 1896 shrapnel, which, having about the same weight (6.9 kilograms instead of 6.52 kilograms), contains 250 hardened lead bullets of 13 grams each and a powder charge of 120 grams, while the old one contained only 152 bullets of 10 grams each and a powder charge of 90 grams.

5. A special arrangement insures the automatic uncapping and pulling out of the safety pin of the fuze of the shrapnel, an improvement which admits of quicker loading.

6. The adoption of the new shrapnel has resulted in the abolition of case shot, which can not be fired any more rapidly than shrapnel.

7. In order to facilitate the operation of regulating the fuze, which requires great calmness and close attention on the part of the gunner, an automatic fuze wrench has been adopted. In this manner the accuracy, rapidity, and uniformity of this operation have been perceptibly increased.

NORWAY.

In this country much intelligent effort has been devoted to obtaining the best type of rapid-fire guns for the field artillery.

On the 26th of May, 1900, the Storting unanimously voted 1,000,000 crowns for new quick-firing artillery. As a result of the experiments, and of observations made in regard to tests in foreign countries, the commission having the matter in charge reported that the Schneider-Canet and the Ehrhardt (Rheinische Metallwaren und Maschinenfabrik) were the best and that it had found both very satisfactory, but that it proposed at present to adopt the Ehrhardt system for the new field artillery matériel with a few modifications, of which the most important was a Nordenfeldt mechanism for the gun. The war department finally recommended to delay the final choice of the system until a trial battery with the proposed modifications could be procured and further experiments made in firing, maneuvring, etc., in comparison with the Schneider-Canet guns which had been provided for the landstorm.*

It appears from the choice of these two types that preference has been given to a system in which the carriage is fixed to the ground while the barrel moves over it in a long recoil,

*See "Armeens budget," 1900–1901, page 135.

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which is regulated by an hydraulic brake, and in which the barrel is brought forward after the recoil, in the Ehrhardt system by a spring, and in the Schneider-Canet either by a spring or by compressed air.

ITALY.

The Italian Government, in 1897, directed experimental work to be undertaken in the artillery establishments of Naples and Turin with a view to the selection of a suitable rapid-fire gun, and at the same time invited private firms to enter a competition with the same end in view. As the models offered were not considered satisfactory the competition will probably be reopened.

In the meantime, pending the adoption of a new type, the existing matériel, consisting of 7-centimeter and 9-centimeter guns, continues in service. The former, it is decided, should be replaced as soon as a rapid-fire gun should be determined upon. The carriage of the 9-centimeter gun has been modified, and by the adoption of a new trail brake the possible rate of fire has been increased. So that it is proposed to replace the 7 centimeter by a new rapid-fire gun as soon as it shall have been selected (an extraordinary credit of 15,500,000 francs has been asked for this purpose), while the 9-centimeter gun will be retained for some time to come.

SPAIN.

The Spanish Government, on account of financial considerations, did not enter as deeply into the question of rearming its artillery with rapid-fire guns as it would have liked.

Four years ago the director general of Spanish artillery invited a board of officers to submit propositions in regard to a type of rapid-fire guns that it would be desirable to test. The conclusions of this board were as follows:

1. That the rapid-fire gun had reached a point in its development that rendered it acceptable for field service.

2. That experiments should, if possible, be made looking to the adoption of a new gun.

3. That no gun should be adopted unless it could be aimed after each shot; and as the time necessary depends on the extent of recoil the practical annulment of the latter is a point of the first importance.

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4. The board recommended a gun with a caliber of 75 millimeters, with a projectile weighing 6.5 kilograms.

5. The board was in favor of fixed ammunition.

6. The board was of the opinion that shields offered more disadvantages than advantages.

7. It also recommended the adoption of a 12-centimeter howitzer on account of the necessity for curved fire in the field.

The board recommended several different types of field guns for test, and that the field gun of Colonel Sotomayor and the mountain gun of Lieutenant Colonel Ordoñez should be among the guns tested.

No reports have been received that the tests recommended were carried out, probably on account of the war.

Late advices are that the Spanish Government had ordered 120 Vickers-Maxim guns last summer.

BELGIUM AND HOLLAND.

The subject of rapid-fire guns is at present occupying the attention of the general staff of both these countries. Tests have been made with a view to the adoption of a type. While no decision had, at latest advices, been reached, the choice seems to lie between the Krupp and Cockerill-Nordenfeldt systems.

UNITED STATES.

While the United States has not yet adopted a rapid-fire gun, much study has been given to the subject, and the following programme of tests for field artillery has been issued.

WAR DEPARTMENT,
BOARD OF ORDNANCE AND FORTIFICATION,
WASHINGTON, D. C., *November 15, 1900.*

With a view to determining the best type of field gun and carriage for use in the United States service, the Board of Ordnance and Fortification has prepared the following programme of tests to which it is proposed to subject the various field guns and carriages presented:

Manufacturers submitting field guns and carriages for competitive test under the conditions herein proposed will be given one hundred and twenty days from November 20, 1900, in which to do so; the complete equipment to be delivered at the proving ground at Sandy Hook, N. J., ready for test by March 19, 1901.

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Manufacturers desiring to enter this competition will inform this office as soon as practicable, and will furnish, for the information of the Board, a general description of their equipment at least thirty days before the date fixed for the test.

In the opinion of the Board, it is desirable that the guns and carriages submitted for test should use fixed ammunition and be provided with cylinders and trail spades to reduce the recoil of firing to a minimum. The limber chests should be on springs and should provide for carrying the ammunition packed horizontally.

REQUIREMENTS.

1. Total weight allowed behind horses, 3,950 pounds.

2. Weight of common shell loaded and fuzed, 15 pounds.

3. Muzzle velocity, 1700–1750 f. s., with a pressure not to exceed 33,000 pounds per square inch.

Manufacturers submitting material for test will furnish gun, carriage, limber, and all tools and equipments complete for assembling, dismounting, care, and service of the piece.

The ammunition required during the tests will be furnished at the expense of the Government.

The powder, in addition to giving the required velocity, shall be of a known and satisfactory composition.

Two cases of ammunition, packed and sealed for shipment, will be furnished.

All projectiles will be delivered filled with sand to the required weight and fuzed with a blank fuze plug.

During the tests the repair of such minor defects as may occur, and which can be made without material delay, will be permitted. Changes in construction will not be permitted.

Any defect which shows violation of an essential principle of construction will discontinue the tests of the material unless in the opinion of the Board further tests are warranted.

INSPECTION.

1. A careful inspection to be made of the gun. In the breech mechanism the number of parts, their simplicity, strength, and certainty of action to be noted. The ease with which the mechanism can be assembled and dismounted, together with tools necessary for this operation. Special notice to be made of those mechanisms permitting dismounting after any part jams while breech is closed, and special

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note will be made of those mechanisms permitting a firing of the gun or primer before the breech is closed and locked.

During this inspection ten or more rounds may be fired.

2. A similar inspection of the carriage. In this, special note will be made of the following:

(*a*) Weight and construction of wheels.
(*b*) Space between naves.
(*c*) Free space under carriage when limbered.
(*d*) Simplicity and certainty of elevating and traversing gear.
(*e*) Amount of lost motion in these gears.
(*f*) Accuracy of elevating device, including the sight radius or its equivalent.
(*g*) The nature of the devices for limiting the recoil, and, if hydraulic, the kind of fluid to be used in the cylinders and the ease with which the cylinders can be filled.
(*h*) Operation of firing, and road brakes, if any.
(*i*) Ease with which broken parts can be replaced, etc.
(*j*) Ease with which gun can be mounted.
(*k*) Speed with which gun can be elevated and depressed and moved from one extreme to the other in azimuth, and these with wheels level and with one wheel higher than other. Power required on hand-wheels or cranks to be noted.
(*l*) Location of sights for easy and quick laying, especially while loading.
(*m*) The number of bearing surfaces, the facility for cleaning them, and the means provided for proper lubrication.
(*n*) Length of trail and weight on trail in limbering.
(*o*) An examination of the calculations on which the strength of various parts were determined. For this purpose the calculations should be submitted with the description of the carriage. It is desirable that one rotation of the elevating wheel or crank should correspond to an even reading in elevation.

FIRING TESTS—SPECIAL.

VELOCITY.

Velocities and pressures will be taken at once to determine whether or not ballistic requirements are fulfilled; and at

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such times as may be necessary to insure the maintenance of these conditions.

ACCURACY.

Twenty shots to be fired at 2,500-yard target from clay or loam platform.

RAPIDITY.

Each gun and carriage will be subjected to four tests for rapidity.

1. Rapidly unaimed shots from loam platform, 20 rounds.
2. Rapidity with accuracy from clay platform, 20 shots at 2,500 yards, the trail having been seated and range secured by necessary sighting shots.
3. Same from macadam road or rock platform.
4. Maintained rapidity: Seventy-five aimed shots from clay platform. During this test the target will be twice changed; the targets being so placed that the trails will have to be shifted.

DEFECTIVE AMMUNITION.

Guns using metallic ammunition and those using any form of percussion primer to be subjected to a firing test of two rounds, with defective primers causing blowbacks, and ten rounds with cases weakened longitudinally by a cut extending nearly through the metal and within 2 inches of the head of the case.

DUST.

The mechanism of each gun and carriage to be exposed to a blast of fine dust in such manner as to insure its being uniformly and equally covered with dust. Ten rounds to be fired with elevations from 2° to 10° and from one extreme to the other in azimuth. Time to be noted.

RUST.

Mechanism of gun and carriage to be rusted thoroughly and uniformly. Ten rounds as in preceding.

EXCESSIVE CHARGES.

Ten rounds to be fired with increasing pressures, as follows:

Two rounds	35,000 pounds.
Two rounds	38,000 pounds.
Two rounds	40,000 pounds.
Two rounds	42,000 pounds.
Two rounds	44,000 pounds.

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GENERAL TESTS.

Five kinds of platform will be used for the test, *i. e.*, clay, loam, sand, rock, and macadam.

On each there will be fired 45 rounds at each of the three elevations, viz, extreme elevation, zero elevation, extreme depression, 15 rounds being with the gun in its extreme position, right; 15 rounds in mean position, and 15 extreme left.

In these tests the jump, departure from line of fire, and depth of trail and wheels will be noted. When necessary to move the trail, the power and time required will be noted.

In addition, 20 rounds will be fired with trail rigidly supported by an oak post set into the ground and braced to prevent yielding.

Carriages having recoil on the ground will, in rapidity tests, be limited to 40 feet, and the ground will be broken up to assimilate actual conditions.

SUPPLEMENTARY TESTS.

1. When metallic ammunition is used, 10 rounds will be immersed in water for five minutes and then allowed to stand twenty-four hours before firing.

Ten additional rounds will be subjected to a humidity test at a temperature of 100° F. and relative humidity of 95° for thirty days and then fired.

2. Each limber chest completely filled will be mounted on a vibrating table and be subjected to the jarring thereon for forty-eight hours.

A careful examination will then be made to see if the serviceability has been affected.

Same moisture and humidity tests as in 1.

3. One shipping case packed and sealed will be immersed in water for one hour and then broken open, examined, and contents fired.

4. Limber chests filled will be exposed to the weather for two weeks and then examined and contents fired.

5. Those guns and carriages which have not failed in the above will be subjected to a practice march of 150 miles, following country roads as much as possible.

Careful examination will be made of the equipment en route and at the end of the march.

Such additional rounds will be fired over and above those mentioned as may be deemed necessary to establish any point

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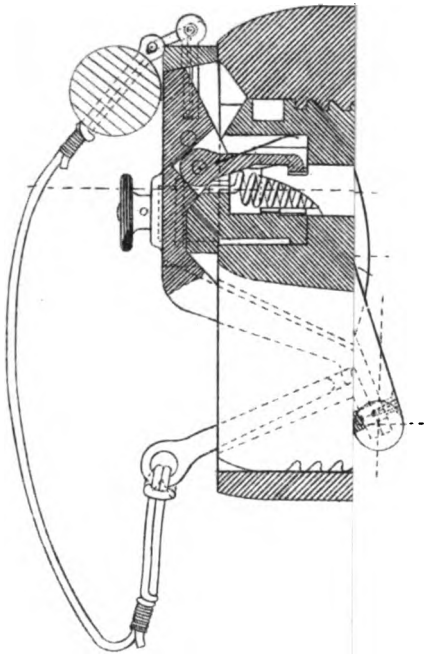

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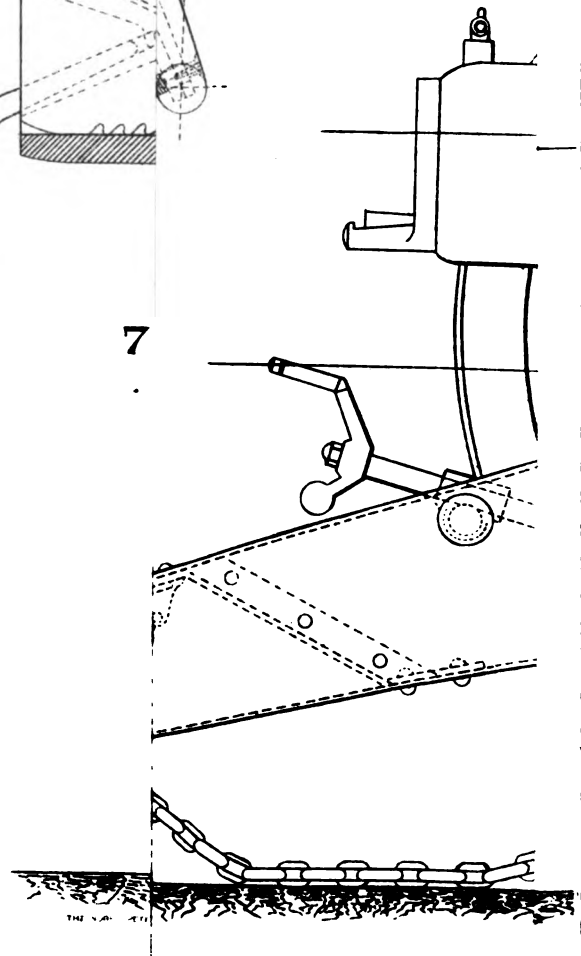

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arising, and such additional tests will be conducted as may for any reason seem necessary to the Board.

Below will be found a brief account of some of the systems of rapid-fire field guns that have been prominent in recent competitions abroad. As they are made by private firms, they are of various types, the companies being ready and willing to meet the requirements of purchasers. One type only of each is considered. The Krupp system has been already spoken of in connection with Germany.

COCKERILL-NORDENFELDT.

The gun, of nickel steel, consists of a gun and jacket. The line of sight is on the left. The gun rests upon a cradle, with which it is connected by a vertical trunnion, and upon the elevating screw. It can thus be given a slight lateral movement (3° to right or left) without moving the trail. The traversing device is graduated so that the gunner can, at any moment, tell the angle made by the axis of gun and trail. The cradle is connected with the carriage proper by two horizontal trunnions. The wheel brakes are attached to the axle by eccentrics, and are connected by an arm passing under the stock of the carriage. On the march the mechanism is hooked up. In this position the brakes may be pressed against the wheels by means of a crank within reach of a cannoneer seated on an axle seat, and thus serve as road brakes. When firing, the cross arm is unlocked, and the brakes fall to the ground behind the wheels. The brakes are connected by chains to a spiral spring located between the cheeks, the spring opening out during recoil, at the same time the wheels rising on the inclined face of the brakes. When the force of the recoil is exhausted, the spring, contracting, helps the wheels to descend the inclined faces of the brake and regain their former positions.

The breech mechanism consists of a cylindrical screw, with its axis below that of the piece. No part of the mechanism projects beyond the breech, whether open or closed, except the crank handle. When the breech is open, the piece is loaded by inserting the cartridge from the rear through a cylindrical opening in the breechblock. Various devices preclude the possibility of the piece being discharged by

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shock on the march (thus enabling it to be maneuvered when loaded), or from being discharged before the breech is completely closed, or the possibility of the opening and closing lever working loose on the march.

The details of the piece are sufficiently shown in accompanying plate.

The chest of the limber is metallic. It is furnished on the interior with guides on which slide the ammunition boxes. There are ten of these boxes, each containing four cartridges.

Principal data of the large-wheeled piece.

Caliber of the gun	millimeters	75	= inches	2.96
Length of the bore in calibers	calibers	30		
Total length of gun	millimeters	2,408	= inches	94.8
Total weight of gun with sight and breech mechanism	kilograms	345	= pounds	760
Weight of the carriage complete	kilograms	662	= pounds	1 459
Weight of gun and carriage	kilograms	1,007	= pounds	2,219
Weight of the limber with empty ammunition boxes and accessories	kilograms	517	= pounds	1,140
Weight of limber loaded with 40 shots	kilograms	846	= pounds	1,865
Weight of the gun and carriage complete with 40 shots and accessories	kilograms	1,853	= pounds	4,064
Weight of the cartridge case empty	kilograms	0.965	= pounds	2.13
Weight of projectile	kilograms	6.500	= pounds	14.33
Initial velocity	m. s.	525	= f. s.	1,722

There is a type of carriage with smaller wheels, in which the total weight of gun and carriage complete is about 150 pounds less, and the initial velocity 82 f. s. less.

SCHNEIDER-CANET 75-MM. Q. F. GUN.

(By permission "London Engineering.")

The 75-millimeter (2.952-inch) gun, long type, on carriage, with hydro-pneumatic recoil and trail spade, pattern 1898,

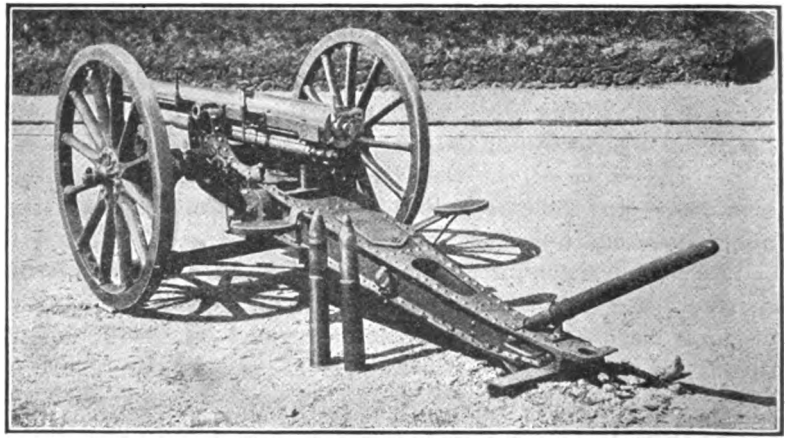

Fig. 11.

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may be taken to embody all the experience obtained by trials of previous models, and to represent the most advanced Schneider-Canet practice (see fig. 11).

This type is characterized by an almost complete immobility of the carriage under firing, a condition which has been obtained without reducing in any way the power of the gun, the precision with which it is fired, or the ease with which the material can be carried from one place to another. The gun is joined to the carriage by a long-travel recoil mechanism, with constant resistance; the effort due to recoil has been reduced to a minimum owing to the weight of the recoiling mass—365 kilograms (804 pounds). The carriage does not recoil; it is held to the ground at three points, by the trail-spade and by two drag-spades placed under the wheels. Lateral deviation is practically absent; and vertical deviation is very slight, the trail not penetrating the ground; corrections for training, when they are necessary, are therefore very quickly effected. As the carriage scarcely moves under fire, and it is possible to seat two gunners on the trail, their weight contributes still more to the stability of the carriage, and they can rapidly train and load. Lateral training is effected by displacing the carriage on the axle, the wheels turning on the drags; this arrangement does away with the strain that would result from the obliquity of the gun on the carriage. Trained gunners can fire with this type 20 to 24 aimed rounds per minute, owing to the simplicity of the maneuvers. The quick and smooth return of the gun is one of the elements necessary for rapid firing. The system followed for fixing the carriage to the ground does not cause trouble and delay in the placing of the gun in battery, nor in removing it to other spots and attaching it to the forelimber.

The force of recoil is absorbed by the hydraulic recoil cylinder in the simplest manner possible, and return is insured by an independent compressed-air recuperator, which, being quite tight, requires no special attention. As it is independent of the recoil cylinder, in case of an accident firing can still be proceeded with, the gun being run out by hand. A pump forms part of the equipment, and with it one man can charge the recuperator afresh in five minutes.

The gun is of forged and hardened steel manufactured to the requirements of the French ordnance regulations. It is 2.470 meters (97.240 inches) in length, and is built up of three

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parts, the tube in which the breechblock is screwed, a jacket over about half the length of the tube, and a chase coil fitted in with tongue and groove. The force of recoil is transmitted to the recoil cylinders from the jacket, there being, therefore, no unbreeching effort to counteract. The jacket carries a certain number of parts forged in one piece with it, namely, the lugs which hold the recoil piston rods and the recuperator rods, the flanges that act as guides in the cradle, the T-shaped guide for lateral training, and the hinge which carries the breechblock. The breechblock seating is made with two threaded parts and two interruptions.

The breech-closing device contains but a limited number of pieces, and these are strong and of simple shape; they are easily put in place and removed by hand, no tool being required. It projects but little over the rear end of the gun. The breech opens with one circular action. Firing takes place by pressing on the catch through a spring rod fixed to the cradle, either direct or through a line; the firing device does not, therefore, recoil with the gun, and the gunner has it constantly under his control, but he can not fire the gun until it has run completely out. Thousands of rounds have been fired with this device. No tools are required for taking apart the breechblock and firing device, and this can be done in less than one minute.

The carriage is fitted at the rear with a rigid trail spade; it carries the cradle in front on horizontal trunnions. The axle runs through the carriage. The cradle in which the gun recoils is of forged gun steel in one piece; it contains the trunnions, slides, recoil cylinder, and the cylinder and reservoir of the air recuperator. The slides are lined with brass, and are so arranged that recoil is always insured, whatever be the state in which the sliding surfaces happen to be, whether damp, or rusty, or covered with sand or mud. On the left-hand side of the cradle are fitted the scales and sight, and to the rear of these is a small guard plate. The hydraulic recoil cylinder (on the left-hand side) is very simple in design. The piston works in the cylinder. The inside surface of the latter is made in such a way that the liquid, by flowing through ports of varied sections, opposes a constant resistance to the force of recoil. The piston-rod gland is made tight, and a hydraulic buffer counter rod does away with all shocks on return of the gun. The recuperator cylinder contains com-

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pressed air, which acts on a piston, the head and rod of which are fitted with tight linings to prevent air escape. The middle cylinder acts as an air reservoir, and is in communication, at the rear, with the recuperator cylinder. To the air reservoirs are fitted the valve and joint for the charging pump. The recoil and recuperator piston rods are symmetrical; they are joined together by an elastic joint formed of Belleville springs. They are completely down when the gun is not in action and run out during one second only, at each round. The recoil cylinder requires no attention, and, like the other parts of the mechanism, it is well protected against hostile fire. The joints and bushes are taken apart only in exceptional cases; this is easily effected with the help of the tools carried with the battery, by gunners under the supervision of a non-commissioned officer.

The body of the carriage is made with two brackets joined together by top and bottom plates and stay bars. A cast-steel headpiece is fitted with a cylindrical jacket, which slides on the axle for giving lateral training. The carriage trail is fitted in the rear with a strong spade, the top part of which is bent horizontal and prevents the trail from plowing up the ground. A trail ring, trail levers, and all the other requisites are provided for the service in the rear. The axle is of tempered gun steel; it is round, and is fitted at its central part with a rack for lateral training; the journals are lubricated automatically. The wheel rims are in three parts, and are made of bent wood; they are joined to the nave by 12 spokes cut with the grain. The nave is of brass; steel plates are interposed between the spokes and the rim to prevent the yielding of the wood. The naves are fitted with friction brake.

The gun and cradle, which oscillate round trunnions, rest, with a slight preponderance, on the top of the elevating rack. The latter is in the carriage plane, and slides in a brass guide; it is worked by means of a crank keyed on an endless screw, which gears with a helicoidal wheel on the elevation shaft. On this same shaft is a pinion which engages the rack. Each revolution of the crank gives a variation of 26 minutes in the angle, corresponding to a variation in the range of about 175 metres (574 feet). The endless screw, helicoidal wheel, and rack are cased round to protect them from dust. For transport, the gun is elevated to its maximum positive angle, and strapped to the carriage, a slight preponderance of

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muzzle being allowed. For training the gun, the rack on the axle engages a pinion, the axis of which carries at one end a helicoidal wheel worked by an endless screw driven by a hand-wheel. The pinion, by turning in the rack, displaces the carriage on the axle over 80 millimeters ($3\frac{1}{8}$ inches) on each side, the wheels turning on the brake; this produces a rotation of the carriage round the trail space as center, through 4°. When the gun is being transported, the lateral training mechanism is held fast by a small chain. The brake used in firing consists of two arms fitted with shoes, which can turn round the axle or be displaced lengthwise over about 100 millimeters (4 inches); the arms are joined by a crosspiece. The shoes, the top surfaces of which are flat, are fitted at their lower part with spades made parallel with the carriage axis; the crosspiece is joined to the trail by two tie-rods, at the end of which is a balanced lever and a slide. A key fixes the slide in the firing position. When the material is shifted, the crosspiece is held up under the carriage. The fore limber and caisson are practically similar to those of the preceding models.

Particulars of gun.

Weight of gun	kilograms..	365	= pounds..	804
Weight of projectile	kilograms..	6.5	= pounds..	$14\frac{1}{3}$
Muzzle velocity	m. s..	550	= f. s..	1,804
Height of axis of gun above ground level	meter..	0.855	= inches..	33.661
Elevation	from −5 degrees to +14 degrees.			
Training	through 4 degrees.			
Diameter of wheels	meters..	1.220	= inches..	48.030
Distance between wheels	meters..	1.400	= inches..	55.118
Weight in battery	kilograms..	1,010	= pounds..	2,226
Weight of fore limber, with 38 cartridges	kilograms..	772	= pounds..	1,702

VICKERS-MAXIM 75-MM. Q. F. FIELD GUN.

(By permission "London Engineering.")

These guns, which are constructed for firing fixed ammunition—that is, with the shell fixed to the cartridge case, are not only made for naval use on conical mountings but are fitted to nonrecoil carriages, field carriages, and are also adapted for mountain use, the parts being made detachable and of such proportions as to be taken to pieces and in this form carried by mules.

BREECH MECHANISM (see figs. 12, 13, and 14).—The principal advantages of the mechanism may be briefly indicated before describing the arrangement and working. A single movement of the hand lever is sufficient for opening or closing the breech. The whole mechanism can be put together and

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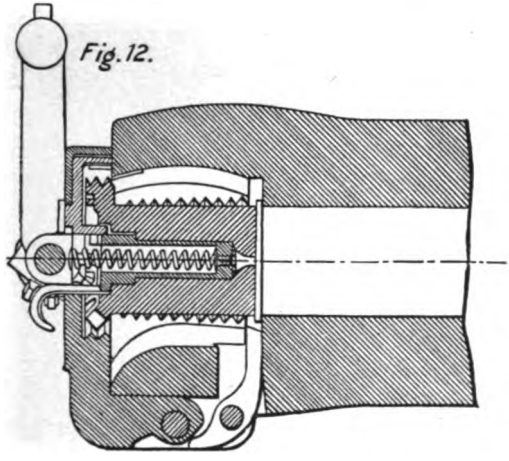
taken to pieces by hand, without the aid of any tools. The firing pin and main spring can be changed by withdrawing the hand-lever axis only, and does not necessitate either the taking of the mechanism to pieces or the opening of the breech.

Fig. 12.



Longitudinal Section of Breech.

By means of a hook on the recocking tail of the firing pin, extending outside the carrier, the firing pin can be recocked in case of a missfire without moving the breechblock, or any other part of the mechanism.

The breechblock is tapered or coned, but contrary to the usual practice the larger diameter is nearest the chamber when in firing position, thus increasing the safety of the breech. The breech of the gun has no lateral aperture for the insertion or withdrawal of the block. The block is carried on a vertical hinge or carrier, pivoted at the side of the breech, and is inserted into and withdrawn from the breech by one simple movement round a hinge, and consequently has no longitudinal movement in the carrier. For the purpose of giving a clear swing out of the block, the opposite sides of the breech are cut away. The block is firmly held in the carrier by continuous threads on its rear, and fitting into corresponding threads in the carrier. For turning the block about its axis, a circular bevel-toothed segment is secured to its rear end. With this segment is geared the bevel pinion of the hand lever, which is pivoted to the carrier by an axle pin.

By turning the hand lever, the pinion forces the block to turn round its axis, thereby disengaging it from the breech,

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and by a continuous movement swings the block out round the carrier pivot. The closing of the breech is effected by a similar movement in the reverse direction. The firing pin is placed in the center of the block, and is actuated by

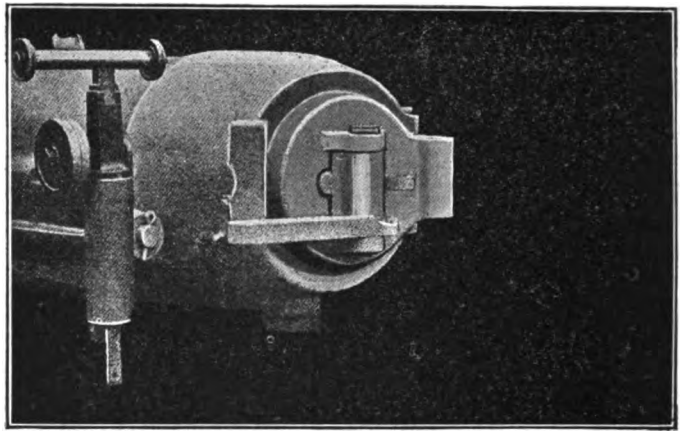

Fig. 13.—Breech Closed.

a spiral spring. A small block or guide plate is provided for holding the main springs, for guiding and preventing the firing pin from turning, for guiding the trigger sear, and for covering the aperture through which the firing pin is inserted into the block. This guide plate is kept in position by a hand-lever axis pin.

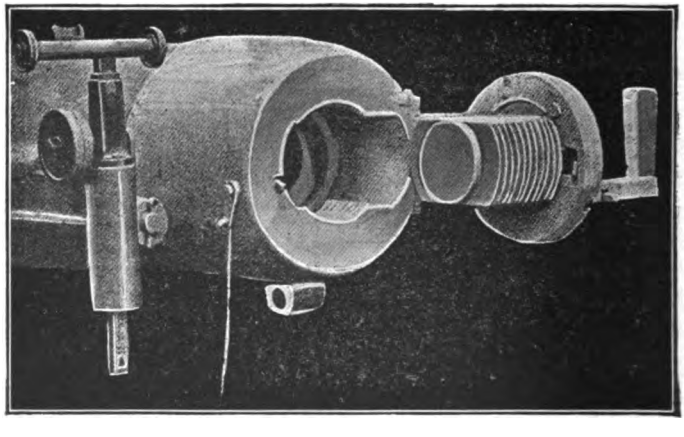

Fig. 14.—Breech Open.

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The cocking is effected by the block turning about its axis whilst unlocking. In the block two cams are provided, and on the firing pin two lugs, which engage the cams. The re-cocking tail of the firing-pin prevents it from turning. When the block turns, the cams force the firing-pin lugs back, and thus compress the spring and bring the firing-pin into engagement with the trigger mechanism. The trigger sear, which is pivoted to the carrier by its arm, has its outer end bent so that it engages with the trigger finger projecting through the side of the breech. The sear also has a retaining catch engaging with a shoulder on the firing pin when cocked. A spring is connected with the sear to act thereon, so as to press the catch into engagement with the firing pin.

The safety arrangement consists of an outer arm on the trigger sear, having at its upper end a projecting lug engaging with two concentric grooves on the rear end of the block. Each of these two grooves in turn holds the safety lug in its proper and safe position, while the block moves around its axis.

The partition between the two grooves is cut away in two places, so as to allow the lug to pass from one groove to the other. While the mechanism is being opened, the firing pin is cocked, and during that motion of the block the trigger sear, with its safety lug is kept still until the full quarter turn is completed, the safety lug in the meantime having been in the inner groove. As soon as the block is fully turned the catch on the trigger sear engages the firing pin, and the safety lug passes to the outer groove, in which it remains during the time of closing the breech, and thereby retains the sear in a locked and safe position till the block is fully home. At the firing of the gun, the safety lug again passes to the inner groove.

The extractor is pivoted near the carrier hinge, and extends into position to engage with the rim of the cartridge case in the gun. A short arm or projection on the extractor is struck by a shoulder on the carrier hinge, when the latter is turned to open the breech.

The necessary means for holding the block immovable while it is out of the breech is provided for by a locking bolt moving in the carrier. When the block is turned and ready to swing out, a recess formed in it comes opposite the locking bolt already referred to; which, acted upon by a spring,

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engages the block, and holds it so that it can not be displaced by turning on its axis whilst moving with the carrier in and out of the gun. To prevent the hand lever from moving, through the concussion caused by the discharge, a retaining latch is pivoted in the lever and projects through its handle. The latch engages a recess in the carrier, and holds it so that the hand lever can not move. In grasping the breech to open it, the hand also grasps the latch lever which is thereby pressed inwards and releases the latch, the hand lever then being free to move outward as required.

THE FIELD CARRIAGE.—The gun, it will be seen, rests in a cradle, provided with two cylinders with hydraulic buffers, one on each side. The position of these buffers with reference to the axis of the gun permits the transmission of the recoil

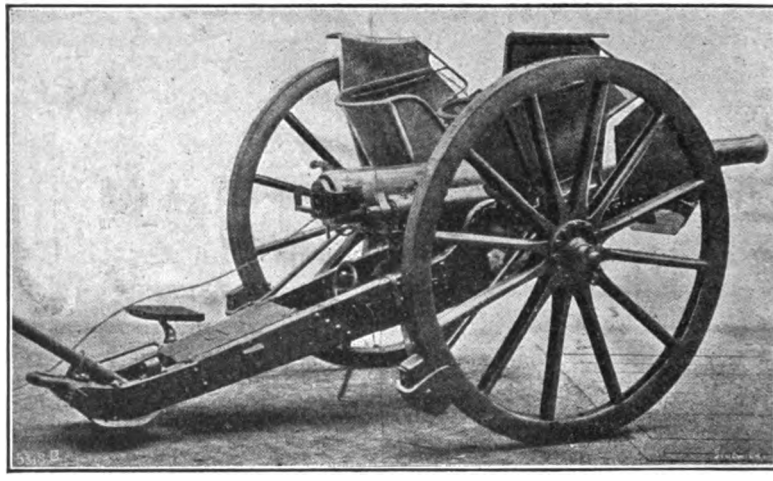

Fig. 15.—Field Carriage for 75-mm. Field Gun.

under favorable conditions. The hydraulic buffers are of the ordinary type, each piston compressing a spring during recoil. This spring returns the gun into firing position. The piston rods are secured to the lugs on the breech of the gun. The length of recoil is 12 inches.

The cradle rests on a semicircular platform, to which it is held by clips. This platform is the center of the traversing movement of the system. The lower part of the platform forms a bearing for the horizontal shaft, round which the whole system pivots vertically. This shaft is riveted to brackets on the trail.

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At the rear end of the platform is a toothed segment gearing with a worm, the shafts of which are supported by two lugs, forming part of the cradle. Immediately below the toothed segment is the elevating joint which receives the upper end of the elevating screw. This latter is actuated by means of hand and gear wheels supported on brackets placed in the body of the trail.

The elevating and traversing handles are so placed that the gunner can, without any difficulty, manipulate them without leaving his seat. The sights are fixed on the left-hand side of the cradle, and do not recoil with the gun. It is, therefore, possible to leave the tangent sight in position after each laying without fear of its altering.

The trail is built of steel plates and angles, and is fitted with a shoe and anchor plate to prevent the trail end digging down in the ground. On the left-hand side of the trail is the gunner's seat, which is swung round above the trail when traveling. The axle is cranked and fixed to brackets bolted on to the sides of the trail.

At each end of the axletree are rings to which are connected the brakes for the wheels during firing. For traveling, these brakes are hung on the sides of the trail; in action, they are raised and placed on the wheels, where, by the eccentricity of their point of support in relation to the axle they produce an almost immediate stopping effect. Thus placed, the brakes work automatically during firing, for the more the wheels have a tendency to turn during recoil the tighter they grip. The trail is fitted with a box containing necessary spare parts and tools.

The great advantage of this system of mounting is the small amount of carriage recoil on the ground; this allows the man laying the gun to remain on the trail during firing.

THE LIMBER.—The limber consists of a limber box secured to a frame which is attached to an axle. This is made of steel plates divided into a number of partitions, each of which holds an ammunition carrier. It is fitted with arm and back rests, and at the rear there is a hinged door, which opens downward, as shown. The ammunition carrier is made of four brass tubes connected together by a steel frame. The interior of each tube is made to represent the chamber of the gun, thus assuring a perfect support of the cartridge in transport. The carrier is fitted with a hinged lid lined with felt

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inside, and on the top of the lid there is a leather handle for carrying it.

The frame is made of steel angles connected to the axletree by means of two elliptical springs. The front angle or "splinter bar," is fitted with drag hooks for attaching the singletrees. It is also fitted with a bracket for securing the pole, and two footsteps to facilitate mounting. The axletree is of a rectangular section drawn out to form axle arms to fit the naves of the wheels. The wheels are of the usual construction with metal-pipe boxes held in position on the axle by means of drag washers and linchpins. Provision is made for carrying necessary intrenching tools and stores.

Particulars of 75-millimeter gun, mark "M."

Weight of projectile	pounds	12.5
Diameter of bore, 75 millimeters	inches	2.953
Length of bore, 29 calibers	inches	84
Total length of gun	inches	88.25
Diameter of cartridge case	inches	2.97
Length of chamber	inches	13
Weight of charge, ballistite	ounces	15
Total weight of gun with mechanism	pounds	683
Muzzle velocity	f. s.	1,575
Rounds per minute		14
Length of recoil of gun in cradle	inches	12
Weight of carriage	pounds	1,275
Diameter of wheels	inches	56.6
Track of wheels	inches	61
Angle of elevation	degrees	17
Angle of depression	degrees	5
Angle of training	degrees	9
Height of axis of gun	inches	36.3
Weight of limber and thirty-six rounds of ammunition in carriers	pounds	1,850

EHRHARDT SYSTEM.

The ingot for the gun is first forged solid by hydraulic press and then pierced by another hydraulic press. It is claimed for this process that the tenacity and elasticity of the steel are increased, and that in consequence of the compression undergone by the inner layers of the tube the surface of the latter becomes very hard and erosion is to a great extent obviated.

The guns are made with the side wedge fermeture or with the interrupted screw, according to the preference of purchasers. The former is recommended for separate ammunition, the latter for fixed ammunition.

Each system is worked by a single motion of the man serving the breech, all loading manipulations being at the same time automatically performed. Firing is effected by pulling the lanyard, which action cocks the striker and then releases it.

The firing arrangement is designed with the special object of preventing any possibility of the gun being fired until the breech mechanism is fully home.

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An automatically acting safety arrangement also prevents the breech from opening when traveling.

In order to obtain the greatest rapidity of fire, a nonrecoil system is necessary. To meet this want two systems of carriages are constructed, viz:

1. Carriage with hydraulic buffer and spade attachment.
2. Carriage with spade attachment fitted with spring.

CARRIAGE WITH HYDRAULIC BUFFER AND SPADE ATTACHMENT.

Field pieces fitted with hydraulic buffers are so constructed as to approach as closely as possible, as regards rapidity of fire, the quick-firing guns of marine artillery. To attain this aim, the gun is allowed to recoil on the top carriage, while the lower carriage is built with a very small angle on the trail point, thus checking the recoil of the piece and obviating the jumping up of the wheels in front.

The force of recoil is at first supported by the gun alone and then gradually transferred to the carriage. To this end an hydraulic buffer is fitted between the gun and the top carriage. The violent shock occasioned by the discharge of the piece is taken up by the liquid in the buffer and transformed into pressure of a less severe nature. This pressure, moreover, is distributed along a great length of recoil, by which means the strain on the carriage is very much lessened. A small angle of the gun carriage on the trail point is obtained by lengthening the lower carriage for firing by means of a tubular piece, which is telescoped over the trail when traveling and withdrawn when the gun is unlimbered.

The gun is fitted with a front and a hind claw which act as guides during recoil and grip it to the carriage. To the front claw the glycerin cylinder is attached, which is supported and guided behind by the rear plate of the top carriage, the piston rod being fastened to the front plate of the top carriage. The glycerin cylinder is surrounded with spiral springs, which in front press against the front guiding claw, while the hind end lies against the rear plate of the top carriage. The latter is U-shaped and consists of a weldless Ehrhardt tube cut in two to insure sufficient strength together with light weight, and also to form a protection for the glycerin cylinder. In order to procure a further protection for the sliding service of the top carriage against the enemy's fire, the gun is fitted with a steel shield or mantlet, placed at such a distance from

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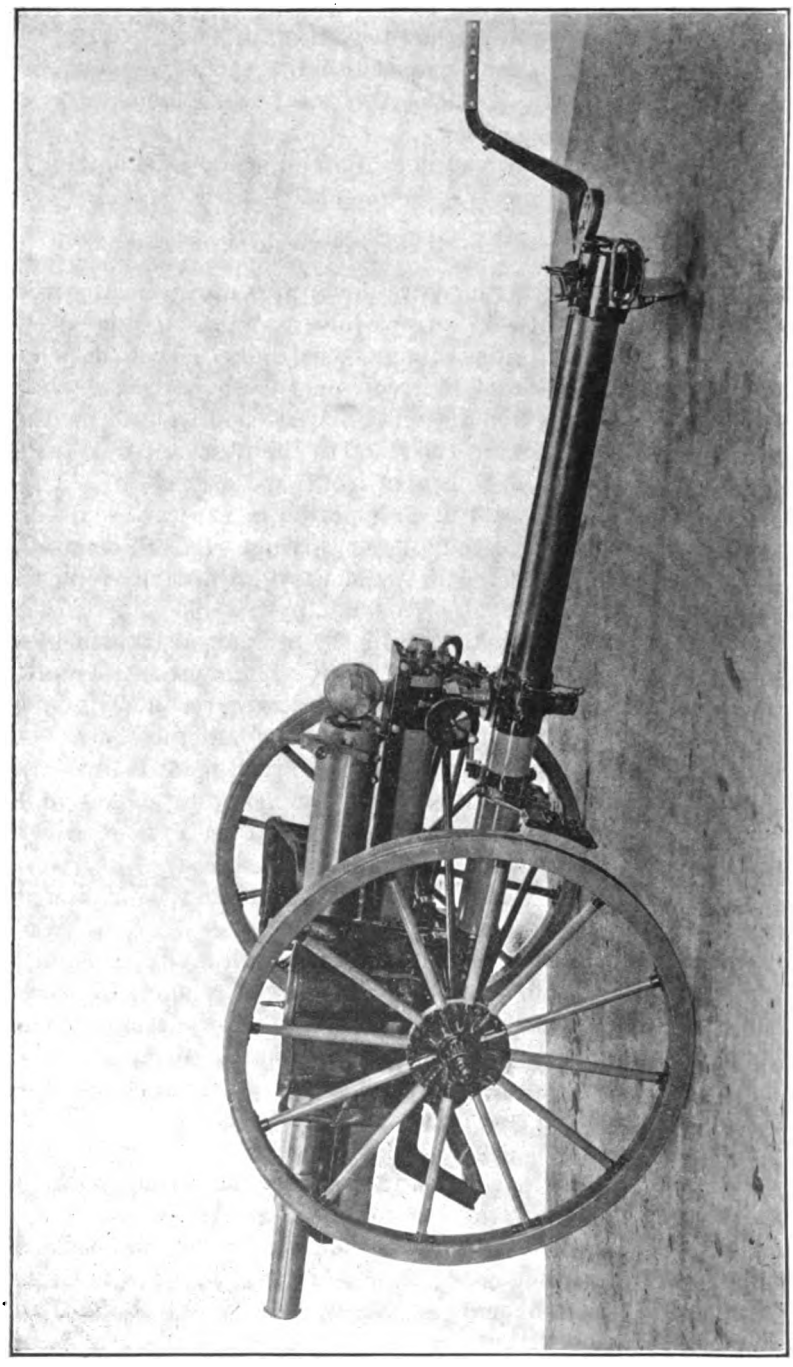

Fig. 16.—Ehrhardt 7.5-cm. Quick-firing Field Gun. Carriage with hydraulic buffer and spade attachment.

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the moving parts that any dents or other damages that may happen to the mantlet can not in any way interfere with the working of the buffer. This protection, in the opinion of the makers, goes a good way toward silencing a great many of the objections raised against the employment of hydraulic buffers with field carriages. The glycerin cylinder and the mantlet also serve to diminish the force of recoil by means of their weight.

The buffer springs can be mounted or dismounted in a few minutes by means of a checking screw, this operation requiring no special skill.

In order to be able to correct the direction when the spade has dug into the ground and rendered the trail immovable, a traversing apparatus is provided and fixed within easy reach of the laying number. The cushion of this apparatus consists of two sledges sliding on one another, the lower one being connected by stays with the axletree, thus preventing any lateral movement of the lower sledge. The upper sledge slides on the lower one, describing an arc of a circle, this movement being produced by a screw and handwheel. The top carriage, which, by means of a pivot, swings horizontally in a hole in the middle of the axletree, is attached to the upper sledge and moves together with it. Elevation is given by means of an elevating screw—worked by an arrangement of beveled wheels—which moves the sledges, and with them the top carriage.

The laying number sits on a seat fixed to the left stay of the traveling brake gear and is thus enabled to look constantly over the sights, so that the rapidity of fire depends solely on loading and firing.

The lower carriage consists of two tubes telescoping one into the other, in order to have a short trail for traveling and a long one for firing with moderate angles of elevation. A spade attached to the trail gives the necessary resistance.

The whole construction aims at as small a weight as possible combined with high ballistic power and great rapidity of fire.

With this piece eighteen well-aimed rounds may be fired per minute.

The makers claim that they have thus succeeded in constructing, for the first time, a carriage suitable for employment in the field which totally checks recoil and prevents the wheels from

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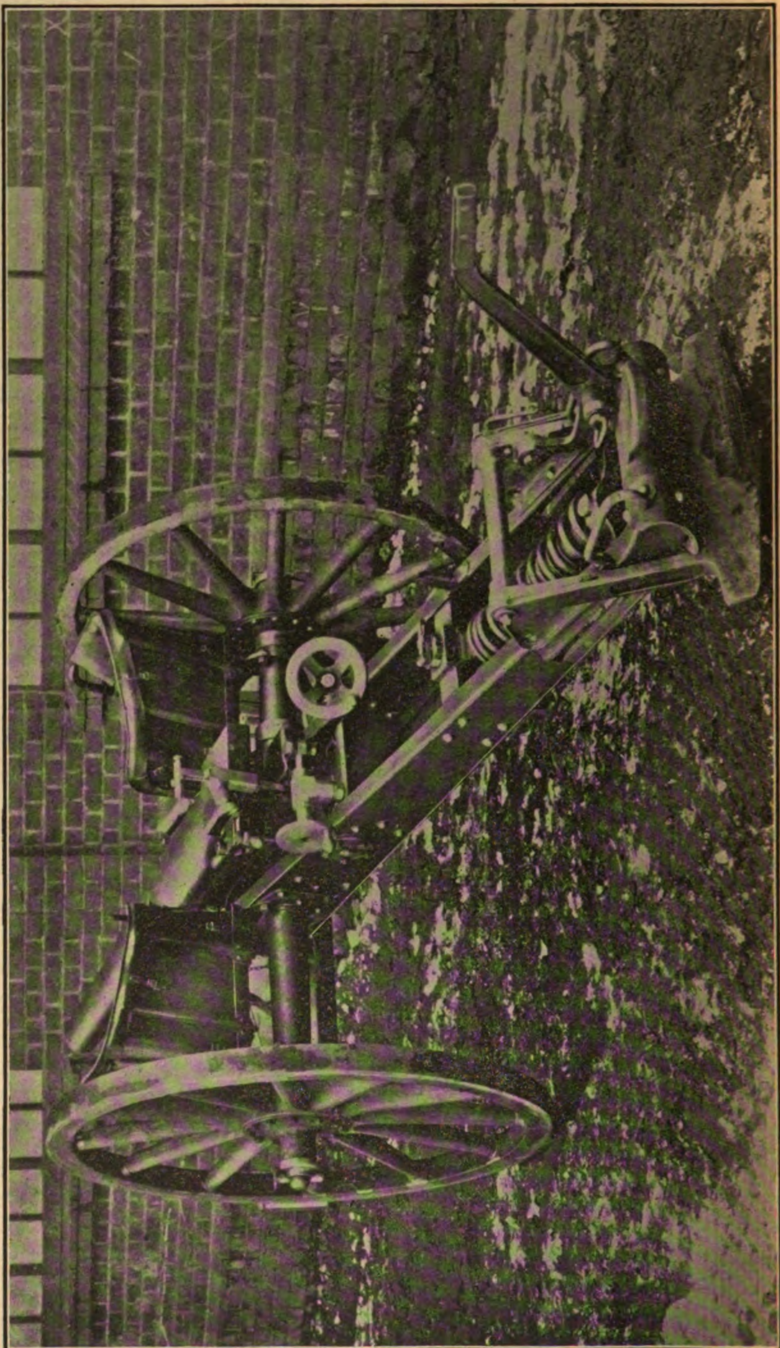

jumping. Elevation and direction remain so entirely unaltered while firing that a series of ten rounds may be fired in rapid succession with sufficient accuracy, without it becoming necessary to control the aim.

CARRIAGE WITH TRAIL SPADE FITTED WITH SPRING.

In case high ballistic power should not be required, or if the complications involved by the hydraulic buffer are feared, a carriage fitted with a simple trail spade with spring may be chosen instead of the hydraulic carriage. When intended for a relatively moderate amount of work, a carriage with trail spade fulfilling all requirements of field service may be built within the admissible limits of weight, if the height of the axis of the gun above the ground is diminished by letting the axletree pass through the brackets of the carriage, and if the angle of the carriage on the trail point is reduced by giving the carriage a longer and narrower shape. Thus it is possible to considerably lessen the strains put upon the carriage. The recoil is checked by a spade fixed to the trail, which compresses a spring placed between the brackets. After recoil, the spring expands and restores the gun to its firing position. The spade acts as a one-armed lever in such a manner as to allow the carriage a long recoil, a highly favorable circumstance as regards the strains, while the spring is by comparison but moderately compressed.

As the spade digs into the ground, and thus prevents a lateral movement of the trail, the laying number must be able to give the gun a limited amount of traversing without it being necessary to move the carriage. For this purpose the gun is provided with a vertical trunnion, by means of which it rests in a fork-shaped support, the latter resting by means of two horizontal trunnions in bearings in the brackets of the carriage. The screw of the traversing gear, the bearings of which are attached to the fork, works in a nut which is fixed to the breech portion of the gun; thus the gun may be traversed through an angle of about 6 to 8 degrees. At the same time a clutch formed on the breech piece of the gun and sliding in a groove cut into the fork serves to unite firmly both parts.

Both the carriages just described are built up of steel plate of first quality and pressed-steel joints, etc., as also of weldless-steel tubing, and therefore combine great lightness with great

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resistance against the strains set up on the road and when firing.

For traveling a strong shoe brake with wooden shoes, worked from the axle-tree seats, is provided, which, if necessary, can also be employed as a firing brake.

The nave of the wheel is of pressed steel, the spokes are made of weldless-steel tubing and are firmly fixed to a solid-drawn hollow-steel felly of rectangular section. The whole is bound together with a strong steel tire.

This steel wheel denotes, without doubt, a considerable improvement on the wooden wheels in use heretofore; furthermore, there is no occasion for the numerous and expensive repairs that are constantly becoming necessary with wooden wheels in consequence of the contraction and expansion of the single parts occasioned by atmospheric and climatic influences.

A feature of the Ehrhardt system of gun construction, i. e., maximum strength with minimum weight, has also governed the construction of vehicles, all parts of the limber and the ammunition wagon being made of steel, and especially of solid drawn steel tubing manufactured by the Ehrhardt pressing process.

Axletree and wheels are the same as for the gun carriages. The ammunition boxes are built up of steel plate and reenforced by pressed-steel joints, etc. Singletrees and bars are made of weldless-steel tubing of oval section, in order to increase their resisting power against bending.

To insure the ammunition being elastically stored in the boxes, and at the same time to obtain as light a weight as possible, the ammunition boxes are fitted with wicker ammunition carriers, which, though very light, permit a great number of rounds being carried in the boxes, or with ammunition carriers made of steel plate.

The limber box opens at the back, the box of the ammunition wagon both at the back and in front.

The limber holds 32 to 36 rounds, the ammunition wagon 84 to 104 rounds, according as steel or wicker ammunition carriers are used.

A shrapnel having the bursting charge in the base has been adopted for the following reasons: In shrapnel having the charge in front, for example, the French "obus à mitraille," the bursting of the charge tends to diminish the velocity of the bullets blown out at the moment of explosion, and so

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reduces the length of the zone covered. With shrapnel having the charge in the center the velocity of the bullets and the depth of zone covered is not impaired, but the angle of opening of the sheaf, already very large in consequence of the sharp pitch of the rifling, increases still more, and the density of the sheaf will rapidly diminish, and with it the efficacy of the explosion. With shrapnel having the charge in the base, on the contrary, the charge, on bursting, imparts a certain increment of velocity to the bullets and tends to increase the length of the zone covered by the sheaf, as also to form a narrow sheaf, which will have a sufficient density over a great length.

The shrapnel with charge in the base has been compared to a small mortar, which is projected bodily into the air, in order that it may pour out its contents on the enemy at the proper moment. The bursting charge is made large enough to impart as large an increment of velocity as possible to the balls, and at the same time to increase the facility of observation. In order to make observation possible even at the utmost limit of range of the piece, there is employed, besides the large bursting charge, a strong smoke generator.

Two kinds of shell are made:

1. A sort of locomotive mine, containing a large bursting charge, the shell having great length and comparatively thin walls. The bursting charge is very efficacious against field obstacles and also against living objectives, by causing ruptures of the inner vessels through the excessively violent explosion.

2. A detonating shell with thick walls and a smaller bursting charge than the foregoing one; the shell breaks up into a great number of fragments, which fly about in a cone having a considerable angle of opening. This projectile is the only one with which field artillery—when it has at its disposal no curved-fire ordnance, which naturally can not be expected to be forthcoming at all emergencies—can achieve effect against troops in cover behind field works, in or behind houses, etc., where they can not be reached by the flat trajectory of field guns. A limited number of these detonating shell carried into the field is therefore to be recommended.

Both sorts of high-explosive shell are made of steel by the patent Ehrhardt process, and there is no risk of their breaking up in the gun, an accident which is apt to happen with

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shell made of cast iron, in consequence of flaws in the metal. Steel has the further advantage, in consequence of its great tensile strength and tenacity, of forcing the explosive to assume a higher tension before it is capable of bursting the projectile.

In order to facilitate observation at long ranges, the shell is also provided with a smoke-generating matter which produces a cloud, the color of which contrasts visibly with the black cloud originated by the bursting charge.

FUZE.

Fuzes are carried into the field ready screwed into the shell and require no manipulation whatever. If the fuze is to be used as a time or a percussion one, it is set by turning the graduated composition ring, this being the only manipulation necessary. Such favorable conditions can naturally only be attained if the fuze is constructed in such a manner as to exclude every possibility of its acting prematurely on the march or while loading. The time of burning is about twenty-one seconds, which corresponds to a distance of about 6,000 meters. At still longer ranges the percussion arrangement is used, while the time arrangement is prevented from acting by setting the composition ring at †.

The composition ring is divided into seconds, or in divisions equal to one one-thousandth of the length of the line of sight, or in meters.

Principal data.

Weight of gun	kilograms	395	= pounds	871
Weight of carriage	kilograms	530	= pounds	1,168
Weight of gun and carriage	kilograms	925	= pounds	2,039
Number of rounds in limber		32 or 36		
Number of rounds in tray		4		
Weight of limber with ammunition	kilograms	727 to 731	= pounds	1,603 to 1,611
Weight of fully equipped piece	kilograms	1,652 to 1,656	= pounds	3,642 to 3,650
Traverse of top carriage, either side	degrees	3		
Maximum elevation	degrees	17		
Maximum depression	degrees	8		
Weight of charge, smokeless powder	kilograms	0.52	= pounds	1.146
Weight of projectile, full	kilograms	6.5	= pounds	14.33
Weight of cartridge case, with primer	kilograms	0.98	= pounds	2.16
Weight of complete cartridge	kilograms	8	= pounds	17.64
Muzzle velocity	m. s.	530	= f. s.	1,739

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Type.	Weight.
	Ounces.
Sword bayonet	15.
Rifle	15.
Rifle	14.
Sword	18.
Rifle	15.
Rifle	14.
Rifle	13
Rifle	13.
Rifle	15.
Rifle	8.
Sword bayonet, pattern 1888 (knife bayonet).	15.
Sword (quadrangular cross section).	14.
Sword	15.
Sword	19.
Ordinary triangular.	13.
Rifle	13.
Sword (sciabola-baioneta).	------
Rifle	10.
Rifle	8.
Sword	19.
Rifle	12.
Old type (quadrangular cross section).	11.
Rifle	13.
Triangular	13.
Rifle	15.
Sword	28.

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CHAPTER III.

SMALL ARMS (RIFLES).*

adoption of the magazine rifle and the rearming of rces by the great powers has been accomplished. Dur- last fifty years the muzzle-loader has been replaced by gle-shot breechloader, this by the magazine rifle, and some of the nations of Europe are considering the bility of adopting an automatic magazine rifle.

table, made in 1896, gives the rifles used by the principal , corrected to date as far as the data at hand permit. e sake of brevity, the rifle only is discussed. In most ies the carbine used is of the same make and model rifle.

des those mentioned in the table, some of the smaller s are armed as follows:

ssinia, with many varieties, the best being Remingtons erdans.

via, with a few Mausers, most of their rifles being gtons.

garia, with Mannlicher and Berdan rifles.

na, with many kinds, the best being Mauser and Lee

ta Rica, with Mauser model '93.

ea, with a variety, the best being Remingtons and ni-Henrys.

via, with the Mauser.

th African Republic, with the Mauser.

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m "Repetier- und automatische Handfeuerwaffen der Systeme v. icher," by Konrad Edler v. Kromar, Vienna, 1900; "Jahrbücher deutsche Armee und Marine;" "Revue d'Artillerie;" "Rivista di eria e Genio;" "Journal of the Royal United Service Institution;" er sources.

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During the last year the following changes of importance and new inventions have been noted:

AUSTRIA.

The rifle in use at present is an improvement on the Mannlicher, model '90, which it replaced. It weighs 0.7 kilogram less, has a shorter barrel, and has a hand guard.

MANNLICHER AUTOMATIC RIFLE, MODEL 1900.

This rifle belongs to the system of automatic firearms with a fixed barrel, in which the bolt mechanism is actuated by powder gases from the barrel. These gases act on a piston moving in a gas cylinder parallel to the barrel and the bolt. The energy which they exert is transmitted from the piston to the breech mechanism.

The novelty in the method of actuating the bolt consists in the fact that the gas piston, which is driven back a short stroke by the gas, has only to unlock the bolt and start it toward the rear. After the bolt is unlocked the gas piston merely gives it the impulse to continue its rearward movement, not accompanying it during its entire rearward and forward movement. After completing its short stroke the gas piston is returned forward independently by a spring, while the bolt completes its movement to the rear under the short but quite sufficient impulse it has received, being then driven forward again by its own spiral spring and locked.

The purpose of this construction is to enable the breech mechanism to be operated with a very short, solid, and light gas cylinder and piston, at the same time leaving the greater part of the movement of the bolt independent of the gas mechanism, so that if the opening in the barrel for the escape of the gas is closed the breech mechanism can still be operated independently of the gas mechanism, as in the ordinary repeating rifle.

This arrangement has made it possible to produce a simple, safe, and compact rifle.

In the barrel is bored a vent through which the powder gases enter the gas cylinder as soon as the projectile has passed beyond the vent. The gas cylinder is fastened underneath the barrel by means of a screw. In it moves the piston, which is constantly pressed forward by a spiral spring, and is forged in one piece with an arm extending to the rear and

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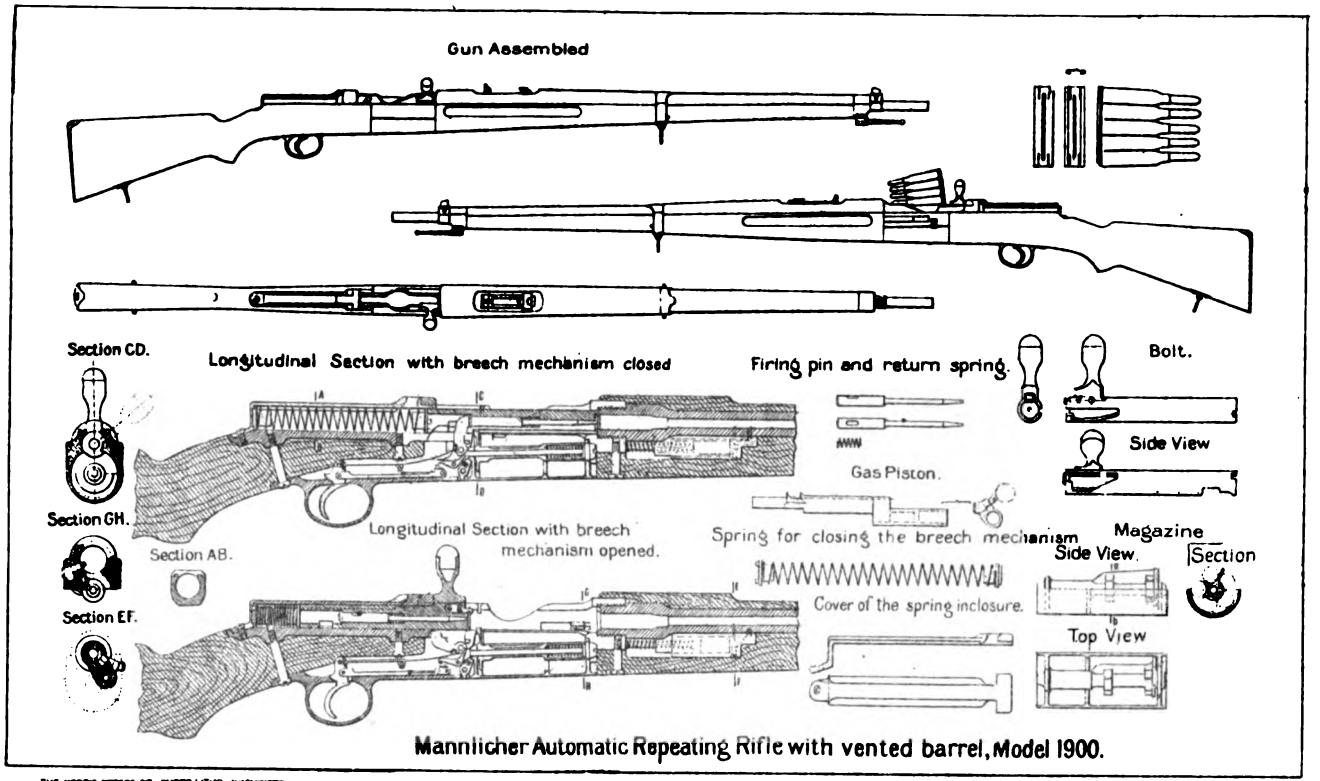

THE HORRIS PETERS CO. PHOTO-LITHO. WASHINGTON, D. C.

PLATE III.

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to the side. This arm moves in a slit in the sleeve and engages with the bolt by means of a lug.

The bolt has a recess with a cam for the reception of the lug on the arm of the piston. When the bolt is locked and the piston at its forward position, the lug on the arm of the latter lies at the forward end of the cam of the recess in the bolt.

When, upon firing, the piston is driven back, the lug of the arm engages in the cam of the recess in the bolt and forces the latter to turn to the left, or to unlock. Through the shock of the lug against the end of the recess in the bolt the latter also receives the impulse necessary for its further rearward movement in a rectilinear direction, while the piston, having completed its travel, is driven forward again by its spiral spring.

The bolt now continues its rearward movement under the impulse received, whereby the hammer is cocked and the empty shell, taken along by the extractor, is thrown out by a blow against the ejector. At the end of the movement the bolt spring drives the bolt forward again.

At the completion of the forward movement the bolt must be turned to the right again in order to be locked. This is accomplished by means of the bolt spring, which is fastened in such a manner to the bolt and the breech casing that it is in torsion and constantly tends to turn the bolt to the right into its locked position.

The vent in the barrel which leads to the gas cylinder can be sealed by a screw, after which the arm can be used as a nonautomatic repeating rifle. In this case the return spring of the bolt can be left unused or removed.

If, when the rifle is used automatically, the bolt spring should break or become useless for any reason, the breech mechanism may be locked by hand, but the rifle still remains available as a repeater.

ENGLAND.

The present South African war has developed defects in the rifle with which the British army is armed. The principal fault with the rifle seems to be in the sight. There is no allowance for drift, and the rifle seems to be "undersighted" for all ranges. Over 250,000 new sights have been sent to South Africa since the war began, to replace those in use.

In the latest rifles made for service use several changes of importance have been made. There are fewer parts about

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the breech and the extractor has been improved. The present clip is stamped from a single strip of steel and grips the cartridges more effectively.

H. Greener, of Birmingham, has patented this clip, by means of which the cartridges may be transferred to the magazine by a single movement. The magazine has heretofore been filled, one cartridge at a time, and had to be removed from the rifle in order to fill with maximum speed. The British and Boers have each accused the other of using "dum-dum" bullets in the present conflict. Such a bullet was used by the British in the expedition of Lord Kitchener to Khartoum. As men had been known to continue fighting after having been struck by a half dozen Lee-Metford bullets, it was decided to use against the fanatical hordes of the Soudan one capable of producing a greater shock. This bullet is shown in the illustration, Mark IV (fig. 18). It is of the

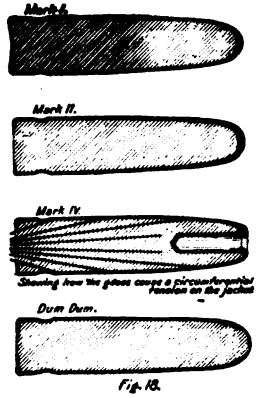

Fig. 18.

same length and caliber as the Lee-Metford bullet, and can be used in all the service rifles. The jacket is nickel, the core lead, and the head countersunk. The powder used is cordite. This bullet was withdrawn from use because the core tended to burst the jacket and leave portions of it to clog the barrel of the rifle. Mark I bullet was the first used in the service, but was replaced by Mark II, as it was found to have insufficient "turnover" at the base, and the wall of the cupro-nickel jacket was too thin at the shoulder. Mark II is used at present. The "dum-dum" with soft nose and open base is shown.

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FRANCE.

It is expected that within the next six months a new rifle, a modification of the Lebel, will be issued to the French army. Details regarding its construction are at present kept secret.

Experiments made in 1900 at the French military firing school at Chalons with Captain Daudeteau's new rifle proved it to be superior to the Lebel rifle. The magazine holds 5 cartridges, caliber 6.5 millimeters.

The new bullet is longer, sharper pointed, lighter, and has more penetration than the old one.

GERMANY.

The so-called "new rifle" of the German army is an improvement on the old model of 1888. The same system, caliber, and ammunition are retained. Some of the modifications are a hand guard added; a quadrant sight has been substituted for the old sliding sight, by which the field of vision of the marksman is improved, there being no top piece to obstruct the view; adaptation of the magazine for use of the loading clip; attachment of the bayonet on the stock, instead of on the barrel; adoption of a sword bayonet; magazine closed from below, preventing dust and dirt from getting in, and a device in the mechanism which prevents jamming of a cartridge from the magazine with an empty shell.

The Mauser automatic repeating rifle, model 1900, resembles the automatic pistol of that name. In the rifle the energy necessary for its operation is furnished by the recoil. After a cartridge has been fired, the breech moves backward and carries the barrel along, which movement cocks the hammer and tightens a recuperating spring. The connection of the barrel and breech then ceases, and the former is arrested in its travel, while the latter continues to recoil, by virtue of the velocity acquired, and brings about the extraction and ejection of the shell and the compression of a second recuperating spring. The first spring then expands and repels the breech, which shoves into the chamber the cartridge situated at the upper part of the magazine. After the breech is closed, the second recuperating spring expands in its turn and brings the barrel into a firing position. All that is necessary is to press the trigger, and the weapon continues to fire until all the bullets in the magazine are expended.

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DENMARK.

The Danish Automatic Rifle Company, of Copenhagen, Denmark, has recently introduced an automatic rifle or mitrailleuse, for which a variety of uses are claimed. The rifle is made any caliber desired. The magazine is of the detachable type and is filled with an ordinary cartridge clip, the cartridges descending by gravity into the magazine as they are needed. The magazine of an 8-millimeter rifle will hold 25 cartridges. The breech mechanism is operated by pressure of powder gas from the barrel. The firer has only to press the trigger in order to fire all the cartridges in the magazine. The rifle weighs about 11 pounds and the tripod 8.8 pounds. The tripod consists of three thin steel tubes, with an arrangement for securing the gun fast in position when it is desired to aim continuously at any object. A smaller tripod is used in the lying-down position. The inventors claim that this weapon can be used in both army and navy. With infantry it could be employed in the firing line when the latter is less than 500 yards from the enemy. Here a company of 100 rifles (300 men—2 ammunition bearers for each rifleman) can fire as many shots in a given time as 2,500 men armed with magazine rifles. They would be useful with a rear guard in defending a position and in a defile or pass. With cavalry they would be carried in a light two-wheeled cart, with ammunition, the cart being drawn by one or two horses. With artillery one or two could be carried on each ammunition wagon. They would aid in protecting the flanks and rear of a battery in action from infantry or cavalry attack. These are a few of the uses claimed for these rifles. Their utility generally on the firing line or on the march is doubtful. Their sphere would seem to be in intrenched positions, in fortifications, or on shipboard.

ITALY.

Among the automatic rifles which have attracted attention may be noted the mitrailleuse rifle of the Italian, Cei-Rigotti. It is perfectly automatic through the utilization of the powder gases. By pressing the trigger successively, the cartridges are discharged one by one (Section B, fig. 19), but by turning a lever at the side of the breech all the cartridges, with one pressure of the trigger, are discharged in a few seconds

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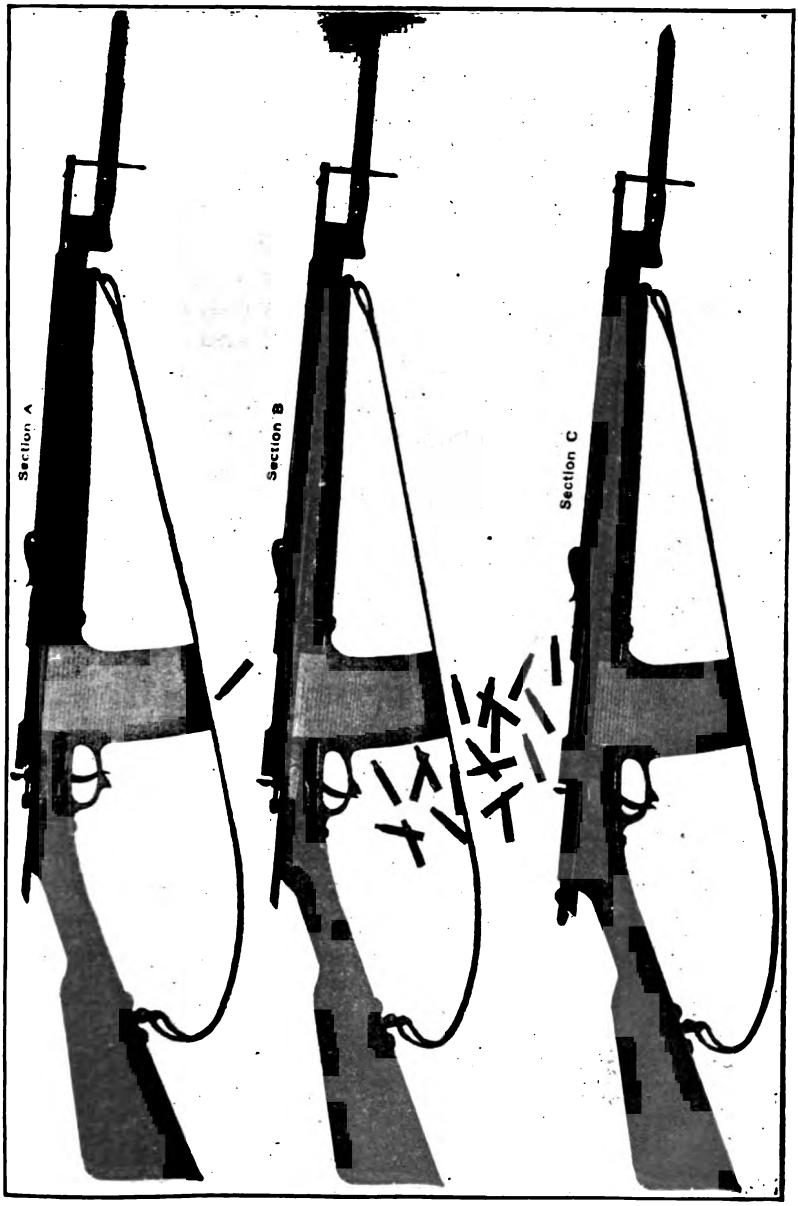

Fig. 19.

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(Section C, fig. 19). The magazine is quickly filled with the loading packets, and contains any number of cartridges up to 50, as may be desired. The device for using the gas is composed of four pieces, and can be applied to any rifle for war or sporting purposes, or to revolvers. The barrel is furnished with a sight graduated up to 2,000 meters, and carries a short bayonet. The ramrod is jointed, the parts screwing together, and is packed into the stock. The whole gun can readily be dismounted and assembled.

The ammunition is arranged in clips containing from 6 to 25 cartridges, to be used according to the kind of fire desired. As many as 15 shots have been fired in a second, each having a muzzle velocity of 700 meters a second, without altering the aim or taking the rifle from the shoulder. The 25 shots in the magazine can be similarly discharged in less than two seconds, the detonations following so rapidly upon each other as practically to constitute one report, and the bullets leaving the muzzle 50 yards behind each other.

JAPAN.

The new Arisaka rifle, with more convenience in loading, containing 5 shots in the magazine and having a range of 2,500 meters, is replacing the old Murata. The latter has the unwieldy tube-system fixed magazine, a range of 2,000 meters, and is too heavy.

PORTUGAL.

The old Kropatschek rifle, weighing 10 pounds, with a caliber of 8 millimeters and the fixed-tube system of magazine, has been lately replaced by the modern Steyr rifle, weighing 8.36 pounds, caliber 6.5 millimeter. The new rifle was preferred to the Mauser on account of its greater range and simpler mechanism.

MEXICO.

As a result of the recent Spanish-American war the Mexican Government has recently placed an order with the Remington Arms Company, of New York City, for 32,000 single-shot breech-loading rifles, believing this war to have proved that magazine rifles are liable to get out of order and are too complicated for military purposes. This belief must be founded on some deficiency of the Spanish Mauser, for no complaints are on record against the Krag-Jörgensen rifles used by the

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United States troops. The new Remingtons are of 7-millimeter caliber, and fire the Mauser ammunition of the same caliber. They are sighted up to 2,300 yards, weigh 8½ pounds without the bayonet, and the barrel is 30 inches long. The cartridges are loaded with 37 grains of smokeless powder, and have a jacketed bullet of 175 grains, with a muzzle velocity of 2,230 foot-seconds.

SWEDEN.

Experiments have been made recently at Rosersberg with a new automatic rifle invented by Lieutenant Friberg, which is said to possess many desirable qualities. In appearance it resembles the new Mauser and can use the same cartridge. When the magazine is filled, each round passes automatically into the firing chamber without the necessity of working the breech mechanism. The recoil is less than in most rifles, and the mechanism of the rifle is very simple.

SWITZERLAND.

The Schmidt, model '89–'96, has recently had the breech-block shortened. The new rifle weighs 100 grams less and costs 50 centimes more.

BELGIUM.

H. Pieper, of Liege, has invented a new rifle in which the bayonet lies in the plane of symmetry of the barrel and is set wholly into the stock. The bayonet is released by pressing a button. The magazine has no projections, and holds six cartridges. The fire can be stopped at will. The rear sight, of a new type, consists of one sheet of metal. It is attached to the breech casing, so that the temperature of the barrel in no way affects the rear sight. The bolt is made of three pieces. The percussion is effected by means of a flat spring, doing away with the spiral spring in the bolt. In working the mechanism, during rapid fire, a double ejection, or the throwing out of a loaded cartridge with the empty shell, which happens in most magazine rifles at times, is prevented. The stock consists of two parts and covers the barrel completely. The rifle is easily dismounted and assembled. It is strong in construction, though weighing 500 grams less than the Mauser. It is claimed to excel in ballistic properties, as well as in action, construction, and durability.

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CHAPTER IV.

MILITARY BALLOONS.

In 1782 the first balloon was made by two Frenchmen, the brothers Montgolfier. Having seen how easily clouds float in the air, they believed an artificial cloud of very light vapor, in a suitable bag, would also float. They first tried hydrogen in paper or silk bags. These floated, but soon descended owing to the escape of gas. Silk and linen balloons filled with smoke and hot air, by burning chopped straw and wood underneath, proved more successful. By means of such a balloon M. Pilatre De Rozier and Major D'Arlandes made the first ascension, and after a run of twenty to twenty-five minutes, descended successfully.

Coutelle, a young Frenchman, has the honor of first employing balloons in warfare. At the battle of Fleurus, in the revolutionary war of 1794, he made two successful reconnoissances of the enemy's position in his balloon. The defeat of the Austrians was in a great measure due to the information he had obtained. His balloon, 27 feet in diameter, was filled with hydrogen, and was held captive by two ropes. A narrow stick like an arrow, loaded and pointed to insure its sticking into the ground, carried the messages. Napoleon took a balloon corps to Egypt, but the British captured most of it. What was left was used to amuse the soldiers and native Egyptians, so it is not surprising to learn that Napoleon considered balloons "of no strategical importance." Captive balloons were used by Carnot when besieged at Antwerp in 1815. The idea of dropping explosives from a balloon onto an enemy originated in Russia as early as 1812. The Austrians in 1849, at the siege of Venice, attached shells with fuzes ignited to small balloons. They were intended to explode over the city, but the wind carried them over the Austrians themselves, and they burst, inflicting considerable damage. Captive balloons employed in conjunction with explosives were unsuccessful in 1854. France made successful reconnoissances with balloons in Italy in 1859. They were used

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in the United States in the war of the rebellion in 1861. The Union army employed them extensively. The Confederates used one, made from silk dresses patriotically donated by the brave and loyal women of the South. During the siege of Paris balloons were employed, not to reconnoiter the enemy, but as a communication with the outside world. They carried letters and dispatches for various parts of France, also baskets of carrier pigeons for bringing the return messages into Paris. In order to make these messages light enough for the birds to carry, the messages were reduced by photography to a small scale, and printed on a film of collodion, so that twenty dispatches would roll up inside a quill. The quill was then usually fastened to the central feather of the bird's tail. When the bird came to hand in Paris, the minute dispatch was unrolled, enlarged, copied, and forwarded to its destination. Some of the pigeons got back to their dovecotes in Paris on the same day the balloon had left, some were injured by birds of prey, and some killed by the numerous shots which the Germans fired at them. Sixty-two balloons were used, carrying 2,500,000 letters and dispatches representing a weight of about 10 tons, besides quantities of carrier pigeons for the return messages.

A small complement of balloons and 30,000 cubic feet of hydrogen, compressed at a very high pressure, were transported from England to Cape Town, in the Bechuanaland expedition, and thence by rail and wagons into the heart of South Africa, and used without leakage of gas from any tube. Each year balloons are used in the maneuvers of the European armies. Modern war balloons have been used in minor expeditions, like the French in Tonkin, the English in the Sudan, and the Italians in Abyssinia. The United States used a balloon in Cuba in 1898. During the present Boer war in South Africa, the British have accomplished by means of balloons much valuable reconnoitering. Lord Roberts says: "The captive balloon gave us great assistance by keeping us informed of the dispositions and movements of the enemy."

BALLOONS AND BALLOON TRAINS OF VARIOUS COUNTRIES.

Balloons and balloon trains differ much in size, form, and material. The various countries guard jealously their construction and mechanism. For the past twenty-five years, Germany and England have been working independently, and

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have developed features peculiar to themselves. The other countries have been imitating France. In the majority of cases they have been ordering the matériel of their air navigating parks from French manufacturers. Hence there are now three distinct types of military balloons and of aeronautic parks. These three types have one feature common to them all, viz, the method of filling the balloons with hydrogen gas condensed under high pressure and confined in the transportable steel gas receptables—the method developed and adopted by England.

Balloons are employed in the armies of the following countries: Austria, Belgium, Denmark, England, France, Germany, Holland, Italy, Japan, Portugal, Roumania, Russia, Spain, Switzerland, and the United States.

Compressed gas has radically changed the organization of balloon trains; the heavy generators have been supplanted by light wagons, and the trains that have substituted hand windlasses for the steam ones formerly used, have gained immensely in mobility and adaptability for field operations. The number of gas wagons necessary for filling a balloon varies from two to six, according to the size of balloons and gas receptacles. By arranging for the simultaneous emptying of all the gas wagons into the balloons at once, the time needed for filling the balloon has been reduced from three hours to a few minutes. The height of ascension has increased from 500 meters to 1,000 meters, and in Germany, where a steel-wire cable instead of a hemp one is used, to 1,500 meters.

AUSTRIA.*

Only during the last three years has money been assigned by the war department to secure a balloon park and organize a balloon school. Austria is now working with zeal and great interest to develop matters pertaining to aerial navigation. The balloon park secured is on the German model. The fortresses of Krakow and Przemyśl are furnished with captive balloons, the balloon detachments being organized from their garrisons. As appears from recent sources the captive balloon employed by the Austrian troops (fig. 22), is the same as the German kite balloon. [See its description under Germany, and the plates accompanying the description.]

*Taken from "v. Löbell's Jahresberichte, 1898."

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BELGIUM.*

This country organized at Antwerp, in 1899, an aerial navigation school, and acquired in France, from Lachambre, its balloon train. The balloon service is done by the engineer company (ouvriers du génie). The fortress of Antwerp is furnished with captive balloons.

DENMARK.*

The telegraph company is doing the balloon service, besides their regular duty. Ascensions are made every year. The balloon train was purchased in 1899, in France, from Ion.

ENGLAND.†

The military school at Aldershot is wholly responsible for the theory and practice of military ballooning in the English army. Here is constructed and tested every balloon used in the service. The balloon section of the royal engineers constructs all the appliances employed in conjunction with aerial navigation, with the exception of preparing and fitting the skins. The inflated part of a balloon is made from the intestines of bullocks. The skins, received in their natural state, are first thoroughly washed and scraped. They are then fitted together and stretched out on a long table. When thoroughly dry they are peeled off in long strips. These are in their turn fitted together, and form the large balloons. All waste material in this process is utilized in the construction of small balloons. Hydrogen is generated by the action of dilute sulphuric acid on granulated zinc, and then purified by being passed through a vessel containing water. Then it passes from the gasometer through a pipe to the filling room. Here it is transferred as required into steel tubes intended for transport. Each tube before being used is subjected to severe tests. It is placed in some vessel to prevent any injurious results should it burst, and is then filled with water. The amount of pressure is registered by a gauge, and the tube must be capable of standing a pressure of 3,000 pounds per square inch. Before being used for inflating, the gas is also tested. A small balloon is first weighed and then filled with

*"v. Löbell's Jahresberichte, 1898."

†"The Navy and Army Illustrated," January 21, 1898, page 224, and other sources.

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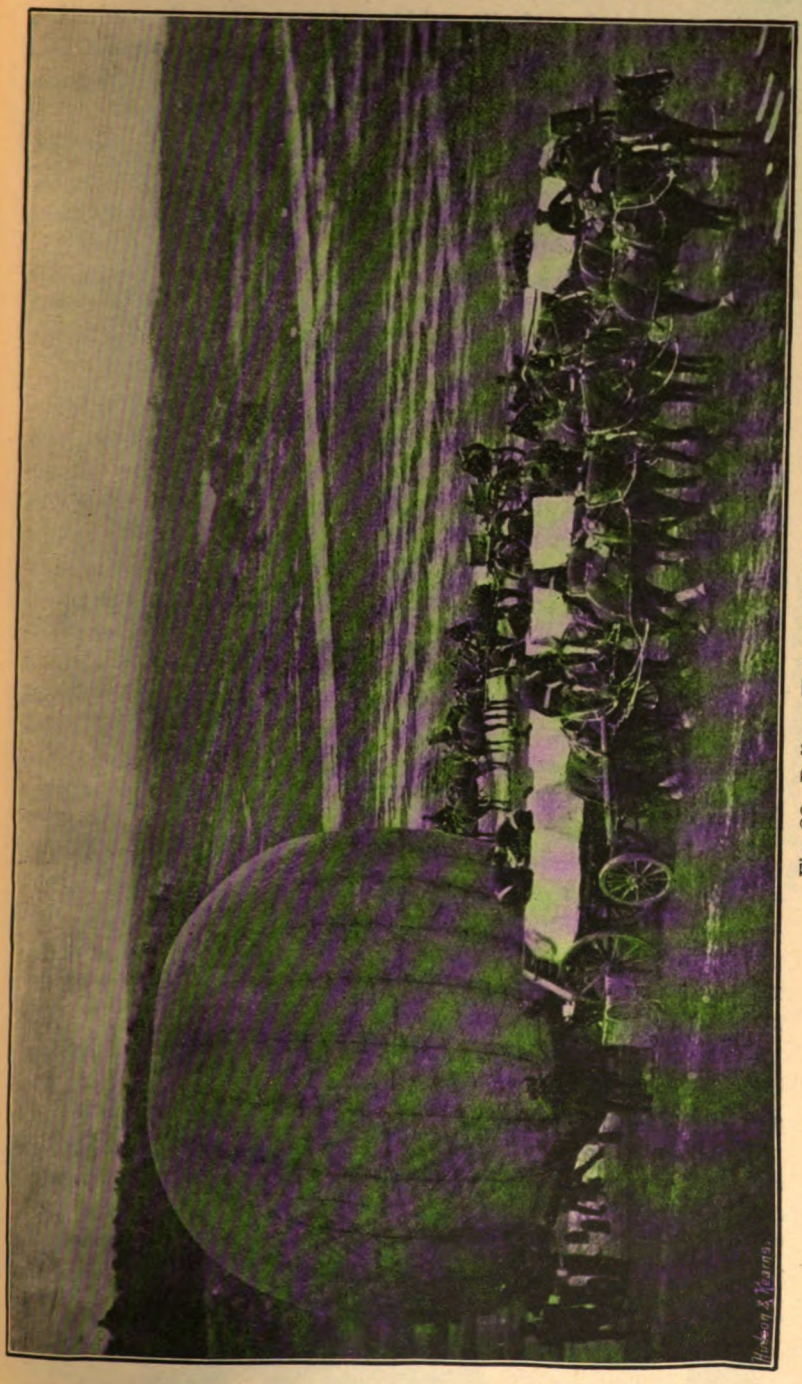

Fig. 20.—Balloon Three Parts Full.

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gas by means of an india-rubber tube passing through the testing instrument. A car is attached to the balloon and filled with weights until it attains its equilibrium. From the data thus obtained specific gravity of the gas is calculated.

When an ascension is intended, the gas in tubes is conveyed by six-horse wagons, or by a steam sapper, to the scene of operation. The balloon itself is placed on a four-horse wagon. (See fig. 20.) To fill the balloon its mouth is connected by means of pipes to the wagons. A full-sized balloon, with all its fittings, costs about $5,000. It takes the intestines of about 74,000 oxen to make an ordinary balloon. The balloon outfit recently sent to South Africa is a very complete one.

The English train is very mobile and simple. It consists of six four-wheeled wagons—one for the balloon and hand windlass, one for accessories, and four gas wagons. Three gas wagons are required for one filling. The gas receptacles may also be transported on the backs of pack animals, as was done during the Sudan expedition. In service the balloon is usually attached to a ballasted cart drawn by six horses, driven by men who are mounted in the same fashion as artillery drivers. The cart bears a drum, on which is wound a hemp or wire hawser. The hawser not only holds the balloon captive when it is up, but also serves as a means of communication between the observation party in the car of the balloon and those on the ground below, the written messages and reports of the observers being placed in a leather bag provided with a metal ring attachment, which, when released, slides down the line. When in mid-air one member of the balloon observation party usually takes his place in the netting, and it is from this position that the photographic apparatus, which forms a portion of the equipment of every military aerostat, is used.

The fabric of the British balloon consists of superposed layers of the skins mentioned. These overlays are not stuck together with any substance, for by the exhaustion of the air and the peculiarity of the substance one sticks to another by itself. Besides being the toughest and strongest of balloons, it will retain its charge of gas for weeks at a time. This it will do in any climate. When the balloon is struck by bullets and shrapnel the rents close automatically, and the leakage is very slight.

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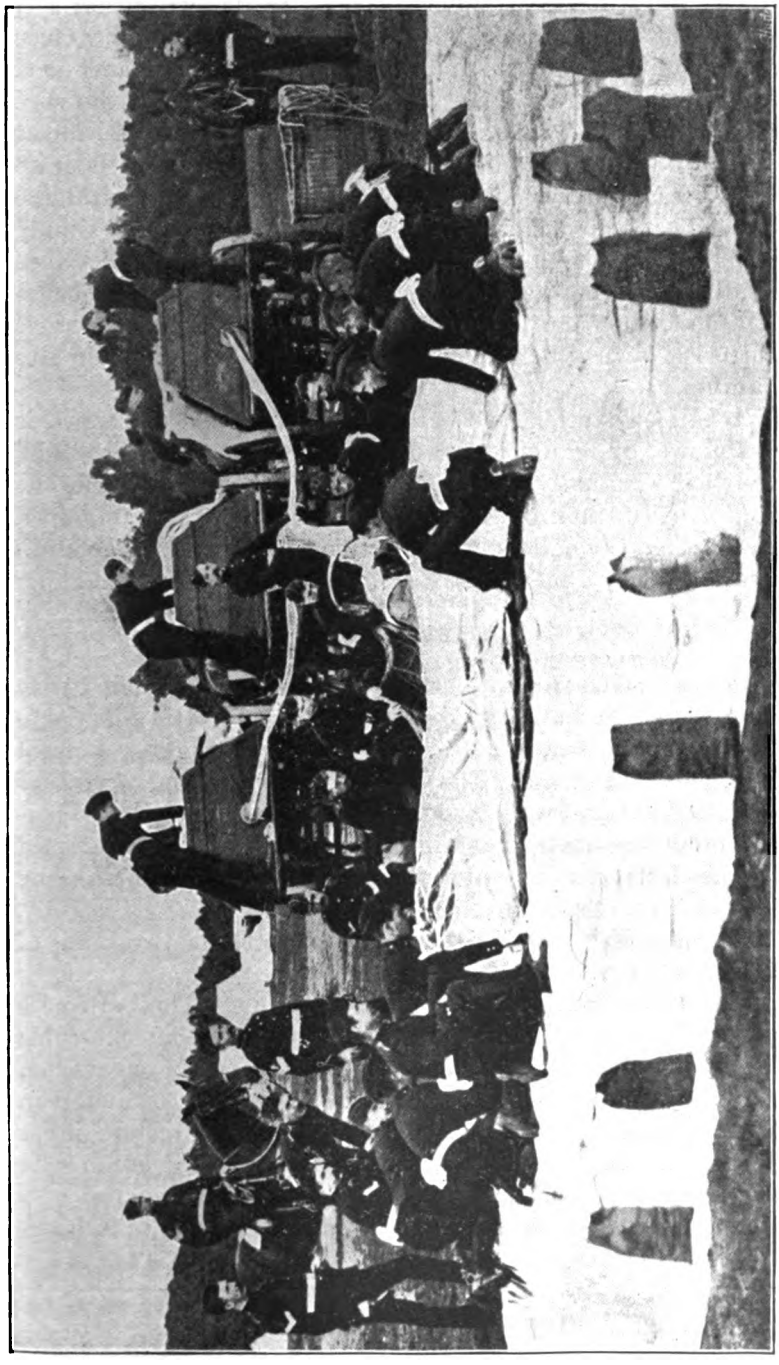

Fig. 21.—Crowning the Balloon.

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The body of the balloon is carried in its own wicker car, which also contains instruments and two parachutes. Once a zinc cylinder is tested and filled, the gas in it remains good for its purpose for years. As the balloon ascends the wire rope that holds it captive is paid off from the windlass, and at the same time the balloon itself generally pays out a separate wire connected with its telephone instrument. Should the balloon be wanted again at a distance of a few miles, it is simply wound in, and without being deflated, is carried the distance required, floating harmlessly behind the wagon. To secure lightness, all scientific instruments, from cameras to electric batteries, with which each car is provided, are made of aluminium.

A balloon section, one balloon personnel and transport, is as follows, by regulation: 3 officers, 51 men, 42 horses, and 8 vehicles. Actually, in the recent South African work, one section had 40 men and 1 officer, and 10 men of these remained back, when the balloon was in action to make gas. The minimum number of men necessary to run a balloon was 20.

FRANCE.*

The French aeronautic train is generously supplied with gas receptacles, but its wagons are heavy and little adapted to field maneuvering, owing to the necessity of lugging a steam engine with the train. The varnished silk balloon, of various sizes, is light and well made, and excels in the technical perfection of the smallest details. The hydrogen gas is obtained by the electrolysis of water, the French Government having its own factories.

The firm Yon, of Paris, has been furnishing two kinds of trains, a heavy and a light one.

The heavy train consists of three wagons. The balloon is globular in shape, 10 meters in diameter, or about 526 cubic meters in volume. The whole balloon is placed in one wagon. A steam windlass serves for winding up a cable 500 meters in length. The generator gives about 200 cubic meters of gas per hour. The objection to this system is that it is too solid and not mobile enough for field warfare, and the use of a steam engine and generator is too complicated and unreliable.

The light balloon train (of newer construction) is adaptable

* "v. Löbell's Jahresberichte, 1898."

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for balloons of 300 cubic meters. The steam windlass is replaced by a hand windlass which is transported in the same wagon with the balloon; so that the train consists of only two wagons.

The competing firm of Lachambre Brothers is furnishing a light train consisting of a varnished silk globe 350 cubic meters in volume, a hand windlass (transported with the balloon), and a generator capable of giving 150 cubic meters of gas per hour.

In the French peace establishment the "central balloon section," situated at Châlet-Medon, near Paris, is intrusted with the development of the aeronautic matériel, which is manufactured at the government factories, and has in charge the instruction of the balloon troops through the medium of a special school. The balloon troops comprise four balloon companies and are incorporated in the engineer regiments. There are, however, independent balloon detachments organized in the more important fortresses upon the Eastern frontier, and even the navy has its own special balloon troop units.

The central balloon section is composed of: (1) A school for officers and men; (2) An experimental station for the investigation of all questions relating to aerial navigation; (3) Factories for the construction of the matériel; (4) An instruction detachment consisting of 5 officers and 60 men. The officers and men of the balloon companies and fortress detachments undergo a thorough course of study relating to the material of the balloon, employment of balloons in war, and keeping them in good order. A special course is offered to the general staff officers with the view of acquainting them with the system of observation from balloons. At the head of the "central balloon section" is Major Rénard, the well-known inventor of the balloon "La France."

Each of the four balloon companies (incorporated into four engineer regiments) is composed of 2 officers, 14 noncommissioned officers, and 70 men. Privates of these companies have a distinctive uniform. In case of mobilization the men who have served in the balloon companies will be designated for the formation of balloon troop units which may then be organized.

The fortress balloon detachments belong to the garrisons of fortresses (as Toul, Epinal, Verdum, and Belfort). Each consists of 3 officers and 52 men. From these fortresses

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several ascensions are made every year. In time of war there will be organized from the peace strength, reenforced by the reserve balloon men; 8 field detachments, 4 fortress detachments, and 1 reserve detachment (depot).

Each field detachment (in time of war) is divided into four columns: First column is for the service of the balloon; second column may be called a gas-supply column, and is exclusively destined for supplying the balloons with gas; third column, bearing the name of storage column, has charge of the transmission of gas from the stores of the fourth column for the use of the second column; fourth column has charge of a movable gas factory, and is designed for the production and the compression of the necessary quantity of hydrogen.

The fortress detachments (in time of war) are recruited from the fortress garrison troops.

The reserve detachment (for time of war), not going into the field, is destined to fill the losses in the field and other troops.

The equipment of these balloon troops in war time is very complete and well designed.

(*a*) FIELD DETACHMENT.

First column.

Material wagon with three balloons and all their accessories	1
Steam windlass with 500 meters of steel cable	1
Tender with the store of water and coal	1
Gas wagons with the store of gas for two and a half fillings	5
Provision wagon	1
Total number of wagons	9

Second column.

Gas wagons with a store of gas for two fillings	4

Third column.

Gas wagons with a store of gas for two and a half fillings	5

Fourth column.

Gas generator	1
Compressor	1
Gas wagons	6
Total	8

(Besides the wagons needed for the transportation of zinc and sulphuric acid.)

Each field detachment will thus have 20 gas wagons, sufficient for ten fillings, as every two wagons contain enough gas for one filling.

(*b*) FORTRESS DETACHMENT.

Matériel wagon with three balloons (as in the field detachment)	1
Steam windlass (as in the field detachment)	1
Tender	1
Generator	1
Total	4

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The French, so-called, normal balloon is the same for the field as for the fortress detachments. It is made of a varnished silk tissue and is about 526 cubic meters in volume. It lifts two men to the height of 500 meters. The balloon basket is hung very cleverly, always preserving (even in high winds) a vertical position.

Besides two normal balloons, a third balloon is carried by each detachment and is called the auxiliary balloon. It is half the size of the normal balloon and lifts one man.

Fortresses have at their disposal a number of free balloons, each 900 cubic meters in volume, inflated with hydrogen.

Every gas wagon can be loaded with eight steel gas receptacles, each containing 35 to 36 cubic meters of gas under the pressure of 2,000 atmospheres. As each of these receptacles is 4 meters long and weighs 250 kilograms, the gas wagons, with their 2,000 kilograms of freight, are very heavy.

The great advantage of the French equipment lies in the uniformity of its matériel for both the field and the fortress detachments.

GERMANY.*

It has been the aim of the German authorities to keep secret the result of their discoveries in the science of aeronautics. The captive balloon is used in the German army in both field and fortress warfare. The balloon detachment is trained for field warfare, while for fortress warfare a special training is given to men selected from among the garrison troops and the foot artillery.

The Prussian balloon detachments are attached to the railway brigade troops, but have their own system of recruiting and a special uniform. There are two companies, each commanded by a field officer. This officer is also in charge of the balloon school, where instruction in aeronautics is given to officers of the various arms of the service. The material, contrary to the system adopted in other countries, is not made in military workshops, but is furnished by private firms, with the view of diverting as few men as possible from the strictly military line of service. Even the furnishing of the gas is mostly left to the civil industry.

* Various sources. Description of the kite-balloon taken from the publication of the Military Information Division: "The Military System of Sweden and other papers selected for publication," Washington, 1896, page 114.

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The Bavarian balloon detachment is organized in the same way and has a matériel similar to that of the Prussian detachment. The more important fortresses are also provided with balloons for the training of the balloon units organized from among the garrison troops.

The German balloon train has the mobility of a mounted battery, owing to the system of putting its wagons upon limbers, and could be used in the advance guard. The balloon can be filled with hydrogen gas in a few minutes, making its tactical application for reconnoissance perfectly assured.

The raising and lowering of the balloon is done by means of a hand winch. Intercourse is kept up between the observers and those below by means of a telephone, the conductor being the cable by which the balloon is held.

Until 1896 the spherical form was used in captive balloons, as it is still used for free ascents. This form was unstable and unfit for use in a wind of 6 to 7 meters velocity. The kite balloon, invented a few years ago by two officers of the Bavarian balloon detachment, is now used in both the field and the fortress service.

THE KITE BALLOON (PATENTED).

The ordinary spherical captive balloon is acted upon by the wind in such a manner that the stronger the wind the more acute becomes the angle which the cable makes with the ground. In gusts, particularly in disturbances of the air acting vertically, the balloon is subject to violent oscillations, and in a strong wind it sometimes touches the ground. These defects may under certain circumstances prevent observations altogether, and the loss of gas resulting from the violent movements seriously shortens the time during which the balloon can be kept in operation. The kite balloon does away with these defects.

The kite balloon has been given a cylindrical shape, with hemispherical ends. The long under surface acts like the face of a kite, the balloon being so adjusted that its longitudinal axis lies in the same vertical plane with the direction of the wind and forms an angle of about 20° with the horizontal, in consequence of which the extremity facing the wind stands considerably higher than the other. The oblique position of the longitudinal axis is produced by suspending the

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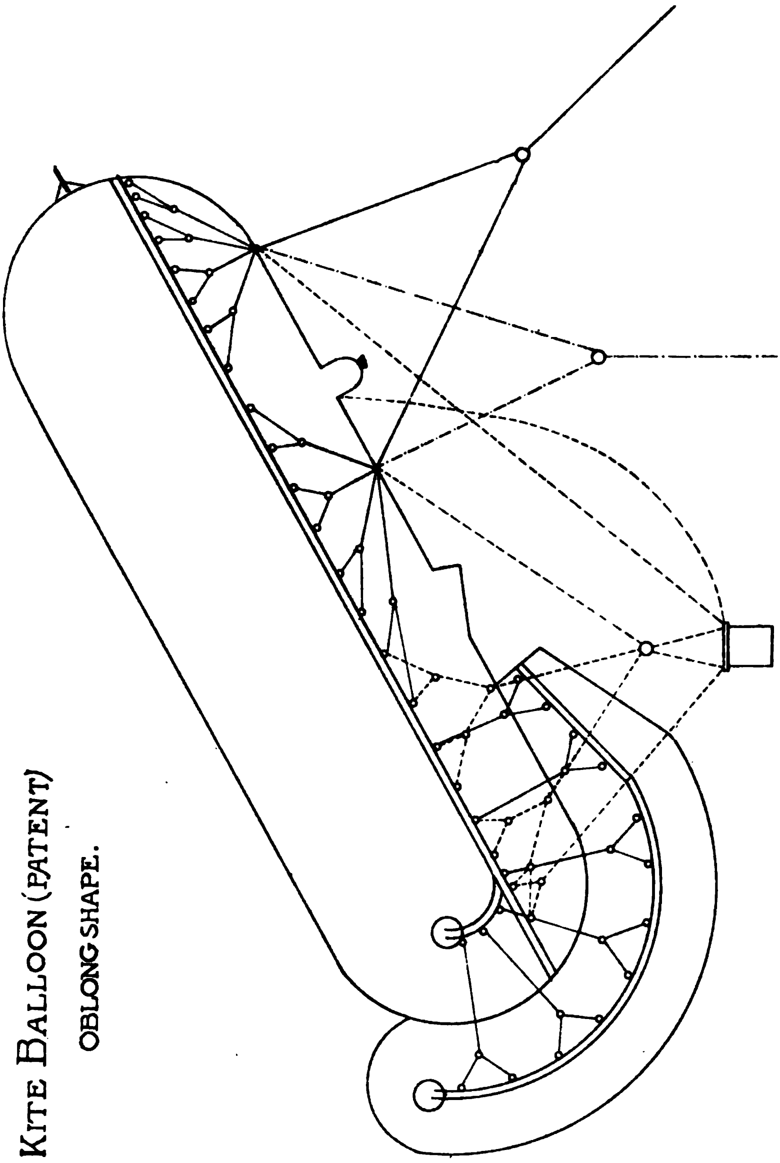
PLATE IV.



KITE BALLOON (PATENT)
OBLONG SHAPE.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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weight to be carried from the rear and lower half, and the cable from the forward part, which is facing the wind.

On account of the large under surface, vertical movements of the balloon are checked. The balloon, however, has a tendency to lateral oscillations which, in a violent wind, attain dangerous proportions. It was necessary to get rid of these lateral oscillations by means of a vertical rudder, which, in conjunction with the rear portion of the main body, presents a rigid, vertical surface of considerable extent. This device has the shape of the sector of a ring joined to the rear part of the balloon, as shown in Plate IV, and is inflated with air.

In order to prevent the formation by the wind of concavities in the balloon surface and the bagging of the envelope from loss of gas, the balloon is provided with an air pouch (ballonet) which is inflated by means of a trumpet-shaped wind sail arranged perpendicularly to the wind. The rudder pouch is inflated by the wind in the same way. Automatic valves in the wind sails increase their efficiency.

The bursting of the balloon is guarded against by a safety valve attached to and opening into the ballonet and, moreover, the main valve also acts as a safety valve.

No framework enters into the construction of the balloon, as a framework is a source of danger to the balloon when it is being filled in the open in a strong wind, during which action violent movements of the balloon are unavoidable.

DIMENSIONS, DETAILS OF CONSTRUCTION, ETC.—The principal parts of the balloon are:

(1) The cylindrical main body with hemispherical extremities.

(2) The ballonet.

(3) The rudder.

For these parts the following dimensions have been found suitable, any departure from which materially modifies the action.

Principal dimensions.—Circumference of the main cylinder to its length, 20:15.

Ballonet.—The seam of the ballonet coincides with a section which passes through the middle of the lower element of the cylindrical part and the center of curvature of the after hemisphere, and which is perpendicular to the vertical plane of symmetry of the balloon.

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Rudder.—The main body of the rudder forms a portion of a ring of circular cross section. It encircles the after hemisphere, and terminates above in a hemisphere and below in a cone. The diameter of the rudder is approximately half the transverse diameter of the cylinder of the balloon. The cone should be approximately so proportioned that its point would coincide with the middle of the lower element of the main balloon.

Holding belt.—At a distance below its middle, equal to about one-fifteenth the length of the cylindrical body, the balloon is encircled by a strong belt of about 25 centimeters in width, made of stout sailcloth and protected on both sides from the effects of moisture by simple rubber-coated material. To this belt are fastened the tackles of cable and basket.

Attachment of the lines.—The "three-loop system" has been found the best for attaching the lines to this belt. The system is so constituted that each line is passing through two opposite horizontal loops and through a third, which is perpendicular to the first two. No matter in what direction the strain of the line may act, its end will assume such a position that the tension of the loops acts nearly in their longitudinal direction, which prevents their being torn off. Loops that are made of stuff should be sewed to the belt for a length of not less than 50 millimeters with strong thread and three rows of stitching and wrapped with twine where they come in contact with the lines. They are best made of raw balloon stuff. The loops must stand a tension of 50 kilograms without any loosening of their fastenings.

Attachment of the lines to the cable.—In order to distribute the forces which act on the lines as uniformly as possible over the belt, the lines are not connected so as to form a net but are arranged in a series of tiers freely movable at their ends. Thus one of the stay ropes has at its end a thimble through which passes another line which has thimbles at both ends; through these thimbles two more lines pass, and so on until the fourth tier is attached to the belt by sixteen loops; the third and fourth tiers do not need thimbles, simple spliced or knotted loops being sufficient. The individual cords should not be made too long, as otherwise they are apt to twist together when wet, which impedes the free action of rigging. This holds good more particularly for the fourth tier, which attaches directly to the belt; here braided cord should be used.

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Patented kite balloon

long form

Vertical section through longitudinal axis.

Balloon ascending.

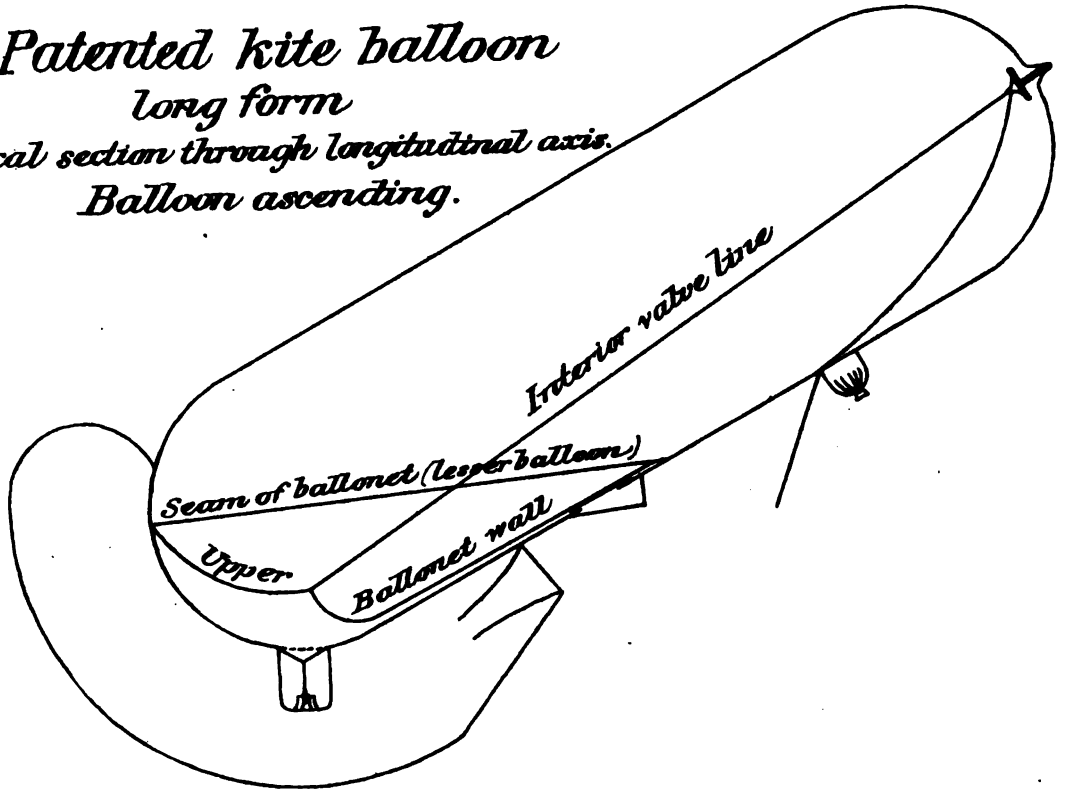

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PLATE V.

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If the arrangement of the ropes leading to each stay rope is simply termed a "system," four systems at least should be used on each side of the balloon for holding it and three for holding the basket. In the diagram some of the systems of rigging of balloon and basket are indicated by broken lines. These systems are not all entered on the diagram, in order not to impair its clearness.

Suspension of the cable.—In order that the cable may distribute its action as uniformly as possible over the belt in wind of varying force, so as to guard against a bending of the balloon, a pulley is attached to the end of the cable, through which a strong rope is passed. This rope is split at both ends and is fastened by its four extremities to the riggings of the balloon. The broken and dotted lines of the diagram show the cable in a different position and illustrate the action of the pulley. For this purpose the stay ropes on each side of the balloon are spliced to steel rings, there being one ring for every two stays, whereby four points are established which will not shift their geometrical position with reference to the body of the balloon however the balloon may move. The correct location of these four points is essential for the proper working of the balloon. They are situated on a line with the lower element of the balloon, the two to the front being in the plane in which the hemisphere joins the cylinder, while the two to the rear are at a distance from the former equal to about nine-tenths of the diameter of the balloon.

Arranging the tackle.—The tackle is best arranged with the balloon spread out flat on the ground and the belt drawn out straight. The stay ropes are in the first place knotted into the four steel rings. The stay ropes of the basket are fastened to a steel ring, the position of which is in front of the plane joining the rear hemisphere to the cylinder, and, measuring in the direction of the axis of the balloon, at a distance from this plane equal to three-fifths of the balloon's diameter. The lines carrying the basket are attached to this ring directly or by means of another steel ring of a diameter of about $\frac{1}{2}$ meter. Rotation of the basket itself is guarded against by means of suitably arranged guy ropes. To prevent oscillations of the rudder, the latter is connected with the balloon on both sides by lines. For attaching these lines to the entire circumference, the rudder is provided with a belt on

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both sides and a little in the rear of its axial lines; in like manner the balloon is provided with an arc-shaped belt surrounding the lateral pole of the hemisphere and distant from this pole at least one-fifth of the transverse diameter of the balloon. These belts, like the main holding belt, are provided with loops and the lines are fastened in the manner described above. The fastenings of the cone of the rudder are attached to the main or holding belt.

Tension on the balloon surface.—Individual tensions to be borne by the balloon from single lines, ends of belts, buttons, and the like, should be distributed over as much balloon surface as possible, to prevent a tearing of the material. This is accomplished by gluing at these points circular plates of double material and attaching the lines to them; in some cases it is advisable to sew cross loops to these plates before gluing them on, and to use them for attaching the lines.

Openings.—Openings on the balloon surface should have their edges reenforced and should be of circular section.

The action of the kite balloon in the air.—The ballonet is intended, in case of loss of gas from the balloon, to inflate itself automatically with air, so that the exterior form of the balloon shall be distended. The ballonet is capable of replacing the loss of one-fourth of the gas volume. The ballonet should be situated in the lowest part of the balloon.

To prevent strong gusts from producing indentations of the balloon surface the wind is gathered in a funnel-shaped aperture set perpendicular to the direction of the wind and conducted into the ballonet through an opening. The impact of the air causes a tension in such a funnel-shaped opening, and this tension is transmitted to the interior of the ballonet, and thence from the bellying upper wall of the ballonet to the lifting gas. In addition to this pressure there is the pressure within the volume of gas itself due to the static buoyant effort, a pressure which varies according to the altitude of the atmospheric stratum. The higher portions of the balloon, particularly at the end opposed to the wind, are thus subjected to an inner excess pressure superior to the one which the wind is capable of bringing to bear from without. In this manner the formation of concavities at the head of the balloon by the action of the wind is impossible at any time.

But the force of the gust is never constant and its variations would produce a constant influx and efflux of air through

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Patented kite balloon
long form.

Vertical section through longitudinal axis.
Balloon after being recovered from a great height.
Ballonet filled.

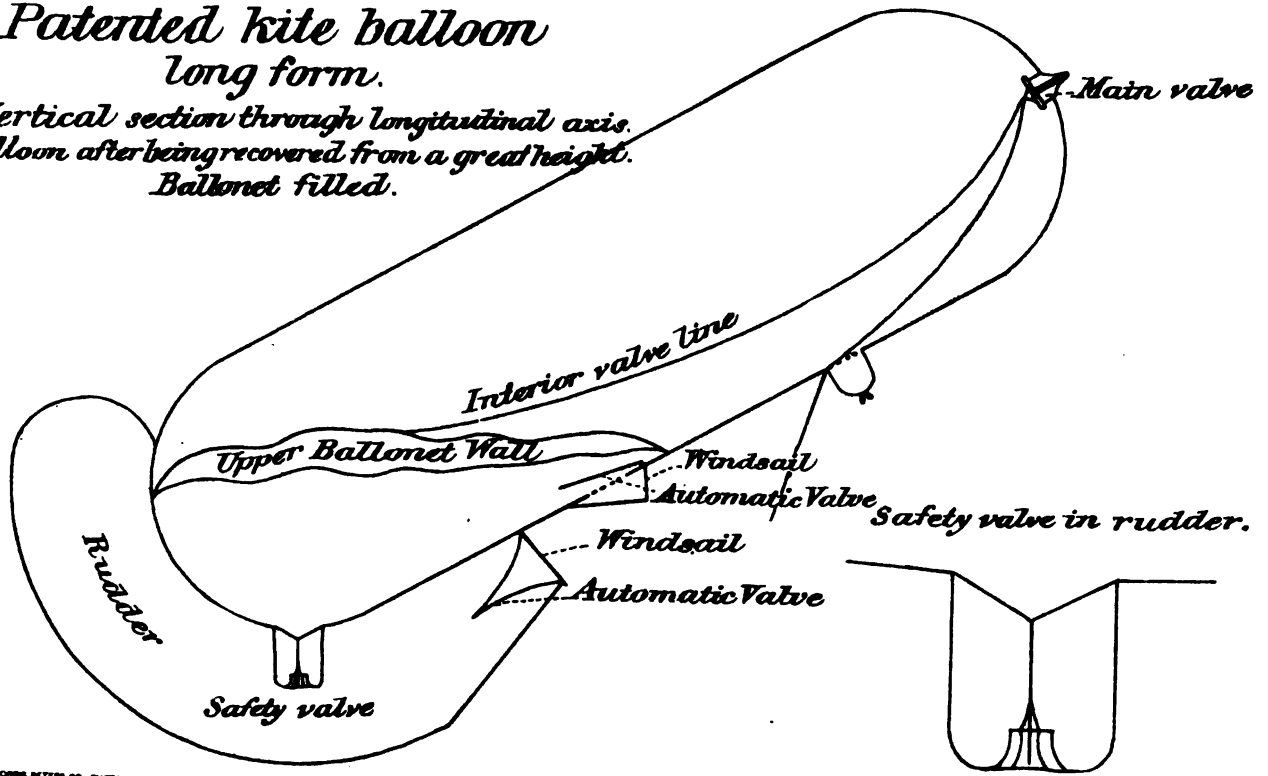

PLATE VI.

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the wind sail, changing the shape of the balloon continually, so that the balloon's movements could not then be predicted. To prevent this, the aperture of the ballonet is closed by a valve which is made of fabric and which, while easily admitting air, prevents its exit. It consists of a quadrangular piece of material, which by its front edge is fastened to the ballonet, and whose other two corners are maintained in the proper position by means of lines at least 1 meter in length.

The automatic valve of the wind sail completely closes the ballonet, and the balloon might thus be burst by the expansion of its contents. On this account a safety valve has been provided for the ballonet, which will open automatically under a certain excess of pressure. The following simple form has been found suitable for the valve: In the ballonet wall there is a circular opening to which a hose made of balloon stuff is attached; its lower edge is provided with a number of eyelets to which an equal number of strings are fastened; the latter all run together into one. The same is done at the upper end of the hose where it joins the wall of the ballonet. The junction points of the strings are connected by an elastic cord. The lengths of the hose, strings, and elastic cord are such that when no forces are acting on the valve, the elastic cord will choke the outer end of the hose and will pull its edges inwardly. But when there is an excess pressure in the interior of the balloon the elastic cord will be stretched, and under sufficient pressure from within it will give the lower opening more or less play. In this manner the action of an automatic valve is produced. Under a certain excess pressure the valve opens and permits the air to escape through it into the interior of the rudder.

If this function comes into operation, for instance, during the ascension of the balloon, the air will soon be driven out of the ballonet in the manner described above, and there may be renewed danger of the balloon's bursting if some valve does not open itself in the gas compartment. For this purpose a line in the interior of the gas compartment is carried from the main valve, which is located in the center of the forward hemisphere, to the inner (or diaphragm) of the ballonet and is there fastened by means of several plates. The length of the line is such that when the balloon wall [diaphragm of ballonet? — *Tr.*] is about 1 meter from the balloon envelope, the line becomes taut and opens the valve.

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This will happen under very small pressures owing to the large surfaces of fabric acted upon.

To test the safety valve, the gas, when the balloon is being inflated, is allowed to enter until the main valve begins to play; the balloon is now full and the automatic opening of the gas valve in the air is assured.

When filling the balloon it is necessary to open the ballonet to enable any air that may have entered to escape, since the low position of the balloon precludes any working of the safety valve.

The rudder is entirely independent of the balloon, and has its own wind-sail, which consists of an aperture of a cross-section of more than 1 square meter in the conical part facing the wind. In order that the rudder may be well inflated it is likewise provided with an automatic valve, which consists of a short, wide hose, with a cross-section equal to that of the aperture and is sewed to the same. The hose lies in the interior of the rudder and its inner edge is provided with lines which are fastened to two opposite points and which draw the inner aperture of the hose flat. The lines are made fast to plates in the material of the cone and are under slight tension only; the air can thus easily enter, but can not leave the rudder by this route. The air escapes through an aperture, of a diameter of about 20 centimeters, at the upper extremity of the rudder in the middle of the hemisphere.

AUXILIARY KITE BALLOONS.—To prevent all troublesome oscillations of the balloon, small kite balloons are attached to the principal balloon by lines, so that they stand off at a considerable distance from the main balloon. The form and arrangement of these auxiliary balloons is as follows: The main body consists of a ring having an opening of a diameter of about 10 centimeters. It is encircled by a second ring, the lower element of which is flush with that of the inner ring. The systems of lines arranged as in case of the main balloon, are attached to the second ring and from their point of junction a line passes through the central opening which ramifies and takes up the strain of the wind acting on the central parts of the balloon. The whole surface of the base is smoothly covered in with material. To this covering a windsail is attached, which admits air to the spaces between the covering and the rings of the balloon so that these spaces act as a ballonet and preserve the shape of the balloon. To

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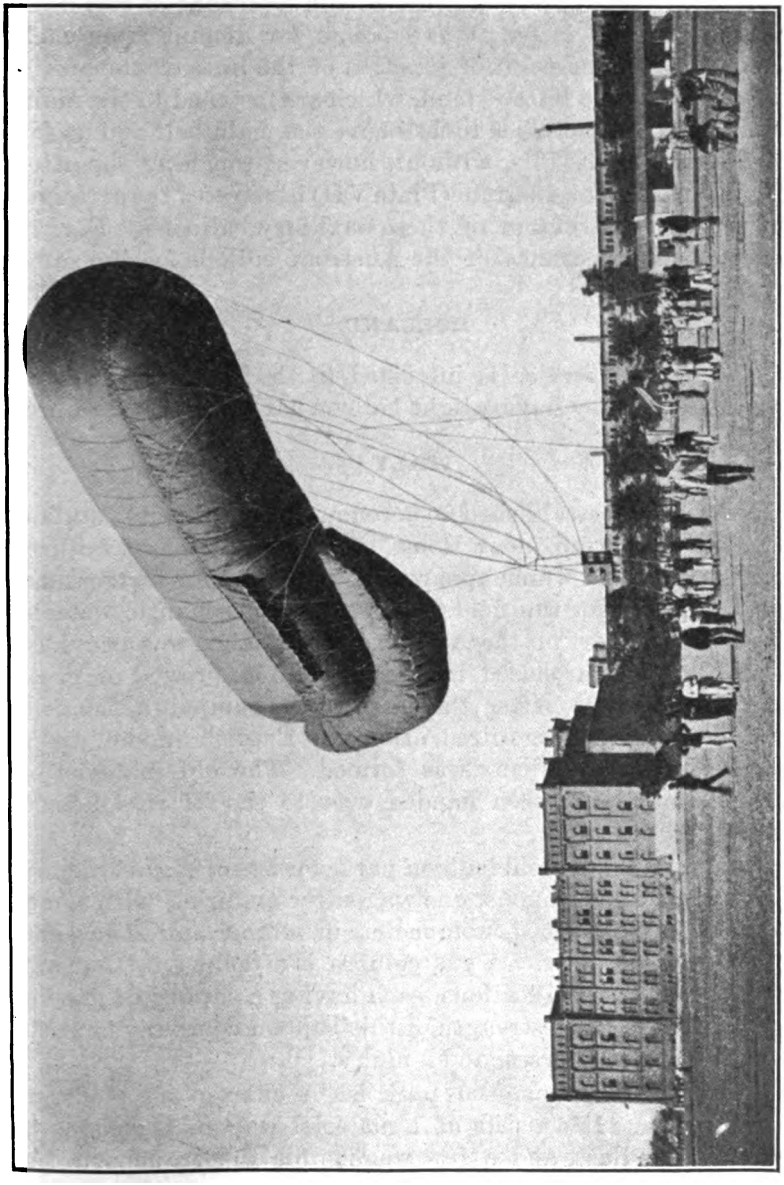

Fig. 22.

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prevent unnecessary oscillations a device shaped like the tail of a kite is connected with the balloon by means of two lines attached to the latter at two points far distant from each other. From the point of junction of the lines of the auxiliary balloon two lines extend, which are fastened to the main balloon at two points a little above the main belt and as far to the rear as possible, without, however, touching the after hemisphere. The diagram (Plate VII) illustrates the arrangement and construction of these auxiliary balloons. Fig. 22 shows the appearance of the Austrian balloon of the same type.*

HOLLAND.†

The balloon service is intrusted to the sixth company of engineers. They have a light balloon park from Lachambre.

ITALY.†

Italy in 1885 established an aeronautic experimental station at Fort Tiburtino, near Rome, and purchased two balloon parks from Yon, which apparently were good for fortress use but too heavy for the field. In 1887 the aeronautic detachment taking part in the Abyssinian campaign was provided with matériel purchased in England, which proved of great practical utility. After the close of the campaign the field balloon park was organized after the English model, and a special balloon company was formed. The old matériel of French make has been handed over to the fortress detachments.

In war time the field balloon park consists of eight wagons, namely: six gas wagons, one wagon for matériel, with a varnished silk balloon 526 cubic meters in volume, and one wagon for a hand windlass. A gas column is attached to the park and consists of two sections, each having a supply of gas for one inflation. The strength of this balloon company is 2 officers, 73 men, 30 horses, and 2 mules.

The fortress aeronautic park is in charge of 2 officers and 60 men. It consists of 1 matériel wagon, 1 generator, 1 steam windlass, and a few wagons for the transportation of sulphuric acid and iron filings for generating gas.

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* Fig. 22 taken from "De Militaire Spectator."

† "v. Löbell's Jahresberichte 1898."

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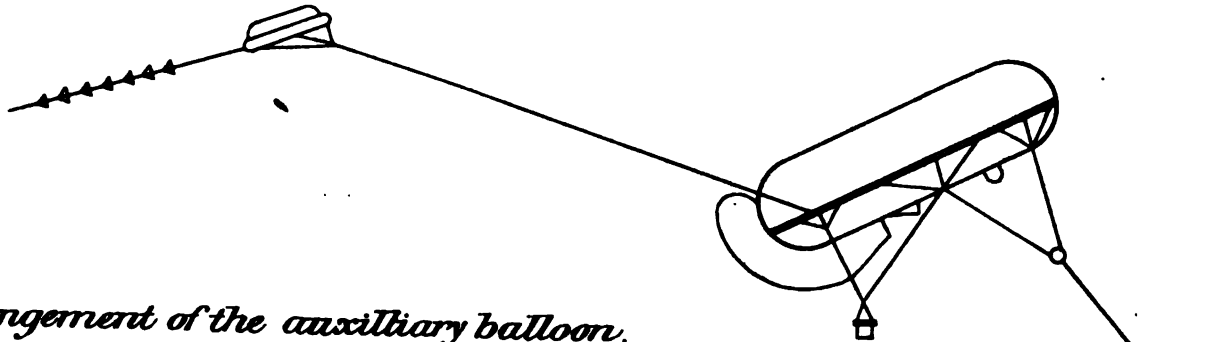
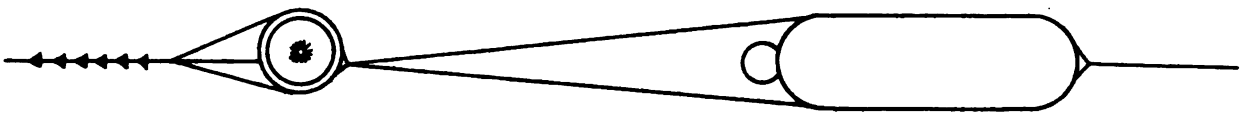


Arrangement of the auxiliary balloon.



Vertical section, auxiliary balloon.

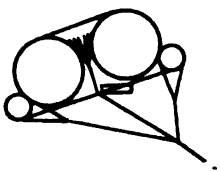


PLATE VII.

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JAPAN.

Very little is known of the use to which the light balloon train purchased from Yon has been put.

PORTUGAL.

A light balloon park was acquired from Lachambre in 1899. Balloon troops have not been organized.

ROUMANIA.

A light balloon park has been purchased from Yon. A balloon troop detachment is formed from men belonging to the first regiment of sappers, with headquarters at Bucharest.

RUSSIA.*

The balloon instruction park, situated near St. Petersburg, and organized upon the model of the French central balloon section, is a school for the officers and men of the Russian army, who are sent there periodically. Its permanent organization consists of 1 field officer, 2 captains, 1 second captain, 2 lieutenants, and 88 men.

Its duties, besides instruction, are to conduct experiments and investigation in the domain of aeronautics, and to construct the matériel in government factories. In case of mobilization, the park is to form field balloon detachments. The present peace organization of the field park is unsatisfactory, because the gas for filling the balloon is generated on the spot, requiring several hours' delay, and the train is very heavy, lacking mobility.

On the other hand, much importance is attached to the fortress balloon parks. There are at present six of these, well organized and equipped—one each in the fortresses of Warsaw, Osovets, Novo-Georgievsk, Ivangorod, Kovno, and Jablonna (near Warsaw). The composition of each park is: In peace time, 2 officers and 52 men; in war time, 5 officers and 136 men. Each park can handle three captive balloons at the same time. Much importance is also ascribed to balloons as a means of signaling. To sum up, Russia has not enough field-balloon units (and those which she has are poorly equipped), while her fortress balloon troops are well organized and well supplied.

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* "Razviedchik," July 13, 1899.

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SPAIN.

At present there is a heavy balloon train acquired from Yon, of Paris, the fourth company of the telegraph battalion being designated as balloon troops. It is proposed to organize an independent balloon detachment, which will be equipped with modern light matériel.

SWITZERLAND.

In the new organization of the federal army, Switzerland, profiting by the experiments of other countries, has a splendidly equipped balloon detachment. It consists of 1 captain, 2 or 3 lieutenants, 70 noncommissioned officers and men, 8 riding and 50 draft horses, and 14 wagons. The balloon train consists of 1 wagon for the cable, 9 for the compressed gas, and 2 for accessories.

USES OF BALLOONS.

Balloons are classified as free, captive, and dirigible. They are used principally for reconnoissance, for signaling, and for the transmission of messages. Although balloons are recognized universally as a splendid medium of reconnoissance, many are opposed to their use. It is claimed that the captive balloon betrays the presence and the position of the forces using it. In reply, it may be said that an army of sufficient magnitude to employ a balloon train will surely betray its presence, at least at the distance of a day's march, regardless of balloons, while a captive balloon can give the enemy no correct idea of composition, strength, or dispositions. The advantages obtained from its proper use greatly outweigh any knowledge it may give the enemy.

Another objection to the use of captive balloons is that they are unable to ascend in any but very calm weather. The Germans have overcome this objection to the extent that their balloons can be used on eight days out of ten.

Balloon reconnoissance permits accurate sketches to be made of the enemy and the ground, or, better still, photographs can be taken. Further development of telephotography—photographing with the aid of a telescope—will, perhaps, make possible the taking of accurate photographs at distances beyond 6 kilometers, now practicable only below that limit.

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In siege work the captive balloon enables the besieged to keep close watch on the movements of the enemy during the day, and with search lights also at night.

Free balloons must carry a larger load and remain a longer time in ascension than captive balloons. Hence they have a capacity of about 900 cubic meters. A large part of the increased capacity is needed to carry the ballast, on which, to a considerable degree, the duration of ascension depends. After the free balloon has reached its first zone of equilibrium, that is, has ceased to rise and floats with the air current at a fixed altitude, the escape of the gas through the material causes it gradually to descend, to avoid which some ballast must be thrown out. As it is quite impossible to determine the amount which will exactly counteract the effect of the loss from the causes mentioned, too much may be thrown out, and the balloon will rise again to a second zone of equilibrium. As this action is repeated several times during the course of the voyage of a free balloon we have several alternate descents and ascents, the balloon finally coming down gradually when all the ballast is gone.

Inability to determine the course or destination of free balloons limits their use in warfare. Free balloons have found their most important application in enabling the besieged to escape to their friends, or in carrying messages, as in the siege of Paris.

Signaling from captive balloons has received more attention in Italy than in any other country. In their Massowah expedition a special company devoted its time to the use of electrical and calcium search lights and signaling, and proved of great assistance to their troops. In maneuvers at night, the considerable altitude of a captive balloon renders its search light visible to every unit of a force, enabling it to regulate its movements accordingly.

Dirigible balloons are still unknown quantities. When they cease to be such, warfare will be revolutionized.

Still, some trials of such balloons have proved successful. On August 9, 1884, the French captains, Renard and Krebs, in the balloon "La France," built by them, made a voyage of about twenty minutes' duration, developed a speed of 19 feet per second, and returned to their starting place. This was on a calm day, and is a record which has never been equaled.

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Many experiments are under way to secure a lightness and speed sufficient to enable a dirigible balloon to navigate the air as our ocean liners plow the water below. Among the most remarkable of such experiments may be mentioned the trial made on July 2, 1900, the testing of Count Zeppelin's dirigible balloon on Lake Constance. It was the aim of the inventor to construct a balloon which would be provided with at least two independent motors, so as to have one motor in reserve in case the other became useless, and which would still float even if both motors stopped. The balloon was to be capable of navigating for several days without requiring replenishment with fuel, gas, or provisions, and of going in any direction whatever, even against the wind. The balloon was 416 feet long and 38 feet in diameter. It consisted of aluminum trellis work holding 17 balloons, thus having its body divided into compartments. When fully inflated the balloon contained 11,300 cubic meters of hydrogen, and had a lifting force of 10 tons. The propellers were actuated by two Daimler motors of 15-horsepower each, one being placed in the car at the front of the balloon and the other at the rear car. The occupants of these cars could communicate with each other by telephone. By means of a weight attached so that it could be made to slide on a rod under the airship, the latter was made to move in a horizontal or inclined plane, as desired. The balloon on its trial trip remained in the air for over twenty minutes, making a distance of 3½ miles, with the wind, and at a speed of 26 feet per second. It was found that the propelling power did not develop sufficient speed, 32 feet per second having been expected. The steering apparatus was also unsatisfactory. These defects may be remedied in time, but any increase in the weight of the machinery will, of course, affect the static condition of the balloon. Its construction cost $24,000, and the cost of a single filling was $2,380. These figures seem to be a serious drawback to the manufacture of such balloons. The above-mentioned sums include the expenditure for "wharf" and balloon house, and, in the case of gas, the cost of transportation over a considerable distance; consequently, the balloon alone would involve smaller expenditure.

Experiments have been conducted with the object of solving the problem of aerodromes, the true flying machines. Experimenters are numerous, machines invented by them

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are often very ingenious, and some of them have made successful trips in the air. However, up to the present time, none of these machines has proved itself of practical utility, and there are no signs indicating proximity to the solution of the problem. There is a tendency, noticeable in some recent experiments, toward the construction of a combination airship consisting of a small balloon and an aerodrome.

FIRING AT BALLOONS.

Many experiments have been conducted to determine the vulnerability of balloons. In Austria, in 1895, a balloon of 600 cubic meters volume, at an elevation of 750 meters, fired at from 1,115 meters, fell after 16 shrapnel shots, with 27 holes. At 5,100 meters, 64 shots brought down the target with two large tears and five holes. A battery of eight 8-centimeter guns fired 80 shrapnel at a balloon at an elevation of 800 meters and a range of 5,300 meters. Result, unsuccessful, but the balloon was hit three times.

In England, in 1886, a balloon at 1,500 feet elevation, range 3,000 yards, was not hit after 12 rounds of shrapnel had been fired at it. In August, 1899, at a range of 3,500 yards, elevation of 1,700 feet, a balloon drifting in the line of fire, very favorable for hitting, was struck after forty minutes firing and at the sixteenth round. It descended slowly, and while descending was again hit. The damage done to the balloon consisted of two tears about 1 foot long each, and eight or nine small holes. This could have been easily repaired on the spot, so as to have the balloon again available for duty on the same or the next day.

It is erroneous to suppose that a few holes in a balloon will bring it down at once. On the contrary, most of the shots pass from side to side of the lower half of the balloon. Few go through the upper part. The gas, of course, escapes but little in a downward direction. Consequently a balloon may remain long in the air, even after having been hit by many projectiles.

The vulnerability of captive balloons has been determined by numerous experiments conducted by many nations during a number of years. It is proved that only shrapnel fire is dangerous. Field guns can very seldom be elevated sufficiently to hit a captive balloon. Balloons are usually held at 1,000 to 1,500 meters elevation. At these elevations they can

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be hit only by siege guns (12 centimeters and 15 centimeters). To be absolutely safe from fire the balloons must be kept away from the enemy at the distance of 5 kilometers in field operations and about 7 kilometers in siege warfare. Balloons can be used much nearer the enemy, and the chances of being hit are very slight, if ascensions of short duration are made or if the balloons are kept in motion.

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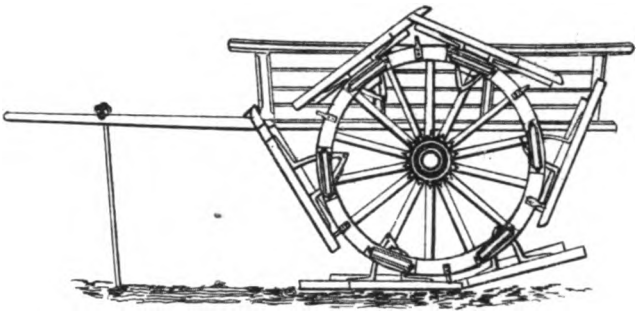
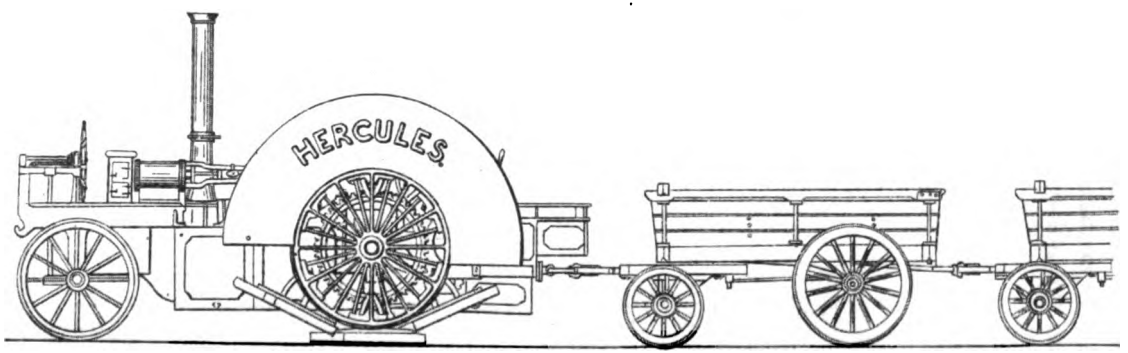


—Cart fitted with Boydell's 'Endless Rails, 1855.



—The Boydell Traction Engine with Endless Rails (*Porte Rail*), 1854. As used in Crimean War.

THE HORNIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

PLATE VIII.

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CHAPTER V.

TRACTION ENGINES AND ARMORED TRAINS.

TRACTION ENGINES.*

The Boydell traction engine with endless rails was used successfully in the Crimean war of 1854. The crudeness of this means of traction is apparent from the illustration (Plate VIII), but it was found very useful by the British in transporting heavy artillery and other loads from the magazines at Balaklava to the front.

The war of 1870 showed the value of traction engines for forwarding supplies. The Prussian war minister purchased two Fowler traction engines. General von der Goltz states that the work done by them included the transportation of some tons of ammunition and coal and four gun carriages, and the hauling of two locomotives and tenders around broken portions of railways; in one instance around an unrepaired tunnel. If the German army had secured more of these engines the transportation of heavy guns for the siege of Paris would have been very much facilitated. The work done seems especially remarkable, considering that these engines were constructed for drawing plows, weighed 20 tons each, and were too heavy for pontoon bridges. On short winter days and with bad roads they made 15 miles a day, while on longer days and better roads they made as high as 25 and 30 miles.

In the Russo-Turkish war of 1878 the Russian and Roumanian railways were inadequate, and were insufficiently equipped with engines and other rolling stock. This gave a field for the use of traction engines. Major Demianowitsch, of the Russian army, states that the twelve traction engines used gave satisfactory results, transporting for the army in the field 9,141 tons of matériel, at a reduction of cost and a

*From "Mechanical Traction in War," by Lieutenant Colonel Otfried Layriz, of the German army, translated by R. B. Marston; "Scientific American," and other sources.

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saving of labor. Those of the Roumanian army before Plevna were also very effective and were used in arming the batteries.

Although used successfully in two great compaigns, no great preparation was made for their use in future wars, presumably on account of the abundance of horses. Italy was the exception, because of the scarcity of draft animals in that country. From 1875 to 1883 traction engines there rendered efficient service, especially in the great maneuvers, even drawing heavy guns and carriages over the Apennines. Though half the weight of those used in 1870, their employment was discontinued in 1883 for several reasons. The engines required about 440 gallons of water every 8 or 9 miles, and about half a ton of coal every 24 miles; the smoke and noise caused the interruption of ordinary horse traffic. The engines drew only twice their weight on the level, and the jolting ruined engines and exhausted drivers. Speed was desired, but resulted invariably in the engines breaking down.

The French were only partially successful with road locomotives until improvements in mechanical construction permitted much lighter engines and boilers of rapid vaporization.

The tests recently made at the Versailles headquarters, extending from 1897 to 1900, convinced the French military authorities that the traction engine is capable of rendering great service to armies in the field, including transportation of siege guns and other large pieces of artillery.

Over two dozen traction engines were used by the British in South Africa. They were of great assistance on the lines of communication.

SOME TRACTION ENGINES IN USE.

At present there are two kinds of steam motors available for road transport in war—the road locomotive (traction engine) and the steam wagon. The former is for traction only and draws trains of wagons; the latter is primarily an automotor, and is used only to a limited extent for traction purposes, such as hauling single guns. While a train of such light automotors would conserve the usefulness of roads and bridges, the great amount of water and fuel required would be a disadvantage. A comparison between cost, length of trains, and number of men required to serve them, of a traction engine drawing loaded cars, and a number of steam motors carrying the same load, shows the traction engine and train of cars to

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cost one-half as much, to require one-fifth the number of men, and to occupy less than one-third the distance in column as the steam motors. A former objection to traction engines was the noise and smoke which disturbed horse traffic on the same road. This has been overcome by the utilization of the steam expansion, so that the exhaust takes place at a low pressure, almost noiselessly. The traction engine is now pronounced superior to the steam wagon.

Fig. 23.—Scotte Traction Engine at the Versailles Army Headquarters.

After a very thorough series of tests the French army has adopted the Scotte traction engine or automobile. It is also a carrier, transporting in the rear a load of 4 tons. It draws a train of strong trucks and army wagons, and transports from 10 to 12 tons useful load with an average speed of 4 to 4½ miles an hour on ordinary roads, while on good roads this speed may be increased. Its nominal capacity is 27 horsepower, but this is raised to 40 when necessary. The Scotte engine weighs less than 6 tons and is capable of passing over all classed roads of France without injuring them, making turns of an interior radius of 11 feet. The rolling stock may be drawn by horses or by the tractor without any change.

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Recent experiments have proved that 25 of these engines can supply an army corps of 60,000 men, at a distance of 60 miles, in eighteen hours, with its ammunition. Fifty 9-inch guns,

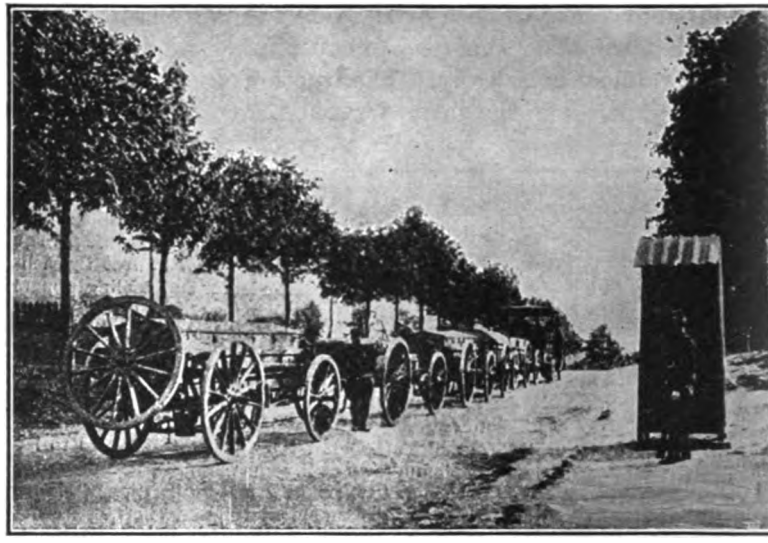

Fig. 24.—Ammunition Wagon on 8 per cent Grade—Total Weight, 18 Tons.

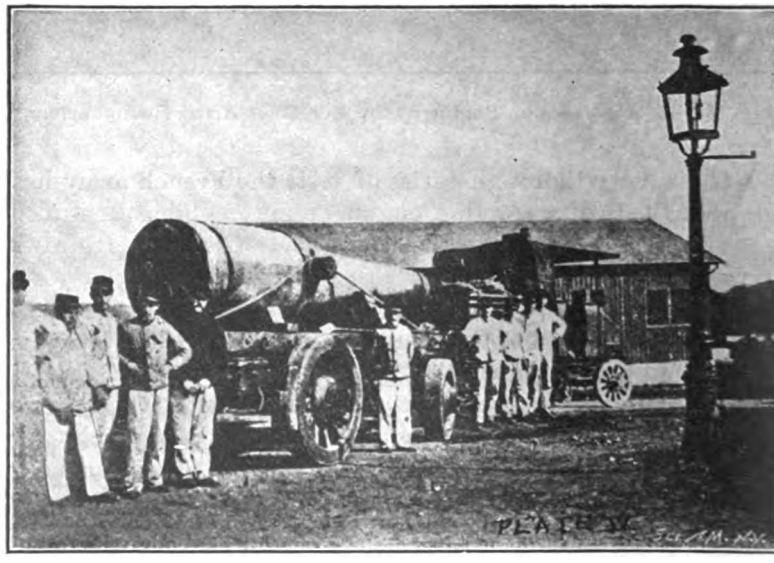

Fig. 25.—10-in. Siege Gun, Weighing 55,000 lbs., Drawn by Scotte Engine.

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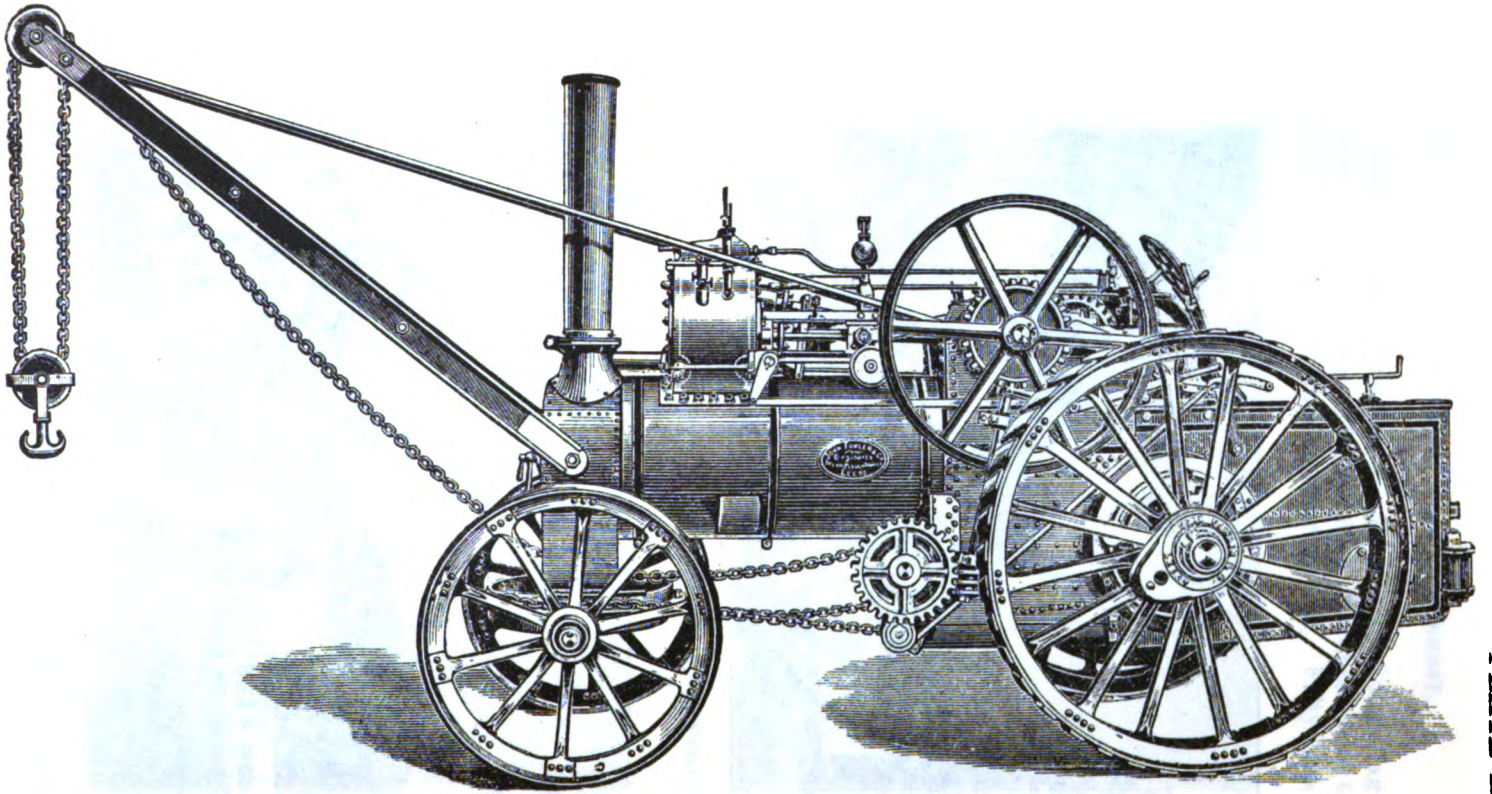

PLATE IX.

THE JOSEPH PETERS CO. PHOTO-LITHO. WASHINGTON, D. C.

—Fowler Road Traction Engine fitted with Crane.

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weighing 24 tons each, have been moved 9 miles in one night by the same number of engines.

John Fowler & Co. have improved on the road engines furnished the German army in 1870. The engines that this firm now makes for the English war office are more lightly constructed, one of 10 tons' weight working up to 50 indicated horsepower. They are more economical on account of a better utilization of the heating material. The water supply, from 60 to 90 gallons, is replenished only every 8 or 9 miles on a level road, and with a tender at less frequent intervals. The fire boxes of the engines are adapted to the use of wood, naphtha, and agricultural refuse. When the engine is firmly planted crosswise, its power may be multiplied to overcome steep grades or other obstacles by winding or warping by means of a capstan and 50 yards of steel-wire rope connected with the rear driving axle. This engine draws after it a load of 22½ tons on gradients of 1 in 12, and winds it up gradients of 1 in 8. A crane fixed on the engine adds a means for hoisting.

A recent design is Fowler's armored traction engine and train. Bullet-proof steel plates tested to withstand rifle fire at 20 yards range, or splinters from shells, cover the special road locomotive and three or four wagons which make up each train. A cannon can be mounted in each wagon. Protection is given to all the vital parts, but nothing prevents the driver or steersman from blowing off, washing out, and otherwise cleaning the boiler, lubricating the working parts of the engine, or paying out the steel cable on the forward winding drum. The locomotive is Fowler's compound, spring-mounted type. If desired, its armor can be removed, and it will be similar to the army service type now being used in South Africa. The boiler is constructed to work at a pressure of 180 pounds to the square inch. By means of a self-acting differential gear a speed of 1½ to 3 miles an hour is made in slow gear, about 2½ to 4½ miles an hour in middle gear, and about 6 to 8 miles an hour in the fast gear. The driving wheels are 7 feet in diameter by 24 inches in width, and provided with section strips for giving increased hold on the veldts and sandy ground.

The driver and steersman are inclosed in a large cab, access to which is obtained by a small door in the rear. Lookout holes provided with special shutters are arranged for the

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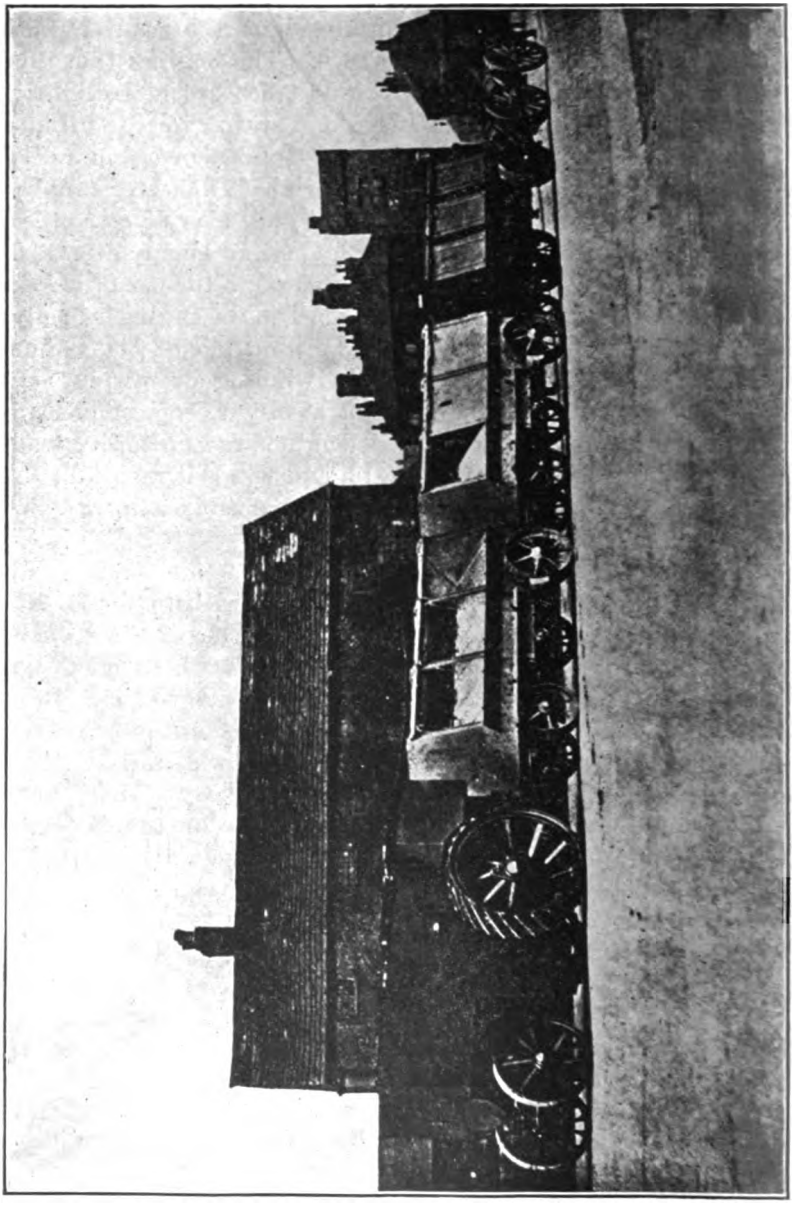

Fig. 26. General View of the Fowler Armored Road Train.

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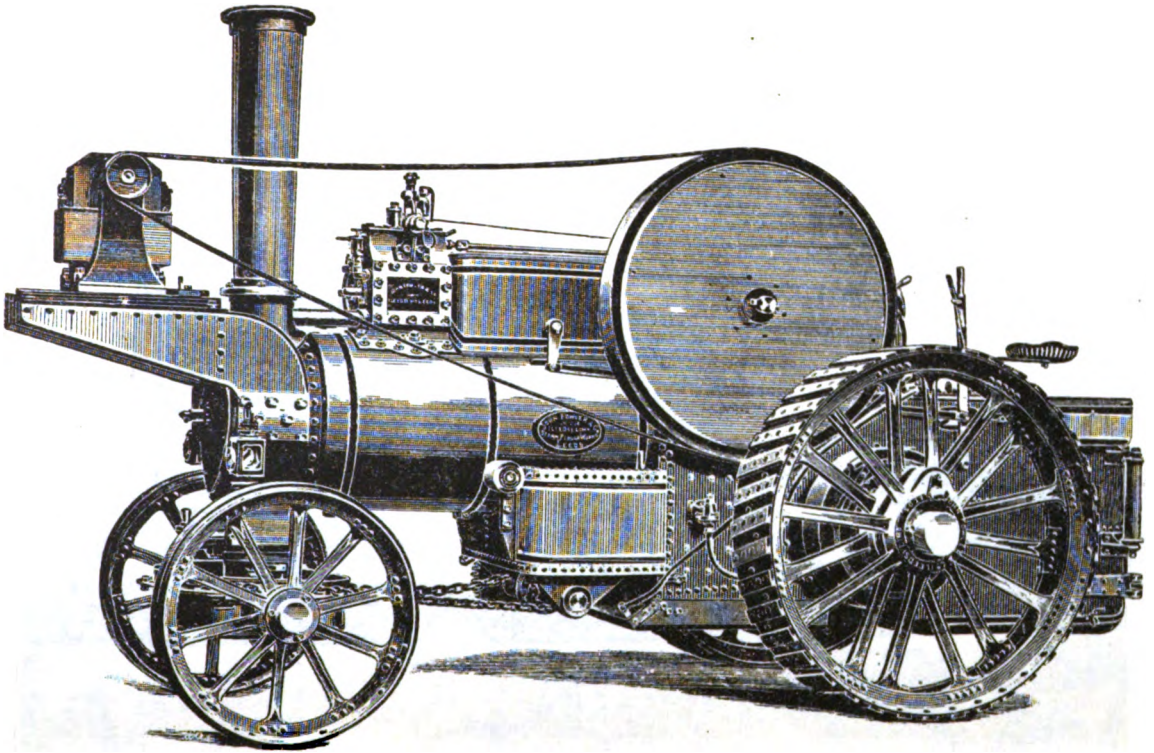

—Fowler Road Traction Engine with Dynamo for supplying Electric Power and Light.

THE HORRIS PETERS CO. PHOTO-LITHO., WASHINGTON, D. C.

PLATE X.

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engineers. The locomotive possesses the important advantage of being mounted on laminated springs which enable it to attain a high rate of speed even on rough ground, and minimizing the damage to the engine and driving gear from oscillation. The wagons were made after plans prepared by the war department and are provided with springs so that they too ride steadily over rugged ground. They are armored against rifle fire and loopholed for small arms. The brake power, which is strong and ample, can be applied either from within or without.

Germany, Italy, Russia, Switzerland, and Austria also employ traction engines in their armies and are continuing their experiments to perfect this form of transportation.

USES.

The many experiments conducted by the French from 1897 to 1899 furnish some interesting data relative to some advantages of steam over animal traction. It was found that in transporting 250 tons of matériel over a distance of 36 miles there was an economy in personnel of 275 men, in length of train 2,550 feet, and in cost $186 in favor of the steam tractor. It was also demonstrated that there is a saving in time of about one-half, no need of relays, and, in active operations, a reduction in the size of the escort on account of the difference in length of the columns.

During the last few years petroleum, naphtha, and solar oil have been used for fuel in place of coal with great success. Some of the advantages claimed for petroleum are: Greater heating power (twice as much as coal), economy of space, simplified service (as the supply is automatic and no stoker required), and ease of regulating the degree of heat.

The traction engine is superior to other automobiles for the reason that it is adapted to a greater variety of uses. In the rear of the army it transports material of every kind. At railway termini it serves for loading and unloading trains. In quasi-permanent camps it furnishes electric light and pumping power.

In the road locomotive, therefore, the army possesses a transportable hoisting, lighting, pumping, and draft-power engine, while in the case of the motor wagons their use is limited to carrying purposes only.

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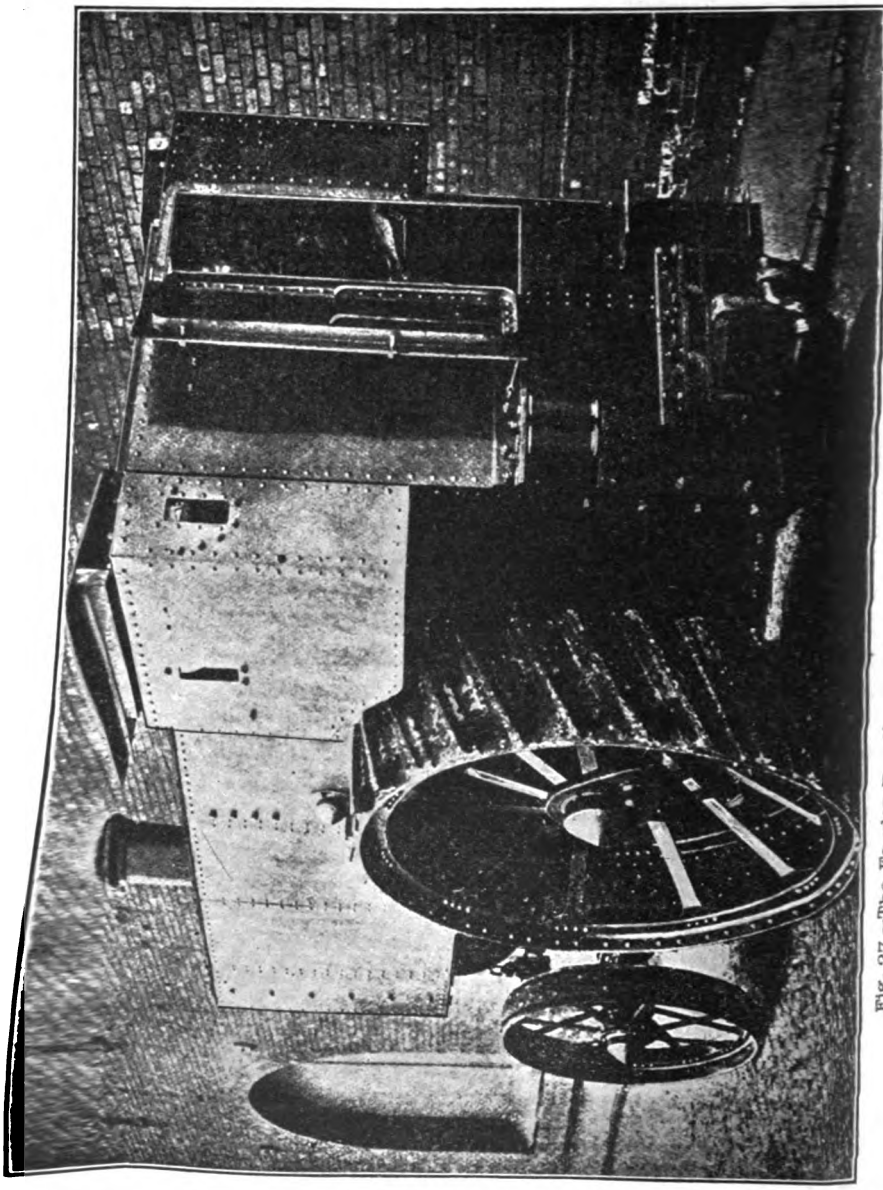

Fig. 27.—The Fowler Traction Engine for Lord Roberts's Armored Road Train.

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Traction engines can also be used for making earthworks or roads by drawing plows and road scrapers, for transporting and mounting large guns, and for hoisting building materials.

The traction engine is also constructed with two sets of interchangeable wheels, permitting its use on railroad tracks.

ARMORED TRAINS.

The first campaign in which armored trains were used on the battlefield was during the Franco-Prussian war. In their sorties from Paris the French frequently were aided by the fire of light field pieces carried on cars. In the Egyptian campaign of 1882, the British sailors armored two trains for protection against rifle fire, one at Alexandria, the other at Ismailia and Telel-Kebir. Railroad iron, iron plates, and timber were used to armor engines and cars. They were not extensively used, except as auxiliaries to reconnoitering parties.

For about twenty years France and Germany have regarded the armored trains as an important part of their fighting equipment. At Mafeking and Kimberley armored trains were used by the British. Most of the operations in South Africa with armored trains resulted disastrously to the British. On October 12, 1899, at Kraai Pan Station, near Mafeking, a train was derailed by the Boers, only one man of the British force escaping capture. On November 15, 1899, a train between Estcourt and Chievely was derailed and part of the British force captured. About October 17, 1899, a train under rifle and artillery fire successfully engaged the Boers near Spytfontein without any British losses. An engine armored with rope mantles by British sailors was used successfully on the Colenso line. An armored traction engine and train, described more fully under "Traction engines" has been constructed for use in South Africa. At the battle of Calumpit, Luzon, the United States troops employed an armored train. The armored train is a useful auxiliary to an attacking force, when it can be pushed forward over track previously reconnoitered, and deliver effective artillery fire from points under fire of the enemy and untenable for the attacking artillery unless encased in armor. In the make-up of the train the locomotive is in or near the middle.

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The armored traction engine and train, being independent of rails, the possibilities of its use as a moving fortification are many. Its practicability on the battlefield has yet to be determined.

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CHAPTER VI.

MISCELLANEOUS NOTES ON MILITARY MATTERS.

The following notes on military matters are compiled from various sources:

AUSTRIA-HUNGARY.

In matters of organization the extension of the war school and of the military riding institute are to be mentioned, while of the fighting arms only the cavalry received an increase in its establishment, by the addition of two remount depots of 200 horses each. Austria came to no conclusion last year in the rapid-fire gun question. However, one battery each of rapid-fire guns, made of bronze, were given for experiment to the artillery regiments at Gratz, Przemyśl, and Pesth, and reports are to be made thereon after the close of this year's autumn maneuvers. The most important military change in Austria in 1900 was no doubt the reorganization of the general staff, whereby a long-felt want was filled, and a single general staff for the army and both landwehrs was created. It is evident that the Austro-Hungarian army has greatly gained in efficiency by this change.

CAVALRY PONTOON BRIDGE.

Experiments recently made before a committee of officers with cavalry pontoon bridges proved successful. The pontoons are made of aluminium, carried in specially made wagons, and can be used in flying bridges or those of a more permanent nature.

GENERAL STAFF.

Regulations have been issued for a single staff corps for the whole army. The six bureaus of the general staff, viz, direction, operations, military information division, geographical section, railroad bureau, and telegraph bureau, which formerly existed, have been retained, but a new one has been added—the bureau of instruction.

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LANDWEHR (RESERVES).

The reorganization of the landwehr infantry of the Krakow and Innsbruck corps districts of the Austrian army took place in the fall of 1900. The landwehr infantry divisions of the entire army are to be renumbered. After the present reorganization is carried out there will be 6 landwehr divisions of 5 regiments each (15 battalions), 1 landwehr division (No. 45) of 4 regiments (12 battalions), and 1 of 3 regiments (9 battalions).

For the complete establishment of all the new landwehr formations it will be necessary to organize 3 landwehr infantry brigades, besides 6 regimental staffs, 12 field and 8 reserve battalion staffs. All these organic changes are expected to have been made by the fall of 1902.

MEDICAL SCHOOL.

On the 1st of October, 1900, a military medical school was formed at Vienna. Here military medical candidates are perfected in the branches of instruction which were taught them in the university, and given theoretical and practical instruction regarding their duties in peace and war. The course is one year, and is divided into a theoretical part bearing on military hygiene and pharmacopœia, surgery in war, psychopathology, the military sanitary service in peace and war, army organization, tactics, topography, map reading, and army administration; and into a practical part including surgical operations, diagnostics, bacteriology, and the visiting of the large establishments in Vienna from a hygienic point of view. There are final examinations, and a report of the whole course, accompanied by a classification list, is sent to the war minister.

TRAIN TROOPS.

On January 1, 1901, new organic regulations for the train were issued. According to them this arm now consists of 3 regiments and the independent fifteenth train division.

PAY.

In Austria-Hungary the civilian employees of the Government are divided into certain classes, and each of these classes corresponds to a certain military rank. Heretofore the civilians have received more pay than military officers of the same

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class. This has been partly remedied by the new pay regulations, which went into effect on January 1, 1900, but the military still does not receive as much pay as the civilians. Under the new law a field marshal, corresponding to the first class among civilians, receives 24,000 crowns a year, about $4,800; a lieutenant, corresponding to the eleventh class among civilians, receives 1,680 crowns a year, about $336. In addition, officers are allowed lodging and stable allowances, forage, etc., calculated in this way: All garrisons are divided into ten classes, Vienna and Budapest making two additional classes by themselves; in all, twelve classes. In Vienna the allowances of officers of the first class amount to 6,688 crowns annually ($1,337.60); of the eleventh class, 880 crowns annually ($176). In garrisons where the allowances are less high, they vary from 2,800 crowns ($560) for officers of the first class to 136 crowns ($27.20) for officers of the eleventh class. Up to and including the rank of major, officers are allowed an amount each year for furniture. First lieutenants and lieutenants are mounted at the expense of the State; all other officers must purchase their own mounts. Officers up to and including the rank of colonel are provided with an orderly; if not so provided they receive a monthly allowance of 16 crowns ($3.20). Officers of higher rank are provided with orderlies, but must feed and keep them. Officers newly appointed receive an advance for equipment according to the expense of the same.

The rate of pensions was also increased at the same time. Lieutenants of the eleventh class will receive a minimum of 600 crowns ($120) and a maximum of 2,040 crowns ($408) after forty years' service.

RIDING INSTITUTE.

A military riding and driving institute founded recently at Schlosshof will instruct 28 artillery and 6 train officers, thus relieving the institute for instruction in military equitation at Vienna, which hereafter will instruct only cavalry officers, and not more than 50 of these.

SCHOOLS.

Two new cadet schools established in 1899 are now completely organized.

A recent order abolishes the higher course of study required for artillery officers and the general staff of the war college

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has been increased, so that the artillery can attend with others. The preliminary examinations are different for artillery officers, however. The college is now capable of instructing 150 officers.

ARGENTINE REPUBLIC.

The new Argentine war academy was opened April 25, 1900. Many of the higher officers had objected to it. The course of study is two years. Thirty lieutenants or captains enter each year, who must have served two years with their regiments, been well reported upon, and passed a successful written examination. The course for the first year consists of tactics, military history, artillery, field fortification, topography, general history, general geography, international law, French, and riding. There are in addition four courses called optional. These are telegraphy and optics as applied to war, mathematics, German, and explosives. Each pupil is required to take at least two of these. The course for the second year consists of military history, applied tactics, fortification, staff duties, military hygiene, general history, general geography, French, and riding. In addition to these there are two optional courses, geodesy and German. One of these is compulsory. The officers who graduate among the first five at the final examinations are permitted to travel to Europe to study at the expense of the Government.

FIRST FIRING SCHOOL.

The first Argentine firing school was opened in Buenos Ayres on July 23, 1900. The school began with 26 scholars, 12 infantry officers, 12 cavalry officers, and 2 of chasseurs. Soon after 6 more cavalrymen were admitted. Instruction consists of two courses per year, each course of five months' duration. A period of four months is devoted to practical and theoretical exercises within the school, while the last month is reserved for target practice on terrain, under war conditions. The curriculum of the first-mentioned period covers judging of distances, application of the principles of ballistics, test firing for officers, and school target practice up to 650 meters.

HORSES.

During 1900 England has purchased 15,000 horses in Argentine Republic for use in South Africa. Improvement in breeds

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has made Argentina a source of horse supply for European armies. The prices are much lower than in Europe.

BELGIUM.

MACHINE GUNS.

The Hotchkiss machine gun proved so satisfactory in tests recently made that the Belgian committee appointed to investigate the matter reported in favor of adopting it. In consequence the Government has ordered the purchase of eight.

THE AUTOMATIC BROWNING PISTOL.

In 1898 a committee was appointed by the Belgian war minister for the purpose of finding a substitute for the Nagant revolver, with which, up to that time, the Belgian officers had been armed. It decided for the American Browning pistol, and its introduction was ordered July 3, 1900. The pistol, small model, is of 7.65 millimeters caliber, weighs 0.615 kilograms, and uses a cartridge of 7.85 grams. The magazine, arranged for 7 cartridges, is in the handle. The new arm is manufactured in Herstal by a factory under Government control.

BRAZIL.

MILITARY SERVICE.

A recent law makes military service in Brazil general. Every Brazilian from 19 to 40 years of age is liable to military service, which lasts three years in the army and three years in the reserve. In peace men will be taken up to the age of 30, in war up to 40. There are some exemptions.

SCHOOLS.

A law of November, 1899, requires military instruction to be given hereafter, as follows: In regimental schools, for the preparation of soldiers to be noncommissioned officers; in preliminary courses, the elementary school, and the military lyceum, for soldiers and youths who seem fitted for eventual acceptance in the war school. The instruction in the preliminary courses and the elementary school is to last four years, while the military lyceum will take boys from 8 to 15 years old and keep them till they are 20 years old. The war school is for the instruction of officers of all arms. They must remain

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in the school three years, two years being devoted to theoretical, and one year to practical instruction. In the war academy the aim is not only the training of general staff officers, but also the thorough technical education of artillery and pioneer officers. The war academy is to have three distinct sections, that for general staff officers, with a two-year course; that for artillery officers, also with a two-year course; that for pioneer officers, with a three-year course. Every officer must, before entering the war academy, pass an examination, and can be admitted only after at least five years' service.

CHILE.

INSTRUCTION OFFICERS.

The number of German officers in the Chilean army for the purpose of instruction is, at the request of the Chilean Government, to be increased from 6 to 15.

MILITARY SERVICE.

The law passed by the Chilean Senate in August, 1900, making military service general, is copied after the German law. Every Chilean, who has not suffered some dishonoring punishment, must serve in the army from the time he is 20 until he is 45 years of age; one year in active service, nine years in the first reserve, and fifteen years in the second reserve.

ENGLAND.

FLOATING DOCK FOR BERMUDA.

A floating dock 545 feet long, with a clear width of 99 feet, and a lifting power of 16,500 tons, has been ordered from an English firm by the British admiralty, to be placed at Bermuda. Next to one being built for the United States Navy it is the largest single floating dock in the world.

MILITIA SERVICE.

By a decision of the secretary of state for war, service with a militia command embodied with the forces in the field, or service with the regular forces, if not less than one month in duration, counts as one annual training; if of four months' duration, as two annual trainings.

HIGH EXPLOSIVES.

During 1899 and 1900 a committee of English officers conducted experiments to determine the effect of climatic

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conditions on the storage of cordite, a nitroglycerine compound, and "rifleite," a purely cellulose powder. The trials proved that "rifleite" cartridges would remain constant in ballistic properties under all climatic conditions, but cordite cartridges, if fired while hot, gave increased pressures and velocities over those heated and allowed to cool before firing.

HORSES IN SOUTH AFRICA.

After a thorough investigation of the causes of the great mortality among horses during the present South African war, Veterinary Lieut. Col. I. Matthews, of the English army, gives the following causes: Exposure to a tropical climate, without stables, sometimes without nosebags; watering and working animals in the early morning before the sun had dispersed the mist; the great number in all commands that broke loose at night and wandered in unhealthy localities; loss of natural energy by the great heat of January, February, and April; the use of freshly cut grass as bedding for stabled animals; the scarcity of water and its obvious impurity; inexperience in stable management and the want of second blankets; lack of acclimatization; failure to separate sick animals from well ones; failure to remove sick animals to a healthy locality. Colonel Matthews believes that the planting of blue or red gum trees around the stables, or even the camps, would, with careful stable management, eradicate the disease of glanders which has been so prevalent in South Africa lately. Since the beginning of the South African war, England has purchased the following horses: From Argentina, 24,778; from Australia, 5,983; from United States, 14,755; from Canada, 3,190; from Austria, 6,176; total, 54,882.

REARMAMENT.

The native Indian regiments in the field army are being armed with the new 0.303 rifle. This will necessitate the manufacture of more cordite ammunition at the manufactories at Dum Dum and Kirkee, India, and its army will soon cease to use black powder.

REORGANIZATION OF INDIAN MULE AND PONY TRANSPORT.

The Government of India has approved a plan to reorganize its mule and pony transport. In case of war another corps of pack mules is to be raised, the peace organization admitting

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of rapid expansion. Each pack-mule corps, when expanded, will consist of 768 mules, with a carrying power of 1,280 maunds (about 102,400 pounds).

FRANCE.

France is the first nation in the number of military changes, the most important being the reorganization of the superior war council. In the cavalry the lance was ordered introduced by General Gallifet for 8 dragoon regiments, but it is not known whether his successor, General André, will arm all the cavalry with lances or not. Owing to a lack of men it has been impossible to establish the fourth battalions in the 52 infantry regiments, which was ordered sometime ago. The uncertainty, as to the absolute utility of the new field gun, has caused the suspension of the rearmament of the batteries which have not yet received it. The proposed rearmament of the horse artillery is suspended for the same reason.

MEAT WAGONS.

A newly introduced meat wagon weighs, empty, 950 kilograms, and can carry 1,000 meat rations, cut up or in quarters. It is four-wheeled, drawn by two horses, and two men (a butcher and assistant) are sufficient for loading. It is intended to carry freshly slaughtered beef after the troops, and also the apparatus for slaughtering.

NEW COLONIAL ARMY.

The marine infantry will be placed under the war department as a colonial army. The colonial troops stationed in France will be increased from 34 to 36 battalions, which enables 12 regiments of 3 battalions each to be formed instead of the existing 10 regiments of 3 or 4 battalions each.

In the colonies there will be the following European organizations: Five regiments of colonial infantry of 3 or 4 four-company battalions each in Indo-China, Madagascar, and West Africa; 2 four-company battalions in New Caledonia and Martinique; 1 battalion of 2 companies in Guyana; 1 company in Guadeloupe; and 1 company in Tahiti.

There will be the following native organizations: One regiment Anamite rifles of 3 battalions in Cochin-China; 4 regiments Tonquinese rifles, two of 3 and two of 4 battalions; 3 regiments Senegal rifles (1 regiment in Senegal, 1 in Sudan,

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and 1 in Madagascar); 2 regiments of native Madagascar rifles of 3 four-company battalions; 4 battalions of Senegal rifles of 4 companies each in Schari, on the Ivory coast, Zinder, and Diego Suarez.

BICYCLE COMPANIES.

Two new bicycle companies are to be created in addition to the two existing ones. They are to be of 150 men each.

BUDGET COMMISSION.

The report of the budget commission on the budgets of 1900, passes a number of criticisms on the same. Some of these are: Too many officers employed at headquarters; too many general officers employed on committees, commissions, inspections, etc.; personnel of department services too large; using for all sorts of labor soldiers who should be in the ranks; prices paid by officers of the commissariat department for supplies much higher than the market prices; bad management of the clothing department.

GARRISON MANEUVERS.

Hereafter troops will maneuver at all seasons of the year instead of during the fine season as heretofore. Special instructions have been issued by the medical department regarding precautions to be taken to retain health during winter maneuvers.

MILITARY TELEGRAPH SERVICE.

The law of July 24, 1900, on the reorganization of the telegraph service began to be carried out November 1, 1900. On this date three of the six telegraph companies provided for were formed, being attached to the fifth engineer regiment.

MEDICAL STUDENTS.

By a decision of the minister of war, hereafter medical students will be sent at once to infirmaries or military hospitals to practice medicine under corps doctors. Formerly they were required to undergo a period of military instruction, varying from three to four months with some regiment, in lieu of the two years' service required of other young men. The new rule resulted from the dearth of doctors in the army, there being but 1,250 of the 1,400 allowed by law.

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CARRIER PIGEONS.

Heretofore carrier pigeons were carried by the cavalry with feet drawn up and wings folded in zinc tubes placed in baskets attached to the saddle; now they are carried slung over the back. The jolting soon rendered the bird lifeless or unfit for duty, as all the feathers were removed from the back, leaving the flesh bare and sore. The birds are still placed in tubes made of wicker, lined with hair, the elasticity of which deadens the effect of the jolting. Three tubes can be carried in a basket. If left in the tubes several days the birds get so numb they die. To prevent this a form of folding cage is now carried into which the birds are placed at a halt, so they can rest and partake of nourishment. Twelve cavalrymen are sent each year to the military pigeon station at Vaugiraud to take a course of instruction in the handling and treatment of pigeons.

SABER PISTOL.

The French cavalry is considering the advisability of adopting a saber pistol, weighing one-third more than the present saber. It is so arranged that at every thrust a bullet may be fired by simply jerking back the blade 2 millimeters. It is hoped this weapon will aid the cavalry in attack, particularly in a hand-to-hand encounter with hostile cavalry. The weapon can be used unloaded as well as loaded.

INFANTRY-FIRING INSTRUCTIONS.

In France, at present, the greatest importance is given to training the infantry to fire by sections, while in Germany an entirely different method is employed. The Germans believe in developing the individual skill of each man, and only after this is accomplished do they proceed to group and battle firing.

MACHINE GUNS.

France is at present making experiments with the Hotchkiss machine gun, looking to the adoption of machine guns with her infantry, as Germany has already done.

WAR COUNCIL.

According to the present reform, eligibility to membership in the war council, except in the case of the war minister and the chief of the general staff, who are members ex officio,

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will be conceded only to generals who in war are actual commanders of armies and in peace hold actual commands or serve as military governors. The members may be commanded by the war minister to conduct grand maneuvers, or undertake journeys for study or inspection. Formerly generals who did not command any army corps in war time were appointed members of the war council, so they could take part in the deliberations, but had no direct responsibility when it came to carrying out the measures adopted. At present the war council consists of the war minister, the chief of the general staff, and eight other generals.

HIGH EXPLOSIVES.

The French war department has adopted a smoke-producing shell for the 2.9-inch gun, intended to produce a thick cloud of smoke before the enemy's batteries or firing line, in order to mask their view of their opponent's operations.

GERMANY.

The most important military event in Germany in 1900 was the mobilization of troops against China, the demands made thereby on the military officials, etc., being extraordinary, for not only the rapid-fire field gun and howitzer given to the army in the preceding spring, and the rifle, model '98, with which the army is being armed, were to undergo a real test under fire, but the mountain artillery, hitherto never used in the German army, was to give proofs of its utility.

NEW MUSKETRY REGULATIONS.

The chief changes in the new infantry musketry regulations consist in the introduction of new targets (head and shoulder, head in a circle, and targets representing a section of men), and in the suppression of certain others. The conditions imposed on the firer are increased, the limitations with regard to badges and musketry prizes are revived, the firer is required to use his own rifle, and frequent practice firing of infantry at ranges between 600 and 1,000 meters at low lines of skirmishers is required.

REPORT OF MAJOR WOODBURY, SURGEON, U. S. V.

The field maneuvers of the German army in 1899 were observed by Dr. Woodbury, late major and surgeon, U. S. V.,

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and he has submitted a report to the War Department on the hygienic, sanitary, and medical arrangements of the German military establishment. Each man's feet are inspected by one of his company officers at least twice a week in barracks and oftener in active field maneuvers. Socks and boots are also inspected at the same time as to cleanliness. The entire body of each man is inspected once a month by a company and a medical officer for heart lesions, hernia, venereal disorders, skin diseases, etc.

The total weight of each man's equipment, pack and piece, is 60 pounds. The shelter tent is rolled and attached to the knapsack; no blanket roll, slung from the shoulder to the hip, is allowed. Each man carries his own provisions in an aluminium canister on top of his knapsack; no haversack being used. When the top or lid of the canister is removed, the the bottom may be used as a kettle and the top as a coffee pot. In the field two men usually mess together, one making soup in the bottom of his canister, while the other makes coffee in the bottom of his and the tops are used for plates. The food is sufficient and of good quality. A daily ration consists of one-half pound of meat, a pound of fresh vegetables, a portion of split peas or beans for soup, and two ounces of coffee, chocolate, or cocoa.

NEW ORGANIZATIONS.

The budget for the land forces for 1900 contains an increase of 21,496,449 marks over the ordinary budget. Three squadrons of mounted orderlies, 19 field batteries, a third instruction group (Abtheilung) for the field artillery school, and 33 military train men have been added to the army. In all, there is an increase of 77 officers, 11 doctors, and 1,552 men over the last budget.

On October 1, 1901, the Bavarian army will be increased by 2 brigade staffs, 3 regimental staffs, 1 group staff, and 3 field batteries. On October 1, 1902, by 1 brigade staff, 1 regimental staff, 1 group staff, and 3 field batteries. These changes are in accordance with the law of March 25, 1899, which provided for the increase of the Bavarian army from 2 army corps to 3 of 2 divisions of 2 brigades each.

CARRIER PIGEONS.

Each year Germany adds to and improves her carrier pigeon system of communication. By means of her network of

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stations the different parts of the country are in close communication with each other. The number of pigeons at each dovecote is commensurate with its importance, 200 at small stations, 600 at medium, and as many as 1,000 at points of importance like Metz, Strasburg, Cologne, and Thorn. In each dovecote a noncommissioned officer of engineers and a competent pigeon fancier are intrusted with the care and training of the birds. They are under the orders of the station commandant who is responsible for the care and dispatch of the birds. The federated society of German pigeon fanciers possesses 73,000 pigeons, which in the event of war would be placed at the disposal of the Government.

LEARNING RUSSIAN.

At the Bavarian military academy a regulation of October 1, 1900, requires students who are marked proficient in French the first term, to learn Russian the second and third terms.

FIELD SERVICE REGULATIONS OF THE GERMAN ARMY.

A commission of fourteen officers of the German army, of which the president was General Häsler, made a thorough revision of the previous regulations on the subject. The results of the work of the commission were approved by the emperor and embodied in a set of regulations bearing the date of January 1, 1900. This book appears in the form of an octavo (4 by 6), containing 230 pages, bearing the title "Felddienst-Ordnung." The following summary of it appears in the "Revue Militaire" for April, 1900:

"Created principally for the purpose of conforming to the changes in organization and the technical improvements made in the armament and the auxiliary services of the army, the regulations of 1900 are chiefly new in that they furnish data on these various points.

"Thus it is learned that the new organization of the field artillery involves the suppression of the corps artillery, and that the employment of heavy artillery by a field army has left the domain of discussion to receive official sanction, mention being also made of the creation of telegraph troops, of the progress of cycling, etc. These changes affect various chapters, such as those on marches, regimental trains, bivouacs, supply service, etc., but they do not in any way modify the principles set forth in the preceding edition. An excep-

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tion must, however, be made for the cavalry, the method of employing which has undergone certain modifications.

"The action of the committee presided over by General Häsler seems to have had special influence on the text of the new regulations. The subjects treated of in the various chapters have been distributed in a different manner; the number of paragraphs has been increased in order to give prominence to certain ideas formerly left in the background; and the style of the old regulations, so concise and uncommonly clear for German military publications, has even been improved in the new edition.

"The 1900 regulations are, therefore, merely a step ahead along a path already tested, an accentuation of certain theories rather than a calling into question of principles already established. They comprise, as did their predecessor, an introduction; a first part, on field service, and a second part, containing provisions for grand maneuvers. About two-thirds of the work is devoted to field service, the provisions on the organization and conduct of maneuvers occupying the last third.

"The introduction comprises only some ten pages, but is nevertheless one of the most important parts of the regulations. It starts out with the idea, faithfully summing up the spirit which animates the succeeding pages, that 'the requirements of war should govern the instruction of troops in time of peace.' Then it comments on the methods of instruction for the whole army.

"After having defined the soldier as a disciplined man, ready to march and use his weapon, the introduction lays more stress than in the old edition on the rôle of the officer as commander and as instructor. The duties of the officer have increased owing to improvements in armament and the utilization of technical means for the conduct of operations, as well as to the fact that length of service of infantry has been reduced in Germany. The various kinds of knowledge necessary for an officer to possess can be put into play only if he 'is able to throw his whole personality into a task, without shrinking at responsibility.' The new regulations further emphasize this idea by prescribing that 'the higher commanding officers should encourage in officers and require of them this manifestation of their personality.'

"How are officers and troops to be rendered equal to their task?

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"Besides the war game, lectures, winter studies, and instructional journeys, the German regulations also mention the solution of tactical themes as means of perfecting the education of officers. A rather curious rule is laid down for tactical themes and the war game, viz, that 'it is essential for them to be directed by officers showing the necessary aptitude, regardless of seniority.' On the subject of winter studies and lectures, which, 'even when carried on among comrades, have the advantage of obliging persons who have to speak to choose the right word to express their thoughts,' the regulations add the following remark: 'These exercises, however, are not profitable unless the subject be adapted to the knowledge of the officer. Moreover, generalities should not be strictly adhered to, but rather the study of definite questions undertaken. Finally, it is desirable that the subject should give the person treating of it an opportunity to develop his personal ideas.' Besides this personal instruction, it is the duty of officers to keep themselves in good physical training by indulging in such sports as may be beneficial to them, the regulations mentioning, besides fencing and gymnastics, the chase for mounted officers and bicycling for officers of dismounted troops.

"The regulations still recommend individual instruction as strongly as ever for the private. Thus, after having mentioned maneuvers and combat firing as one of the means adapted to training the infantry soldier to fire discipline, they cite as still more important the development of 'the initiative and intelligence of the marksman, so that if the commanding officer falls or can not make himself heard, the isolated soldier left to himself will still be able to make an intelligent use of his weapon.'

"The regulations, finally, give some new suggestions for increasing the marching capacity of troops, such as gradually habituating the young soldier to carry the complete war equipment and organizing special marching drills. 'The infantryman should carry home with him the conviction that he is capable of executing all the marches required in war.' Attention is called to the importance of night marches, 'which will be frequent during war;' of drills executed by units at war strength; of maneuvers and fire on varied ground.

"The regulations, however, recommend that the correct spirit inculcated into the men during individual instruction

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and observed at inspections should not be allowed to be lost during maneuvers and drills in the field. They further accentuate this idea by pointing out the fact that maneuvers can not be considered as simply a means of instructing the cadres. Combined exercises of all units may be executed at any period of the year, but should not be so extensive as to hinder the instruction of the small units or individual training—'solid and always essential bases for the proper instruction of troops.'"

AUTOMATIC MACHINE GUN.

Ten jäger battalions and two infantry regiments of the German army have recently been provided with automatic machine guns. The gun rests on springs, is surrounded by a bronze water jacket, is protected with its detachment by steel shields, is mounted on a four-wheeled carriage drawn by four horses, and is served by a master mounted gunner and four men, who, on the march, ride two on the gun carriage and two on the limber. The service of the gun, in which the recoil is utilized, is very simple, and 500 or 600 shots can be fired in a minute.

REORGANIZATION.

The war budget for 1901 provides for continuing the execution of the law of March 25, 1899, by the formation of five squadron of mounted jägers with their necessary staff, to be formed at Posen, a staff for the foot artillery regiment, one battalion of foot artillery, one battalion of pioneers, a balloon detachment company, a transport company, the equalizing of the effective of cavalry regiments and jäger squadrons, the formation of Maxim gun detachments for all the army corps, the establishment of several new depots for the artillery and its armament, sums for the construction of magazines, barracks, garrison churches, guardrooms, etc., in different towns, the increase of the maneuver grounds of Arys and Alten-Grabow, and the reenforcement of certain fortified places like Ulm.

NEW BOAT.

Near Strassburg on August 1, 1900, an interesting military drill was held in crossing the Rhine, the horses of a hussar regiment having to swim from 1,200 to 1,500 meters. A new kind of boat was tried, made solely out of cavalry lances

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covered over with waterproof sail cloth. The practical part of these boats is that two of them can be packed on one horse. In a few minutes the boats were set up, the lances turned into oars, and the whole put into the water. Each time 16 men with their weapons, and four to six horses, the saddles in the boat, were taken to the opposite shore. The crossing is said to have been rapid and without accident. The boats were soon taken apart and packed on the horses again. The inventor of these boats is an Alsatian shipowner, Adolph Rey, and he superintended the use of the boats. The experiments are soon to be continued in a strong wind and swift current.

Russia and France are experimenting with similar boats made of lances.

PORTUGAL.

COLONIAL TROOPS.

The events of the South African war have forced Portugal to begin the increase of her colonial troops, which was decided upon in 1899.

By royal decree the war minister was authorized, simultaneously with the reorganization of the army, to turn over two companies of infantry, one squadron, one battery, and a number of intendance officials, in all 20 officers and 710 enlisted men, to the minister of marine and colonies.

ITALY.

REORGANIZATION OF ERYTHREA.

By a royal decree the colony of Erythrea is reorganized. The civil governor, nominated by the King, is given extensive powers. The defense of the colony is intrusted to a corps of colonial troops. Italian officers of colonial troops receive the pay of their rank plus a colonial allowance and a bounty on first appointment. The total effective strength of the new colonial corps is 239 officers and 6,512 enlisted men, and of these 57 officers and 5,400 men are natives.

NEW PROJECTILE.

An Italian captain, Cei-Rigotti, has patented a new form of projectile suitable for guns and rifles of all kinds. The form is ellipsoidal, enabling the projectile to overcome the resistance of the air in such a manner that a graduated sight

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in rear is not needed (?), as the trajectory is almost a straight line. The wound made by the bullet is perfectly clean, without any sign of laceration.

WIRELESS TELEGRAPHY.

The Italian engineer, Emilio Guarini, has invented an automatic repeater, by which a message dispatched from one wireless telegraphic station would be repeated automatically by the receiving station and so passed on to another station, and yet another and another, according to the distance it is desired to send the message. With Signor Marconi he was convinced that the present limit of 72 miles between stations could be extended to 300 miles over sea and 150 miles on land, and that 80 stations would be enough to carry a message around the world. The great value of the automatic repeater is shown from the fact that if a message took an hour to deliver and the operators had to wait at each of the 80 stations this time before they could dispatch the message to the next eighty hours would be consumed in sending a message around the world, while with the repeater it would require but one hour.

NEW EXPLOSIVE.

Colonel Cornara, of the Italian artillery, has invented a new explosive called "cosmos," which is obtained by the electrification of water hermetically inclosed in a steel receiver. There is claimed for it an explosive force fifty-five times that of gunpowder and twenty-eight times that of dynamite. It is cheaper per unit of explosive force than other explosives, and the force can be so regulated that the new explosive can be used in cases where other explosives would be impossible.

GYMNASTICS.

Recent instructions make gymnastics form a chief factor in the training of the soldier, following the principles practiced at the infantry musketry school at Parma. Frequent changes from all exercises to gymnastics during drill are to be made, obstacles are to be placed in roads to be surmounted while marching to and from drill, competitions in marching, fencing, bicycle riding, etc., for officers and men are ordered, games are to be played to stimulate agility, endurance, and quickness of decision, gymnasium apparatus is to be furnished each battalion, and other nonregulation apparatus is to be used if it can be secured at small expense.

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BICYCLES.

On account of the good results obtained at maneuvers 3 new bicycle companies, each having a captain and 4 lieutenants, will be organized. The Carraro folding bicycle, which proved best in a thirty-four-day test, will be used.

NEW ARMAMENT.

On February 6, 1900, the pioneers, train and fortress artillery were armed with the 6.5-millimeter carbine, model '91, which formerly was used only by the cavalry and field artillery.

SCHOOLS.

On January 1, 1900, a new regulation divided schools into preparatory schools, schools for preparation of young officers, completing or finishing schools, post-graduate schools, and special schools.

The following number of young men and noncommissioned officers were admitted to the following schools in 1900: Seventy young men to the military academy at Turin; 100 infantrymen and 40 cavalrymen to the military school at Modena; 50 youths from 13 to 16 years of age for the first course and 20 from 14 to 17 for the second course at the military college at Naples.

A recent order has introduced generally agricultural instruction in the Italian army.

PROMOTION.

By a royal decree of March 18, 1900, officers recommended for promotion by their superior officers must pass an examination, with the exception of general staff officers, pupils and candidates of the war school, and gendarmery officers.

PERU.

MILITARY SERVICE.

By the law promulgated in June, 1899, every citizen from 19 to 50 years of age is liable to compulsory service. The army consists of five parts:

1. The regular army, which is subdivided into: (*a*) The volunteers, those who willingly enlist, without being called; (*b*) The conscripts, young men from 19 to 23, who are drawn

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from the communal lists; (*c*) Those enrolled individuals called to the colors because of crimes committed.

2. Supernumeraries, conscripts borne on the communal lists whose turn of service has not yet come, but who are called on when for unforeseen circumstances enough men can not be supplied from the three sources mentioned under 1. If these are not sufficient the reserves are called on to serve.

3. The first reserve, men of 23 to 30 years who have completed their military service.

4. The second reserve, men from 30 to 35 years of age.

5. The national guard, men from 35 to 50 years of age.

PORTUGAL.

MILITARY SERVICE.

A law of July 10, 1899, and a decree of September 7, 1899, change somewhat the military organization of Portugal. Military service is obligatory, with a few exceptions, and lasts fifteen years, three years in the regular army, five years in the first reserve, and seven years in the second reserve. The army consists of the headquarters' staff and staff corps, the various branches of the service, special troops (municipal guards and customs officials), and the reserves.

RUSSIA.

In Russia the new formation of the East Siberian army corps of 20 battalions, 10 squadrons, and 9 batteries is to be regarded as the most important military event, and one of the results of the Chinese troubles.

CANTEENS AND SHOPS.

By a recent order shops and canteens are formed with the object of providing soldiers with articles of daily and necessary use of the best possible quality at the lowest possible rate. Wines, beer, and brandy are permitted when necessary, but all games of chance are forbidden. Like our late post exchange they are conducted under the supervision of officers, and the profits accrue to the benefit of the enlisted men.

CHIEF STAFF.

An order of December 8, 1900, states that the organization of the chief staff, which is one of the principal branches of

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the war department, is to be changed by the addition of a quartermaster section. The present section for the "conveyance of troops and baggage" is also to be changed to the "department of military communications."

TRANS-BAIKAL RAILWAY.

The Trans-Baikal Railway, the last part of the Trans-Siberian road in the direction of Port Arthur, was opened for travelers and for goods traffic on June 1, 1900. Its total length of rail is 1,128 kilometers, one section of 63 kilometers from Irkutsk to Baikal Lake, thence across the lake by steam ice-breaking raft to Myssovski, the raft carrying the train, thence over the other section by rail 1,065 kilometers to Strietensk on the Amur River, from this point by steamer to Khabarovsk, where the Ussuri Railway commences. The time from St. Petersburg to Port Arthur is twenty-nine days. The great value of this line with its branches to the south, from a military standpoint, is apparent. With their aid Russia can place great bodies of troops at Port Arthur, Vladivostok, on the frontier of Western China, or on the Afghan frontier, in a very short time.

FOREIGN LANGUAGES.

Special attention is being paid in Russia to the study of foreign languages. Schools for the study of French and German have been started in several military districts. At Askhabad there is a military school for the study of Hindustani, the course lasting two years. On July 13th an Oriental institute was opened for the study of Chinese at Vladivostok, this language having become of great importance to Russian officers.

BICYCLES.

On January 19, 1900, an order was issued fixing the distribution of bicycles. Fortresses of the first, second, and third classes, infantry battallions, infantry regiments, artillery companies, detachments of telegraphists, are all given bicycles. The type of bicycle is left to the discretion of the local higher military authorities, the rigid type, however, being retained, as the folding bicycle has proven unsatisfactory.

ORGANIZATION.

On May 1, 1900, two light foot batteries of four guns each under the name "First and second batteries of the Siberian

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reserve artillery division" were formed. In war times this reserve division is to be expanded into four Siberian artillery divisions numbered 1 to 4.

On January 1, 1900, the second Trans-Baikal Cossack regiment was disbanded, and in its place a new cavalry regiment of six sotnias was organized, which has been named the first Argan regiment of the Trans-Baikal Cossack troops. The Finnish field gendarmes squadron has become the sixth field gendarmes squadron.

SWEDEN.

MILITARY SERVICE.

The Swedish Government intends to replace the present methods of recruiting by compulsory service for all. All men taken will be required to serve 365 days, distributed through a period of nine years. The new system will result in a considerable increase of the army.

SWITZERLAND.

NEW RIFLE.

A rifle using the same ammunition, and having the same breech mechanism as the present infantry rifle, caliber 7.5 millimeters, but with a magazine carrying only 6 instead of 12 cartridges, with a length of 1.10 meters instead of 1.30 meters, with a weight of 3.6 kilograms instead of 4.3 kilograms, and costing 79 instead of 85 francs, has been furnished the position artillery, fortress troops, telegraph companies, balloon companies, and cyclists. The federal council believes that the field, mountain, and park artillery, and the administration troops will have to be similarly armed.

MACHINE-GUN COMPANIES.

Mounted machine-gun companies with Maxim guns have been added to the Swiss army, one company of 8 machine guns to each cavalry brigade, but each company may be divided into detachments of not less than two guns. A loading ribbon containing 250 rounds is used. The range is 2,000 meters. The gun is carried on a pack saddle; weight of the gun and packing, carried by one horse, 108 kilograms; weight of ammunition, packing, and 5 kilograms oats, carried by one horse, 114 kilograms.

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AUTOMATIC PISTOL.

After long experiments Switzerland has adopted an automatic pistol of the Borchard-Lueger system, for the use of mounted officers, and to replace the model '78 revolver. Caliber, 7.65 millimeters; length, 237 millimeters; weight, 835 grams.

TURKEY.

ORGANIZATION.

The second and third army corps of the Turkish army are each to have 1 horse and 2 mountain batteries added to their artillery complement. The second receives 10 new field batteries, and the third receives 14.

SMALL ARMS.

Turkey is converting the Gras rifles captured in the recent Greco-Turkish war into Mauser rifles at the Zeytun-Burnun factory. The Martini-Henry rifles of the Turkish army are being converted similarly. This work will probably be unsuccessful, as France tried to convert Gras rifles in 1885 but ruined the barrels.

VARIOUS COUNTRIES.

WEIGHTS OF RIFLES.

There was considerable difference in the weights of the rifles carried by the nations participating in the late conflict in China.

The Austrians carried the heaviest rifle, weighing 4,220 grams (about 9 pounds 4½ ounces). The Swiss and Portuguese rifles are nearly as heavy, weighing 4,190 and 4,130 grams, respectively. The rifles of the British, French, Danish, and Russian troops are all of the same weight, 4,070 grams (8 pounds 5 ounces). The Spanish rifle is much lighter, weighing only 3,870 grams. Next are the Belgian and Turkish rifles, 120 grams less. The lightest of all are the German and Italian rifles, weighing 3,540 and 3,450 grams, respectively (7 pounds 12½ ounces and 7 pounds 9½ ounces). The Italian soldier carries, as far as the weight of his rifle is concerned, ¾ of a kilogram, or nearly 1 pound 11 ounces less weight than his comrade in the Austro-Hungarian army.

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CHAPTER VII.

MANEUVERS.

THE FRENCH AUTUMN MANEUVERS, SEPTEMBER, 1900.

(Reported by Capt. T. Bentley Mott, artillery corps, U. S. Army, military attaché.)

On account of the prevalence of typhoid fever last year no grand maneuvers of the army took place in France. This year they were on a larger scale than usual, the weather proved to be excellent for the work, the health of the troops was good, and the results fulfilled every expectation. About 100,000 men and 20,000 horses constituted the maneuvering forces. The director in chief of the maneuvers, General Brugère, and the generals commanding the two opposing armies, Generals Lucas and de Négrier, were not only officers of high rank but men of the first military reputation.

The troops designated to take part in the maneuvers began to leave their garrisons early in September. The operations of smaller units, brigade against brigade, division against division, and corps against corps, occupied the time up to September 14. Foreign officers were not invited to witness these maneuvers which were undoubtedly of the first importance in instructing regimental and brigade officers in the service of security and information and in the tactics of the battlefield.

On September 14 the army of the North, composed of the fourth and tenth corps and the first division of cavalry, had been assembled in the neighborhood of Chartres; the army of the South, composed of the fifth and ninth corps and the fifth division of cavalry, had been assembled in the neighborhood of Châteaudun; for three days these two armies operated against each other; on the fourth day the two armies united operated against a represented enemy, and on the fifth day the whole body of troops passed in review before the President of the Republic. These five days' operations constituted the grand maneuvers to which foreign countries had been accorded the privilege of sending representatives. Russia sent six officers, headed by a lieutenant general; Germany, Austria, and Italy each three officers, headed by major

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generals; Turkey and Belgium each a general officer. In all there were 32 foreign representatives.

MANEUVER AREA.

The area covered by the operations which are to be described was a plain about 25 miles square lying south-southwest of Chartres, a town 70 miles southwest of Paris. To the north is the Eure, a tributary of the Seine, to the south and west the Loire and Ozanne, flowing southeast and south and eventually joining the Loire. These streams are the only natural military obstacles in the region; there are practically no brooks and no woods. The inhabitants all live in small villages composed of farm houses with their barns and inclosures.

The railways and high roads radiating from Chartres and Châteaudun show the principal lines of communication.

This whole region is a nearly level cultivated plain, of light, loamy soil, practically devoid of any rocks, ravines, trees, or undergrowth. There are no fences, hedges, or walls, except the inclosures in villages. Troops of all arms could therefore move for any distance in any direction, and there was no necessity for keeping to the roads except to make marching easier.

GENERAL SUPPOSITION.

Paris is invested, and an army called the Northern army has been pushed to the west to cover the investment. An army called the Southern army has been organized south of the Loire in the region Orléans–Tours to march to the relief of Paris.

SITUATION OF THE NORTHERN ARMY SEPTEMBER 14.

The general commanding the Northern army learns that important forces of the enemy have debouched from Tours and Amboise and are marching upon Vendôme and Châteaudun; he therefore directs his forces (fourth and tenth corps) upon the line of the Eure, which on September 14 he occupies from Courville to Thivars. The same day the first division of cavalry, which has been placed at his disposal, reaches the environs of Auneau. The general commanding the Northern army determines to advance on September 15 to meet the Southern army, and, if possible, push it back upon the Loire.

The composition and strength of the Northern army is given in the table marked "Northern army."

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The troops of this army occupy the following cantonments on September 13 and 14:

Headquarters at Courville.

Fourth corps: In divisions side by side in the zone le Coudray, Morancez, Barjouville, Ver-les-Chartres, Thivars, Nogent-sur-Eure, Saint Georges-sur-Eure, Fontenay-sur-Eure, Saint Luperce, and Ollé.

Tenth corps: The two divisions one behind the other in the zone Courville, Chuisnes, Landelles, Billancelles, St. Arnoult-des-Bois, Favières, Gâtelles, Châteauneuf-en-Thymerais, St. Maxime, Thimert, Marville, and St. Sauveur-Levasville.

As a measure of security the fourth corps has its outposts on the line Corancez, Mignières, Meslay-le-Grenet, and Bailleau-le-Pin. The tenth corps has a detachment on its right flank at Friaize.

No body of Northern infantry or cavalry should be found south of the outposts of the fourth corps.

On the 13th of September the first division of cavalry having become part of the Nortern army, occupies the following cantonments: Auneau (headquarters), Oinville-sous-Auneau, Béville-le-Comte, Roinville, Aunay-sous-Auneau, and La Chapelle-d'Aunainville.

The division faces to the southwest. The line of communications is Montereau, Melun, Versailles Maintenon, and Chartres. Depot of reserve supplies, Montereau.

Headquarters of the railway supply service, Maintenon.

INFORMATION CONCERNING THE ENEMY'S MOVEMENTS.

Detachments of all arms have been seen on the 13th to the west of Châteaudun, and on the 14th parties of their cavalry appeared on the Loire between Bonneval and Illiers.

SITUATION OF THE SOUTHERN ARMY SEPTEMBER 14.

The Southern army, composed of the fifth and ninth corps and the fifth division of cavalry, has been raised south of the Loire, with the idea of carrying succor to Paris, following in general the railway from Tours to Paris via Vendôme.

The different elements of this army concentrated on September 14 to the north of the Loire in the region Châteaudun–Courtelain, protected by an infantry division pushed forward to the Ozanne and the fifth division of cavalry established upon the Loire above Bonneval.

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On the same date the commanding general of the Southern army learns that large forces of the enemy occupy Chartres and the country to the northwest of that town. He therefore decides to advance his army to the north on September 15, immediately pushing forward his most advanced troops to seek out the enemy and prevent his crossing to the south of the Eure, whether at Chartres or above that town.

The composion and strength of the Southern army are given in the table marked "Southern army."

The troops of this army occupy the following cantonments on September 13 and 14:

Headquarters, Châteaudun.

Fifth corps: Two divisions, one behind the other, at Châteaudun, St. Denis-les-Ponts, Douy, St. Hilaire-sur-Yerre, Montigny-le-Gannelon, Cloyes, and St. Jean-Froidmontel. The advance guard of the first division is at Marboué. The head of the second division is south of Montigny-le-Gannelon.

Ninth corps: One division on the Ozanne from Trizay-les-Bonneval to a point about 4 miles west. The troops of this division should not be found more than about 1 mile north and 3 miles south of the Ozanne. The center of the division is at Dangeau. The remainder of the ninth corps is on the Yerre at Arrou, Courtalain, St. Pellerin, Le Poislay, and Boisgasson.

Fifth division of cavalry: On the Loire between Alluyes and a point a mile below Illiers, and not reaching further north than Monfoulon and Bouville.

The cantonments of the corps cavalry are to be determined by the Army Commander, but they should not extend further north than St. Eman, Illiers, Alluyes, and Montboissier. The line of communication is Les Aubrais (at Orléans), Blois, Vendôme, and Châteaudun. Depot of reserve supplies, Les Aubrais (Orléans).

Headquarters of railway supply service, Vendôme.

INFORMATION CONCERNING THE ENEMY'S MOVEMENTS.

On the morning of September 14 troops of all arms appeared on the railway leading from La Loupe and from Illiers to Chartres. Cavalry patrols were also seen south of the Eure on the roads from Châteaudun and Brou to Chartres and also southeast of Chartres as far as the railway from Voves to Auneau.

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MANEUVERS OF SEPTEMBER 15.

The Northern army with its corps cavalry thrown out in front marched in four columns, as follows:

Tenth corps:

Nineteenth division by Fruncé, Cernay, Le Breuil, and Illiers.

Twentieth division and corps artillery, by Orrouer, Ollé Magny, Illiers, and St. Avit.

Fourth corps:

Seventh division and corps artillery by Chaufours, Bailleau le Pin, Blandainville, and Charonville.

Eighth division by Meslay, Sandarville, Mizeray, Ermenonville-la-Petite, and Saumeray.

The heads of the advance guards of the two columns of the tenth corps passed, respectively, Cernay and Magny at 9 a. m.; of the fourth corps Bailleau-le-Pin and Meslay-le-Grenet at 8 a. m. The first division of cavalry did not leave its cantonments around Auneau till 5.30 a. m.

The Southern army formed a general advance guard out of the eighteenth division of infantry which was already posted on the Ozanne, and the fifth division of cavalry, which had reached the line of the Loire. This advance guard was to delay the march of the enemy's columns until the bulk of the army could come up to the Loire and get a foothold on its left bank.

The forward movement of the army was made in three columns, as follows:

Ninth corps:

Seventeenth division and corps artillery by Chatillon-en-Dunois, Logron, and Dangeau on Saumeray.

Fifth corps:

One brigade and corps artillery by Montharville, Trizay-les-Bonneval on Alluyes.

The rest of the corps moved along the highroad from Châteaudun toward Bonneval and Chartres.

At 8 a. m. the heads of the columns were expected to arrive on the line Dangeau, Montboissier.

The fifth division of cavalry in starting north from Saumeray toward Ermenonville-la-Grande met the fourth brigade of corps cavalry between Auferville and Mizeray about 7 a. m. The division charged and drove the enemy toward the west. It then tried with its artillery to delay the forward movement

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of the eighth division, which by this time had reached Mizeray. The eighth was obliged to cover itself by a flank guard, and the delay caused by this movement enabled the eighteenth division to occupy Ermenonville-la-Petite and to push a few companies upon Mizeray, where, at 9.30 a. m., a fight took place with the advance guard of the eighth division.

The orders given for the advance by the generals commanding the two armies and the development of the maneuver made it evident that only the left wings would meet during the day, since the right columns of each army were unopposed to the enemy; therefore the general director of the maneuvers, General Brugère, intervened and gave a certain amount of information to General de Négrier, commanding the Northern army, concerning the movements of his enemy. Acting upon this, General de Négrier executed a change of front toward the southeast and brought back all his forces to the line Charonville, Ermenonville-la-Petite.

The eighth division occupied successively Mizeray, Epautrolles, and Argançon, whence, about 10.20 a. m., it prepared the attack against Ermenonville-la-Petite and took the village without much trouble.

The work of the eighteenth division seemed now to have been accomplished and it in turn retired to the line Montligeon, Bois Babonville, which it reached at 11.15 a. m. Dispositions were here made to resist any attack on this rather strong line.

On its side the seventh division, prolonging the line of the eighth to the right, marched from Blaindainville to Charonville and moved against Bois Babonville.

In spite of its distance from the scene of the fighting, the tenth corps managed at this time to get three battalions to St. Avit to support the movement of the fourth corps.

With regard to the rest of the Southern army, the seventeenth division debouched from Saumeray upon Aubépine. The tenth division, which had assembled to the southeast of Bouville, moved by the Vallée Bareau to the aid of the eighteenth, which was slowly falling back, fighting foot by foot. At about noon the tenth division came up with all its forces to the east of the farm of Montligeon and enabled the eighteenth to take the offensive. At this moment the end of the maneuver was sounded.

The only cavalry engagement of any consequence during the day occurred in the morning after the first division

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rejoined the extreme left of the Northern army when it attacked with success the fifth division, causing it to retire.

In delaying the advance of the Northern infantry, portions of the Southern cavalry several times charged infantry with what seemed to be hopeless chances of success, but it may be that they considered it necessary to sacrifice themselves on these occasions.

The Northern army the night of the 15th occupied cantonments on the Loire between Illiers and Alluyes and to the north; the first division of cavalry, around Moriers.

The Southern army was on the Ozanne between Brou and Trizay and to the south; the fifth division of cavalry, around Bonneval.

The outposts of the two armies were about 1,500 meters apart along the line Vieu-Vicq, Mézières, Grand Bois, and Bourgeray.

MANEUVERS OF SEPTEMBER 16.

As a result of the fighting of the 15th, the Southern army had been forced back south of the Loire.

In order to facilitate the ulterior lodgment of the Northern army south of this river, General Brugère in his capacity of director of maneuvers gave orders during the night of the 15th to one of the regiments of the seventh division of infantry (fourth corps), to attack and take the hamlet of Grand Bois, occupied by an outpost of the Southern army. This was done at 4 a. m. At 8 a. m., when the maneuver of the day, properly speaking, began, this place was held by the Northern troops. The intention of the general commanding the Northern army was to attack vigorously his adversary's left between Bullou and Ludon. He therefore directed the following movement:

Tenth corps:

The twentieth division to attack Mézières and Bullou.

The nineteenth division to form in close order south of Aubépine.

The heavy artillery (four 6-inch howitzers) to be at the disposal of the commander of the tenth corps.

Fourth corps:

The seventh division to assemble northeast of Saumeray and then attack Ludon.

The eighth division to form as a general reserve to the south of Génarville.

The first division of cavalry to cover the left of the army.

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The general commanding the Southern army intended to offer a strong resistance on his left with the ninth corps, while on his right the fifth corps would debouch toward Saumeray and Alluyes. He therefore ordered:

Ninth corps:

The eighteenth division to form with its brigades deployed side by side between Ludon and Herbault (2 kilometers west of Mézières).

The seventeenth division to be held as a second line to the west of La Touche-Pigault.

The corps artillery to assemble at La Tremblaye.

The ninth brigade of (corps) cavalry to cover the left flank.

Fifth corps:

The ninth and tenth divisions to march in line of divisions upon Mortemain.

The corps artillery to be at Osmoy.

Division of cavalry:

The fifth division, reenforced by the brigade of cavalry of the fifth corps, was to take position at Bouville to prevent any attempt at an enveloping movement on the part of the enemy.

It will be seen from these dispositions that each commander intended to preserve a defensive attitude on his left and act offensively with his right.

The action began at 8.30 a. m. by the Southern forces endeavoring to retake the position at Grand Bois which the enemy had seized during the night.

To this end a brigade of the eighteenth division debouched between Ludon and Boisguillon. It was supported by a brigade of the ninth division, which marched upon Saussay and Mortemain. These places were both taken between 9.30 and 10.15 a. m. Before this attack, the brigade of the seventh division (fourth corps) which the Northern army had left on the right bank of the Loire, below Saumeray, fell back upon the river and vigorously defended the crossings.

Toward the west, the Southern army was attacked at 9 o'clock by the advance guard of the tenth corps debouching to the south of the brook Foussard The thirty-fifth brigade (eighteenth division, ninth corps), which alone held Mézières, was not supported in time and was dislodged from the village by the twentieth division of the tenth corps, while at the

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same time three regiments of the nineteenth division crossed the Loire and came up on the line between Mézières and Néron. The heavy artillery cooperated in the action north of Mézières. Before this display of force Bullou naturally fell.

Seeing the danger which menaced his left, the Southern commander called up one of his reserve brigades with the intention of trying to retake Bullou, but before the effect of this action could be observed the end of the maneuver was sounded.

Toward the east, the leading brigade of the tenth division (fifth corps, Southern army) marched upon Alluyes, crossed the Loire, and advanced toward La Ronce, notwithstanding a charge made by the second cuirassiers (first division of cavalry), which tried to prevent its exit from Alluyes. But this offensive movement of the Southern army had only a short success, for the advance elements of the tenth corps were checked by the arrival of the seventh division (fourth corps) and had to fall back again south of the Loire.

About this time, too, the Northern commander took the offensive with the whole of his left, attacking all along the line Grand Bois, Le Saussay, and Bourgeray. He put in his general reserve (eighth division) and pushed it across the Loire at Saumeray and Launay to support the movement. This attack, however, does not seem to have been well timed, for the artillery was too far off to properly prepare it, and it was not considered that any decisive result had been reached when the end of the maneuver was sounded (12.20 p. m.).

On the evening of September 16 the outposts of the Northern army were established along the line La Tremblaye–Ludon–Bourgeray; those of the Southern army along the line Bougeâtre, La Touche-Rigault, and the heights on the left bank of the Ozanne.

MANEUVERS OF SEPTEMBER 17.

The Southern army is supposed to have received reenforcements on the evening of September 16, and is about to make a vigorous movement to the north. The Northern army in the face of this is to retire fighting against superior numbers. In order to give an appearance of reality to this supposition, and also to facilitate the offensive movement of the Southern army, the director of the maneuvers, General Brugère,

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ordered the Southern general to attack and take the hamlets Boissay and La Tremblaye during the night of the 16th. This was done by a regiment of the seventeenth division, and the Northern outposts fell back to the line Bullou, Néron, and Grand Bois. The following dispositions were made for the attack of the 17th:

Southern army—

Four divisions to mass to the south of the Ozanne at 8.30 a. m., the fifth corps to the east of Dangeau, the ninth corps to the west. The seventeenth division was ordered to support its regiment which had taken and was holding Boissay and La Tremblaye. It occupied these two places and Touville and La Chesnaye, with a battalion at the Brémeau farm. The fifth brigade of corps cavalry was to cover the right of the army, and the fifth division of cavalry the left.

Northern army—

The fourth corps rested its left on Montemain, the seventh division being to the north of Néron, and the eighth to the north of Grand Bois and Rouillis. Of the tenth corps, the twentieth division was between Mézières and La Folie and the nineteenth held as a general reserve near St. Avit, on the left bank of the Loire. The tenth brigade of cavalry was to cover the right, the fourth the left, while the first cavalry division was to establish itself in the center behind the corps artillery of the two corps which was massed between Mézières and Coudraie.

The general commanding the Northern army intended first to attack with the seventh and twentieth divisions the heads of the enemy's columns as they advanced and then fall back under cover of the eighth division and the first division of cavalry. In carrying out this plan he directed the nineteenth division and a brigade of the twentieth upon Boissay, La Tremblaye, and Bougeâtre, while the seventh division was ordered to attack Ludon vigorously. Before this attack the heads of columns of the Southern army were obliged to give way.

The general commanding the Southern army then determined to force the enemy's center, and to this end converged upon Saumeray the seventeenth and nineteenth divisions,

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each supported by a brigade from the adjoining divisions. At 10.45 he took the offensive along his whole line. On the left, the seventeenth division supported by 12 batteries moved upon Néron aided by the fifth division of cavalry, which sent information that the enemy had evacuated Bullou and was falling back. On the right, the ninth division, leaving a single regiment with the corps artillery between Bremeau and Ludon, debouched by Petit Mondétour and attacked Saussay, one brigade moving off to the right in an effort to outflank the enemy by La Ronce.

The Northern commander, however, had already given orders to retire; the tenth corps and the seventh division fell back by echelons to the left bank of the Loire, protected in the movement by several charges of the first division of cavalry executed by successive squadrons. The eighth division, which was also covering the retreat, abandoned Ludon at 11 a. m. and Saussay at 11.30 a. m. Néron and Grand Bois were evacuated at the same time.

The whole effort of the Southern army was now concentrated on the crossings of the Loire around Saumeray between Roland's farm and the Crouzet Mill.

The tenth corps fell back by St. Avit and Masson, the seventh division upon Aubépine, abandoning about noon the crossings of the Loire. This enabled the fifth corps, about 12.30 p. m., to debouch to the north of the river. The general reserve of the Southern army moved forward to support the attack on Saumeray, and one brigade of the fifth division of cavalry charged the first division of cavalry at the moment it was retreating across the river. The end of the maneuver sounded at 12.30 p. m.

MANEUVERS OF SEPTEMBER 18.

The maneuver of this day consisted in an engagement between an army of four corps and a represented enemy.

The Southern army was composed of the fourth, fifth, ninth, and tenth corps (less the troops detailed to represent the enemy) and the first division of cavalry.

The Northern army was represented by the fifth division of cavalry, the thirteenth cuirassiers, 4 companies of engineers, 2 groups of field artillery (6 batteries, 24 guns), and 2 regiments of infantry (8 battalions).

During the maneuver each company of the Northern force represented a battalion, each piece a battery, each regiment of

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cavalry a brigade. Thus the Southern army was supposed to face roughly a corps d'armée complete and two divisions of cavalry.

General de Négrier commanded the Southern army and General Boysson the Northern army.

It was announced that the object of this day's work was to exercise the troops in certain details of the typical combat which the handling of smaller units could not accomplish, such as the movements of reserves in mass formation, the passage of a long line of artillery engaged in preparing the attack, and the deployment in front of the enemy of the troops for assault.

The Northern or represented army occupied the line Meslay-le-Grenet–Mignières–Bois Mivoye–Dammairie, about 5 miles south-southwest of Chartres. Its reserves at Trizeray and Corancez served to protect its flanks.

In the advance to attack his enemy, the commander of the Southern force disposed his army checkerwise: The fourth corps furnished the advance echelon and was directed on Mignières and Bois Mivoye; to its right and rear the fifth corps was directed on Dammairie and Corancez; on the left, the tenth corps on Nogent-sur-Eure and Trizay; the ninth corps was in rear of the interval between the fifth and tenth corps and was directed on Meslay. The reserves of the advance guards were expected to cross the line Harville–Mizeray–Laplante–Meslay-le-Védame, as follows: Fourth corps, 6 a. m.; fifth and tenth corps, 7 a. m.; ninth corps, 8 a. m. The first division of cavalry preceded the ninth corps in its advance.

The plan was for the fourth and fifth corps to engage strongly the enemy's front while the ninth and tenth corps were to make the decisive attack on his right flank toward Meslay-le-Grenet, Trizay, and Nogent-sur-Eure.

The fourth corps, supported by the first division of cavalry on its left, began the action on the enemy's front about 7 a. m. upon debouching from Ermenonville la Grande. The tenth corps debouched from Bailleau-le-Pin at 10.40 a. m. and the ninth corps from Sandarville at 11 a. m.

A line of 34 batteries was established about the same hour along the crest of the slight rise of ground between Luçon and Harville, which commanded the village of Meslay-le-Grenet. A thorough preparation by artillery of the attack of this village was all the more necessary as a natural glacis

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about 1,600 yards wide sloped up to its edge, making the attack of infantry quite impossible until the defenders had been thoroughly shaken by artillery fire.

The coming into battery and opening fire by these 34 batteries at practically the same moment was one of the splendid spectacles of the day, and it was done with great dash and precision. After a terrific bombardment of the village, the two divisions of the ninth corps attacked and took it about 11.45 a. m. At the same time the tenth corps moved one division against Nogent-sur-Eure and one against Trizay; these places being taken, the four divisions joined hands and moved upon Pont Tranche-Fétu and Grand Berou. The flank movement had succeeded and when about this time the end of the maneuver sounded it was considered that the enemy's right was routed. His left, too, had been steadily pushed back toward Thivars, and when the assembly sounded this place and its bridges were at the mercy of the southern forces.

After the day's work the troops went into the cantonments which they were to occupy until the review of September 20.

THE REVIEW.

After a day of rest, which the men highly deserved after the two weeks of marching and fighting they had had, a review of the whole force by the President of the Republic took place on a plain near Amilly, 4 miles west of Chartres. Previous to the President's arrival, the troops had been massed on three sides of the great square forming the review ground, two corps on the south, two on the west, and the cavalry on the north. The President drove along the front of the columns, receiving the prescribed honors as he passed, and then took his place in the reviewing stand. The march past immediately began. Each corps was complete in all its elements except cavalry. The divisional and corps cavalry were massed with the two independent cavalry divisions, so that all the cavalry marched past together.

The infantry regiments were all formed with three battalions; neither infantry nor cavalry troops were accompanied by wagons of any sort. The direction of march was shown by a line of guidons, the guide being to the right; the colors were dipped and the officers saluted with the saber at a point indicated by a guidon; another indicated where this salute

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terminated. The infantry moved in quick time, the mounted units at a walk.

The accompanying sketch shows the exact formation of an army corps passing in review, the distances, intervals, etc. Each division marched with its four regiments of infantry abreast, each regiment was in column of battalions, each battalion in double column of sections. The front of the division was thus about 175 men, each company throughout being in column of four sections. The color of each regiment was borne a few paces in front of the head of the column. Every man was in heavy marching order.

The artillery of each corps marched past together in three lines, each line consisting of a regiment. The horse artillery of the cavalry divisions marched with those divisions. The 75-millimeter batteries were formed with four guns and four caissons, the 80-millimeter batteries took no caissons.

The heavy artillery (6-inch howitzers), each piece drawn by nine horses, three abreast, followed the tenth corps.

The balloon train passed with the captive balloon inflated and flying.

The cavalry passed in column of brigades in line of masses, the front being thus about ninety horses. Each division had its two regiments of light cavalry (chasseurs) in front, followed by two regiments of heavier cavalry (dragoons), with its two regiments of cuirassiers in rear.

The four bands and the field music of each division were massed and marched at the head of the division, wheeling out of column after passing the reviewing point and playing till the rear of the division had passed. The march past of the whole army, about 100,000 men, occupied one hour and forty-five minutes. The dressing of troops of all arms was marked throughout by great precision. The infantry marched with a swinging elastic step, wholly free from constraint, making regularly 120 steps to the minute.

When the march past was concluded all the cavalry, ten brigades, formed in line of masses, moved forward at a gallop toward the reviewing stand and halted at a signal. The effect was very imposing.

Immediately after the review the troops moved off to indicated points, made a halt, cooked and ate the midday meal, and the movement by rail or marching to their regular garrisons immediately began. The last of the troops marched

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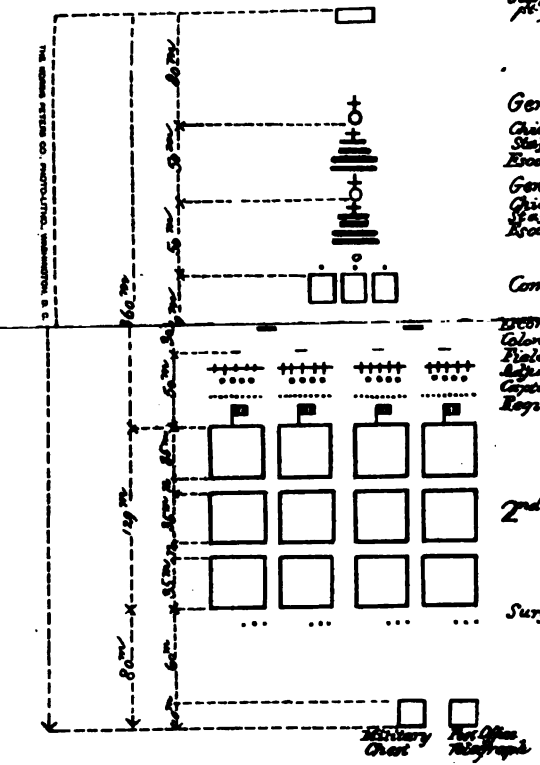

PLATE XIII

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past the President at 11.30 a. m. By 1 p. m. 23,000 men and 1,800 horses had been started from Chartres and the neighborhood on their way home. This movement was made without interfering with the regular train service, even on the roads not belonging to the state. The science of moving troops and supplies with ease, quickness, and precision seems to have reached in France a point approaching perfection.

EXTRACTS FROM INSTRUCTIONS ISSUED BY GENERAL BRUGÈRE, DIRECTOR OF MANEUVERS.

"HONORS.—Under all circumstances, troops, whether in formation or individually, will preserve a military bearing and omit none of the prescribed marks of respect. During the maneuvers and the marches preparatory to them, no honors will be rendered by troops, except that on all occasions and by all the troops the minister of war and the general director of maneuvers will be given the prescribed honors. Likewise, generals commanding armies will be given the customary honors by their respective commands.

"DRESS.—The regulation uniform for campaign prescribed for troops of the different arms will be worn. Army commanders will regulate the time of day when their men will use the different garments composing this uniform. In all cases the men must wear the flannel stomach band, and after 6 p. m. cloth pantaloons will be required. [Pantaloons of heavy cotton drilling are often worn in the day.] Shoes must be kept well greased during the whole time of the maneuvers. From September 14 to 17 troops belonging to the Southern army will wear a white-cotton cover on the head dress to distinguish them from troops of the Northern army. At the review officers will wear white gloves.

"MARCHES.—During halts the road will be left free; infantry will stack arms on the right-hand side of the road, take off packs, and remain behind the stacks. Cannoneers of field artillery will march on foot, except in movements faster than the walk. In regimental trains, etc., the men on foot will march four abreast in front of the wagons, and the led horses two abreast behind the wagons. In going through inhabited places the infantry will take step, keeping the rifle slung. Horsemen and drivers will come to attention, the saber being left in the scabbard. This applies to all detachments and

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trains. No vehicle not belonging to the army will be permitted in a column.

"COMBATS.—In movements across fields injury to crops will be avoided and cultivated land will be respected whenever possible. Silence must be observed during all maneuvers and signals will be used instead of commands.

"The combat will be developed slowly and methodically so that all its phases can be observed; the artillery must be given time to occupy its successive positions, regulate its fire and make it effective. The front of attack must be regulated by the number of men present in the command and must not be based on the war strength of the units.

"In every attack the assaulting troops will be halted at from 50 to 100 yards from the opposing troops. If neither adversary thinks he ought to retreat, arms will be stacked and the decision of an umpire awaited. Cavalry charges will be halted at 100 yards distance. When cavalry charges infantry, it passes through if this can be done without danger, or moves off to the right or left after the charge. It should never station itself under infantry fire, even to await an umpire's decision.

"In the deployment, the wagons of the canteen women will be left in rear of the roads at points indicated by commanding officers. The same applies to all vehicles of the fighting train except hospital wagons and company ammunition carts which alone are on the field of maneuver.

"Bugle calls are prohibited for outposts and the maneuver ground, except those of the director of maneuvers, which must always be repeated.

"THE END OF THE MANEUVER.—When the assembly sounds and during the critique, the troops will be conducted to favorable ground where they will make their coffee and eat the cold provisions carried in the haversacks. Fatigue details for bringing water will be regularly made. The wagons of the fighting train and canteen women will join their commands at this time. Each officer, whatever be his grade, should carry on his horse or person a cold repast which he should eat at the same time and under the same conditions as his men. The assignment of cantonments will be made in sufficient time beforehand to allow the camping party to be sent to them as soon as the end of the maneuver has sounded. The cooks will

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march with the camping party and the meat wagon will immediately follow.

"CANTONMENTS.—It is to be observed that the commanding officer of a cantonment has the authority and duty of a commanding officer in garrison; he is responsible for order and security. Troops will enter their cantonments at quick time, arms at the shoulder or saber drawn and bands playing. In the trains such men as have been authorized to ride on the wagons will be made to march if able to do so. All enlisted men must be in quarters at 8.30 p. m. Wagons and horsemen as a rule must not move at a trot through cantonments, and all details will march at attention. Ordinarily the bands will play from 5 to 6 p. m. Each cantonment will be examined for water supply before troops are sent there, and in case of scarcity sentinels will be placed over wells to regulate their use. The surgeons will see that no eatables of bad quality are sold to soldiers. If any drinking shop permits a soldier to have enough intoxicant to make him drunk, the place will be prohibited to all.

"All troops that bivouac will be allowed a ration of brandy for the night.

"FOOD.—In the morning, before marching, the men will make and drink their coffee and fill their canteens. After the maneuver (about 12.30 or 1 p. m.) the men will make coffee and eat their cold lunch. The "soup" (the soldier's ordinary evening meal) should be eaten at 6 or 7 p. m., and this can generally be done if the cooks and meat wagon are sent off to the cantonment in time.

"REPORTS AND CORRESPONDENCE.—The journal of the marches and operations will be kept in each command by the staff officers. In order to be able to furnish the reports which may be required after the maneuvers, this journal should be made complete at the close of each day. It is recommended that these reports be reduced to the most concise statement of essentials, in order not to uselessly absorb the time of officers. To the same end, all paper work between depots and departments with troops participating in the maneuvers will be reduced to a minimum.

"OUTPOSTS.—The outposts of each of the two armies will be established at 5 p. m. September 14, and will be continued until the close of the maneuver of the 17th, during which

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time each army will assure its own security as though in the presence of the enemy. No operation, however, will be undertaken after the close of each day's maneuver or during the night without orders from the director of maneuvers. This interdiction does not apply to the movement of regimental trains with provisions for the troops. After the maneuver of the 17th no outposts will be established. Officers, couriers, and cyclists going to or coming from the director of maneuvers are neutralized. The same obtains for wagons, etc., bringing water to the troops; these can come and go everywhere and at all hours.

"CRITIQUE.—At the end of each day's maneuver, the director of maneuvers will criticise the day's work. Generals commanding armies and corps, chiefs and subchiefs of staff of armies and corps, as well as all general and superior officers and umpires who are in the vicinity of the director of maneuvers, will be present at this critique. [Foreign officers were not permitted to be present.]

"UMPIRES.—Umpires are under the orders of the director of maneuvers, who will convey his instructions to them through the chief of umpires. They are informed by the army and corps commanders to whom they are attached, of orders and instructions issued by them for the various movements.

"As a rule, umpires should not interfere directly in the operations except to remedy an evidently impossible situation. Every decision which would have as a result a suspension of the movement should be given with the greatest caution and only when no other means is possible to restore a normal situation.

"During the course of the maneuver, the umpires will endeavor above all to have constantly an exact idea of the respective situations of the contending parties and especially at the close of the day's work to be able to locate the positions held by each. They will report this to the director of maneuvers, either directly or through the chief of umpires, so that he can understand the general situation.

"Umpires are divided into groups, one of which is attached to the staff of the director of maneuvers, and the others to the staffs of the armies and corps. Each group operates during the maneuver in the zone of action of its army or

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corps, and in order to insure the covering of the whole zone of operations by the umpires of the opposing sides, each group should follow the movements of the troops forming the right of their unit.

"Umpires of general rank are authorized to have an aid-de-camp accompany them. They alone are followed by an orderly with a white guidon."

Eight general officers and eleven field officers constituted the body of umpires.

AMMUNITION.—Each infantryman was allowed for the whole period of the maneuvers 100 blank cartridges, each engineer soldier 40, each cavalryman 20; for each revolver 10 blank cartridges. Each battery was allowed 360 blank cartridges. A little less than half of this allowance was used during the days preceding the four days of the "grand maneuvers;" the rest was used during those four days. The troops representing an army on September 18 were given an extra allowance of cartridges. Army commanders regulated the consumption for each day.

All his cartridge shells were picked up by each man after "cease firing" had sounded, and directions were given for turning in these shells to the cartridge factories after the close of the operations.

Army commanders were directed to exercise the company ammunition carts in their functions during the march and during the combats.

RATIONS AND SUPPLIES.—During the maneuvers the troops were supplied with bread, sugar, coffee, and oats from the depots in the rear; hay, straw, wood, liquors, and groceries were bought by the different organizations from shops near their cantonments. No regular corps supply trains or field bakeries were organized. Each army was supplied independently. As is regularly required of troops in campaign, each man carried two days' preserved rations in his haversack. These were used in place of the ordinary ration on days fixed by each army commander.

As a rule supplies for two days at a time were sent by rail from the main depot to points indicated in the requisitions, whence they were hauled to the troops by the regimental train of the organization to which they were addressed. For long hauls by wagon, heavy-draft automobiles (hauling as

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many as six wagons each loaded with a ton) were placed at the disposal of the transportation service. In returning to their garrisons, the troops which marched drew their sugar and coffee for the march before starting.

Fresh meat was furnished by the supply department chiefly from droves of cattle bought in the region covered by the operations. When fresh meat was not to be had, canned meat was used from the reserve rations and the two days' canned rations carried by each man.

OBSERVATIONS.

The French troops seen in masses at their work in the field produce upon the mind of the military observer a different impression from that made by the individual soldier met in the street. The average enlisted man is not set up, his uniform is badly fitting and gives no appearance whatever of smartness. Calisthenics and gymnastics are encouraged and enforced, but solely as exercise and training and not with the added object of giving to the men the erect and military carriage on all occasions to which we are accustomed. The result is that the individual looks slouchy. On the other hand a company or battalion on the march or disposed for attack act in unison, are quick and easy in their movements, and look business-like. They are so used to the pack that it seems no burden or impediment. During the whole maneuver, silence is observed, even when the men are halted and allowed to lie down.

Most of the time the weather was very hot, but it was rare to see a man during a halt drinking from his canteen. The principles of marching are taught with great thoroughness, and among other things men are made to go without drinking from the start in the morning till the first long halt, often four or five hours. The practical value of this habit is necessarily great; men become accustomed to it, and do not suffer from thirst as do troops who are constantly getting at their canteens. On the march a man is not allowed to drink without permission, and generally he is then allowed only to rinse his mouth.

The easy, swinging stride with which a column moves, even at the end of a long, hot, dusty day's work is admirable. The pace of our quick time is kept up without any apparent effort, and the files rarely open out.

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Very few men fell out from sickness or fatigue. In the tenth corps each regiment lost from ten to fifteen men sent back to garrison on account of illness. A few men per day in each regiment would be given permission for one reason or another to have the wagons carry their packs, and sometimes men were left behind in cantonments with orders to join the following day.

Absolute uniformity of dress was observed and the coat was always kept buttoned up except sometimes the top buttons when it was very hot.

INFANTRY.—The uniform for war or campaign consists of the hobnailed shoes worn on all occasions by French soldiers (even cavalrymen), short black leather gaiters nearly cylindrical in shape, red trousers of cloth or drilling, red forage cap, and a gray-blue "capote" or overcoat. This is the coat habitually worn in winter though not over a blouse or other jacket. However, in campaign, even in the hottest weather this thick double-breasted coat, coming to the knee, is always worn, the skirts being looped back front and rear so as not to impede the legs in marching. However little may be worn under it, it must be a very hot garment for summer. No socks of any kind are worn.

The pack is carried very much as with us, but there being no overcoat, blanket, or poncho, it is lighter though quite bulky. It is very readily removed and put on, and when the men halt for a few minutes they generally loosen one strap, unsling, and rest the pack on the ground.

Two men in each squad carry packed on the knapsack a bundle of dry twigs collected generally before the morning start; another man carries a coffee boiler, and these arrangements enable coffee to be made immediately upon halting by each squad. No shelter tents were carried.

The blue-gray coat and red trousers constitute a uniform that is decidedly conspicuous as compared with khaki, both against green and dirt-colored background. This question of conspicuousness seems wholly ignored in the French army. The brilliantly polished steel helmet of cuirassiers and dragoons and the cuirass of the former disclose their presence at great distances. There appears to be no arrangement for obviating this in time of war.

In the development of the attack, concealment and use of cover were little regarded.

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Ground scouts are prescribed in the drill regulations but were little used. It is true the ground was wholly open and rarely offered good opportunities for the business of the scout. The firing line is practically a line in single rank with elbow room; following this come the supports and reserves in line of platoon columns which do not deploy until nearly up to the firing line. The casualties among these troops would certainly be very heavy before they were in a position to fire a shot. Bayonets were fixed anywhere within 1,000 yards. There is practically no lying down to fire. The reserves while in column and waiting to be moved up generally lie down to save the men's force, but this seems not often done for protection. The firing line sometimes kneels, but habitually stands and delivers its fire and especially during the last few hundred yards of the advance.

The music of the regiment is massed immediately behind the line, and the drums beat the charge. There is no advancing by rushes in our sense, and no lines were seen to move at double time except in the final charge. A battalion often moves forward by echelons of companies, but very deliberately and without lying down or kneeling to fire. Commands by voice are rarely heard, most indications being by signal with the hand and whistle. Most of the higher noncommissioned officers as well as the officers were provided with maps and field glasses.

There were no machine guns used at the maneuvers, though it is understood that the French intend to have one automatic machine gun, firing infantry ammunition, attached to each battalion. Volley firing was the rule, by section, platoon, or company, though there was a good deal of firing at will, even at mid ranges.

As each man carried the day's allowance of cartridges on his person, no exercises in supplying the firing line with ammunition were observed. The company ammunition carts, however, were always near the company.

Bicycle companies were very little in evidence, though they were used and were seen in action generally on the flanks. They were quick and well drilled. They did not use the folding bicycle. Bicyclists were much used for couriers.

The infantry did not at any time intrench itself. Some shelter trenches were made by the engineers but they had no bearing on the operations.

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ARTILLERY.—The caisson stays habitually with its piece. In route marches, it precedes or marches alongside the piece; in coming into battery, it always precedes. The chiefs ride forward and indicate the line for establishing the battery in the usual way; the caissons halt on this line, unlimber, and the limber moves off to the best protection obtainable, often a hundred yards away. The trail of the caisson is then lifted and revolved to the rear until a step on what was the back of the caisson chest strikes the ground, the trail being vertical. The trail, which has a hinge near its junction with the caisson chest, is unpinned and then broken down and forward from its vertical position till its end touches the ground. Thus what was, when limbered, the top of the caisson chest becomes the back, and what was the bottom becomes the front toward the enemy. This bottom is a bullet-proof steel shield and protects the men who are behind serving ammunition. The top, now become the back of the chest, has double doors which swing open in exactly the same sense as the double doors of a bookcase, enabling the cannoneers to pull out the ammunition. This is fixed and lies in horizontal rows in this firing position of the caisson. When the caisson is limbered the cartridges are vertical, point of projectile down.

The piece comes up and halts on the right of the caisson, is unlimbered, and then reversed. The left wheel of the piece is now as near as possible to the right wheel of the caisson. The limber moves off and joins the caisson limber, the saddle horses of officers, etc., accompanying it.

In limbering up, the doors of the caisson chest are closed, the trail revolved up and pinned and then dropped down on the pintle of its limber, which has meantime come up faced to the front. The piece limber comes up, reverses, and the piece is limbered. It then reverses and takes its usual place behind the caisson.

Even when parked for the night, each caisson is alongside its gun; intervals sufficient for the horses of each section separate the carriages of one section from the next, with the picket line stretched from wheel to wheel about 3 feet from the ground.

As soon as the piece is unlimbered the trail is raised nearly vertical, the wheel brakes are unfastened and allowed to drop into place, and the trail is dropped to the ground. This movement brings the shoes of the brakes under the lowest point

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of the wheels and digs the trail spade into the ground. The carriage is thus held on three rigid supports, and when the piece is fired it recoils along its slides and returns to battery, while the wheels show no motion except a very slight jerk to the rear and an immediate return to their original position.

Two small seats are fastened on each side of the trail. The man who points and the man who loads and fires sit on the left and right seats, respectively, covered by the gun shields. They do not leave these positions when the gun fires. The cannoneers are thus all protected from any infantry fire from the front and no man leaves his position, the cartridges being passed from the caisson to the man at the gun.

When the ammunition in the caisson chest is exhausted, it is replaced at the earliest opportunity from the supply in the limber chests.

Guns, carriages, and caissons are all painted a uniform gray color.

While the smokeless powder used gave no indication of the position of a battery, the dust raised by the blast and the vivid flash served to do so. These clouds of dust during a fairly rapid fire were visible and characteristic at over 2,000 yards.

The whole terrain was dry, but even in grass fields and the day after the rain this effect was the same.

Each battery has a telescope of excellent power on a light tripod, which is used to observe the effect of the fire. This telescope also has stadiometer wires for calculating height of burst and lateral errors.

The cultivated fields were very soft, but the artillery never seemed to have any difficulty in moving over them at a trot or gallop.

No guidons are prescribed for field artillery, each gun being considered as a color.

CAVALRY.—That the day has passed when cavalry can successfully charge infantry is evidently not believed in the French army. Every day during the maneuvers cavalry was to be seen charging infantry full in the front, sometimes, too, when bodies of the unbroken enemy could take them in flank as they advanced. Frequently the advance began at from 1,500 to 2,500 yards from the enemy and lay over open ground swept by his fire. The charges were generally made by regiment in successive squadrons. Most of them in war would have been characterized as reckless folly or pure sacrifice.

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About 11 a. m, on the 18th, near Dammarie, a successful charge on a battery was observed. The squadron got in among the guns before they could fire a shot. Later on the same day a regiment charged over open ground for a mile upon a battery unlimbered and supported on the front and flanks by infantry. It looked like pure folly.

Cavalry was rarely seen dismounted to fight on foot, except on the 18th, when one division was used as a represented enemy. This method of fighting seems to be considered exceptional, not usual, and the mens' equipment unfits them for it. The chasseurs are not so badly off as the cuirassiers and dragoons, but the leather-bottom trousers would be very trying for foot work. An impression prevails with us that the cuirass and helmet are clung to simply as an ornament and through sentiment. This is a mistake. The cuirass is held to be bullet proof (it is certainly enormously heavy), and the helmet is worn as a protection against saber cuts. Both are always worn in war. From our point of view more men would be disabled in a hard campaign through wearing this equipment than would be saved in fight through its protection.

Automobiles were considerably used by corps and higher commanders and staff officers, by couriers, and by the supply department. The latter had four steam and four petroleum motor wagons in use. Some of these hauled trains composed of six wagons each, loaded with about a ton. They made 3 to 5 miles an hour. The numerous and excellent roads, and the absence of any need of fording streams (there being always bridges), made this practicable. One automobile was fitted with a search light of considerable power. The same engine that drove the wagon was used to operate the dynamo. No practical demonstration of the use intended for this appliance was given.

The balloon train was under the control of the director of manevers, General Brugère. It was moved from place to place as needed with great ease, and on the day of the review the whole train passed by with the troops.

A cart with carrier pigeons was on hand but no use seemed to have been made of them.

The cantinière furnished the service expected of her in active campaign. The men could not only buy from her such extra articles of food, drink, etc., as they needed, but she generally provided the mess for the battalion officers. This saved a good

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deal in the matter of mess chests and servants, was a profit to the cantinière, and a great comfort to the officers. At the end of the day's work, when the troops had been marching and fighting seven or eight hours, the "long halt" would be ordered. The men cooked their coffee on the spot, the cantinière got out her tables and her lunch and the officers had their meal with no trouble or delay. A rest or a nap followed, and then after an hour or an hour and a half all were refreshed and ready to resume the march to the cantonment for the night, which often was not reached till 6 or 7 o'clock.

The following was the regimental transport during maneuvers:

Infantry regiment:	
Baggage wagons	5
Supply wagons	8
Meat wagons	2
Company carts	5
Medical carts	2
Canteen carts (one for each battalion)	3
Total	25

Each company had one bicyclist.

Artillery group, 3 batteries:	
Baggage wagons	6
Wagons for officers' kits	2
Supply wagons	1
Meat wagons	1
Canteen carts	1
Total	11

Each battery and group commander had one bicyclist.

Cavalry regiment, 4 squadrons, 300 to 400 men:	
Forge wagons	4
Supply wagons	4
Meat wagons	4
Baggage wagons	2
Medical carts	2
Canteen carts	2
Total	18

Each mounted man carries 4 or 5 pounds of oats.

The meat wagon is arranged like a portable butcher shop. The top has ventilators, the meat is kept hung and is thus clean and readily gotten at. It forms part of the regimental

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transport and is replenished every two days from the herd or from supplies sent by rail.

In conclusion, it is remarked that in examining the French military system or endeavoring to draw from it results applicable to ourselves, it must always be remembered that the French army is organized, equipped, and trained with the primary idea of preparation for war on the Continent of Europe. The American and the British systems on the other hand contemplate primarily a campaign in any part of the world rather than upon the soil of the native country.

Also, it is not believed that in actual battle French officers would employ the tactics which are seen at maneuvers.

The shortness of the time, the desire to be always doing something with the men, the absence of casualties and of danger, inevitably tend to make every man within range of the enemy act in a different way from what he would do on a field swept with hostile fire. The supreme value of these costly maneuvres comes in the practical lessons they teach general and staff officers. These latter have to march, feed, supply and give orders to troops under almost the exact conditions of war, and their capacity for command is thoroughly exploited. The absence of confusion, the complete knowledge which each commander had of what was going on about him and what he was expected to do, the ease with which 100,000 men were concentrated, supplied, marched, fought, and sent home, indicated that the maneuvers of former years are bearing fruit to-day.

REPORT OF THE IMPERIAL MANEUVERS IN GERMANY, 1900.

(By Lieut. Col. W. R. Livermore, Corps of Engineers, U. S. Army.)

The descriptions of the positions and movements of the troops are made out from personal observations and the verbal report of other officers present, from the official bulletins and maps, giving the positions of each division on the evenings of the last five days, from reports in the daily newspapers so far as they appear to be consistent, and from the account published in the "Internationale Revue" for December.

The operations were to have combined the army and navy had not the war with China interfered.

The territory on which the maneuvers were held is shown in accompanying map, and extends from Berlin to the southern shores of the Baltic. The principal battlefields are from

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25 to 50 kilometers south and a little east of Stettin. The ground here is gently rolling and quite open, so that at times it was possible to see a very considerable portion of the troops on each side from commanding positions.

About 60,000 combatants were engaged, including the guard corps and the second army corps and a division of cavalry. The proportion of cavalry was about one-fourth of the infantry, and of the artillery 10 guns to 1,000 infantry. They were divided into two parties whose strength was, on some days, equal, but on the last day in the ratio of 3 to 5.

The order of battle for the guard corps and the second army corps, respectively, are shown in the accompanying diagrams. The strength of a battalion has been estimated at 550, of a squadron at 150, and of a battery 120 men and a little more than 5 guns.

The nature of the problem is explained by the following:

GENERAL SUPPOSITION.

The Blue army is beyond the boundaries of the empire. A Red army corps with numerous cavalry has disembarked on the 26th of August on the coast of Pommerania, near Rügenwaldermünde.

SPECIAL SUPPOSITION, BLUE.

The guard corps (3 infantry divisions and 1 cavalry division) has been assembled at Berlin on the 2d of September to repel the enemy, who has disembarked. Information has come to the effect that hostile infantry and artillery has been seen at Labes on the 1st of September, and the cavalry has shown itself the same day at Stargard and Alt-Damm.

The Blue fleet, which had hastened here from Kiel, had been dispersed by the Red at Arcona.

Swinemünde, Spandau, and Küstrin have been fortified and occupied by Blue troops.

SPECIAL SUPPOSITION, RED.

The disembarked second army corps (4 infantry divisions and 1 cavalry division) is to advance as quickly as possible against Berlin.

The cavalry division A, together with the jäger battalion No. 3, has reached the neighborhood of Pyritz and Bahn; the cavalry regiment of the forty-second infantry division has

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Blue army.

3d Guard Inf. Div.
Maj. Gen. v. Woyrsch.

Mixed Inf. Brigade
Maj. Gen. v. Zamory.

Body Grenadier Regt. Friedrich Wilhelm III. (1st Brandenburg) No. 8.
Col. v. Schlick.

Grenadier Regt. Prince Charles of Prussia (2d Brandenburg) No. 12.
Col. v. Treskow.

5th Guard Inf. Brigade
Maj. Gen. Baron v. Lü...

5th Foot Guard Regt.
Lt. Col. v. Ec...

Guard Gren. Re... Regt.
Maj. v. ...

17, 3, 12

...Brigade.
...oltke,
...aj. the Emperor.

...d Regt.
...enberg
...j. the Emperor.

...d Regt.
...Hadingen.

...v. Besser
Guard Jäger Battalion.

Cuirassier Regt. Emperor Nicholas I of Russia N...
Col. Baron v. Toll

...Schlobitten.

...d Hussar Regt.

3d Guard Field Artillery Brigade.
Maj. Gen. Friedrichs.

Field Artillery Regt. General-Feldzeugmeister No. 18. Col. Rüder.
II. 6 5 4 I. 3 2 1

Field Art. Regt. ...
Lt. Col. Kott...
II 6 5 4

...ld Art. Regt.
...nemann.
I 2 1

1 Platoon Division Bridge Train.

4. Guar...

...Pion. Batn.

M...
1a...
G...
2d...
A...

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Red Art battalions, 48 squadrons, 44 batteries.

42d [illegible] 11 | 3d Infantry Division. 12, 5, 11 | Gt. Lieut. Hentschel v. Gilgenheimb.

Railroads Bde. Majr. Gen. v. [illegible]

6th Infantry Brigade. Majr. Gen. Bronsicel Elke v. Brun.

5th Infantry Brigade. Majr. Gen. Baron v. Grutschreiber.

Railroad Regt. Majr. Stahl

Colberg Grenadier Regt. Count Gneisenau No. 9. Col. Elkester.

Grenadier Regt. King Friedrich Wilhelm IV No. 1. Col. v. Wedel.

Railroad Regt. Majr. Dahl

Inf. Regt. von der Goltz No. 64. Col. Hopfner.

Inf. Regt. Prince Moritz von Anhalt-Dessau No. 42. Col. v. dem Borne

Lt. Col. v. Koller.

3, 2, 1 9th Wilhelm.

Bd. Baron v. Ami

3d Field Art. Brigade. Col. Gunkel.

Mixed Field Art. Regt. Majr. Sander

Field Art. Regt. No. 38. Lt. Col. Kriegk.

Field Art. Regt. No. 2. Majr. Reichenbach.

Horse

1st Bde. Div. Brig. Train 2. 1. 9th Rm. 1st Bde. Corps Bd. Train

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reached the Welse region on the left bank of the Oder; the forty-second infantry division, the region between Stargard and Freienwalde; the third, fourth, and forty-first infantry division, the line Reselkow–Labes; all on the 2d of September. Rügenwaldermünde has been occupied. Further troop transports are expected there.

The Red fleet, after the successful disembarkation, has advanced against the Blue fleet coming from Kiel, has routed it, and is now on the point of turning against Swinemünde.

With the certain expectation of a successful result of the movement of the fleet against Swinemünde, which will make it possible to remove the line of communication to that place, the second army corps begins the advance with three divisions from Stettin against Berlin on the left bank of the Oder. The cavalry division A will have the task of guarding and reconnoitering the right bank of the Oder; the forty-second infantry division assigned to it follows via Pyritz. Contact with the enemy has not been established. From different sources, however, information has come to hand that a strong corps is assembling at Berlin, and that Spandau and Küstrin are fortified and occupied with troops.

EVENTS FROM SEPTEMBER 3 TO 8.

BLUE ARMY.

On the 3d of September the guard corps commenced the advance from Berlin toward the Oder with a wide front, the right wing at Buckow, the left at Liebenwalde. Patrols of the guard cavalry division hurrying on in the front found the Oder bridge at Zackerick and the ferry between Zellin and Hohensaathen on the steep right bank strongly occupied by hostile sharpshooters, cavalry, and artillery. A crossing did not seem to be possible here. The conditions seemed better above Zellin. In the night between the 4th and 6th of September a battalion of the Küstriner garrison succeeded in driving a weak hostile force from Halse. Between this place and Kienitz was a bridge built with the material from the fortress, and early in the morning of the 5th the guard cavalry division crossed the river here. A small force of hostile cavalry, which threw itself against them, had to retreat with severe losses to the north of Vietnitz. The whole region of the Oder was cleared. On the afternoon of the 5th the heads of the three guard infantry divisions reached the left bank of

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the Oder and occupied the most important crossings on the other side.

After a day of rest on the 6th, bridges were built in the night between the 6th and 7th at Güstebiese and Ndr. Wützow. These two military bridges were all the guard corps had to depend upon for crossing, as the permanent bridge at Zackerick had been destroyed by the retreating enemy. The second and half of the first guard infantry division crossed on the morning of the 7th at Güstebiese, and the third and half of the first at Ndr. Wützow.

A hostile troop formation of all arms advanced via Zachow against the left flank of this party. The advance guard brigade of the third guard infantry division was with severe losses thrown back to Karlstein. The greatest part of the guard corps was as quickly as possible rallied at this point. The enemy withdrew again toward the north, through the Peetziger forest, fearing these masses and also fearing an outflanking movement on the left flank by the first guard infantry division, which, judging from the thundering of the cannon, was marching to Wrechow. The guard corps remained between Mohrin and Zehden. The guard cavalry division assembled on its right flank. This division had been attacked and thrown back by the hostile cavalry which in the mean time had assembled.

On the 8th of September the guard corps continued the advance via Königsberg. The center column (first guard infantry division) met the enemy at Uchtdorf; he, however, confined himself to an artillery fire, and as he saw his flanks threatened by the two other divisions he drew back through the forest Kehrberg. The guard corps followed and reached the line Wildenbruch, Selchower Mühle, Jägersfelde, and Röderbeck. The guard cavalry division had advanced to the east of Königsberg as far as Bahn, had repulsed a strong body of hostile cavalry at the defile of Langer Lake, and had taken shelter east of the line of lakes.

RED ARMY.

On the 3d of September the cavalry division A went from Bahn via Königsberg toward the Oder and reconnoitered toward Berlin, while the hussar regiment v. Zieten reached from the Welse region to Angermünde at the head of the Finow canal. As the patrols of the advance guard reported very strong

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hostile forces from Berlin in a northeasterly direction, the cavalry division A stopped all further advance over the Oder, and assembled on the 4th of September in the region Mohrin, occupying the crossings over the river from Hohensaathen to Zellin. Jäger battalion No. 3 had followed via Königsberg and occupied the bridge at Zackerick and the ferries at Ndr. Wützow and Alt-Rudnitz.

On the night between the 4th and 5th of September strong hostile cavalry crossed the Oder at Kienitz and threw part of the cavalry division A which opposed them at Barwalde back beyond Mohrin–Nordhausen. The hussar regiment v. Zieten, occupying the Finnow canal, was driven back by the hostile cuirassiers and cyclists, who thereupon showed themselves at Schwedt and at the Welse crossing, but at both places were repelled by cyclist detachments from the second army corps.

In the meantime the second army corps had on the 5th reached Gollnow–Stargard with the third, fourth, and forty-first divisions and Bahn with the forty-second. From information which had been received there, it was known that the enemy was advancing only with the cavalry followed by weak infantry toward the Oder region, Ndr. Wützow–Zellin, but was with his main forces on the point of starting toward Stettin via Liebenwalde and Eberswalde on the left bank of the Oder. The commanding general therefore decided, on the 6th, to march with three divisions via Alt-Damm to Stettin to meet the enemy advancing on the left bank of the Oder. He was confirmed in this decision by the prospect that the Red fleet would take Swinemünde in the near future, and thereby open a far shorter and easier line of communication than the former one from Rügenwaldermünde via Farther Pommerania. The forty-second division was directed to remain on the right side of the bank to serve as a support for the cavalry division and if possible keep off a further advance of the enemy from Hohensaathen. The information received on the 6th led the Red to suppose that a crossing at this last place might be expected soon. The forty-second infantry division started on the 6th from the neighborhood of Hanseberg southeast of Schwedt.

On the 7th of September the enemy crossed the Oder in strong force at Ndr. Wützow and Güstebiese. The forty-second infantry division attacked the first columns through the Peetziger forest and threw back about a brigade of

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infantry together with artillery to Karlstein. As, however, a long hostile column moved from Wrechow against the left flank, the forty-second infantry division drew back through the forest unmolested by the enemy to its former position. At the same time the cavalry division A had succeeded in throwing back strong hostile cavalry at Vietnitz.

On the 8th of September the forty-second infantry division went back to the region of Rohrike and took a position at Uchtdorf. The enemy advanced in several columns via Königsberg and Rehdorf and deployed against the forty-second infantry division. This defended itself, however, at Uchtdorf against superior artillery and did not withdraw to Kehrberg–Lindow until information was received that hostile forces were advancing against its flank.

The cavalry division A had at first protected the flank of the forty-second infantry division at Königsberg and had then gone to Marienthal Bahn. There they were attacked by hostile cavalry which had marched up from the east of Langen Lake and were thrown back via Liebenow.

During these events the second army corps had remained at Stettin with outposts on both banks of the Oder and with an advanced detachment in Greifenhagen to protect the crossings there.

THE INTENTIONS FOR SEPTEMBER 10.

BLUE ARMY.

The guard corps continues the advance.

The second guard infantry division, at 8 a. m., from Wildenbruch via Bahn to Cunow.

First guard infantry division, which is joined by the commander in chief, at 8.30 a. m., from Selchow via Marienthal to Liebenow.

Third guard infantry division, at 8 a. m., from Jägersfelde via Selchow–Gr. Schönfeld to Heinrichsdorf.

The guard cavalry division from Bahn via Cunow to Wartenberg.

RED ARMY.

The second army corps intends to advance against the enemy on the eastern side of the Oder. It will march as follows:

The third infantry division, at 5 a. m., from the Zollhausbrücke (Reglitz) via Alt-Damm–Muhlenbeck to Glien and

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Neumark, taking possession of the crossings over the Kreckgraben and those at Klausdamm.

The fourth infantry division, which is joined by the commander in chief, at 4.45 a. m., from the Parnitz bridge via Kespersteig–Hokendorf–Binow to Sinzlow and Kortenhagen.

The forty-first infantry division, at 5.30 a. m., from the Parnitz bridge via Kespersteig–Podejuch–Clebow, to Woltin and Garden.

A detachment (3 battalions, 1 squadron, ½ battery) under Major General Rahtz at 7 a. m., from Hohen-Zahden via Griefenhagen to Wierow.

Reconnoitering on the left bank of the Oder to the Welse on the right as far as the line Buddenbrock–Borin–Leine–Gr. Rischow.

The cavalry division A and the forty-second infantry division have the task of stopping the enemy, and, if necessary, will retire along the Oder. The forty-second infantry division assembles at Kl. Zarnow, the cavalry division A at Langenhagen.

The plan of the Blue was by attacking the left flank of the Red to cut him off from his communications or develop the strength of the invasion and its lines of operation. The plan of the Red was to push onward toward Berlin as quickly as possible, and especially to clear the broken and wooded ground southeast of Stettin and gain a broad front for a further advance.

EVENTS ON SEPTEMBER 10.

BLUE ARMY.

The guard corps continued its advance in the intended manner to the line Bahn–Liebenow–Heinrichsdorf. As the enemy showed strong forces of all arms at Kl. Zarnow–Wilhelmshöhe, the third guard infantry division deployed against them at Heinrichsdorf, and the advance guard of the first guard infantry division tried to envelop its left flank advancing from Liebenow to Rosenfelde, while the second guard infantry division was drawn from Bahn to Gebersdorf. The enemy withdrew, however, via Bartikow behind the lower Thue. In the afternoon the division reached the line Gr. Zarnow–Schwochow–Langenhagen–Rosenfelde.

The guard cavalry division had in the morning advanced from Bahn via Rohrsdorf–Neu-Grape to Leine and found

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itself opposite to hostile cavalry which had advanced from Langenhagen to Wartenberg. It unlimbered its horse artillery on the little hill Fuchsberg, just north of Leine, and fired on the cavalry as it passed by Karlshof. It was obliged to retreat in the afternoon via Neu-Grape to Pyritz, as the hostile infantry advanced through Wartenberg and toward Isinger. The advance guard of the third infantry division had come under fire of the artillery at Fuchs-Berg as it passed over the hills from Schutzenane to Kurze Bridge, east of Alt-Falkenberg.

In the course of the day consistent reports had been received about the advance of strong hostile columns from Alt-Damm in a southerly direction.

On the 11th of September the guard corps intends to cross the line Schwochow–Langenhagen–Rosenfelde, and advance to Wartenberg–Karlshof–Walterdorf. The cavalry division will cover the right flank.

RED ARMY.

The second army corps went from Stettin to the right bank of the Oder and marched in three columns via Clebow, Binow, and Neumark. The line from the hills north of Kl. Schönfeld to Wartenberg–Alt-Falkenberg–Isinger was reached in the afternoon.

The forty-second infantry division assembled at Kl. Zarnow, compelled a hostile force which had advanced via Gr. Schönfeld to Heinrichsdorf to deploy, and then withdrew over the Thue to Wierow and Vogelsang. The enemy followed to the region of Rosenfelde–Stecklin and took possession of Langenhagen and Schwochow.

The cavalry division A had assembled in the morning at Langenhagen, and had marched off to Wartenberg as it received information about strong hostile cavalry which advanced from Bahn via Rohrsdorf–Neu-Grape. The hostile cavalry showed itself at Leine and went back to Pyritz in the afternoon.

THE INTENTIONS FOR SEPTEMBER 11.

On the 11th of September the second army corps will attack as follows:

The forty-second infantry division will march behind the outposts to Kl. Schönfeld and from there at 8 a. m. to Hop-

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fenberg; the forty-first infantry division will go via Wolterdorf–Karlshof to Frankenberg; the fourth infantry division via Wartenberg to Beelitz; the third infantry division via Falkenberg–Isinger to Leine; the cavalry division A will, at Isinger, cover the left flank of the corps.

The Blue had for the night placed its outposts in the line Briesen–Neu-Grape–Schwochow–Borin–Bartikow–Buddenbrok (on the Oder). The divisions lay behind, mostly in cantonment, the guard cavalry division at Pyritz, the second guard infantry division at Rohrsdorf–Kunow, the first guard infantry division at Gebersdorf–Liebenow, and the third guard infantry division at Rosenfelde–Heinrichsdorf.

The outpost chain of the Red stretched from Thuehausen an-der-Oder via Kronheide–Kl. Schönfelde–Woltersdorf–Karlshof–Beelitz–Leine–Repenow, to Gr. Rischow; behind were the army divisions at Alt-Grape–Sabow–Isinger, on the south coast of the great Madu Lake, with the third infantry division at Wartenberg, the fourth at Garden–Neuhaus, the forty-first at Wierow and Woltiner Lake, and the forty-second at Griefenhagen.

Both parties proposed to attack. The chief of the Blue assembled his forces on the line Schwochow–Langenhagen–Rosenfelde, and intended to advance against Wartenberg–Karlshof–Waltersdorf.

The Red party prepared for the great flank movement as above indicated. The cavalry divisions simply covered the flanks of the respective parties.

EVENTS ON SEPTEMBER 11.

The emperor, who this day took command of the Red, arrived at Borin at 5.45 a. m., by special train. It had rained heavily during the night * and a little in the early morning so that the muddy roads were difficult to pass, but just as the fight began the sun appeared. The Blue party advanced its three divisions to the line Wartenberg–Karlshof–Woltersdorf, which lay directly in the line of march of the Red.

Thus the three divisions forming the center and left of the Red met the two forming the center and right of the Blue.

The second guard infantry division marched from Cunow to Schwochow, but when the left flank of the Red was seen

*Almost all the troops were under shelter during the night.

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advancing from Isinger to Leine, the brigade on the right flank of the Blue marched to oppose it.

When the first line of the second guard infantry division had reached Rumprechts-Berge, Leine and Fuchsberg were occupied by the third infantry division. After a long fire fight the Red party attacked but was driven back through Leine toward Alt-Falkenberg and Isinger pursued by the Blue.

Meanwhile the first guard infantry division advanced in two lines, the first brigade from Hopfenberg toward Karlshof, the second from Frankenberg toward the Wartenberg farm, 1,200 meters to the east. This division met the fourth division of the Red party in front and on its right flank, north and east of Karlshof, and was attacked on the left flank by the forty-first infantry division coming from Walterdorf. After a long fire fight the Blue was obliged to retreat to Frankenberg and Eich-Berg and then to Gebersdorf. The 5 battalions of the first guard infantry division which formed the second line had occupied Schwochow to keep up the connection with the second guard infantry division at Rumprechts-Berge and Leine, but, as soon afterwards the second guard infantry division was obliged to take up the general retreat, these 5 battalions with part of the second guard infantry division took up a position on the Kanzelberg.

The third guard infantry division had advanced from Rosenfelde to Hopfenberg, and from Höhenbrück-Mühle to Langenhagen, but were attacked on the left flank by the forty-second infantry division, which advanced in great force from Borin, and were obliged to retreat to Liebenow and Gebersdorf. The right flank of the Blue could then no longer hold its position and gradually fell back from Rumprechts-Berge and Leine to the heights southeast of Schwochow and then to Cunow and Rohrsdorf. In retreating over the broken ground, and especially through the forest south of Langenhagen, the Blue troops were thrown into more or less confusion. While attempting to hold the line from Höhenbrück-Mühle to Kanzelberg it was outflanked at the latter point by the third infantry division advancing from Leine.

Early in the morning the guard cavalry division had advanced to Sabow, where it confronted the cavalry division A, but after the retreat of the infantry it fell back to Gr. Zarnow and Cunow, and made a counter-attack on the left wing of

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the Red infantry, which had just outflanked the Blue at Kanzelberg. The object of this attack was to facilitate the retreat of the Blue infantry. Those who remained in ranks after this ride were attacked and dispersed by the Red cavalry, who had been slowly pursuing them by the way of Alt-Grape and Neu-Grape.

In the fight which took place on the advance of the two army corps against each other, the guard corps had been forced to retreat. The second army corps pursued with full force, but after the adversaries had disappeared behind the Thue, it withdrew a part of its forces to a greater distance.

The chart shows the position in the evening of September 11.

The second army corps sends its cavalry division A in the direction of Landsberg* on receiving information about the assembly of hostile troops on the lower Warthe.

A cavalry division,† 7 battalions and 12 batteries,‡ from Berlin, joins the guard corps in the afternoon.

The orders for the 12th are as follows:

On the 12th of September the guard corps intends to advance as follows: The second guard infantry division via Bahn to Cunow, the fourth guard infantry division via Liebenow to Gebersdorf, the first guard infantry division via Heinrichsdorf to Langenhagen, the third guard infantry division via Stecklin to Borin, and to cross the main road, Bahn–Liebenow–Rosenfelde, at 9 a. m., the cavalry corps advancing at 8 a. m. against the left flank of the enemy.

The second army corps will advance as follows: The forty-second infantry division in two columns, at 8 a. m., from Kl. Mellen via Stecklin to Kl. Zarnow and from the mill to the west of Borin via Rosenfelde to Heinrichsdorf; the forty-first infantry division, at 8.15, via Höhenbrück-Mühle in the direction of Gr. Schönfeld; the fourth infantry division, at 8.30, in two columns via the upper and lower mill to the Forsthaus Marienthal; the third infantry division, at 7.40, from Cunow via Bahn to Marienthal.

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* 50 kilometers south-southeast of Pyritz.

† The cavalry division A joins the guard corps.

‡ The first guard infantry division is, with the assistance of these reenforcements of infantry and artillery, formed into two divisions—Nos. 1 and 4.

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THE POSITION ON SEPTEMBER 12.

The emperor stayed on the field during the night and took command of the Blue party, and in the course of the evening placed outposts on the line Gr. Möllen–Bahn–Kl. Zarnow–Paaslent–Buddenbrock. The guard went back to the low country behind the Thue, which was covered on the right flank by the Langen Lake, south of Bahn.

In the course of the afternoon the guard corps had received its reenforcements—a whole cavalry division, 7 battalions, and 12 batteries—so that it was now stronger than the Red party by 4½ battalions, 40 squadrons, and 5 batteries. The reenforcements, with the exception of the cavalry division, were indicated by flags. As cavalry division A went over to the Blue party, the emperor had 2 cavalry divisions, in all about 8,000 men. By the help of reenforcements of infantry and artillery, the first guard infantry division was formed into two—the first and the fourth.

In the morning the positions were as follows: On the right flank the cavalry corps at Wildenbruch, on the south bank of the Langen Lake, where the emperor had bivouacked in the forest; the second guard infantry division at Marienthal–Selchow, the fourth guard infantry division at Gr. Schönfeld, the first guard infantry division at Lindow, and the third at Wilhelmsfelde.

The Red party was in a semicircle behind its outposts, Bartikow–Rosenfelde–Liebenow–Gr. Zarnow–Neu-Grape–Sabow, with its forty-second infantry division at Kl. Schönfeld–Borin; the forty-first at Gebersdorf–Langenhagen, the fourth at Kunow–Schwochow and the third at Beelitz–Leine, and a small flank detachment at Thuehausen south of Griefenhagen. The air was very clear and the sun shone brightly.

In carrying out the forward movement ordered, the two army corps met on the line Stecklin–Ferdinandsfelde–Liebenow, and the hill (73) to the west of Rohrsdorf.

At 9 a. m. the advance guard of the third guard infantry division of the Blue found the village of Stecklin already in possession of the advance guard of the right column of the forty-second infantry division of the Red, and took possession of it after a short fight. After a long artillery fight between all the batteries of the opposing divisions, the Red tried to recapture the village by assault, and was not only repulsed but was also enveloped on the right flank by the third guard

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infantry division coming from Bayereshöhe, so that it was obliged to retreat behind the Thue at Borin. The third guard infantry division followed, but was unable to disturb their retreat. It was about to attack Borin when it received orders from the commander in chief to turn to the right to the support of the first guard infantry division north of Liebenow.

The advance guard of the first guard infantry division on reaching Ferdinandsfelde had been attacked by the forty-first infantry division from Höhenbrück-Mühle and by the left column of the forty-second infantry division from Rosenfelde, and being threatened in its left flank was obliged to retire until the right wing of the third guard infantry division came to its support from Stecklin, and the fourth from Liebenow. Meanwhile the left wing of the fourth guard infantry division met at Liebenow the advance guard of the fourth infantry division, which had occupied that village with one regiment but was driven out after a long fight. After the fourth guard infantry division had sent reenforcements to the first guard infantry division in the direction of Ferdinandsfelde, the main body of the fourth infantry division of the Red had crossed the Thue at Ober-Mühle and tried to recapture Liebenow, but was driven back after a long fight, and the crossing at Ober-Mühle remained in possession of the Blue. At 10.30 the right flank of the second army corps was driven back to the line Borin–Gebersdorf. In the eastern part of the battlefield the second guard infantry division, advancing from Bahn, met the third infantry division advancing from Cunow, while the cavalry corps of the Blue party was working around the flank from Wildenbruch south and east of the Lange Lake to Neuendorf, and occupied a sheltered position behind Bahne Stadtforst. Learning of this movement the chief of the Red party sent out six squadrons and two batteries via Rohrsdorf to Marienaue to protect his left flank. An infantry regiment was also sent from the third infantry division to Marienhaus, for the same purpose, in order to open up communication with the main body through the pass between the two branches of the Lange Lake leading from Gut Neuendorf to Marienthal. The second guard infantry division drove back the third infantry division toward the line Cunow–Gebersdorf. The Blue cavalry corps seeing this movement worked its way through the forest to Gr. Möllen, and formed for attack behind the rolling ground southwest of Heinrichshorst with the

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front toward Rohrsdorf. Then, supported by fire of the four batteries of horse artillery, the cavalry corps, conducted by the emperor in person, attacked the six squadrons and the regiment of infantry sent to protect the left flank of the Red party. Although the ground was swampy and intersected by ditches and other obstacles, the charge was made in perfect order and was adjudged to be successful. The third infantry division then retreated to Cunow, and the cavalry corps passing around to the east of Rohrsdorf turned to the left between Rohrsdorf and Cunow and fell upon the left flank of the third infantry division, which was retreating under fire from the second guard infantry division. This attack of the cavalry was also adjudged to be successful in view of the fact that the Red infantry was already demoralized. This charge showed to good advantage the excellent training of the German cavalry and the complete command over the 8,000 horses that rode up at a gallop and halted at 15 meters from the object of attack in as perfect order as if it had been on the parade ground.

A general retreat of the second army corps was ordered. The third infantry division retreated on the position at Gebersdorf, which was still held by the fourth infantry division but soon after was carried by the combined attack of the fourth, first, and second guard infantry divisions. The cavalry corps, following along the line, fell upon the retreating fourth infantry division and then upon the artillery that was supporting its retreat. The recall signal was displayed at 1 o'clock.

The chart shows the position of both the army corps on the evening of the 12th.

The first and the fourth guard infantry division had suffered such severe losses during the fight that one division was formed by consolidating them. (The cavalry corps was detached from the guard corps.) On the 13th of September the guard corps intends to advance: With the second guard infantry division from Cunow, at 7.40 a. m., via Schwochow to Karlshof, the right flank detachment to Beelitz; the first guard infantry division from Gebersdorf, at 7.40 a. m., via Langenhagen to Waltersdorf; and the third guard infantry division from Kl. Mellen, at 8.10 a. m., via Kl. Schönfeld to Garden.

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The second army corps received the information that more troops had disembarked at Cammin, 60 kilometers north of Stettin; one cavalry division having already, on the 13th, joined the corps. The corps commander's order is to oppose the enemy and retreat only if hard pushed. As hostile troops are reported to march from Mecklenburg, the forty-second infantry division is sent against them to Stettin. (The forty-second infantry division is detached from the corps.)

The second army corps intends to take a defensive position, with cavalry division A to the west of Sinslow; the forty-first infantry division at Kortenhagen; the fourth infantry division to the north of Wartenberg, and the third infantry division at Alt-Falkenberg.

The outposts of the Red held the line Kl. Schönfeld–Karlshof Station–Wartenberg–Dammersaue to the west banks of the Madü Lake. The outposts of the Blue with the front to the northeast were at Gr. Zarnow–Kanzelberg–Höhenbrück-Mühle–Kl. Mellen.

Although the problem for the Red only contemplated holding on to the debouches from the forest between Stettin and Madü Lake, the commander of the second army corps thought that this could be effected better by advancing to attack the enemy than by awaiting the enemy immediately south of the forest, and he ordered:

The forty-first infantry division in two columns from Sinslow–Kortenhagen via Garden to Kl. Schönfeld and via Neuhaus to Woltersdorf.

The fourth infantry division in two columns from Wartenberg, one on Beelitz, the other on the farm between Karlshof and Beelitz. The third infantry division in two columns from Alt-Falkenberg to Leine and from Schütenau on Isinger. The cavalry division A to protect the right flank and reconnoiter to the south over a wide front.

The march by brigades was so regulated as to pass the line of the railroad Kl. Schönfeld–Beelitz and the line Beelitz–Isinger at 8 a. m. On reaching this line without opposition, a further advance was ordered as follows: Forty-first infantry division, Kl. Schönfeld to Borin and Woltersdorf to Hopfen-Berge; fourth infantry division, Wartenberg to Eich-Berg and Beelitz to Schwochow; third infantry division, Alt-Falkenberg to Leine and Isinger to Alt-Grape.

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At 8.30 the two armies met on the line Kl. Schönfeld–Hopfen-Berg–Beelitz–Fuchs-Berg; but the left brigade of the third infantry division had not yet met the enemy.

The first line of the left brigade of the first guard infantry division was driven from Hopfen-Berg by the forty-first infantry division, but the third guard infantry division attacked the forty-first in the right flank. Its right brigade was driven back from Kl. Schönfeld and its left soon after from Hopfen-Berg and the division retreated to Woltersdorf–Karlshof, and the right wing of the Red was soon enveloped by the first and third guard infantry divisions, while the first attacked it in front at Karlshof and the third on the left flank at Woltersdorf.

Meanwhile the second guard infantry division was attacked in front at Frankenberg and Eich-Berg by the fourth infantry division and on the right flank from Leine and Alt-Grape via Schwochow by the third infantry division, while the cavalry division A, which had come from the right to the left flank of the Red army, now threatened the right flank of the Blue.

By this time, about 9.40, the first guard infantry division, having driven back the forty-first infantry division, began to attack the right flank of the fourth. Each party had enveloped the right flank of his opponent, but so great was the numerical superiority of the guard on its western wing that the second army corps retreated to the north side of the valley between Glien and Bangast lakes, the fourth division by Beelitz and Babbin, the third division by Leine and Alt-Falkenberg, covered by the fire of all the artillery of the second corps, which was so well posted as to keep down the fire of the artillery and stop the advance of the infantry of the Blue party.

At 11.15 the signal to cease fighting was displayed.

POSITION ON THE EVENING OF SEPTEMBER 13.

The second army corps holds the line Sinzlow–Wartenberg–Alt-Falkenberg, with instructions to oppose the enemy, and to retreat only if hard pushed. The forty-second infantry division, which had been sent to Stettin against the hostile forces marching from Mecklenburg, has been forced by them to withdraw in a northeasterly direction to Gollnow. The Blue troops advancing over Stettin have, in pursuing them,

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reached Alt-Damm and placed outposts in the line Kolow–Mühlenbeck–Hohenkrüge.

The guard corps, which occupied the line Langenhagen–Borin–Kl. Schönfeld–Woltin, intends to attack. The guard cavalry division with two machine-gun detachments is sent to the east of the Madü Lake with instructions to break off the enemy's connection with the rear, and has reached the region southwest of Stargaard, with the outposts at Moritzfelde.

The forty-second infantry division has joined the Blue party.

The second army corps, in order to carry out its problem of guarding the debouches from the forest between Stettin and Madü Lake, so that the reenforcements arriving from Cammin could advance over a wide front in the direction of Berlin, took up a strong position upon the hills extending from Glien Lake to Sinzlow, Kortenhagen, Babbin, and Alt-Falkenberg. This position, which was protected by the low and marshy ground in front, was fortified along the crest with shelter trenches, gun pits, and all kinds of cover for infantry and artillery. Communications across the swamp in rear of the position were improved by bridges and road work. The front was occupied by a comparatively thin line, and the reserves were strengthened in order to repel any attempt to surround the position. The engineers had in this day's operation a fine opportunity for practice in all kinds of field works. The forty-first infantry division occupied the section extending from Glien Lake to hill 46 (2,000 meters north of Babbin); the fourth infantry division extended from this hill to the brickkiln "Zgl," just north of Babbin; the main body of the third infantry division was stationed at the disposal of the commander in chief at a farmyard 1,500 meters southeast of Kortenhagen, where it was kept under shelter behind the hill; three battalions, one squadron, and three batteries of this division were also placed at the disposal of the commander in chief 2,000 meters north of the brickkiln near Babbin. The six squadrons of the division cavalry were all stationed at Binow to protect the right wing, and cavalry division A at Leine to protect the left.

The emperor took command of the Blue party and made the following dispositions to surround and capture the invaders: At 6 a. m. the third guard infantry division to be at Wittstock; the first guard infantry division at Garden; the second guard infantry division at Kl. Schönfeld. At daybreak the

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forty-second infantry division had reached Kolow, and the guard cavalry division Moritzfelde, north of Madü Lake. The emperor ordered the further advance as follows: The forty-second infantry division, surrounding the right flank of the enemy, to push on to Neumark, and in connection with the guard cavalry division to cut off the retreat of the enemy to the north.

The third guard infantry division to Glien, the first to Sinzlow, the second to Waltersdorf and the farm between Kortenhagen and Babbin. At 7.15 a. m. the commander in chief of the second army corps received definite information of the advance of heavy forces of hostile infantry at Kolow and of cavalry from Küblank to Neumark. He ordered the following dispositions: The main body of the third infantry division, in reserve near Kortenhagen, to take the offensive in the direction of Glien–Kolow. The detachment of the third infantry division in reserve north of Babbin to retire to Neumark to protect the rear of the army corps.

At 8 a. m. the forty-first infantry division, which held the villages of Sinzlow, Kortenhagen, etc., was attacked by the first and third guard infantry division on the line Neuhaus–Garden–Wittstock, in greatly superior force and by heavy fire of artillery on hill 50 (1,500 meters north of Neuhaus), where the emperor directed the attack. To relieve the forty-first infantry division from the pressure, the fourth infantry division was ordered to make a counter-attack, and leaving one regiment and the artillery brigade to hold the fortified line; nine battalions of infantry advanced to the attack and fell upon the second guard infantry division on the right wing of the guard corps with more or less success. But at 9.45 the forty-first division was driven from Sinzlow by the first and part of the third guard infantry division and at 10.45 Kortenhagen was also lost for the Red in spite of repeated counter-attacks by the reserves of the forty-first infantry division. This division, badly scattered, was compelled to retreat toward Neumark, so that the fourth division could no longer hold the advanced position it had won, but was obliged to retire; and three of its regiments, whose retreat was cut off by the first guard infantry division, had to make a circuit to the southeast by way of Babbin and Schützenaue.

The third infantry division had gone from Kortenhagen to Glien to meet the expected attack of the enemy from Kolow.

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It did not, however, meet the forty-second infantry division, which had gone further north through the Mühlenbeck forest to Neumark, but instead met the third guard infantry division, which was continuing the attack.

The retreat of the forty-first infantry division forced the third infantry division also to retire toward Neumark, hotly pursued by the third and part of the first guard infantry division. The Blue guard cavalry division, reenforced by the machine-gun detachments of the jägers and sharpshooter battalions of the guard, appeared on the height south of Neumark at 8 a. m. directly in rear of the second army corps. Meanwhile the forty-second infantry division had passed the Mühlenbeck forest in two columns and sent forward its artillery under cover of the cavalry division. At 8.30 a. m. the following troops of the Blue party were already south of Neumark in rear of the second army corps: An artillery regiment of the forty-second infantry division and the machine-gun detachments were on the Hohle-Berge with the guard dragoon brigade near them; the other artillery regiments of the forty-second infantry division and the mounted artillery of the guard cavalry division were on the Klaus-Berge with the guard uhlan brigade near them. The guard cuirassier brigade with a machine-gun detachment was at Hofdamm to guard the left flank of the Red. The artillery at first fired on several hostile batteries at Babbin and then on the hostile infantry, which was advancing to the attack over the Kreck-Grabe. This was the one infantry regiment of the third Red infantry division which had been placed at the disposal of the commander in chief and had received orders from him to cover the rear of the second army corps at Neumark. Excepting a strong attack in this direction, the forty-second infantry division continued to march on Neumark instead of turning off to Glien to attack the enemy's right wing. This division was gradually deployed on the hills south of Neumark on both sides of the road to Schützenaue. The second army corps in its retreat over the causeways across the Kreck-Grabe was exposed to the enfilading fire of the guard corps which was pursuing them with the second, first, and third guard infantry divisions from the south and west, while the forty-second and the cavalry divisions with the artillery and machine guns brought a galling fire upon them in front, but the greater part of the third infantry division and several batteries of the

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Red had taken up a position between Neumark and Glien, which enabled them to cover the retreat of the fourth infantry division to a place of shelter in the woods near Dobberphul.

Meanwhile the forty-first infanty division in the open ground south of Neumark was exposed to the enfilading fire of the forty-second infantry division and was attacked by many squadrons of the guard cavalry division with serious consequences, but a large portion of the Red army escaped through the opening between Neumark and Glien which had been left by the forty-second infantry division and seized and occupied by the third infantry division. It is not known what became of the Red cavalry division A in this fight.

The maneuvers ended at 11.15 a. m.

The maneuvers of this year derive great interest from the fact that the regulations for field service have just been revised, and that the new regulations for field artillery have been in force only since October, 1899.

For a long time after the war of 1870 the favorite and almost exclusive method of attack consisted in an attempt to envelop one or both of the enemy's flanks, but recently a reaction has come about in favor of a direct frontal attack. An effort is made to mass all the artillery available so that it can concentrate its fire upon the point to be attacked and maintain this fire while the infantry advances without firing until it has come near enough to make its own fire deadly.

Increased importance is given to the use of howitzers in the field instead of attempting to maintain a single caliber, which was formerly considered so desirable. The rapidity of fire of both the guns and howitzers has been greatly increased, and under the overwhelming shower of projectiles that are thus thrown over the enemy's position, it is considered that if he is not driven off he will at least not be able to use his own firearms. The curved fire from the howitzers makes them especially suitable to cooperate with the infantry up to the last moment.

In the "Felddienst-Ordnung," January 1, 1900, due consideration has been given to the increased effectiveness of infantry and artillery fire at long ranges, especially for infantry at 1,000–1,500 meters and artillery at 2,400–3,000 meters. On the other hand, while cavalry suffers more than before at long ranges, cavalry detachments not favored by the nature of the ground are allowed to come within 800

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meters of infantry instead of 1,000, as formerly. The effect of field howitzers, even while using shrapnel, is considered as nearly equal to that of guns, and the effect of their vertical fire with shells is recognized up to 6,000 meters.

It is quite significant that in deciding a combat one portion of the line may be victorious while another part is required to fall back, making the exercise a truer representation of the reality.

The use of the flash telegraph for communicating the decisions of the umpires to distant points is also a step in the right direction.

A translation of that part of the "Felddienst-Ordnung," January 1, 1900, which relates to umpires and their decisions, and some parts of the new artillery regulations relating to attack, will throw some light upon the new ideas.

The phraseology of the standing orders and regulations relating to maneuvers, published in No. 11, Military Information Division, page 148, etc., has been followed as far as practicable, and all that part relating to umpires is given below. Those portions of the old regulations not embraced in the new are indicated (thus), and those portions of the new not included in the old are indicated [thus].

UMPIRES.

(54) [614] The function of the umpires is to supply, as far as may be, the impressions and influences of war which are absent in peace. Their decisions must be considered as orders, given in the name of the director, to which even their superior must submit.

In all maneuvers the director performs at the same time the duties of chief umpire.

Umpires may take into account only the actual situation and not the intended course of the maneuvers. They must base their decisions on the same circumstances that in war decide for victory or defeat.

(Only the chief umpire has the power of interfering in any other manner in the maneuvers, in order, as director, to keep in hand as far as necessary the course of the maneuvers.)

[The umpires should guard against ending a fight unnaturally and too hastily.]

(55) [615] The umpires are authorized to demand the necessary information from officers commanding troops, and it is their duty to see that their decisions are obeyed.

[Umpires should explain the reasons for their decisions, and if the decisions are delivered by an assistant they should be in writing.]

Important decisions they must at once notify to the director, while the officers commanding troops must report them to their superiors and communicate them to the troops next to them.

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(56) [616] The number of umpires should not be too small, so that unnatural situations may not arise by waiting for decisions.

Umpires will be nominated by the director from the available senior officers. Junior officers [, orderlies, and bicyclists] will be detailed to them as required. Adjutants of the higher officers and of all corps of troops remain with their commanding officers or corps.

In the imperial maneuvers the umpires will be nominated by his majesty the emperor. Officers of the general staff [and from the war department] will be placed at their disposal by the chief of the general staff. In the imperial maneuvers the director of the general war department and the chief quartermasters will always be employed as umpires.

Umpires are to officiate also against a marked enemy.

Umpires, the officers attached to them, and their orderlies wear a white band above their left elbow.

(57) [617] Before the commencement of the exercise the umpires (are informed of the situation and of the orders of both sides) [receive from the director as much information as necessary to enable them to follow the course of the maneuvers. The information about the special dispositions of each party is necessary only in the imperial maneuvers].

The director of the maneuvers then assigns to them their sphere of action. As a rule they are distributed either by wings or by sections of ground.

The judgment of the artillery combat should, if possible, be intrusted to special umpires. Considering the influence of their decisions upon the combat of the other arms, these umpires must communicate them not only to the artillery and the chief umpire, but also, as far as possible, to any other umpires or troops within the radius of the effective action of the artillery. [For this purpose they can make use of the "flash telephone" and the signal apparatus.]

In certain cases separate umpires may be detailed to separate (groups such as advance-guard) detachments, etc. For the operation of independent cavalry it is particularly advisable to tell off separate umpires. This distribution, however, does not preclude any umpire from giving a decision at any other point should its special umpire be not present. Umpires must always be appointed for outposts and any night operations.

(58) [618] From his knowledge of the situation an umpire must endeavor to forecast the developments of an action so as to be at the right place at the right time. He must, both by his own efforts and by the aid of the officers attached to him, keep himself constantly informed of the measures taken by both sides, and try, by skillfully selecting his position, to have a general view of all that goes on.

[The observation of the effect of weapons on each side forms the foundation for the judgment.]

As may be needful, he imparts to the leader his observations on the results of the fire of both sides in order that both may pay continuous attention to it, that independent action of the subordinate commanders may be promoted, and that any conduct impossible in war may be prevented, such as remaining without cover in columns under effective fire, making flank marches under fire, etc.

[619] For this purpose the umpire may make use, for units of infantry and field or horse artillery, of loss flags.

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Each company and battery carries a loss flag. It consists of a yellow frame with a black cross, which is to be fixed on a pole in like manner, though not diagonally, with the frame for the indication of target by artillery. The frame is a square, with a side of 46 centimeters for infantry, 70 centimeters for artillery, the black cross to have its stripe 10 centimeters wide, artillery 15 centimeters. The pole to be 1 meter long for the infantry, 2½ meters long for the artillery. Infantry lying or kneeling show the flag by placing the foot of the pole on the ground. Infantry moving or standing hold the frame above the level of the head. The batteries set up the flag close by that which marks the target.

Their appearance shows when and where the fighting energy of the troops has suffered such serious diminution by the enemy's fire that a superiority of fire is making itself felt. But the mere appearance of the flag is never to be regarded as a compulsion to carry out or to give up an intended attack, or to evacuate a position, etc.; after the loss flags have appeared, the leaders must be just as free as before in their decisions which must always be based upon a consideration of the tactical situation as a whole and must be judged by the umpire according to this situation.

(It is left to the discretion of the umpires to decide, at the time when the order is given to raise the loss flag, what proportion of the shaken body of troops is to be retired as an indication to the enemy of its diminished fire power.)

The order may be given to lay the flag down again when in the opinion of the umpires an equality of fighting energy has been restored.

(When in war the decision would be given by the weapons, it is in maneuvers given by the umpire.)

[620] Umpires only, and not their assistants, are authorized to make these decisions, to order the loss flags to be raised or lowered, and to communicate to the combatants the effects of fire.

If several umpires meet at the same place, the senior decides. A decision once made can be reversed only by the chief umpire.

(59) [621] Decisions are to the effect that troops may not advance farther, that they must retire and where to, that they are placed out of action and for how long.

Troops which have been put out of action must retire out of the zone of action of the troops engaged; they can not be used at all during the time stated, and afterwards (only) [at first] in reserve. In order not to impair the instruction of the troops, they should (only under very exceptional circumstances) [never] be put out of action for the entire day.

The umpires are not authorized to order artillery in action to leave its position.

If an attack has been pushed through up to the decisive moment, the umpires state which (side has won and fixes the exact length of the pause in the action which even the victor will require to reorder the troops before commencing the pursuit) [side is victorious at each point].

[The decisions count only for individual bodies of troops and have only an indirect influence on the whole fighting line. One wing may win while the other loses.]

Especially when in villages the troops have become much mixed up, it is necessary to break off the fight for a short time in order that both parties may reassemble in accordance with the decision of the umpire.

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(60) [622] For works of defense, such as shelter trenches and gun epaulments, the construction of which is not forbidden by peace considerations, credit is allowed only so far as they have been actually constructed in proper form.

In estimating the importance of shelter trenches, the clearness of the field of fire, the strength of the cover, and the visibility of the parapet should be considered.

Works may be marked only where, on account of peace considerations, their execution is impracticable. Such cases are the demolition of bridges, construction of barricades, preparations for defense of walls, or of fields which may not be marched across or turned up on account of the heavy compensation involved. If such works are marked the party of troops concerned addresses itself to the nearest umpire, who decides on the value of the supposed construction, and insures its due respect by the enemy.

(61) [623] The effect of infantry fire is influenced by various circumstances, such, for instance, as the distance of the enemy and its correct estimation [the umpires should test the distance with the telemeter], the nature of the target, the intensity and duration of the fire, fire discipline, also surprise and the disturbing effect of the enemy's fire, etc.

[Well directed and powerful infantry fire has considerable effect on uncovered bodies of troops in close order, standing up or marching, of the strength of a company or squadron, as well as against uncovered, unlimbered artillery at distances between 1,500–1,000 meters.] In face of a well-directed, powerful, and steady infantry fire and in the absence of cover, bodies of troops in close order, at ranges of 800 to 1,000 meters, can make short halts or move to a flank only if the fire of their own skirmishers is a fair match for that of the enemy.

Over ground covered by fire within 800 meters, infantry in close order and without cover can move only backward and forward even behind strong lines of skirmishers.

[A firing line in motion but without cover suffers considerable loss from infantry which is not disturbed by hostile fire at distances within 1,000 meters. Any further uninterrupted advance can therefore as a rule be made only when supported by a sufficient fire.]

At ranges less than 400 meters there must be very short delay in deciding upon the fire action of uncovered skirmishers (either that the bayonet attack must be carried through or that one side goes back).

Cavalry detachments [not favored by the nature of the ground] may not appear at a less distance than (1,000 meters) [800 meters] in front of the infantry in good order, whether in extended or in close formations, except in the charge. All other movements or halts made by cavalry without cover within this distance must be reckoned to its disadvantage.

[The fact that patrols ride into the zone of hostile fire is not by itself sufficient ground for ordering them back, but the important consideration is whether the patrol or a single mounted man exposes himself to hostile fire without taking part in it, or intentionally avoids the danger by a rapid gait.]

Artillery under infantry fire within (800 meters) [1,000 meters] can unlimber and come into action only under the most favorable circumstances; for example, behind actual cover. If in company with the infantry rushing on to the decisive attack it approaches without cover

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within this distance, the procedure must not be disallowed, but the losses it would entail in war must be given their due consideration in the final decision. At a shorter distance artillery without cover loses its mobility in a short time, and at 300 and 400 meters it can no longer limber up.

The enfilade fire of infantry must be reckoned as especially efficacious.

(62) [624] The success of a bayonet attack depends first of all upon the previous effect of the fire of infantry and artillery; after that must be considered the relative strength of the parties, the strength of the fresh troops thrown into the fight by either side, [the manner of carrying out the attack, the condition of the troops making it,] the behavior of the enemy, and the nature of the ground.

It is further of importance whether the attack has succeeded in striking a weak point or in enveloping a flank.

Since in actual war the success of an infantry fight at close quarters is always very costly, decisions in such cases must carry long-lasting consequences with them, should the fate of the day not be in any case decided by the successful or unsuccessful attack of large masses of infantry.

(63) [625] The short space of time occupied by a cavalry attack renders it difficult to appreciate justly the various circumstances attending it, which must be taken into account. Here, even more than elsewhere, the umpires must be on the spot betimes.

In deciding on the result, besides the relative strength, weight should be chiefly laid on the condition of the adversary and the execution of the attack. If one side succeeds in catching the enemy's cavalry in the act of deployment victory may be given to inferior numbers. On the other hand, great superiority of numbers will not be effective unless the leader throws in his forces at the right moment.

In an attack of cavalry against cavalry it is less essential to traverse great distances quickly than to charge compactly and vigorously. Outflanking increases the effect of the attack.

In an attack of cavalry against infantry the condition of the infantry is of still greater importance.

Against shaken and weak infantry detachments cavalry can dispense with depth of formation; therefore, in such cases even small parties of cavalry can attack with effect. Against unshaken infantry a succession of lines, a uniform start, and a persistent execution of the attack are required. When the ground does not allow of concealed approach, nor of surprise, the cavalry must rapidly cross the fire-swept zone. It is to the cavalry's advantage if the infantry allows itself to be lured into changes of formation, or does not preserve the coolness indispensable to an effective fire. Such attacks will always carry with them heavy losses for the cavalry.

Artillery on the move must be considered defenseless against a cavalry attack unless covered by other troops. Artillery in action is most vulnerable on an uncovered flank. A frontal attack upon artillery may be costly but is not hopeless if the necessary depth of formation is adopted.

The final decision must declare whether in actual war the cavalry could have carried off or rendered unserviceable either guns or limbers, or gained time to secure its success in some other way.

[For this it is necessary that the leader and the troops show that they understand what dispositions to make.]

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(64) [626] Charges of cavalry against cavalry must be ended when the two sides are 15 meters from one another (the mêlée should then be represented) [in attacking infantry the individual bodies of cavalry must halt at a distance of 15 meters].

[Cavalry can ride through artillery in single rank. Cavalry in close order must halt at a distance of 15 meters.]

[627] The side which the umpire declares beaten always retires at once 300 meters. The victor may either rally or pursue with his entire force or with part of it. In so doing he must maintain a distance of 100 meters from his adversary. If the pursued is not disengaged, nor his retreat protected, he must, without reforming, retire before his victor, so long as the latter pursues in sufficient strength. The umpire must take care that the pursuit is not pushed too far, and determine, according to the mode and force of the pursuit, how long the vanquished is to be considered out of action.

(65) [628] The effect produced by the dismounted fire of cavalry is to be judged in the same way as that of infantry.

(66) [629] In determining the effect of artillery fire points to be considered are: Whether the artillery has been able to approach under cover and has thereby been enabled to come unexpectedly into action, (the selection of the position as regards effective fire and cover, facilities for observing shots and ranging, and difficulties of observation and ranging for the enemy; further, the distance of the target, its size, visibility and mobility, the description of fire employed, its duration and rapidity, the number of batteries firing at the same target, and finally, also the losses which would have been caused to the guns by the enemy's artillery and infantry fire. Under this last head the cover given to the limbers should also be taken into consideration). [a clear field of fire, the number of batteries firing at the same object, and the rapidity and duration of the fire. The effect of the fire, especially the quickness of finding the range, will be favored by the correct estimate of the distance and the proximity, size, and visibility of the target. Stationary objects or those moving forward and backward in the line of fire are easier to hit than those moving across the line or diagonally to it. The effect is indirectly increased by a position which makes the enemy's observation more difficult or makes the loss of the firing batteries less or the supply of ammunition easier.]

The fire effect can be reckoned as commencing with the first shot if the exact distance has been ascertained from batteries which have already regulated their fire. In other cases some time is to be allowed for ranging, and it should be borne in mind that this is delayed by a too precipitate opening of fire.

(67) [630] Under a well-sustained and well-controlled artillery fire of sufficient strength, parties in close order of the strength of a company or squadron can halt without cover (between 1,500 and 2,000 meters) [under 3,000 meters] only when the enemy's artillery has already suffered considerably or is sufficiently occupied by their own artillery fire. [At distances of less than 1,000 meters the fight between infantry and artillery must be decided quickly.]

[Cavalry not favored by the ground should not come under artillery fire in closed order unless in rapid motion within 1,500 meters, or

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attacking within 600 meters. Artillery which has found its range can so endanger unlimbering of artillery up to 3,000 meters as to reduce to an equality of power an originally superior force.]

(Between 1,500 and 1,000 meters the fire of artillery must be credited with great effect against unsheltered troops in close formations. In such cases, infantry, if the ground does not afford at least occasional cover, can move only in line and only backward and forward, and cavalry can not move at a walk.)

At ranges of about 1,000 meters artillery can still hold its own against the fire of skirmishers, but if strong firing lines are allowed to approach within 800 meters of guns insufficiently protected by their own infantry, the artillery must either retire or be liable to become incapable of moving. Cavalry in close order may appear in front of artillery firing, at less distances than 1,000 meters, only when moving rapidly; within 600 meters, only when charging.

Artillery which has found its range can endanger the unlimbering of a superior number of guns up to a range of (2,400) [3,000] meters. A decision as to the result of an artillery duel at greater distances than (2,400 meters) [3,000 meters] depends principally on the great numerical superiority of guns on one side or the intervention of other arms. At ranges of (2,400 meters) [3,000 meters] and less, even a slight numerical superiority makes itself felt. Particularly during the commencement of an action, a decision must be arrived at more quickly in proportion to the superiority of the artillery on one side; moreover, if the opposing artillery forces are of unequal strength, a decision should be given all the sooner the nearer the opposing guns are to each other.

The enfilade fire of artillery must be considered much more effective than its frontal fire.

[631] [Field howitzers are nearly equal to guns in shrapnel fire. Against objects immediately behind cover, and against villages, the fire of the shells is superior. Vertical fire of field howitzers is available only for the destruction of strong field defenses and at distances from 2,100 to 5,900 meters.]

[632] [In judging the effect of heavy field artillery should be considered: The position of the enemy, whether he has approached unseen and fired unexpectedly from a sheltered position, and whether the effect of fire can be observed and directed with certainty. Moreover, howitzers are required against strong field fortifications and mortars against permanent works, the range in each case not to exceed 6,000 meters.]

[Whereas, it is of first importance for the heavy artillery to subdue the enemy's heavy batteries, the howitzers, because of their mobility and the explosive effect of their shells against living targets, will also take part in the fight against field artillery and infantry, especially in the attack, by firing on trenches and other shelter at the point where it is proposed to make an opening for the assault.]

[633] [All circumstances must be carefully considered when giving decisions about superiority of fire. This makes the maneuvers more natural.]

On the other hand if two bodies of troops are standing opposite each other with ordered arms they should not have to wait long for their decision. In such a case it is not so much a minute and tedious inquiry that is required as a rapid decision.

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(68) [634] The capture of individual men, of led horses, etc., to denote a success is not permitted.

[The umpires alone are allowed to hold back individual men.]

(69) (The communications made by umpires to leaders as to the effect of the enemy's fire are to induce them to make a careful and resolute use of all circumstances which offer themselves and must be supplemented by information as to the effect of their own fire. Umpires must abstain from all interference except these communications and their decisions.)

[635] In making decisions, all the principles given above are to be taken only for general guidance, as even in peace maneuvers numerous matters come into consideration which can not be laid down beforehand in hard and fast rules.

(Particular value is, in all decisions, to be given to moral influences, as far as they assert themselves in peace. They are apparent mainly in the steadiness and order of the troops and the clearness of the orders issued to them. Even the beaten troops must, as far as possible, remain convinced that victory was denied them only on account of peace considerations, which prevented their actual value making itself felt.)

EXERZIR-REGLEMENT FÜR DIE FELD-ARTILLERIE—THE ATTACK.

346. As soon as the fire of the hostile artillery is weakened and the commander of the troops has designated the part of the hostile position which he wishes to attack, an overpowering fire of artillery should be united there and if possible from an enveloping position. During this time one part of the batteries is charged with keeping down the hostile artillery, especially that which could act efficaciously upon the ground of the attack. Even during the execution of the attack by the infantry, the artillery should endeavor to cooperate with all its forces. Even if new hostile batteries should come up, or others which had been engaged should resume the fight and direct their fire against the artillery, the principal effort of the latter should nevertheless be so directed as to sustain the attack of the infantry. It is advantageous to have the fire upon the point of attack so directed from commanding or oblique positions that it will be unnecessary to change the position as long as it is possible to maintain a good direction of the fire—that is to say, as long as one can distinguish between friends and enemies and observe the shots well, and as long as our own troops are not endangered by the projectiles. As soon as the attack approaches the hostile position the ground in rear of it must also be brought under fire to prevent the reserves from coming up on the line. Therefore a just division of the duties is one of the most important functions of the senior officer of the artillery. He requires a full knowledge of the intentions of the commander and a clear understanding of the tactical situation.

347. To facilitate the attack of the infantry it is recommended that its advance be accompanied by single batteries or by groups of batteries up to the most effective range. The attack gains thereby a great increase of moral force so as to compensate largely for the losses suffered from the artillery.

The attack of a position should be conducted according to a definite plan. All the fire should be directed by one head. Sheltered positions should be selected for the batteries and earthworks constructed for further

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shelter. Large supplies of ammunition should be stored in the batteries, places of observation should be established, and measures should be taken to transmit orders rapidly. The apparatus for the telephone or optical telegraph, if available, should be put in readiness to insure communication.

353. Against the most important and strongest defenses and against the point chosen for assault, groups of field howitzers should be directed; if at the beginning of a fight it is impossible to foresee against what part of the position the howitzers should be employed it would be well to keep them in the rear for the time being.

354. It will not be possible to break the enemy's resistance until the artillery of the defense has been weakened. As heavy a fire as possible should be concentrated upon those parts of the position which from the ground and from the plan of attack are considered to be the most important, while making the surrounding places untenable and subduing the artillery of the defense. It must be observed, however, that it would be wasting ammunition to fire against field fortifications which are only weakly garrisoned. This is especially to be feared if the defense can recognize a separation of the fight into a tedious artillery preparation and a subsequent infantry attack. The artillery attack against the important point will be the most efficient if at the same time our infantry assaults it and forces the enemy to occupy his lines and show his troops. It is one of the important duties of the commander to bring the gradual deployment of the infantry into cooperation with the fire of the artillery supporting it.

355. As soon as the defender shows himself shrapnel fire is used, and thereby all the space beyond the hostile fire line is swept, especially those points which appear the foci of the infantry fight.

It will be seen from the narrative that in all the great fights excepting the last, the problem was so arranged that both parties were required to take the offensive.

This is quite in line with the general tendency of the military mind both in and out of Germany to encourage the offensive in contradistinction from a passive defense. To reap the benefit of the moral courage which an attack inspires, it should have a fair prospect of physical success, and to this end it must be planned upon sound principles of grand tactics. It would be as erroneous always to attack the center of the enemy's line as always to attack his wing. If the line is dense enough to resist an attack in front it will probably be short enough to invite an attack on an unprotected flank. If it is too long to be outflanked it will be weak enough to invite an attack in the center.

The improvements in firearms enable the same number of men to hold a much longer line than formerly, but for a long time after the new weapons were in use the spirit of conservatism favored the old formations, and an army in taking up

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a defensive position made the line dense enough to be defended by the old weapons and impregnable in front when defended by the new weapons and only assailable upon the flank. To guard against danger from this quarter the defense will soon learn to spread out its line so far as to confront the enemy at every point, and eventually will become exposed to an attack in the center. Whether this point is often reached at present is a question on which opinions are perhaps divided, but there can be no doubt about the necessity of considering the relative advantages of the attack in flank and center. It is the power to make this selection which gives the offensive its great advantage, both morally and physically. As the flank attack has so long been the rule and custom it is not surprising that in some of the battles of this year's maneuvers one or both parties have attacked the center.

In taking the offensive each party massed its infantry and artillery on a front of 6,000 or 7,000 meters, making about three men to a meter, and one gun to about 30 or 40 meters if scattered along the line, or one gun to 15 meters if we suppose half the front to be reserved for the artillery.

When it is considered that the artillery now is capable of firing five or ten times as fast as it could a few years ago, it will be safe to estimate that the effect of its fire is at least four times as great as long as its ammunition holds out, and as its gunners are more or less protected by shields from the fire of infantry, the relative power of the two arms is quite different from what it has been, so that with shell and shrapnel it would be possible for the artillery of the attack to make good preparation for the advance of its own infantry.*

It will be seen from the diagrams showing the order of battle that the artillery was divided up among the divisions with no great general reserve, as formerly. The artillery took care to dig gun pits and shelter for the men wherever it was convenient. The infantry was usually drawn up with the divisions side by side and only on the last day was one division kept in reserve by the Red party, which was then on the defensive. The formations were deep, the firing line had a

*Field artillery on rapid-firing carriages will be more than a match for infantry at all distances above 300 meters, if the field of fire is clear and if the horses are sheltered, so that infantry will be forced to use automatic rifles or confine itself to broken ground or to natural or artificial shelter.

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density of a little less than one man to a meter and the other line or lines were usually kept well to the rear, the companies marching in line or column or by the flank according to the ground and the character of the hostile fire. Although the infantry was well provided with intrenching tools it made little use of intrenchments, because this was thought to interfere with the élan of the troops.

The cavalry habitually fought on horseback. On the last day it was reenforced by Maxims and mitrailleuses. The cavalry horses had been trained to perfection, and all the evolutions were performed with beautiful regularity.

In the charges against infantry and artillery the line was halted at the prescribed distance of 15 paces, and as far as could be seen, not a single horse broke over the line. Great skill was shown in approaching the hostile position with as little exposure as possible and attacking by surprise and only troops considered to be disorganized and either retreating from the pursuit of infantry or still engaged in a hand to hand fight. Against troops armed with the old weapons these charges would have been fearful. It remains to be seen how they will be affected by the new.

The maneuvers offered many fine situations for showing what could have been accomplished by cavalry fighting on foot, armed with automatic rifles and accompanied by machine guns and horse artillery.

The Germans have lead the world in the skill and judgment they have shown in covering the front of their armies with a veil of cavalry concealing their own movements and discovering those of the enemy. In this respect the Americans have much to learn from them. It is impossible to tell, however, whether this contact with the enemy was always maintained after the two armies had come to close quarters.

The maneuvers this year afforded an excellent opportunity for the practice of outpost duties and reconnoissance.

The guard corps was reviewed in Berlin on the 1st of September and the second army corps at Stettin on the 8th, but the general idea was so devised that the infantry and cavalry that cooperated with the second army corps to form the army of invaders, or the Red party, confronted the guard corps in its march from Berlin to the battlefields near Stettin. Unfortunately the military attachés were not invited to follow this part of the maneuvers.

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The work of the engineer troops was very extensive in preparing roads and bridges. It kept abreast of the cavalry during the first week of the march of the guard corps from Berlin to the battlefield. It prepared and destroyed temporary defenses, operated the balloons, telegraphs, telephones, wireless telegraphs, and optical telegraphs and laid out the defense lines of the battlefield; but to emphasize the combative spirit and aptitude of this arm of the service it was afforded ample opportunity to take part in fights as infantry, and to practice in all the duties of field troops.

In view of the fact that mitrailleuses have not been held in high favor in Germany it is quite significant that for the last two years the Maxims have taken part in the maneuvers and that they now appear to be recognized as part of the equipment of infantry and cavalry. The pieces were drawn by four horses, the drivers taken from the artillery and the gunners from the infantry. They were formed into batteries of four guns each, and two or three batteries formed an "Abtheilung." The Maxims were not confined to defensive positions, but took an active part with the jägers in the attack, especially against woods and villages.

It is also significant that the Germans have for the last two years made good use of cyclists. Those of each army were organized into a company of 3 officers and 150 men, taken from different regiments.

Automobiles of various types were tested by the umpires and the general staff. They traveled across the country with apparent success.

The flash telegraph enabled signals like those of the heliograph to be sent in the daytime without depending upon sunlight.

The wireless telegraphy was operated from instruments attached to the balloons, which were similar or identical with those used last year.

Dogs are taught to hunt up wounded on the field of battle, and some efforts have been made to train them to carry messages and to bring up ammunition in small carts to the firing line.

The weather was very good throughout the maneuvers with the exception of a few rainy nights, when the troops were for the most part under shelter.

It will be seen from the narrative of operations that the general and special ideas and all the suppositions that were

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announced from time to time were sufficient to give to each day's problem a strategical as well as a tactical basis. So far as the maneuvers were concerned, however, it was a matter of no importance whether some better landing place could have been selected for the Red party. The question for the commander in chief in each case was, how to make the best disposition of the forces at his disposal in order to carry out the letter or the spirit of the orders he had received.

The reenforcements, real or imaginary, on the battlefield or elsewhere, were so adjusted as to bring all the battlefields on the ground previously selected, but this did not prevent either commander from attempting to bring it elsewhere, leaving it for the director to make these adjustments if necessary.

On the 10th of September the Blue did not succeed in cutting off the forty-second division nor in seizing the debouches from the forest southeast of Stettin, but it established contact with the enemy all along the line, and this is all that was possible, unless the guard cavalry could have eluded that of the enemy.

On the 11th of September the Red party having cleared the broken country and developed a wide front with the freedom for maneuvers which it afforded, took advantage of this position to occupy the entire line of 25,000 meters from the Oder to the Madü Lake. The density of this line was only a little more than one man to a meter, and the Blue party was justified in thinking that an attack on the center would offer a fair prospect of success if it could be made quickly and strongly enough to break the line, before reenforcements could come from the wings. The Red could not hold this line by a passive defense without intrenching, nor could it judge of the dispositions of the Blue forces other than by the line of outposts which confronted its own. Accordingly it did not envelop the left flank of the enemy, but anticipating his attack, or with a view to breaking through his line on the opposite flank, it concentrated its forces over a front which proved to be just wide enough to envelop him. The first guard division in its assault upon the Red center was confronted by superior numbers and the third guard infantry division coming after met with the same fate.

On the 12th the second army corps, ignorant of the arrival of reenforcements for the Blue party, pursued the advantage it had obtained and fell upon forces superior in number advancing against it. Having lost for the time the use of its

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own cavalry, it was exposed on the flanks to the cavalry of the Blue. The Red infantry was first driven back by the infantry of the Blue and then charged in flank by the great mass of the Blue cavalry. Whatever may be thought of the possibility of cavalry charges, as weapons become more and more deadly, it must be considered that the maneuvers were planned upon the supposition that they were still possible, and this day's maneuver affords a beautiful illustration of the decisive rôle that cavalry has played in the battles of the past with the lance and saber and may be expected to play in the battles of the future when armed with the automatic rifle.

On the 13th both parties again took the offensive, the Blue to drive out the invaders and the Red to hold the debouches of the forest and avoid being driven upon the marshes in rear of the position in which it found itself. As each party attempted to surround its enemy's right flank, both lines were revolved 80 or 90 degrees about the center of the battle-field.

It is interesting to consider what would have happened if the Red cavalry had been armed with repeating rifles and, supported by the proper complement of machine guns and horse artillery, had fallen upon the left wing of the enemy instead of the right.

The dispositions of the Blue on the last day of the maneuvers were admirably planned to surround and crush the army of invaders. The troops at Stettin, instead of pursuing the enemy to the seashore, turned to the assistance of the guard corps. The Blue cavalry with its two batteries of horse artillery and six batteries of Maxim mitrailleuses could well afford to act independently and cut off the retreat of the Red. So long as the guard corps and the forty-second infantry division continued to approach each other, there was no reason to fear that the forty-second would be cut off, but any mistake or delay would expose it to this danger. Accordingly, the Blue army made an early start to concentrate from every direction.

If on the night of the 13th and 14th of September the Red had known the position of all the Blue forces, and if the problem had been simply to make the best of the situation, it would seem to have been desirable to leave one infantry division to guard the trenches from Kortenhagen to Babbin, and throw the other two with the six squadrons on the right between the forty-second and the main body of the guard

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corps, leaving the cavalry division A to hold in check the guard cavalry as long as possible, and if necessary to support the troops in the trenches or cooperate with the other two divisions in falling upon a weak part of the line and crushing it or forcing its way through to a place of safety.

The instructions for the Red commander, however, might justify him in the belief that the reenforcements recently landed at Cammin would look out for his rear and accordingly his dispositions were made to hold on to the debouches from the forest, occupying it with the forty-first and fourth divisions and placing the third in reserve. On learning of the presence of the enemy in the rear, he turned his reserves against them and not long after made a counter-attack with the greater part of the fourth division against the right wing of the guard. It is interesting to consider what would have happened even then if all the troops that could be spared from the fourth division had joined the third in this movement instead of making the counter-attack, and if the cavalry division A had moved up to cooperate with them.

The concentrated fire of the Blue artillery made itself felt at Sinslow and was then turned on Kortenhagen. The line of the Red was broken at its weak point and all his forces might have been surrounded if the forty-second infantry divisions had effected its junction with the main body.

The guard cavalry division carried out its mission of falling upon the rear of the enemy, and when reenforced by the artillery of the forty-second division made all escape in its direction impossible.

The attack on the forty-first regiment, after it had suffered from the hard fights in the villages and during the pursuit, and while it was still confronted with fresh infantry in the front or flank, was certainly well timed to complete the confusion, and the Red army escaped only in consequence of the skillful dispositions of the third infantry division in seizing the gap left by the forty-second division between Neumark and Glien.

It will thus be seen that from beginning to end the imperial maneuvers of 1900 afforded a continuous succession of most interesting problems in grand tactics, all based upon consistent and clear strategical suppositions, and it is most interesting to observe the consummate skill with which these problems were solved.

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SWISS MANEUVERS, 1900.

(Reported by Capt. G. R. Cecil, Thirteenth Infantry, United States military attaché.)

The troops involved were the third army corps and for the 17th and 18th a combined division made up of detached troops under command of Colonel Divisionnaire Schlatter.

The troops of the third army corps took part in these grand maneuvers after their regular cours de répétition, including minor operations of battalion against battalion, regiment against regiment, and even brigade against brigade, all under the general direction of the corps commander, Colonel Bleuler.

I have not obtained the exact strength of these organizations, but the aggregate strength of the corps present was given me as a little over 25,000 men, and of the combined division as about 13,000, including all arms.

The following is a list of the foreign officers attending the maneuvers:

Russia—
Major General Baron Rosen.

Germany—
Major General Beseler.
Major von Steuben, of the general staff.
Captain de Beaulieu-Marconnay, military attaché, Berne.
First Lieutenant von Bülow, fifteenth hussars.

France—
Major General Pélécier.
Captain Dupont, artillery, attached to the army staff.
Major de Kerraoul, artillery, military attaché at Berne.

Holland—
Colonel von Mook, staff.
Captain Meyboom, infantry.
Captain Jonge van der Halen, artillery.

Austria-Hungary—
Lieutenant Colonel Tschurtschenthaler, staff.

Spain—
Maj. Xavier Manzanos, staff.
Lieut. José Saavedra, Count of Urbasa, artillery.

Sweden and Norway—
Captain Roeder, aid-de-camp to the Duke of Thestrogothie.

United States—
Col. Wm. Cary Sanger, national guard of New York.
Capt. G. R. Cecil, Thirteenth Infantry, military attaché, Berne.

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THE TERRAIN.

The maneuvers of division against division and of the corps against the combined division all took place in the beautiful fertile country to the east of Zürich. The country is undulating, rather mammiform than in continuous ridges, nearly all being under cultivation, densely populated, provided with good macadamized roads, and pretty well watered. To avoid too much damage, vineyards were regarded as impassable lands for any kind of troops, and as far as possible the damage to crops was minimized. There are no fences, but generally the troops marched on the roads until the deployments for battle actually occurred.

THURSDAY, SEPTEMBER 13.

On this date began the maneuvers, division against division. For this purpose the following orders were given out:

MANEUVER OF THE THIRD ARMY CORPS, DIVISION AGAINST DIVISION, FROM SEPTEMBER 13 TO 15, 1900.—GENERAL IDEA.

An Eastern army has reached Wil, coming from the Rhine Valley in St. Gall. It occupies the passes of Toggenburg as far as the Rieken Pass with detached posts.

A Western army assembles on the high plateau of Brütten, with detachments echeloned as far as the Greifen See.

MANEUVER OF THE THIRD ARMY CORPS, SIXTH DIVISION, SEPTEMBER 13, 1900.—SPECIAL IDEA.

Troops: Sixth division, sixth cavalry regiment, Group I of field artillery, regiment No. 11, one detachment of the corps park. (13 battalions, 4 squadrons, 7 batteries.)

The artillery of the sixth division will be commanded by the artillery colonel of the third army corps from September 13 to 15.

The sixth division cantons from September 12 to 13 in the region of Dübendorf-Wangen with outpost lines (supposed) at Kindhausen, Hegnau, and Schwerzenbach.

The following order arrives from the headquarters of the Army at Kloen on September 13:

1. The enemy's march against Elgg, Turbenthal, and the Hulftegg is announced. No new information has arrived concerning the hostile columns at the Riken.

The Western army will meet the enemy with the right wing passing via Pfäffikon and the Hulftegg.

2. The sixth division covers the right wing of this advance while proceeding via Uster and Wald. Its duty is to drive the enemy from the Riken Pass, and to operate upon his left flank and upon the communications of his main army.

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DISPOSITION OF THE MANEUVERS.—Hostilities begin on September 13 at 9 o'clock in the morning. No cavalry shall, before that time, pass through the outpost lines, and no other troops before 12.15 in the afternoon.

The corps park section, which is assigned to the sixth division from September 13 to 15, stands at the disposal of the division commander, at Maur, at 1 o'clock in the afternoon of the 13th.

HEADQUARTERS OF THE THIRD ARMY CORPS:

H. BLEULER,
Director of the Maneuvers.

MANEUVER OF THE THIRD ARMY CORPS, SEVENTH DIVISION, SEPTEMBER 13, 1900.—SPECIAL IDEA.

Troops:

Seventh division, seventh cavalry regiment, group II of field artillery regiment No. 11, one detachment of the corps park. (13 battalions, 4 squadrons, 7 batteries.)

The artillery of the seventh division will be commanded by the commander of the eleventh regiment of field artillery from September 13 to 15.

The seventh division, from September 12 to 13, is in the vicinity of Wattwil and at the Riken Pass in cantonments, with outposts (supposed) on the line Rueterswil–Steg–Ernetswil. There arrives from the headquarters of the army in St. Gall, on the morning of the 13th, the following order:

1. Nothing new from the enemy. The Eastern army has just resumed its march toward the west with the left wing passing, via the Hulftegg, Bauma, and Pfäffikon.

2. The seventh division covers the left flank of this advance while marching via Wald in the direction of Uster. Its duty is to drive the enemy from the vicinity of the Greifensee, and to operate upon the right flank and the communications of his main army.

DISPOSITION OF THE MANEUVERS.—Hostilities begin on September 13 at 9 o'clock in the morning. No cavalry will cross the outpost line before that time, and no other troops of the seventh division before 10.30.

The corps park section, which is assigned to the seventh division from September 13 to 15, stands at the disposal of the division commander, at Uznach, at 10 o'clock in the morning of the 13th.

HEADQUARTERS OF THE THIRD ARMY CORPS:

H. BLEULER,
Director of the Maneuvers.

ORDER FOR THE ASSEMBLING OF THE SIXTH DIVISION ON SEPTEMBER 13, 1900.

THIRD ARMY CORPS, SIXTH DIVISION,
HEADQUARTERS OF THE DIVISION STAFF,
DÜBENDORF, *September 13, 1900, 8 a. m.*

1. Our army marches to-day against the enemy, whose march toward Elgg and Turbenthal, and via the Hulftegg, has been reported to us. The

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right wing of our main army is marching via Pfäffikon in the direction of the Hulftegg. We have to cover the right flank of this forward movement advancing via Uster and Wald so as to drive away the enemy now at Riken Pass and act upon the left flank and the communications of his main army.

2. Dragoon regiment No. 6 is near Hegnau at 9 o'clock, and will receive verbal orders for reconnoissance work.

3. The division is ready for the advance in the following order: Right column—rifle battalion No. 6; the eleventh infantry brigade; field artillery regiment I–11; pioneer company I, battalion 6, at the northern entrance of Schwerzenbach on the road from Dübendorf; in the first line the rifle battalion, behind that the eleventh infantry brigade by regiments in lines; field artillery regiment I–11 in route column on the road, the point abreast of the last infantry regiment; pioneer company I–6 behind the eleventh infantry brigade. Left column—the twelfth infantry brigade; field artillery regiment No. 6; pioneer company II–6 and division hospital, at the western entrance of Hegnau on the road from Wangen; the twelfth infantry brigade by regiments in lines; field artillery regiment No. 6 in route column on the road, the point abreast of the last infantry regiment; pioneer company II–6 behind the last infantry regiment; division hospital No. 6 behind the artillery in route column on the road. Places will be assigned. Guide company No. 6 will be at Schwerzenbach station at 11.30.

4. The first ammunition echelon of the right column will be assembled at the junction of the road east of Grüt at 12.30 p. m.; that of the left column at 12.30 near Stigenhof. The subsistence and baggage columns of the right column will be near Gfenn at 2 p. m., the corps park section will be near Maur at 1 p. m.

5. There will be an issue of orders at 11.30 o'clock at Schwerzenbach station, and all directly subordinated commanders will be there.

WILLE,
Commander of the Sixth Division.

REMARK.—The distribution of rations for the division takes place on September 13, at 9 p. m., at Wallisellen station.

STEINBUCH,
Chief of the Staff of the Sixth Division.

DÜBENDORF, *September 12, 1900.*

ORDER OF MARCH FOR SEPTEMBER 13, 1900.

THIRD ARMY CORPS, SEVENTH DIVISION,
LICHTENSTEIG, *September 13, 1900, 7.30 a. m.*

1. Nothing new about the enemy. Our army resumes its forward movement with the left wing via the Hulftegg toward Bauma–Pfäffikon.

The seventh division has to cover the left flank of this advance in going through the wood in the direction of Uster. It is to drive the enemy from the region of the Greifen See, and to act upon the right flank of his main army and upon his communications.

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2. I hereby direct the division to march in the following order via Ricken, St. Gallen-kappel, and Wald, on Hinwil.

March order.

Advance guard.
Colonel Schiess.
Twenty-eighth regiment.
Seventh rifle battalion.
One platoon of guides.
Division artillery 7–11.
Engineers ½ battalion.
Ambulance 33.
Fighting train.
Main body.
Rest of the guide company.
One battalion of the thirteenth brigade.
Artillery group 7–11.
Artillery group 11–11.
One company of the thirteenth brigade behind each battery of each artillery group.
Rest of thirteenth brigade.
Twenty-seventh regiment
Division hospital.
Fighting train.
Corps park section.

Cavalry regiment No. 7 will cross the outpost line (supposed) at 9 o'clock in the morning and make reconnoissance in the direction of Pfäffikon, Uster, and Egg.

It must maintain communication with the left wing of our army.

The point of the infantry advance guard crosses the outpost line at Steg on the Ranzachbach at 10.30 a. m.

The main body follows at 1 kilometer distance.

Its point crosses the outpost line at the same place at 11.30 a. m.

A halt of 30 minutes will be made by the advance guard when it has crossed the Mühlebach at the western side of St. Gallen-kappel.

The halt is made by the main body this side of the Mühlebach, the point extending toward the river.

3. The division hospital will be at 1 kilometer distance. The train follows immediately behind the hospital; the train lieutenant of the thirteenth brigade takes command of it. The corps park follows the train at a distance of 4 kilometers.

4. The columns of subsistence and baggage march together, in order, under the train officer of the division. The point should reach the junction at Ricken at 12 noon, it follows the main body until it reaches the Mühlebach, then parks on the western side of the Mühlebach and there awaits further orders.

5. The reserve hospital remains at Wyl.

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6. I leave Lichtensteig at 9 o'clock in the morning and go to the advance guard.

HEADQUARTERS OF THE SEVENTH DIVISION.

N. B.—The division wears the white band.

This was sent to the subordinate commanders of the division and also to the corps headquarters.

THE MANEUVERS.

The foreign officers left Zürich early by train and arrived at Schwerzenbach about 8 a. m., where we took horses and followed the left column of the sixth division along the road. We were marching with the advance guard when, at 3.30 p. m., it met the advance guard of the seventh division in the village of Hinwil.

The road was good and the weather fine, and the march was very rapid, covering nearly 6 kilometers per hour for each division. The seventh division was aiming to reach the open country to the west of Hinwil, while the sixth division was trying to intercept this movement in the more broken country toward Wald. Notwithstanding this rapid march, and the hard service that had immediately preceded the large maneuvers, the columns kept closed up, and a staff officer told me that less than fifty men dropped out from the twelfth brigade, and they soon rejoined the column.

The advance guard action was soon followed up by the left column of the sixth division, by strengthening and extending its left as each new battalion came into action, until it occupied the heights to the east near Wernetshausen. Two batteries of artillery were brought into action about 4.05 o'clock on the high ground northeast of Hinwil. About five minutes later two batteries of the seventh division opened fire from a high position north of Hadlikon. The operation was finally extended until it included a front of about 3 kilometers, the heaviest fire being near Wernetshausen. The position taken up by the advance guard of the seventh division was a strong one, but the rapid deployment of the sixth division outflanked it, and offset some of its advantages before the main body of the seventh division could be brought into action. The terrain was very broken and the action was rapidly breaking up into small combats with varying advantages, and the day being too far spent to complete the action before darkness set in, the director of the maneuvers caused the halt to be sounded at 5.35, and directed the opposing forces to place their men in

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bivouac or cantonment for the night, holding their present positions by outposts; the attack was to be renewed on the morning of the 14th, for which the following orders were issued:

MANEUVER OF THE THIRD ARMY CORPS, SIXTH DIVISION, SEPTEMBER 13, 1900.—SPECIAL IDEA.

COMMANDER OF THE WEST ARMY,
WINTERTHUR, *September 13*, —— *p. m.*

To the commander of the sixth division:

Our outposts have met the enemy at Elgg, Turbenthal, and on the Hulftegg, but no decisive action will take place to-day.

Resume the attack to-morrow.

You will receive for reenforcement a battery of the corps artillery which will arrive at Aathal to-morrow at 6.30.

DISPOSITION OF THE MANEUVERS.—A battery of Group II of the corps artillery, marching this evening to its cantonment at Gossau in compliance with the order of the director of the maneuvers, will be neutral until 6.30 to-morrow morning and then will proceed to Aathal under the orders of the commanding officer of the sixth division.

HEADQUARTERS OF THE THIRD ARMY CORPS:
H. BLEULER,
Director of the Maneuvers.

MANEUVER OF THE THIRD ARMY CORPS, SEVENTH DIVISION, SEPTEMBER 13, 1900.—SPECIAL IDEA.

COMMANDER OF THE EASTERN ARMY,
WIL, *September 13*, —— *p. m.*

To the commander of the seventh division:

Our outposts have met the enemy at Elgg, at Turbenthal, and on the Hulftegg, but no decisive action will take place to-day.

Resume the attack to-morrow.

DISPOSITION OF THE MANEUVERS.—When the fight has stopped, the seventh division will send a battery of the corps artillery to Gossau, to be under the orders of the director of the maneuvers, where the battery will go into cantonment. The march and cantonment of that battery will be neutral until 6.30 in the morning of September 14.

HEADQUARTERS OF THE THIRD ARMY CORPS:
H. BLEULER,
Director of the Maneuvers.

SPECIAL ORDERS OF THE DIRECTOR OF THE MANEUVERS TO THE COMMANDING OFFICER OF THE SIXTH DIVISION.

The outpost lines are not to be crossed by any troops except patrols before 7 o'clock in the morning of September 14.

HEADQUARTERS OF THE THIRD ARMY CORPS:
By COLONEL WEBER,
Chief of the Staff.

The same order was given to the seventh division.

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ORDER FOR THE ASSEMBLING OF THE SIXTH DIVISION ON SEPTEMBER 14, 1900.

THIRD ARMY CORPS, SIXTH DIVISION,
DIVISION HEADQUARTERS,
UNTER WETZIKON, *September 13, 1900, 10 p. m.*

1. The division has received the order to resume to-morrow the attack against the enemy.

2. The columns remain formed as they were for September 13.

Battery 54 will be added to the right column.

The left column will assemble at 6.30 in the morning at the bifurcation Kempten–Bäretschwyl, Kempten–Ettenhausen.

The right column is, at 6.30, at the point 547 on the road Ober Wetzikon–Hinwil. The rendezvous are to be ordered by the commandants of the columns. Guide company No. 6 is making reconnoissance in accordance with verbal orders, and will be to-morrow at 6.30 a. m. at the rendezvous of the right column. Dragoon regiment No. 6 will be at 6.30 a. m. at Unter Wetzikon.

The division hospital at 6.30 a. m. at the western entrance of Robenhausen.

3. The rendezvous must be promptly made; the outpost lines are to be drawn in corresponding to the rendezvous.

4. The corps park section sends one echelon at 5 o'clock in the morning to each of the places of rendezvous, and sends to Ober Wetzikon for seven battalions and three batteries, and to Kempten for six battalions and four batteries. The supplying of ammunition will be effected by 6.30 by the exchange of carriages and distribution of pocket ammunition.

5. The distribution of orders at the rendezvous of the right column at 6.30 a. m.

WILLE,
Commander of the Sixth Division.

REMARK.—The distribution of rations for the division on the 14th of September will take place after 8 o'clock in the morning at Uster (station). The baggage column assembles at the same time in Uster. The carriages of the left column pass via Aathal, and those of the right column via Gossau. The combined subsistence and baggage column waits in Uster for further orders.

ORDER TO ASSEMBLE FOR SEPTEMBER 14, 1900.

THIRD ARMY CORPS, SEVENTH DIVISION,
HADLIKON, *September 13, 10 p. m.*

1. The outpost lines of our army have met the enemy at Elgg, at Turbenthal, and on the Hulftegg, but there was nothing decisive. We have no news of the enemy, whose attack we have beaten off to-day.

2. We have orders to resume the attack to-morrow.

3. I hereby direct the cavalry to continue clearing the way at daybreak, according to the directions given yesterday. The most necessary part of the advanced troops are to be left in position.

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The main body of the division must be ready at 6.30 in the morning to begin the attack.

At the right: Thirteenth brigade at Hinwil.

At the left: Fourteenth brigade between Bezholz and Oberhof.

The artillery in rear.

The division artillery near the right brigade.

Corps artillery group (two batteries) near the left brigade.

Cavalry regiment at Brach, west of Taffleton, to cover the left flank.

The rifle battalion at Edikon.

Engineers, half battalion, and division hospital at Oberdürnten.

Corps park at Rüti station.

4. Distribution of rations, 9 o'clock a. m., at Rüti.

5. I will be with the right brigade after 6 o'clock in the morning, and give orders from there at 6.30 in the morning.

HEADQUARTERS OF THE SEVENTH DIVISION.

FRIDAY, SEPTEMBER 14.

As may be seen by the foregoing orders, the sixth division was assembled in the early morning, in two columns, and was reenforced by one field battery taken from the seventh division. The right column was strengthened by the additional field battery near Ober Wetzikon. The left column was to the east of Kempten, and the entire division was near together.

The seventh division of the thirteenth brigade was at Hinwil on the right, and the fourteenth brigade on the left, between Bezholz and Oberhof, the artillery being in rear.

A dense fog enveloped the entire theater of operations and did not lift until after 8 o'clock. Under cover of this fog the sixth division moved out for the attack promptly at 7 o'clock. At 7.30 the eleventh brigade engaged the thirteenth brigade of the Eastern army while still massed at Hinwil, and at 8 o'clock had three batteries in position to the northwest of Hinwil, while the seventh division had no artillery thus to oppose them. At 8.30 the judges decided that Hinwil had been taken, and the thirteenth brigade was withdrawn to the southeast of the town, with its artillery on the heights to the east.

During this time the twelfth brigade of the sixth division outflanked the enemy and effectually turned the position at Hinwil, passing by Ringwil and Gyrenbad, and climbed the plateau of Wernetshausen.

This flank attack was met by the thirteenth brigade, while the fourteenth brigade continued to operate against the right wing of the sixth division, extending its left flank so as to overlap the right flank of the sixth division. This occurred

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about 8.45 a. m., just as the twelfth brigade was showing itself strong on the other flank. The maneuver director then sounded the cease firing, and announced to the two commanders that the Western army (supposed) had been forced back by a superior force, and directed the retirement of the sixth division on Forch-Kapf, to the south of the Greifen See, to protect Zürich. The retirement was to commence at the expiration of one hour. The real retrograde movement began about 11 a. m.

The artillery covered the withdrawal from the battlefield, a rear guard covering the retreat from the time the troops were all in march. The pursuit was not that of a victorious army following its beaten adversary, but was continued till the seventh division reached the vicinity of Esslingen, in the vicinity of which place the troops went into cantonment for the night.

The following are the orders for the operations continued on the 15th:

MANEUVER OF THE THIRD ARMY CORPS, SIXTH DIVISION, SEPTEMBER 14, 1900.—SPECIAL IDEA.

Troops: Sixth division, sixth cavalry regiment, two batteries of the corps artillery, one corps park section. (13 battalions, 4 squadrons, 6 batteries.)

COMMANDER OF THE WEST ARMY,
WINTERTHUR, *September 14, ——, a. m.*

To the commander of the sixth division:

The enemy has developed unexpected superiority at Elgg, at Turbenthal, and on the Hulftegg. The Western army has, consequently, stopped the fight before a decisive action took place, in order to retire to its position on the plateau of Brütten. The right wing is at the northern extremity of the Greifensee.

The sixth division, whose left flank is threatened by the (supposed) hostile sections, has to march over the hills at the west of the Greifensee toward the plateau of Forch-Kapf, in order to join the main army and to cover its right flank and communications. It must maintain its position there.

DISPOSITION OF THE MANEUVERS.—Two batteries will be taken off from the sixth division when the main body of the division has passed Mönchaltorf, and march as a neutral column through Bellikon toward Uster. They will be at the disposal of the maneuver director.

HEADQUARTERS OF THE THIRD ARMY CORPS:

H. BLEULER,
Director of the Maneuvers.

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MANEUVER OF THE THIRD ARMY CORPS, SEVENTH DIVISION, SEPTEMBER 14, 1900.—SPECIAL IDEA.

COMMANDER OF THE EASTERN ARMY,
ELGG, *September 14, ——, a. m.*

To the commander of the seventh division:

The enemy is retiring on the entire line and will be pursued toward the west. I expect the seventh division to reach the plateau of Egg–Esslingen to-day, in order to advance toward Zürich to-morrow.

You will be reenforced by two batteries of the corps artillery this evening.

DISPOSITION OF THE MANEUVERS.—Two batteries of the corps artillery will be taken off from the seventh division and march as a neutral column through Bellikon toward Uster, where they will be at the disposal of the seventh division after 8 o'clock p. m.

HEADQUARTERS OF THE THIRD ARMY CORPS:
H. BLEULER,
Director of the Maneuvers.

MANEUVER OF THE THIRD ARMY CORPS, SIXTH DIVISION, SEPTEMBER 15, 1900.—SPECIAL IDEA.

Troops: Sixth division, sixth cavalry regiment, two batteries of the corps artillery, one corps section park. (13 battalions, 4 squadrons, 6 batteries.)

COMMANDER OF THE WESTERN ARMY,
KLOTEN, *September 14, ——, p. m.*

To the commander of the sixth division.

The Western army has maintained its positions on the plateau of Brûten. It expects reenforcements by to-morrow noon, 15th of September, which will enable it to resume the attack. The sixth division has meanwhile to cover Zürich and the right flank of the army.

HEADQUARTERS OF THE THIRD ARMY CORPS:
H. BLEULER,
Director of the Maneuvers.

MANEUVER OF THE THIRD ARMY CORPS, SEVENTH DIVISION, SEPTEMBER 15, 1900.—SPECIAL IDEA.

Troops: Seventh division, seventh cavalry regiment, four batteries of the corps artillery, one corps section park. (13 battalions, 4 squadrons, 8 batteries.)

COMMANDER OF THE EASTERN ARMY,
TURBENTHAL, *September 14, —— p. m.*

To the commander of the seventh division:

The Eastern army will attack the enemy to-morrow on the plateau of Brütten.

The seventh division will take possession of the hills to the east of Zürich.

HEADQUARTERS OF THE THIRD ARMY CORPS:
H. BLEULER,
Director of the Maneuvers.

The seventh division will commence the attack at daybreak (5.30).

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ORDER FOR THE PREPARATION OF THE SIXTH DIVISION AT FORCH-KAPF ON SEPTEMBER 15, 1900.

THIRD ARMY CORPS, SIXTH DIVISION,
DIVISION HEADQUARTERS,
FORCH, *September 14, 1900, 7 p. m.*

1. The attack of the enemy is expected to-morrow in a position near Forch-Kapf. We know that he has reached Gossau and that he has set outposts at Esslingen.

2. The dragoon regiment will reconnoiter in the advance direction of the enemy.

3. The troops are in following order at 6.30 a. m.:

Field artillery regiment I-11 at the southern side of Wasserburg, the front toward Egg (behind the left wing).

The sixth field artillery regiment at Kapf (behind left wing).

The eleventh infantry brigade occupies with one regiment the front of the position, with the exception of the group of houses of Forch, and holds the other regiment in reserve.

The sixth rifle battalion occupies the group of houses of Forch.

The twelfth infantry brigade will be with one regiment in ready position in the depression to the west of Forch. The other regiment forms the general reserve at Kapf.

The engineer half battalion No. 6 will finish the work which was commanded by a verbal order and then join the general reserve.

Guide company 6 will receive verbal orders for the reconnoissance work.

The Division Hospital will await further orders at Zumikon.

4. The outpost lines will retire to Kapf on the right wing if superior forces make an attack.

5. The fighting train will assemble at 7.30 a. m. at Waltikon, the corps park section at 7.30 a. m. at Hub. They will receive further orders for the issue of ammunition.

6. I shall be at the position above Forch after 6 a. m.

WILLE,
Commander of the Sixth Division.

REMARK.—The distribution of rations for the sixth division and the troops assigned to it takes place on September 15 at 7 a. m. at Tiefenbrunnen near Zürich. The baggage columns of the eleventh brigade and of the dragoon regiment will park after 8 a. m. at Wytikon, those of the other troops after 9 a. m. at Realp.

ORDER TO ASSEMBLE FOR SEPTEMBER 15, 1900.

FOURTH ARMY CORPS, SEVENTH DIVISION,
GRÜNINGEN, *September 14, 1900.*

1. According to the information received, the enemy has retired on the hills between Bellikon-Egg to the west of the Greifen See. Our army will attack the enemy to-morrow on the plateau of Brütten. The seventh division will take possession to-morrow of the hills to the east of Zürich and begin the attack at 5.30.

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2. The outposts must organize at daybreak an active patrol service against the enemy in order to inform their brigade commanders of his movements. The cavalry regiment must be at the same time on the two sides of the Greifen See and will advance in the direction of the heights of Forch–Aesch–Pfaffhausen to cover our flank toward Uster.

3. At 5 o'clock a. m. the thirteenth brigade will be under arms to the east of Esslingen with the right wing resting upon the Grüningen–Esslingen road.

The fourteenth brigade will be on the Oetwyl road to the east of Kreuzlen.

The rifle battalion will be at the Liebenburg mill with the front toward Egg; the corps artillery (4 batteries) will assemble behind the thirteenth brigade.

The division artillery will be behind the fourteenth brigade on the road Oetwyl–Kreuzlen.

The engineer half battalion will be close to the fourteenth brigade.

The division hospital will be in front of Grüningen at the left side of the road leading to Esslingen.

4. The munition echelon will be united at the Grüningen–Esslingen junction after having delivered the ammunition still available for the division exercises.

The train lieutenant takes the command of it.

The baggage wagons will be sent back at 5 o'clock to Grüningen and assembled in park behind the little town. The subsistence wagons shall be left in the cantonments but must be ready at 7 a. m. in Esslingen. They will stay there awaiting further orders.

5. The hospital is at Hinwil.

6. The outposts remain at their positions.

7. I shall leave Grüningen at 4.15 a. m. escorted by the guide company, riding via Rohr to Strassenkreuz near Etzikon.

HUNGERBÜHLER,
Division Commander of the Seventh Division.

SATURDAY, SEPTEMBER 15.

The orders of Colonel Wille indicate the disposition that he had made to defend the position at Forch and consequently the city of Zürich. The position is naturally a very strong one and was strengthened during the night of the 14th–15th by preparing for defense the houses of the little hamlet and constructing barricades on its exposed faces, and by constructing shelter trenches on the slopes and gun pits for the artillery on the crests. The left flank was inaccessible owing to steep slopes and marshy bottoms below, so that the front and right could receive practically the entire strength of the division, and these offered fine positions for defense. The field of fire was practically clear for a kilometer or more, and the woods on the high ground behind the main artillery position gave

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shelter to the strong reserves and a complete screen for their movements. The shelter trenches were concealed by brush in such a way that it was difficult to locate them, and altogether the measures taken to strengthen and hold the position met general approval except perhaps the attempt to occupy the houses of the little hamlet of Forch at the extreme salient of the position, at the point of the ridge which slopes both ways back from the road. These buildings were so exposed to the fire of the enemy's artillery that they would have become untenable before the infantry of the enemy could reach the dangerous zone.

To the southeast of Forch the ground rises gently for a distance of about 600 meters to the edge of a wood which afforded a good screen for the deployment of the attacking force.

The outposts of the defense completely screened the position, but of course there was no doubt as to the position chosen by the defense. A dense fog completely enveloped that part of the country until about 7 o'clock, and many little outpost actions occurred between patrols and small parties trying to feel their way through the darkness, and the main body of the seventh division advanced very cautiously. By 7.30 two batteries were in position near the edge of the wood and the advance guard had driven in all the outposts on the front, and one regiment was fairly engaged on the right but it could do no more than hold the ground it occupied.

Colonel Hungerbühler, whose division had been strengthened by two light batteries taken from the sixth division, massed all his artillery on the ridge to the southeast of Forch except one battery on a ridge to the right, marked 583 on the map, to the east of the hill, and after fairly reconnoitering the position he reported to the maneuver director that, with a force practically only equal to that of the defense, he regarded the position impregnable to an infantry assault.

While not disputing his conclusions he was, however, directed to make the attempt as affording a beautiful illustration of the attack formations. He massed his infantry on the front in the woods behind the artillery, and prepared the way for the assault by a heavy artillery fire, then the infantry in successive lines, very slightly extended, moved forward, captured the town and advanced to the first line of earthworks, met by heavy artillery fire as the reserves were brought into action, when the "cease firing" was sounded at 9.45 a. m.

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The attack was made much sooner than it would have been in real war, if made at all, by reason of the fact that the troops had been worked very hard and it was desired to give them a little rest before they began their march for Zürich.

In all operations of division against division there have been many things to criticize from a tactical standpoint. The troops have not taken advantage of cover to the extent they certainly would under fire; they often fired kneeling when they might have lain down; they crossed exposed places at quick time under a fire that would have annihilated them; generally advanced in dense lines instead of extended order with supports and reserves following them and reenforcing them; and often approached to within 100 meters of each other in such formation as could not live under the opposing fire.

The following order was given for the bivouac of the troops, from which they were dispersed in the afternoon, the third corps (except the rifle battalions) going to Zürich.

The rifle battalions went to Uster, where they awaited the assembling of the combined or maneuver division, to which they were joined for the operations of the 17th and 18th.

MANEUVER OF THE THIRD ARMY CORPS, 1900—BIVOUAC ORDER.

FORCH, *September 15, 10 a. m.*

1. The troops of the third army corps unite, except the sixth and seventh rifle battalions, which will march toward Uster, where they will be at the disposal of the commander of the maneuver division. Colonel Schlatter.

2. The troops of the third army corps go into bivouac at noon, where they may cook and eat.

The sixth division is along the road Egg-Zumikon-Zürich, in front of the northwest entrance of Zumikon.

The seventh division is on the same road in front of the southeast entrance of Zumikon.

The cavalry brigade is at Gössikon (northern side).

The corps artillery is at Ober Hub.

The corps park is at Gössikon (south side).

3. The order for dispersion for the evening will be given at noon at Forch.

HEADQUARTERS OF THE THIRD ARMY CORPS:

H. BLEULER,
Director of the Maneuvers.

CRITIQUE.

Soon after noon the call sounded for the assembling of those officers authorized to be present at the critique. Unfortunately for me it was all in German, of which I know nothing,

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and no complete report of it has been published anywhere. From what I could gather of it, it extended to the entire three days of maneuvers of division against division. It consumed more than an hour's time. According to Colonel Bleuler, the first day, the 13th, had resulted to the advantage of the seventh division (Colonel Hungerbühler), since the sixth division had not succeeded in dislodging it from the plateau of Wernetshausen. This same day the mobility and endurance of both divisions was demonstrated, the seventh division having marched about 36 kilometers this day before reaching Hinwil, while the sixth division, though it marched a less length of time, maintained a rate of 6 kilometers per hour. For the 14th Colonel Hungerbühler attributed the surprise of the thirteenth brigade (Colonel Steinlin) principally to the fact that the troops had been cantoned at the feet of the heights to avoid the hard bivouac on the plateau of Wernetshausen. Colonel Bleuler did not admit the soundness of this explanation, holding that the reassembling at Hinwil should have been better covered, and that, besides, tactical exigencies should prevail over other considerations. The situation of the seventh division (Colonel Hungerbühler) had become the more critical because the left column of the sixth division, making the flank movement through Ringwyl, had succeeded in bringing up its four light batteries which would have finished the defeat of the seventh division if the action had not been interrupted. There were other criticisms, but I succeeded in getting no clear understanding of them from those who understood them.

The troops were marched from their bivouacs into Zürich during the afternoon, where they were quartered until early Monday morning. The conduct of the men was superb; during this time there were no disorders of any kind and the city was as quiet as at ordinary times except for the presence of uniformed officers and men on the streets, yet from Saturday afternoon until Monday morning there were over 25,000 soldiers quartered in the city.

SUNDAY, SEPTEMBER 16.

This day, being the third Sunday in September, is set apart as a day of national thanksgiving, like the thanksgiving day in the United States, and all military operations were suspended until after 6 o'clock p. m., when the outposts were

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established preparatory to the maneuvers of the army corps against the combined division.

MONDAY, SEPTEMBER 17.

On this day really began the maneuvers of the army corps against the combined division, for which the following orders were issued:

MANEUVER OF THE THIRD ARMY CORPS AGAINST A COMBINED DIVISION, SEPTEMBER 16 TO 18, 1900.—ORDER OF THE DIRECTOR OF MANEUVERS.

1. The staff of the director of the maneuvers begins its duties on September 15, in the afternoon, at Uster.

Chief of the staff:
Colonel in the General Staff Wildbolz.
First general staff officer:
Lieutenant Colonel in the General Staff Brüderlein.
Second general staff officer:
Captain in the General Staff Zeerleder.
First aid-de-camp:
Major of Intantry Brack.
Second aid-de-camp:
Lieutenant of Cavalry La Roche.
Attached:
One officer of administration (quartermaster).
One veterinary surgeon.
One secretary of the staff (staff clerk).
One detachment of cavalry.
One detachment of bicyclists.

2. The maneuvers will be participated in by the troops of the third army corps (except the nineteenth landwehr infantry brigade and the war [pontoon] bridge section 3), who are going through their repetition course under the command of Colonel Corps Commander Bleuler, and by a combined division commanded by Colonel Schlatter, the ordre-de-bataille of which is herewith inclosed.

After the critiques on the maneuvers of the third army corps have taken place on September 15, all the troops will be under the command of the maneuver director and remain thereunder until the end of the exercises on September 18.

3. The following general idea is admitted:

A Western army has retired before an Eastern army from the northeast part of Switzerland toward Zürich, beyond the Glatt (river).

The Eastern army has pursued to the Töss.

4. Hostilities between the two sides begin on September 16 at 6 o'clock p. m. and will continue till the termination of the fight on September 18.

If one side intends to make an attack with more than one company between 6 o'clock in the evening and 5 o'clock the next morning, it must immediately inform the maneuver director by telegraph.

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5. As soon as possible after learning the general idea, both sides must furnish one copy of their orders to the maneuver director.

These orders will be reproduced and delivered to the neutrals by the maneuver director.

6. The same officers are designated umpires who have already acted in this capacity during the maneuvers of the third army corps.

Officers assigned to the maneuver director will cease to act as umpires.

7. The following distinctive signs will be used during the maneuvers from September 16 to 18.

The director of the maneuvers and his staff wear red and white arm bands and képi (hat), and are followed by the red flag with white cross.

The maneuver division, white ribbon around the képi.

The other officers and functionaries wear the same signs as ordered for the third army corps.

The maneuver will be discussed by the director only once, at the end of the exercises on September 18.

This conference must be attended by the commanders of the two armies (third army corps and combined division), by the division, brigade, and regimental commanders with their general staff officers and aids-de-camp, and by the commanders of the artillery division, of the battalions, the engineer half battalions, and of the division hospitals.

The headquarters of the maneuver director from September 15 to 18 are at Uster.

COLONEL FAHRLÄNDER,
Commander of the Second Army Corps,
Director of the Maneuvers.

WINTERTHUR, *September, 1900.*

INITIAL SITUATION FOR THE WESTERN ARMY (THIRD ARMY CORPS).

1. The Eastern army has crossed the Töss on September 16 and stands with strong forces on the plateau of Brütten-Kyburg-Weisslingen.

Its advance guards seem to be advanced to the foot of these heights.

2. The Western army stands on the hills at Adlisberg, Geissberg, Käferberg, and Guberist.

Its outpost line stretches from the Greifen See along the Glatt through Glattbrugg-Rümlang to the Lägern.

Having received reenforcements, it intends to resume the attack on September 17.

3. The third army corps forms the right wing of the Western army, and is camped on September 16 on and behind the Geissberg and Adlisberg (also in Ebnatingen, Zumikon, and Zollikon).

Its outposts are placed along the Glatt, from Greifensee to Dübendorf inclusive. They join at Neugut with the outposts of the center.

4. To the south of the Greifen See an independent combined detachment covers the right flank of the Western army (supposed).

At the close of the exercises on September 15 the third army corps will take positions corresponding to its initial situation, also taking into consideration its outposts, which must be placed in the evening of September 16.

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The outpost and information service begins at 6 o'clock p. m. of September 16, when hostilities begin.

The orders for the army commander for September 17 are to be expected on the 16th.

COLONEL FAHRLÄNDER,
Director of the Maneuvers.

INITIAL SITUATION FOR THE EASTERN ARMY (MANEUVER DIVISION).

1. The Western army has retired into a position which extends from the Adlisberg over the Geissberg, the Käferberg, and the Guberist.

2. The Eastern army has crossed the Töss line on September 16. It camps with its main forces on the evening of that day on the plateau of Brütten-Kyburg-Weisslingen-Russikon.

Its outposts extend along the line Winkel, Basserdorf, Tagelschwangen, and at the Kempt to the Pfäffiker Lake.

3. The maneuver division—the left wing of this army—has crossed the Töss near Zell-Turbenthal and passes the night in the region of Ober Illnau-Weisslingen-Madetschwyl-Hittnau-Irgenhausen-Pfäffikon.

Its outposts are pushed forward to the Kempt line and Pfäffiker Lake and join those of the center of the army near Thalmühle.

4. In the district to the south of the Pfäffiker and Greifen lakes an independent cavalry division (supposed) of the Eastern army is operating.

The maneuver division will take positions corresponding to its initial situation during the day of September 16.

With commencement of hostilities at 6 o'clock in the evening of September 16 the outpost and scout service begin.

(The orders of the army commander for the 17th are to be expected during the day of September 16.)

COLONEL FAHRLÄNDER,
Director of the Maneuvers.

ORDER FOR THE WESTERN ARMY, THIRD ARMY CORPS, FOR SEPTEMBER 17.

1. Nothing new about the enemy.

2. The reenforced Western army takes the offensive on September 17, the center in the direction of Winterthur and the left wing in the direction of Neftenbach.

The right wing—the third army corps—advances by the south of the Schwamendingen-Brütisellen road (leaving the road itself at the disposal of the center) in the direction of Russikon-Zell.

The army reserve follows the center for the time being.

3. The advance guards of the center army will cross the outpost lines at 8.30 a. m.

4. The combined detachment (supposed) covers the right wing of the army at the south of the Greifen See.

5. The third army corps, in accordance with the general idea, has at its disposal all the trains and the reserve provisions.

COLONEL FAHRLÄNDER,
Director of the Maneuvers.

USTER, *September 16, 1900.*

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ORDER FOR THE EASTERN ARMY, MANEUVER DIVISION, FOR SEPTEMBER 17.

1. Nothing new about the enemy.

2. The Eastern army continues its attack to-morrow, September 17, against the Western army near Zürich.

The right wing of the army advances (via Oberhasli–Rümlang) toward the Gubrist, and the center (via Kloten–Basserdorf–Tagelschwangen) toward the Käferberg, Oerlikon, and the Geissberg (679).

The left wing—the maneuver division—attacks the Adlisberg.

The army reserve follows the center.

3. All the advance guards will cross the outpost lines at 7 a. m.

4. The cavalry division (supposed) tries to advance toward Forch at the south of the lakes of Pfäffiker and Greifen.

5. The maneuver division (according to the general idea) has at its disposal all the trains and the reserve provisions.

COLONEL FAHRLÄNDER,
Director of the Maneuvers.

USTER, *September 16, 1900.*

ORDER TO ASSEMBLE FOR SEPTEMBER 17.

THIRD ARMY CORPS,
ZÜRICH, *September 16, 1900, 7 p. m.*

Troops: The third army corps, as per ordre-de-bataille already given.

1. Nothing new about the enemy.

2. The reenforced Western army takes the offensive, with its center in the direction of Winterthur and with the left wing in the direction of Neftenbach.

The right wing—the third army corps—advances south of the road Schwamendingen–Brütisellen (the road remains at the disposal of the center), in the direction Russikon–Zell.

The advance guards of the entire army cross the outpost lines at 8.30 a. m. The combined detachment (supposed) covers, at the south of the Greifen See, the right wing of the army.

3. The third army corps stands, in the morning of September 17, at 8 o'clock, ready to start across the Glatt under the protection of outposts.

(*a*) The cavalry brigade protects the assembly by crossing the Glatt at 6 o'clock a. m., and acting under special orders.

(*b*) The sixth division will assemble ready to march in two groups, at 8 o'clock, to the south of the village of Fällanden.

The principal group is on the left. There is a group to the right—a detachment of all arms, with a strength of four battalions. The points of the advance guards are at the bridges of Schwerzenbach (the permanent bridge and one made by the troops). The division will march to the assembling points on the road Wytikon–Fällanden and also on convenient passages at the east of this road.

(*c*) The seventh division assembles at the same time to the southwest of Dübendorf in two groups—at the right the chief group, and at the left one regiment and one detachment of guides. The points of the advance guards are placed at the upper and the middle bridges of Dübendorf.

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It leaves the road of Schwamendingen free, and marches to the assembling points on the roads via Gockhausen to Stettbach.

(*d*) The corps artillery will be, at 8 o'clock a. m., in march column at Pfaffhausen, the point at the south of the assembling points of the infantry of the sixth division.

(*e*) The corps park will be, at 10 a. m., at Wytikon in park and await further orders.

(*f*) The telegraph company will be given special instructions.

4. The issue of rations will take place at 8 a. m. for the sixth division at the Tiefenbrunnen station, and for the seventh division and the corps troops at the freight station. Whereupon the provision column will join the baggage columns, which are assembled at 8 o'clock a. m.; those of the sixth division at Wytikon behind the corps park, and those of the seventh division and of the corps troops near Kreuzstrasse–Oberstrass.

The united columns await further orders there.

I shall ride through Fluntern–Tobelhof–Gockhausen, to Wyl, where the distribution of orders for the advance will take place at 7.30 a. m.

BLEULER.
Commander of the Third Army Corps.

I do not find among the orders furnished me the order of Colonel Schlatter for the assembling of the maneuver division, and I am persuaded that I never received it. As I understand the idea, the left wing of this Eastern army, which is the maneuver division, has crossed the Töss at Zell and Turbenthal and passed the night of the 16th–17th in the country Ober Illnau–Weisslingen–Madetschwyl–Hittnau–Irgenhausen–Pfäffikon, its outposts along the Kempt from Thalmühle to the lake of Pfäffiker.

The division advanced in two columns: The right column, Colonel Stiffler in command, with the fifteenth infantry brigade, guide company No. 12, the twelfth regiment of artillery, and the half battalion of engineers No. 4, by Weisslingen, Unter Illnau, Kindhausen, against Gfenn. The left column, Colonel Leupold in command, composed of the eighth brigade of infantry, a detachment of dragoons, and the detachment of position artillery No. 5, marches from Russikon via Fehraltorf and Gutenschwyl against Hegnau and Fällanden. The cavalry brigade covers the advance, and the march is continued to the line Stigenhof–Hegnau–Homberg, before the order of battle is taken.

A dense fog enveloped the whole theater until about 9 o'clock, when it suddenly lifted. The foreign officers were at Schwerzenbach when the first outpost action began about 8.30.

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The third army corps crossed the Glatt in two places and the sixth division marched from Fällanden on Schwerzenbach–Hegnau.

The seventh division marched from Dübendorf via Wangen on Bütenholz.

The maneuver division took position with its position artillery on the height south of Volketswyl, two batteries field artillery south of Hegnau and four batteries on the high ground just north of the road Hegnau–Gfenn, the infantry on the line Hegnau–Isikon. Parts of the sixth division made two impulsive attacks from the village of Schwerzenbach. Not being supported they were both unsuccessful and the division was forced back, pursued by the infantry of the maneuver division which appeared to gain ground almost to the village of Gfenn. About this time, 11.30 a. m., the seventh division, which had been sent across the marsh toward Bielenhof, appeared on the right flank of the maneuver division, having passed to the north under the cover of the woods, which rendered the position untenable. Having been outflanked on the north, the troops that had pushed out toward Gfenn were hastily recalled and the whole force retired via Fehraltorf on the strong defensive position Russikon–Rümlikon. The pursuit was delayed some time, thus giving the maneuver division time to pull itself together when the entire line was pushed forward, keeping contact in some form until Fehraltorf was reached, when, at 1.30, the maneuvers for the day were suspended.

This flank movement of the seventh division brought its infantry on the flank of the batteries posted on the hill marked 469, having come in from Kindhausen and Isikon.

Just about this time two batteries from the seventh division came into action from a hill east of Wangen. The frontal attacks by the sixth division across the open fields gave to me rather the impression of demonstration to engage the enemy's attention while the seventh division completed its flank movement, and was probably so intended by the corps commander, but they were carried so far that they must have resulted in terrible losses and consequent demoralization. This is apt to be the result when a feint is made with any but the most thoroughly trained and disciplined troops.

During the operations of the day the following hypothetical advice was furnished the commanders of the troops to aid

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them in determining their actions. In the course of this day, September 17, 1900, the following communications and orders were given to the sides.

1. GFENN, *September 17, 10 a. m.*

COLONEL BLEULER,

Commander of the Third Army Corps.

The attack of the left wing of the Western army progresses favorably.

The second army corps (supposed) acting at the left of the third army corps, advances from Wangen-Baltenschwyl toward Ottikon-Ober Illnau.

THE DIRECTOR OF THE MANEUVERS.

2. TO THE NORTHEAST OF VOLKETSCHWYL,
September 17, 1900, 2 p. m.

The Eastern army has retired on the plateau of Brütten, Kyburg, and Weisslingen and has settled there.

The Western army will resume the attack on the whole line to-morrow. The third army corps must take possession of the passages leading from Russikon to Turbenthal-Zell, in order to threaten the hostile line of retreat in the direction Aadorf-Elgg.

On the left the third army corps finds for support the right wing of the second army corps, which is advancing via Illnau toward Weisslingen.

The combined detachment at the extreme right wing of the Western army has driven back an opposite hostile cavalry division and is advancing via Wetzikon in the direction of Bauma.

THE DIRECTOR OF THE MANEUVERS.

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1. USTER, *September 17, 1900, 5.30 a. m.*

COLONEL DIVISIONNAIRE SCHLATTER,

Commander of the Maneuver Division.

The enemy is preparing the crossing of the Glatt on the line Dübendorf-Greifensee. It is in the highest interest of the Eastern army to oppose vigorously this crossing.

THE DIRECTOR OF THE MANEUVERS.

2. AT THE NORTHERN SIDE OF VOLKETSCHWYL,
September 17, 2 p. m.

The Eastern army has been driven back on the plateau of Brütten, Kyburg and Weisslingen, which it is preparing for defense and where it expects the hostile attack.

The maneuver division must prevent the further advance of the Western army against our left wing, by using its whole force and also its heavy artillery, and it will, by holding securely the line Russikon-Zell, protect the communications in our rear.

The East cavalry division, acting on the left wing of the army, will cover the roads at the south of the Pfäffiker Lake, which lead into the Tössthal.

COLONEL FAHRLÄNDER,
Director of the Maneuver.

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THURSDAY, SEPTEMBER 18.

In the afternoon of the 17th the maneuver division halted in its retrograde movement and began its preparation for the defense of the position Russikon–Rümlikon, and published the following orders:

RUSSIKON, *September 17, 1900, 6.30 p. m.*

MANEUVER DIVISION, 1900, DIVISION ORDER NO. 6, ORDER OF OCCUPATION FOR SEPTEMBER 18.

1. The enemy has followed with small forces as far as Kempt.

2. The maneuver division arranges a defensive position near Russikon on the evening of the 17th.

(*a*) The left part, Commander Colonel of Brigade Leupold, will be occupied from the Russikon–Fehraltorf road as far as Wylhof by the entire position artillery and the eighth infantry brigade and the latter will take an assembling position to the east of Russikon at daybreak.

(*b*) The right part, Commander Colonel of Brigade Stiffler, will be occupied from the Russikon–Fehraltorf road to the west of the (letter) F of Fartbühl, by field artillery regiment No. 12, the fifteenth infantry brigade and engineer half battalion No. 4. The latter will establish wire entanglements and barricades at the edge of the forests.

The fifteenth infantry brigade will be in assembling position behind the right wing at daybreak.

The telegraph company unites the right and the left wing of the defensive position, also Fehraltorf (southeast extremity) with Russikon (near the parsonage). The line Fehraltorf–Russikon will be established this evening, the two others by to-morrow at 5 o'clock.

Both artilleries have to establish gun-pits; the infantry, trenches according to directions given by the commanders of the two sides.

Engineer half battalion No. 4 occupies, after finishing the work, the southeastern part of Russikon and prepares it also for defense.

3. The ammunition echelons have to go back at daybreak as far as Madetschwyl. All the wagons of the ammunition and baggage columns must be united by brigades and regiments and will be sent back at 4.30 in the morning via Madetschwyl–Gründisan–Humbel, to Unter Hittnau.

The train officer of the division will give the necessary orders there and lead the united column to Pfäffikon, where the issue of rations will take place at 10 o'clock.

Immediately after the fight has stopped, the troops will have to send the necessary orders to their respective trains (ammunition train in Madetschwyl, H. and P. and baggage train in Pfäffikon).

For the trains of infantry regiment No. 29 and battalion No. 90 special orders will be given to the commander of the fifteenth infantry regiment.

4. Information must be addressed to the church at Russikon.

COLONEL SCHLATTER.
Commander of the Maneuver Division.

All the position artillery was placed together on the extreme left, having a complete command of the country from Russi-

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kon–Fehraltorf road to the Pfäffiker Lake, from which position it might easily hold in check any force sent against that flank. It was supported by the eighth infantry brigade in rear of Russikon, where it also formed the general reserve. On the right was the field artillery—three batteries near Blatten and three batteries on the extreme right, and the fifteenth infantry brigade, the line extending to Rümlikon. Shelter trenches had been constructed for the infantry along the entire front, with gun-pits for the artillery, and in the edge of the woods wire entanglements, and barricades, calculated to delay the advance of the attacking forces, had been placed.

Colonel Bleuler prepared to continue the advance with the sixth division on the right at Freudwyl, with one battalion at Wermatschwyl, and the seventh division to the east of Gutenschwyl between the town and the woods.

The formation was made pursuant to the following order:

ORDER TO ASSEMBLE FOR SEPTEMBER 18, 1900.

THIRD ARMY CORPS,
GFENN, *September 17, 1900, 5.30 p. m.*

1. The hostile army has retired on the plateau of Brütten, Kyburg, and Weisslingen and has settled there. Detachments are standing in front of us on the other side of the Kemptbach.

2. Our army resumes the attack to-morrow along the whole line.

The third army corps must take possession of the passages leading from Russikon to Turbenthal–Zell and subsequently threaten the enemy's line of retreat in the direction of Adorf–Elgg.

On the left the third army corps finds support from the right wing of the second army corps, which advances via Illnau toward Weisslingen. The combined detachment at our extreme right wing has driven back an opposite hostile cavalry division and advances via Wetzikon in the direction of Bauma.

3. The cavalry brigade, which since yesterday has had patrols near the enemy, will advance to-morrow at 4.30 a. m. via Kepten in the direction of Ober Hittnau against the right flank and the communications of the enemy, following special orders.

4. The third army corps will stand to-morrow at 4.30 a. m. in assembling position (under the protection of the outposts), as follows:

(*a*) The seventh division at the village Freudwyl, eastern side; one battalion at Wermatschwyl.

(*b*) The seventh division at the east of Gutenschwyl, between the village and the forest; one battalion at the northwest of the village before the corps artillery.

(*c*) The corps artillery in the depression to the west of Gutenschwyl.

5. The divisions must provide for ammunition supplies this evening at the corps park at Gfenn.

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The artillery must provide for ammunition supplies this evening at the corps park at Gfenn.

The artillery will divide its ammunition equally among the batteries. The corps park will be to the east of Dübendorf to-morrow at 8 o'clock a. m., ready to advance, and await further orders.

6. The telegraph company will act according to special instructions.

7. The issue of rations will take place to-morrow at 9 o'clock a. m. at Nänikon for the sixth division, for guide company 11, and for the cavalry brigade; at Dübendorf for the seventh division, the corps artillery, the corps park, and the telegraph company.

The baggage columns will park to-morrow after 7 a. m. at Nänikon (sixth division, guide company 11, and the third cavalry brigade), and at Dübendorf (seventh division, corps artillery, corps park, and telegraph company), and there await further orders.

8. I shall ride early to-morrow morning from Gfenn on the road toward Gutenschwyl, where the distribution of orders will take place at 4.30 a. m. at the northern side of the village where the roads cross.

BLEULER,
Commander of the Third Army Corps.

It had rained quite hard during the night and most of the troops were sheltered in cantonments, except the outposts, but all assembled and were at their places before daylight. As usual the entire theater was enveloped in a dense fog that did not lift until nearly 9 o'clock.

At about 5.30 the third corps began its advance, the sixth division in the direction of Fehraltorf—Russikon on the right and the seventh division via Unter Illnau on Rümlikon. Five battalions of the seventh division were held in reserve at Gutenschwyl. In the beginning all the corps artillery, 14 batteries, was massed on the hills from Ruti to Lupmen and cannonaded the position until about 7 o'clock. The fog would have prevented very much damage. The four batteries belonging to the seventh division were then withdrawn and moved with that division across the Kempt and were eventually placed on the hill between Horben and Rümlikon, where they played an important part in the attack on that flank. About 7.15 the advance guard of the sixth division sieged Fehraltorf after driving in the advance posts of the East army, but it could not advance until the seventh division got into position. About 8.15 the deployment of the seventh division began under the fire of the artillery of the defense, but it was 9.25 before the artillery near Horben came into action and began the preparation for the infantry assault. This assault was the chief feature of the action, and was made

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very much as was the hopeless one at Forch on Saturday, with not much better chance of success.

At 9.40 the infantry of the division moved forward through Rümlikon. The assault was made in several lines (I did not note the number). After passing to within short range magazine fire was delivered for some minutes while the lines in rear closed up. It was up a practically smooth incline without shelter and exposed to a withering infantry and artillery fire at distances varying from 500 to 750 meters. That part of the line was defended specially by four battalions of infantry and the three batteries before mentioned.

I may add that before the deployment began two of the batteries first brought into position by the attacking force were put out of action by the judges for having come into action under the fire of infantry and artillery that could have annihilated them, having only two against three of the defense. When this assault was fairly developed, at 9.53, Colonel Fahrländer caused the "cease fire" to be sounded, which brought an end to the hostile operations.

Let us now go back to the sixth division, which we left in and to the rear of Fehraltorf. Soon after 8 o'clock the division commenced its deployment, extending its line to the right behind the railroad. For this purpose it drew one regiment from the reserve, and most of the troops moved behind the woods and advanced in the open to the railroad, though some of the infantry, having moved behind the hills Rüti–Lupmen, on which the artillery was located, marched to the right in close order under the fire of the siege artillery. This movement could only have succeeded under cover of darkness, or after silencing the greater part of the 40 siege guns in position on the left. The troops had not completed the deployment when the "cease firing" sounded.

Soon after the cessation of hostilities the combined division was scattered, each unit going to its own rendezvous, some to be dismissed, having completed their regular cours de répétition, and others to begin this course, before being dismissed to their homes. The third corps was moved during the afternoon to cantonments in the vicinity of Wallisellen for the inspection and review set for the 19th.

There was also held, on the field near Russikon, a critique of the last two days' operations, all in German. To my surprise I do not find that any of the newspapers have published even a synopsis of it.

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I could not learn that it severely condemned any of the movements, and it left as undecided the action of the last day.

WEDNESDAY, SEPTEMBER 19.

The foreign officers, all in full dress, joined Colonel Müller with his staff, also all in full dress, at Wallisellen station a few minutes before 9 o'clock, and as we drove onto the field at 9 o'clock the entire formation was complete. A heavy rain of the night before had washed the foliage and the grass clean, and about this time the sun came out and the country presented a beautiful aspect at the ceremony closing the maneuvers for 1900.

The ride around the troops was at once begun, but I regret that I was physically incapable of continuing the entire way round. I had to fall out and joined the procession again just before reaching the reviewing stand. The march past began promptly after our arrival at 9.45 and was completed without a single hitch at 10.37, thus passing the entire army corps of 25,000 men by the reviewing stand in fifty-two minutes. The infantry passed, closed in mass, half company fronts, the artillery in battery front, the cavalry in squadron front, the last two arms at the trot. The infantry carried the rifles slung on the right shoulder, and carried their complete equipment, weighing about 60 pounds. Only commanding officers saluted, and only the corps commander joined the reviewing officer. Each regiment was preceded by its band, which wheeled out of the column and played until replaced by the next, no others playing within hearing. The marching of all arms was excellent, keeping lines and distances remarkably well. The lieutenants commanding half companies were on the right and acted as guides for their commands.

The cycle company was united and appeared well at the head of the column, each walking by his wheel.

After the review the Federal officials, including the President, the foreign officers, and a large number of higher officers and their staffs, were entertained by the Canton of Zürich at a luncheon spread under canvas directly in rear of the reviewing stand, and the maneuvers of the third army corps were given a happy ending. The troops proceeded, each organization to its own rendezvous, and were dismissed to their homes as rapidly as transportation could be provided. I saw in one of the daily papers that Colonel Bleuler had reported that the scheme for the dispersion of the troops had been carried out without a hitch.

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I remained at Zürich over night and returned to Berne the next day.

GENERAL REMARKS.

Notwithstanding tactical defects, some of which I have noted, especially the failure to take advantage of cover, and advancing in closed lines, and sometimes in masses exposed to artillery and infantry fire, the maneuvers of the third army corps may well be regarded as a decided success and indicate a remarkable degree of proficiency, considering that all the forces, aggregating between thirty-eight and forty thousand men, are militia who, at the conclusion of the maneuvers, returned to their civil occupations. Much that I observed struck me with astonishment, though I was prepared to see good work, and induces the suggestion that there is much in the military system of Switzerland that might find application in the reorganization of the national guards of our own country, at least to the organization and training of the militia, which must continue to constitute our great reserve force in time of need. An army of 150,000 men, completely organized, armed, and equipped, is maintained ready for immediate service along defensive lines, with all the enlisted strength under 30 years of age, at a minimum cost to the country. In the twenty-first year from six to eight weeks in the recruit schools, and an average of two weeks thereafter for the enlisted men, is not much time for the citizen to give in preparation for the defense of his country. At other times they pursue their ordinary civil occupations, in producing the wealth which supports them while employed in the military service. Moreover, it is an education for the country lads and tends to moral improvement, and strengthens their patriotism.

The officers give more time. They are selected after strong competitions in the schools without favor, and often become enthusiasts, devoting their leisure to the study of the profession. One of the most striking elements of superiority is to be found in the character and proficiency of the officers. Nothing is done for display, yet the military is very popular with all the people and they feel that upon the efficiency of this militia depends their national existence. Everything is for utility.

Discipline is excellent. During the entire time of the maneuvers I did not hear of a single case of disorder. Even from

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Saturday till Monday, when the entire third corps was quartered in Zürich, the city was as quiet and orderly as at other times.

All seemed to know their places and at no time did I notice the slightest confusion; everywhere was an air of business without display. The men always carried their packs and were marched hard, yet there was no straggling, and organizations were always well closed up. I do not recall that I saw at any time a single unit that occupied more than its allowed depth. The rifles are habitually carried slung on the right shoulder, and the men march usually in cadence with a long swinging step. Another thing especially attracted my attention, and that was the facility with which officers and men could read their maps. All officers and many enlisted men had maps of the theater of the maneuvers, and it was interesting to see patrols, detachment commanders, and messengers consulting their maps for their proper courses.

Map reading is taught in the schools, and in the recruit schools every recruit is required to demonstrate his proficiency in this important subject before he can be passed. Any found deficient are required to make up the deficiency by evening schools and extra instruction.

Bicycles were much used by patrols and scouts and for messenger service in the place of cavalry, which is expensive to maintain in Switzerland. The roads are generally good and favorable for cyclists.

In the route marches a cyclist marches with the captain and two or more with regimental or battalion commanders.

Though there were rains nearly every night, the health of the men was phenomenal. Few men received attention from the surgeons, and the hospitals were practically empty during the entire time. The men always appeared to be cheerful, though at times tired, and altogether the force had the air of an effective army.

I am persuaded that one thing above all others most conducive to this condition is that the officers are carefully selected without favor or influence, and are so imbued with military spirit that they keep it uppermost in their minds and lose no opportunity to add to their store of military information. They cheerfully abandon their civil occupations for the officers' schools where the competition is very great, and in all

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things endeavor so to conduct themselves as to win the confidence of their men.

The chief of the military department followed the entire maneuvers, and other members of the Federal Council were there during the last two or three days. The interest of the people was fairly illustrated by the thousands who followed the maneuvers. A great many officers, not on duty, were provided with cards and followed them in civilian dress.

I can not close this report without some acknowledgment of the extreme courtesy shown me by all the Swiss officials, civil and military, especially Colonel Müller, chief of the military department, the corps, division, and brigade commanders, and their staffs.

Colonel de Tscharner and Captain de Petrot, who were continually with us, and Captain Schwendimann and Lieutenant Tavel gave me much assistance, and through their courtesy, I was able to follow many operations which, owing to my inability to understand German, I could not otherwise have done. For their assistance and polite attention I am very grateful, and so expressed myself to them. During the entire time we were the guests of the Confederation, and right royal hosts are these Swiss people.

I heard nothing but commendation from my foreign associates and I am sure that all were pleased.

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