

The chassis is built throughout of steel; the sides, back, and front are steel channels, and the motor is contained in a stiff casing, over which are carried the driver's flooring and the liquid-fuel and cooling-water tanks. The motor works equally well with petrol or alcohol. The winch above referred to is placed directly beneath the driver's seat; it contains a toothed wheel, which can be driven by a pinion, by the action of a special clutch and gearing fitted in the top of the gear-case. The cable is guided by two small pulleys underneath the frame, one being below the winch-drum, and the other at the back of the rear axle.

There are two brakes—a clamp-brake which acts on a pulley forming part of the differential mechanism, and a shoe-brake on the rear wheels; the former is operated by a foot-lever, and the latter by a hand-wheel on the driver's right-hand side. The automobile weighs in working order 7 tons, and 12 tons with its complete load; it carries 40 gallons of petrol and 6.6 gallons of water—sufficient quantities for a run of 50 miles. A number of projectiles and cartridge-cases are placed in the after body of the automobile. Four ammunition wagons, to contain each about forty rounds, are to be dragged in addition to the guns, and the length of the whole battery train is only 65 yards. The ammunition carried and dragged by the motor gives 72 rounds per gun.—*Engineering*.



#### INJURIES TO THE CESAREVITCH

On August 10 at six o'clock in the morning, the Russian fleet under command of Rear-Admiral Witthoef, and sailing under orders from a higher authority, left Port Arthur to attempt to join the cruiser squadron at Vladivostock.

The sortie of the Russian fleet began with the sending forth of the mine removal division. For this purpose steamers joined together in pairs by steel cables were used. The mines, caught in the bight of such a cable, which did not explode at the impact or from the consequent shaking up, were dragged from the channel. The mine-grappling vessels were followed by the fleet in line-ahead the flagship *Cesarevitch* leading. The cruisers in this order, *Novik*, *Askold*, *Pallada*, *Diana*, and the torpedo boats, closed up with the battleships.

After the harbor had been cleared at 8 o'clock, the fleet steered in a southeast direction toward the Shantung Cape for about an hour, at a speed of 12 knots. Meanwhile the Japanese cruisers of the blockading fleet, closing in upon the enemy from port and starboard, came in touch with the Russians, while the torpedo boats running ahead dropped floating mines in the course. Because of this the Russians were obliged to proceed in a sinuous line, and their advance was consequently considerably retarded.

According to a description, four large and small cruisers were in touch with the Russians, both to starboard, near the head of the Russian line, and to port astern, while at a greater distance several other small cruisers were in sight when the main Japanese fleet appeared to port ahead about 11 A.M. For a short time a running fight at very long range (apparently not less than 8000 meters) took place.

The accounts of the second phase of the battle which now followed are entirely contradictory and confused. No conjectures need be made however as the action was practically without effect until after 1 P.M.

After the fleets had passed each other, the Russians steadily pursued the southeast course, while the Japanese, turning to port and swinging into the same direction, remained far behind—apparently 10 to 12 knots(?). The Russians, believing themselves able to outfoot the Japanese, because the boilers and engines of the latter had been strained by long service on blockade, now proceeded at full speed in order to escape. However, as early as 3 P.M. the Japanese had so far overhauled the Russians that they could renew the battle. As a matter of fact, the Japanese had only temporarily fallen back to allow a number of armored cruisers to reach the scene of action. These cruisers appeared between 2 and 3 o'clock, aft to port, and, with the Japanese battleships, began firing at excessively long range.

In the running fight that now developed, the Japanese steadily drew up on the Russians and concentrated their fire upon the leading vessel, which was repeatedly struck by shells of large caliber fired from the cruisers to port and the battleships to starboard, and at 3 P.M. had lost her commander and could no longer be steered.

At this point the heads of the two fleets were about on a line. At no time had the Japanese allowed the range to become less than six or seven thousand meters.

A 12-inch shell that struck the foremast had killed Admiral Witthoef, and a second, hitting the conning tower, either killed the members of the staff or rendered them unconscious. The rudder had jammed hard to port, so that the *Cesarevitch* circled to the left and thus sheered out of line to the lee of the firing.

Hereupon the *Retvisan*, the second in line, swung around without apparent reason and started toward the main Japanese fleet, which proceeded to meet the seeming attempt at ramming by a corresponding turn of eight points to port.

The breaking from the line by the *Retvisan* was the signal for the general dissolution of the same. After she had approached the Japanese line by some 1500 meters, she again swung to port, and circling around the *Cesarevitch*, laid her course for Port Arthur. The *Pobieda* followed her maneuver, while the three rearmost battleships, turning to starboard, had already taken the same direction.

The Japanese main fleet had meanwhile ceased firing, remained for a time motionless, and proceeded in a northeast direction without attempting further to molest the Russians flying toward Port Arthur.

And so, at the fall of darkness, the *Cesarevitch* alone remained at the scene of action, surrounded by Japanese torpedo boats. The original intention also to return to Port Arthur was given up, as the injuries received did not warrant even the chance of a second meeting with the main fleet of the enemy. It was determined to proceed toward the southeast and eventually force a passage single-handed to Vladivostok.

The repeated attempts by the Japanese to torpedo her during the night were successfully nullified by steaming at full speed. In consequence of the injured funnels, enormous quantities of coal were thereby consumed, the total amount used during the day being some 470 instead of 80 tons.

After the action the difficulties of navigation were greatly increased. The conning-tower compass had been shot to pieces. The remaining compasses are supposed to have become unreliable in consequence of the concussion incident to the explosions, and the vessel had to be steered by the

stars. By mere chance, daylight discovered the ship near the northeast Shantung Cape.

A determination of the injuries showed that in the estimation of the acting commander, Capt. Schoumoff, the ship was not sufficiently seaworthy to steam to Vladivostok. It was therefore decided to go to the nearby neutral port of Tsingtau, and this harbor was reached at 11 o'clock the same night. Among the serious injuries which were the cause of this determination, are mentioned :

1. The striking of the foot of the foremast by a 12-inch shell, which killed Admiral Witthoef, and whereby the support of the mast was so far shot away that the latter threatened to fall.

2. The injuries to the funnels whereby the coal consumption was increased so much that the fuel would have been insufficient to carry the vessel to Vladivostok.

3. A 12-inch shell hit on the starboard side under the forward 6-inch turret, below the waterline, which caused a small leak in the compartment in question.

According to the reports of the Russian officers the ship was struck by fifteen 12-inch and a greater number of shells of smaller caliber.

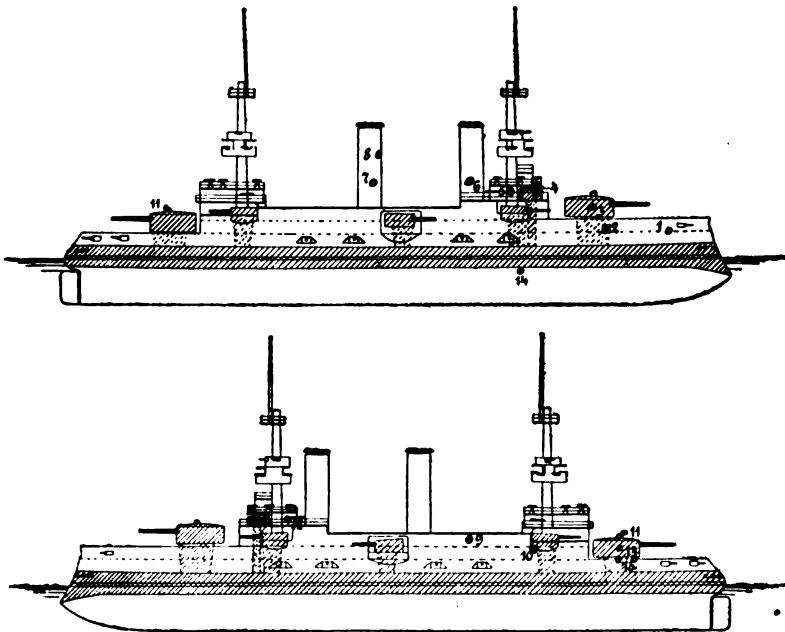


Fig. 1. Diagrams showing hits on starboard and port sides of the Cesarevitch.

Hit No. 1: A 12-inch shell forward on the starboard side at the level of the upper deck, striking the hogs-back of the bow anchor. The projectile tore a hole in the ship's side 2 x 2 meters, passed through the bow and sheet anchor chains, but hardly left a trace of its passage in the hold. Both anchors were lost.

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Hit No. 2: 12-inch shell on the starboard side, level with the upper deck, and just under the forward 12-inch turret. The shell tore a hole in the ship's side 1 x 1 meter, but did practically no damage in the interior.

Hit No. 3: 12-inch shell that struck the armor of the forward 12-inch turret. Ineffective.

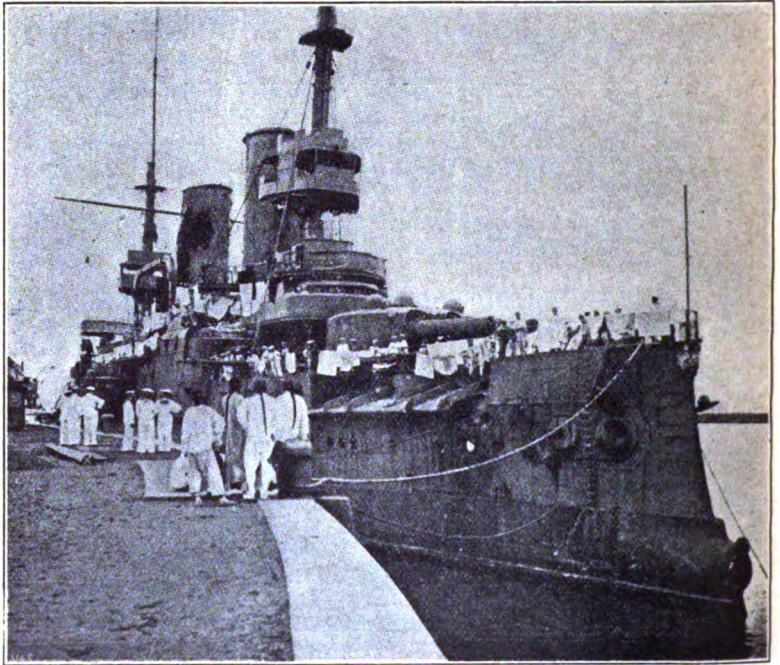


Fig. 2. Hit 1. Starboard Side.

Hit No. 4: 12-inch shell squarely striking the starboard side of the forward conning-tower. The path of the shell is shown in Fig. 3. Of the persons in the conning tower, the ship's navigator, a sub-lieutenant, the helmsman, and two or three orderlies were killed, their heads being blown off, while two officers were stunned. Through the falling bodies, the wheel was turned hard to port, the steering gear being uninjured. The compass was destroyed. The cables running along under the roof of the conning-tower were torn away and the mechanical connection with the engines destroyed. The head of the shell passed out of the tower in the direction of the arrow and buried itself in the hammock boxes that form the forward bridge rail, and here it was later found.

Hit No. 5: A 12-inch shell that squarely struck the foot of the foremast between the upper and lower bridges. The projectile pierced the starboard side of the mast and burst against the port side. Toward the bow the iron plates of the mast are entirely torn away. At the back only a connection between the two bridges remains, but this not strong enough to bear the weight of the heavy fighting mast. The latter actually rests on the upper bridge only, being joined to this by strong angle irons that were un-

injured. The searchlight cables in the mast were broken. The shot killed Admiral Witthoef, the fleet navigator and some fifteen men. The chief of staff, Admiral Matusewitch, and the commander, Capt. Ivanoff, were wounded. The officers were probably in the fire lee of the tower.

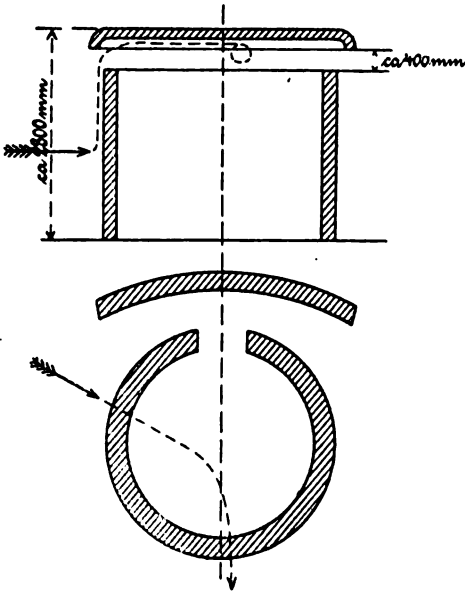


Fig. 3. Hit 4. Showing path of projectile.

Hit No. 6: A 12-inch shell squarely struck the lower part of the forward funnel. The shell pierced the starboard side and exploded against the port side which was torn to pieces.

Hits No. 7 and 8: Two 12-inch explosive shells injured the upper and lower parts of the rear funnel. They struck and exploded against the starboard side of the smokestack which was ripped up and torn from top to bottom. The port side shows no injury that can be traced to either of these shots.

Hit No. 9: Probably an 8-inch projectile fired from a cruiser. The shell pierced the portside wall of the superstructure below the launch. Several injuries resulted, among them the destruction of the bakery. The shell made a round hole about 1 meter in diameter.

Hit No. 10: Another 8-inch shell that pierced the port side of the forward lower edge of the rear 6-inch turret, leaving a hole 1 x 0.55 meter in the wall. The covering of the lower turret structure in the admiral's mess was torn away.

Hit No. 11: A 12-inch explosive shell struck the top of the after 12-inch turret near the sighting-hood. The top was slightly dented and some of the rivets of the angles joining the turret and the hood were driven in killing a man inside of the turret. The man inside of the sighting-hood was rendered unconscious for a short time only. Pieces from the bursting shell pierced the after chart room.

Hit No. 12: 12-inch explosive shell destroyed the forward chart room, abaft the foremast.

Hit No. 13: 12-inch explosive shell struck the after 12-inch turret on the port side. The shell probably burst at impact and did no damage.

Hit No. 14: Probably a 12-inch shell that struck some  $2\frac{1}{2}$  meters below the waterline, under the forward 6-inch turret, and under the armor belt. According to the reports of divers the projectile struck the joint of two of the outer skin plates. The plates, frames and supports are said to be dented and bent, but not torn, for a longitudinal distance of about  $3\frac{1}{2}$  meters. The covering-strap is supposed to have jarred off (see fig. 7) and about 150 tons of water allowed to enter the compartment behind the downward curved armor deck, through the rivet holes. The *Cesarevitch* entered the harbor with a barely perceptible list to starboard.

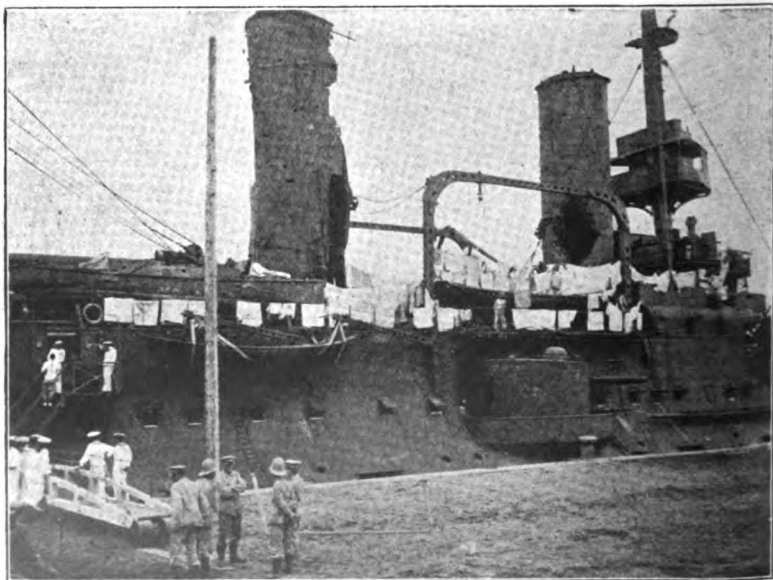


Fig. 4. Hit 6. Showing damage to the forward funnel.

Hit No. 15: A 12-inch explosive shell passed through the port after-deck railing and the upper deck. The bollard is half torn away. The teakwood covering of the upper deck is ripped up for about 4 square meters. The wood did not burn and the deck planking splintered little.

The following facts may be noted in respect to these injuries:

1. As but part of the Japanese shells pierced the sidewall or did barely perceptible damage in the interior of the vessel, we may conclude that they exploded too soon. However, in this respect, the shots that struck the foremast and the funnel differ very widely from most of those that struck the hull. Much may be considered due to the difference in the effect of a shell and an explosive shell. It will probably not be far from the truth to conclude that the Japanese used some "half-armor-piercing shells with bottom ignition."

2. In spite of the wooden deck and of the fact that all boats were on board the splintering effect was small.

3. The wooden decks did not catch fire as was the case in the Chino-Japanese war.

4. In no place was the armor pierced; all the vital parts lying underneath the upper armored deck were absolutely uninjured. Some pieces of the burst shell fell through the after funnel upon the boilers under it and damaged a few superheater pipes. The explanation of the ineffectiveness of the heaviest Japanese shells against the Russian armor may be found in the tremendously long range and the apparent non-use of armor-piercing projectiles.

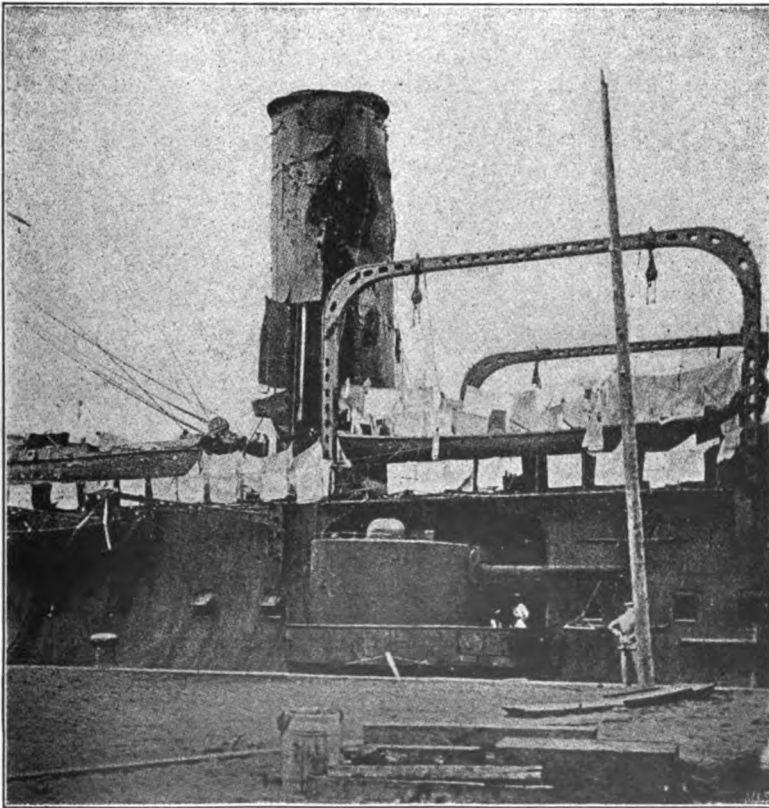


Fig. 5. Hits 7 and 8.

5. The hit below the starboard waterline under the forward 6-inch turret did not perforate the outer skin. The entrance of the water was due to the loosening of the rivets incident to the denting of the outer plates.

6. Both the fore and after 12-inch turrets were struck without injury to the revolving mechanism of the turret or the ammunition-serving apparatus of the guns. However, according to the statement of a German officer who

visited the *Cesarevitch*, the forward turret shows a large groove on the starboard side.

There is no reliable information at hand concerning the quantity of ammunition used by the Russians. According to one of the officers the lack of 12-inch shells—it appears 74 to 76 were fired from the forward turret and 40 to 45 from the rear turret—was one of the reasons for putting in to Tsingtau.\*

According to the report of the ship's doctor four officers and eight men were killed and fifty officers and men were wounded. Nothing detailed concerning the nature of the wounds is known. Stress is laid by all upon the terrible and deadly effect of the explosive shell. As long as 24 hours after the action many complained about deafness, dizziness, loss of memory and headaches without directly being injured. The hair and beards, and partly also the skin, of those who were in the neighborhood of a bursting explosive shell were colored an intense yellow. A similar discoloration shows on the ship at the points of the explosions.

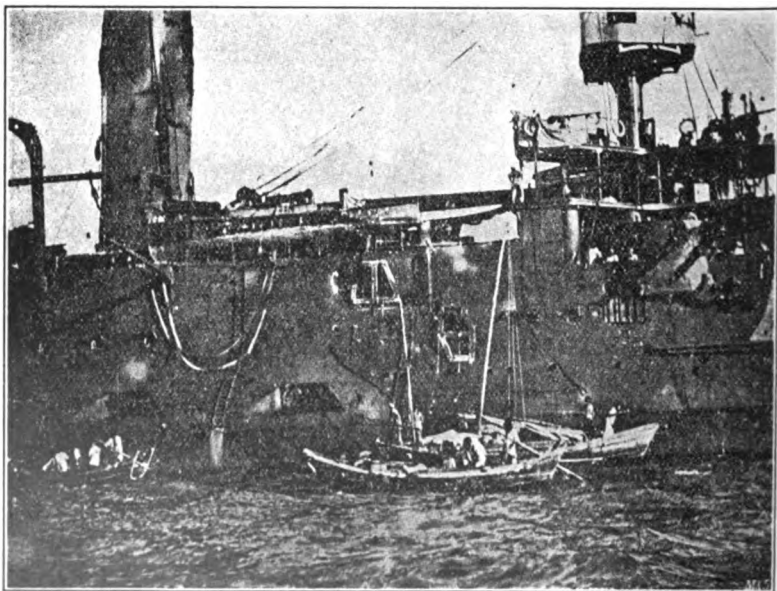


Fig. 6. Hits 9 and 10.

When we regard the actions of the two naval forces in this last battle, considering the enormous value which the control of the sea means to both belligerents, and when we understand what both sides risked and what they could have gained, many of the proceedings of the Russians as well as of the Japanese seem puzzling to us.

Without doubt, since the beginning of the war the Russian fleet has had very little confidence in its capability and its ability to use the weapons intrusted to it. Not only was confidence and tactical knowledge missing because of the lack of squadron training, but the use of the weapons was not understood. Up to the present no Russian torpedo boat has fired a torpedo.

\* It was afterward learned that 580 to 600 shots were fired from the 6-inch guns.



As stated by Russian officers, the boats were exclusively used for laying mines, for scout duty and to fight the Japanese torpedo boats. The uniform lack of success in the last was due to the fact that the Russian torpedo boats were neither accompanied nor backed up by larger and more powerful ships without which the Japanese boats never advanced. The Russians never seem to have thought of using the boats at night. It can therefore be understood why the Russian cruisers and torpedo boats were considered a hindering addition that had to be protected during the sortie of August 10, instead of an offensive instrument which could have done good service in preparing for the sortie as well as during the following night.

But the Japanese also were unable to use their torpedo boats properly. All Russian officers remark that the Japanese torpedo tactics lack nothing in dash, but that the weapon itself is not on a level with its capability. The comparatively insignificant result of the first torpedo attack of February 8 and 9 upon the unconscious Russian fleet lying at anchor in double formation in Port Arthur, seems to confirm this statement. The opportunity in this case could not have been more favorable for the Japanese, and still out of 23 torpedoes fired only 3, or 13 per cent., scored hits.

And so it is explainable that the *Cesarevitch* was able to escape from the torpedo boats surrounding her, during the night from the 10th to the 11th of August, although the opportunities for attacking the thoroughly battered vessel were excellent.

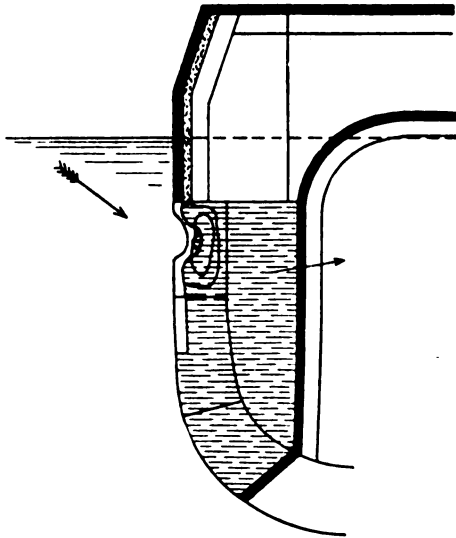


Fig. 7. Hit 14.

Judging from the information at hand we can understand the tactics of both participants in the action of August 10, with the exception of the last phase of all. By means of an exceptionally well organized scout service the Japanese cruisers were able to put their main fleet in touch with the Russians, within 3 hours of the latter's sortie. This maneuver was simplified because geographical necessities to a certain extent prescribed the Russian course. The great superiority of the Japanese in gunnery and in artillery

appliances induced them to give battle at extremely long range with the intention—which has been the Japanese policy throughout the entire naval proceedings of the war—to injure the enemy as much as possible with the least danger to themselves in order to remain strong enough to encounter the threatening Baltic fleet. If we consider this point we can understand why the Japanese were satisfied with driving back the Russian fleet to Port Arthur, and why they did not attempt its annihilation. This tactical proceeding of the Japanese was only made possible by the superiority in speed which enabled them to choose their own distance without being placed at a disadvantage in other matters.

Incomprehensible, on the other hand, is the course of the main Japanese fleet as soon as the enemy began to retreat to Port Arthur. But until the Japanese version of the action is obtainable it would be a waste of time to attempt to explain this point.

The marksmanship of the Japanese is regarded with undisguised wonder by the Russian officers. The range at which the Japanese had to score their hits is, according to Russian estimates, between 7000 and 8000 meters. We must not lose sight of the fact, however, that these are only estimates, for, as the Russian officers admit, the range-finders in use were not available for such distances. All the same, the marksmanship of the Japanese was excellent and far superior to that of the enemy, inasmuch as the Japanese possessed telescopic-sights which the Russians did not.

In criticising the Russian gunnery we must not forget that the fleet, bottled up in Port Arthur, had very little opportunity for practice. Thus, the *Cesarevitch* used her heavy guns for the first time during the war, in the action of August 10.

Nothing, in our estimation, can better prove the necessity for having a battleship backbone for a fleet, than the past occurrences of the war, and England has acted upon this belief with the foresight peculiar to her in naval matters. She has greatly increased the offensive and defensive characteristics of the battleships of the Lord Nelson class as compared to those of the King Edward class, and has sought to decrease the building of armored cruisers. After all has been said, the mastery of the sea, in spite of mines, torpedoes, and submarines, lies with the powerful and sufficiently speedy battleship. And so it will remain so long as the gun can hold its own as a long-range weapon with the torpedo, for "no one can get around the fact that where he wishes to rule, there he must strike."

— *Marine Rundschau*, November.



#### ARMAMENT OF CRUISERS.

The war has confirmed the oft-expressed expectation that long range must be the order in future engagements. In the few opportunities presented to Admiral Togo of engaging with his adversaries from Port Arthur, the distance between the combatants seems to have been not less than four miles, and as a consequence 6-inch guns were of comparatively little value. They no doubt succeeded in silencing some of the guns in the Russian ships, but this must be attributed in large part to the deficient protection of these quick-firing guns, especially in the cruisers. In the design of the Russian vessels, except in the case of the very latest, the desire has been to instal