THE JAPANESE NAVAL DISASTERS.

On March 5 we published a view of the Russian ships which had suffered disablement, or been totally lost, at that period of the Russo-Japanese war. It had been a matter of frequent comment during the course of the war, that in spite of the activity with which the Japanese are prosecuting their offensive operations, extending over a period of several months, they should have suffered the loss of not a single ship. This period of immunity could not last indefinitely, and two or three weeks ago, while one of the torpedo-boat divisions was engaged in the hazardous work of clearing the entrance to Kerr Bay of submarine mines, a torpedo boat was struck by one and was destroyed. Curious to relate, not many hours passed before a torpedo gunboat, the "Miyako," suffered a like fate. Then a few days later occurred what was without exaggeration, for Japan, an appalling disaster, when the "Kasuga," one of the two armored cruisers recently purchased from Chile, rammed and sank the fast protected cruiser "Yoshino," and the great battleship "Hatsuse" struck one of the floating mines, with which the Russians are supposed to have liberally sown the waters around the Liao-tung, and went to the bottom with a loss of more than half her crew of 750 men. Then following close upon this dual disaster came the destruction of the torpedo-boat destroyer "Akatsuki," with the loss of one officer and twenty-four men, during a reconnoissance off Port Arthur.

Now, the magnitude of this loss is not to be estimated by a mere statement of the total displacement that must now be stricken off from the list of protected ships. A total of 21,470 tons is, of course, a big deduction to make from the total of 238,000 tons of the Japanese effective navy; for it means a reduction of nine per cent. If, however, we take note of the character of the ships that were lost, it is not too much to say that the strength of the Japanese navy has been reduced fully fifteen per cent by this loss; for of the 21,470 tons, 15,000 tons represented battleship displacement, and for its actual fighting value, a ton of battleship displacement is worth at least a ton and a half of armored cruiser displacement, and from two to three tons of protected cruiser or gunboat displacement. By the loss of the "Hatsuse," the strength of the first line of battle of Japan has been cut down seventeen per cent, and this is a loss that can never be replaced while the war lasts. The loss of the swift protected cruiser "Yoshino" will be felt when it comes to a question of scouting, or the convoying of transports should the Vladivostock fleet venture out, or the Baltic fleet be dispatched to the Far East. The same may be said of the torpedo gunboat "Miyako," of 1,800 tons, whose speed of 20 knots rendered her valuable for scouting purposes.

The torpedo-boat destroyer "Akatsuki," disabled at Port Arthur, was one of the finest in the Japanese fleet, being a Yarrow boat of 385 tons displacement, 6,000 horse-power, 31 knots speed, and a complement of 55 officers and men. She carried two 18-inch torpedo tubes, and mounted one 3-inch 12-pounder and five 6-pounders.

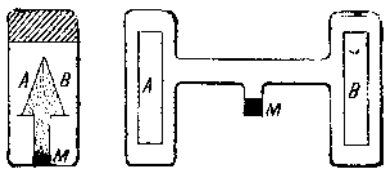
The torpedo boat lost in Kerr Bay was spoken of in the dispatches as No. 48. She was probably a first-class torpedo boat of about 130 tons displacement and 27 knots speed; but as the Japanese have thirty-eight first-class torpedo boats, her loss will not be so seriously felt as will the loss of the "Akatsuki," which was one of the best of the twenty destroyers owned by Japan.

The "Yoshino" was the earliest to be commissioned of the fleet of four very fast protected cruisers of from 4,150 to 4,760 tons displacement owned by the Japanese. She was built at Elswick in 1892; the other three vessels being the "Takasago," built by the same firm in 1897, the "Chitose," built at San Francisco in 1898, and the "Kasagi," built at Cramps in 1897. The fastest of this quartet is the "Takasago," which made 24 knots on trial, and the slowest of them the "Kasagi," which showed a speed of 22.6 knots. The "Yoshino," which was of 4,150 tons displacement, was protected by a steel deck 4½ inches thick on the slopes, and carried four 6-inch and eight 4.7-inch rapid-fire guns, and twenty-two 3-pounders. She had five above-water torpedo tubes, two on each broadside and one in the bow. Her maximum coal supply was 1,000 tons, and her twin-screw engines drove her, on trial, at a speed of 23.08 knots per hour. The "Miyako," destroyed in Kerr Bay, was a torpedo gunboat of 1,800 tons displacement, and a complement of 220 officers and men, that was built by the Japanese in 1897. She carried two 4.7-inch rapid-fire guns, one forward and one aft, behind shields, and eight 3-pounders on the broadside. She was driven by two triple-expansion engines of 6,130 horse-power at a speed of 20 knots. She was entirely unprotected as to her hull.

Next to the "Mikasa," the "Hatsuse" was the finest battleship in the Japanese navy, her displacement being 15,000 tons, and her complement of officers and men 741. She carried four 12-inch, fourteen 6-inch, and twenty 3-inch guns, besides eight 3-pounders and six 2½-pounders. She had four submerged torpedo tubes, two on each broadside. Her hull protection consisted of a continuous belt, 9 inches amidships, 4 inches at the ends, of Harvey nickel-steel. The deck was 4 inches on the slopes, and the side of the ship, amidships, in the wake of the batteries, was protected by 6 inches of armor to the level of the lower deck, while the 6-inch guns were protected by 6-inch casemate armor. She had a maximum coal supply of 1,500 tons, and on her trials her engines indicated 16,117 horse-power and drove her at the speed of 19.11 knots an hour.

NEW FORM OF RADIATION.

M. Debierne, in a paper read before the Academie des Sciences, brings out some new phenomena in connection with radio-active bodies. Previous experiments show that the induced radio-activity caused by radium and actinium is produced by particular centers of energy (active ions or a form of emanation from the substance), and these centers are given off continuously by the active body and form an atmosphere around it. It has been shown that two parallel plates which are placed in this atmosphere become active, the activity becoming greater as the distance which separates them increases. The effect is thus stronger as the number of ions included between the plates is greater. It may be concluded that the active centers do not act



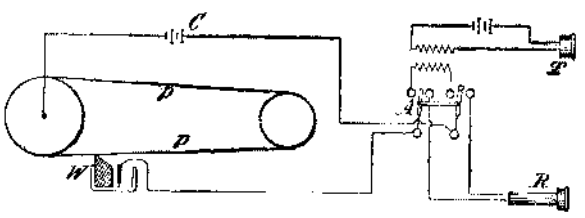
NEW FORM OF RADIATION.

by direct contact with the plates. The phenomenon takes place as if the effect were produced by a special kind of radiation emitted by each of the centers, and that the induced activity of the plate is proportioned to the total radiated flux which it absorbs. The author showed previously that the active ions given off by actinium were concentrated in the neighborhood of the source. If a compound of actinium be placed at the bottom of a tube at *M*, the active ions are almost all confined within the tube, but two plates, *A* and *B*, placed before the opening are nevertheless affected somewhat strongly, due to the radiation from each of the ions.

If the apparatus is placed in a magnetic field perpendicularly to the plane of the figure, one of the plates is more strongly affected, while the other becomes weaker in the same degree. The radiation from the ions thus seems to have been deflected by the field. This deflection occurs in the inverse sense from that of the cathode rays. The active ions are but slowly diffused. It is not probable that the magnetic field acts directly upon the ions, but that it is their radiation which is deflected. The following experiment shows that the diffusion of the ions is not appreciably changed by the magnetic field. The compound of actinium is placed at *M* in communication with two chambers, each containing a plate, *A* and *B*. The pressure in the apparatus is lowered so that the diffusion of the ions takes place easily. The plates are thus strongly affected and both to the same degree. When the central part is placed in the magnetic field, leaving the plates outside, nothing is changed. The field therefore does not act upon the ions, but upon the radiation which proceeds from them. These experiments show that there exists a new form of radiation which is characterized by the property it possesses of rendering radio-active for a time the bodies which it strikes. This radiation is emitted by the active centers which are distributed in the neighborhood of the actinium. The new rays have the property of being deflected by the magnetic field.

ELECTROCHEMICAL PHONOGRAPH.

An electrochemical phonograph has been devised independently by Messrs. Nernst and Lieben. Instead of using magnetic action on a continuous band, as in the Poulsen phonograph, the inventors use electro-



AN ELECTROCHEMICAL PHONOGRAPH.

chemical action. As will be seen in the diagram, a platinum band, *p*, passes over two pulleys which are operated by a motor. Against the band presses a wedge of wood, *W*, partly immersed in an electrolyte contained in the glass vessel. Near it is an electrode which is connected to one of the contact points of the switch, *A*. At *T* is a telephone transmitter which may be connected in the circuit through a battery and an induction coil, and at *R* a receiver which may be thrown in. To produce the record the transmitter is connected in; then the band is passed again, and the reproduction may be heard in the receiver. A supplementary battery, *C*, is also used. Under the influence of the telephone currents an electrolytic action is produced, and the platinum band becomes polarized successively, the action being analogous to the magnetic band of the Poulsen phonograph. Upon passing the band a second time and connecting the receiver, the reproduction is heard, and its sharpness and durability depend on the kind of electrolyte used. But it is remarkable that for reproducing the record an additional electromotive force is necessary in the telephone circuit, supplied by the battery, *C*, and that within certain limits the audition is better as the battery is stronger. This phenomenon is difficult to explain, as it would be supposed that the currents are produced by the discharge of the polarized electrode, and in this case the addition of a constant electromotive force should have no action, since it is only the variation of current which produces the effect. It may also be explained by a simple variation of resistance in the circuit, but it is difficult to suppose that such a variation in resistance could be caused by the polarization of oxygen or hydrogen on the platinum. Besides, M. Lieben has found that the same effect is produced when the resistance is not varied, in the case of a silver band and a solution of double cyanide of silver and potassium. He has made a number of researches with different forms of the apparatus, and concludes that the phenomenon cannot be explained by polarization alone. On the other hand, the idea of a resistance variation will not account for all the effects. A third hypothesis is based on the variation of the friction of polarized electrodes observed by Edison. To efface the record a compress wet with acid is pressed against the band. It is still better to connect it with a pole of the battery, when a continuous electrolytic action is produced which acts like a brush to efface the record.

Spread of Cotton-boll Weevil.

The invasion of the cotton-boll weevil has been a special menace to the cotton crop and has awakened widespread apprehension as to the future of this crop. In addition to the excellent work of the Division of Entomology in combating this pest, the Bureau of Plant Industry has during the past year done considerable work with a view to securing, if possible, early and resistant varieties by breeding and selection. Notwithstanding all that has been accomplished, however, the boll-weevil is constantly spreading north and east, and it seems but a question of time when it will reach all the cotton-growing States. The country is thus confronted with a very great problem, as the invasion of this insect necessarily means a complete revolution in present methods. The Secretary reports that after a personal visit to the South and a thorough canvass of the situation with representative men in Congress and with others, he is of opinion that a cotton-investigation fund should be appropriated for immediate use in connection with this problem. He believes that not less than $500,000 should be appropriated and made immediately available to make this work comprehensive and thoroughly effective, and he enumerates in detail ten problems to the solution of which these funds should be devoted. Should this recommendation be carried out, his plan of work would be to utilize and combine the efforts of the Bureau of Plant Industry and the Division of Entomology, for which he recommends reorganization as a bureau, with the addition of the advice and co-operation of one or two thoroughly practical men in the two States most interested, namely, Louisiana and Texas. The Secretary of Agriculture, he adds, should have full authority to organize the work for the sole object of securing the most immediate practical results.

Gold and Other Minerals in Corea.

The mineral wealth of Corea is considerable, and at present there are a number of gold, silver, iron, and coal mines in operation; petroleum is also obtained from a number of wells. As to the production of gold in Corea, the following figures show the output from 1898 to 1902, and it will be observed that it has more than doubled in that time:

1898	$1,200,040
1899	1,666,670
1900	1,816,100
1901	2,558,700
1902	2,585,200

The greater part of the gold which is produced in Corea is sent to Japan. Iron ore and coal deposits are abundant, but as yet these have been but little worked. Copper is taken out in several districts, and in the last two years the production of copper reached 280 tons, valued at $52,400. The mineral deposits of Corea belong to the crown and persons wishing to operate them are obliged to secure a special authorization. As the government is not favorable to foreigners, this becomes especially difficult, and considerable trouble is experienced before foreign companies can secure concessions in this country.