

THE KNUDSEN WIRELESS TYPEWRITER.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

An interesting development in wireless telegraphy has been perfected by Mr. Hans Knudsen, whose wireless system of telephotography was described a few weeks ago in the pages of the SCIENTIFIC AMERICAN. The feature of this latest appliance is that not only can it be operated in connection with any system of etheric communication, but it can be applied to any description of typewriter, whether having the full keyboard of 72 keys or the single keyboard with shift keys. The general design of the apparatus may be seen in the accompanying illustrations.

Taking the transmitter first: On the deck of the glass-paneled case in which the accumulators and driving mechanism are installed, is a table mounted on four columns, in the well of which the keyboard is placed. As for ordinary communication purposes, for which this invention is designed, only one type of character is absolutely necessary; the lower-case type is omitted, though it can be incorporated if required. By resorting to one case, however, the keys can be disposed in either one or two rows, together with the space key. The letters are alphabetically arranged.

The keys are somewhat similar in design to those of a piano, being about eight inches in length, and are mounted in the same manner in the frame upon pins. At the back of the keyboard frame is a cross-bar formed with circular slots to receive vertically movable contact pins actuated by the rear ends of the type keys. There are as many slots and contact pins as letters. When a letter is depressed, it causes the other extremity of the key lever to rise and lifts the corresponding contact pin so that it projects about 3/16 of an inch above the level of the bar, thereby offering an obstacle to a traveling contact piece which passes longitudinally across the keyboard. The pins are held in their raised position by springs, so that they cannot return to the "off" position until struck by the traveling contact piece.

The four columns shown in the illustration serve as bearings to two rotating shafts at the front and back of the machine respectively, driven by an electric motor in the case. At each end of each shaft a small drum is mounted. Over each pair of drums travels an endless flexible steel band. This band is pierced at regular intervals by small perforations, into which mesh projecting points on the periphery of the drums, so as to secure a modified pinwheel drive. Upon this endless band are rigidly mounted two transverse carriages, from each of which projects downward the contact piece. These transverse contact carriages are so disposed that as one has completed its journey across the table, the other is just commencing to travel thereover, the direction being from left to right. As one contact bar is crossing the table the other is returning to the starting position under the table, and reappearing at the left-hand side as the other bar is disappearing at the right.

As these bars pass over the table, the small projecting contact piece strikes the elevated contact pins corresponding to the depressed keys, thereby completing the electrical circuit, and the impulse is transmitted through the coil and antennæ to the receiving station, where the letter corresponding to that contact pin is printed by the typewriter. When the carriage strikes a contact pin, it releases the holding-up spring, so that the pin returns to its normal or "off" position.

As soon as the traveling carriage has passed over the keyboard, it is momentarily arrested by a contact. This is the synchronizing arrangement, by means of which it is possible to keep the transmitter and receiver in perfect synchrony, as will be explained later.

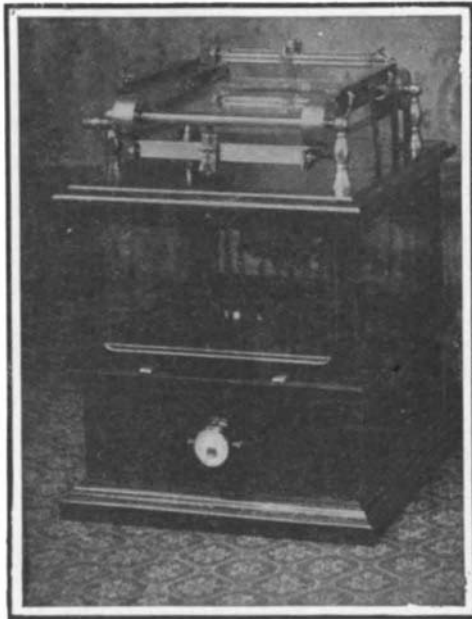
The operator depresses the keys in the time available between the two bars passing a given point,

the operator continually works from left to right and never depresses a letter to the left of that last touched, until the traveling contact bar has passed over the table. As the speed of the traveling motion can be varied within very wide limits, the operator can transmit messages at a speed compatible with his ability.

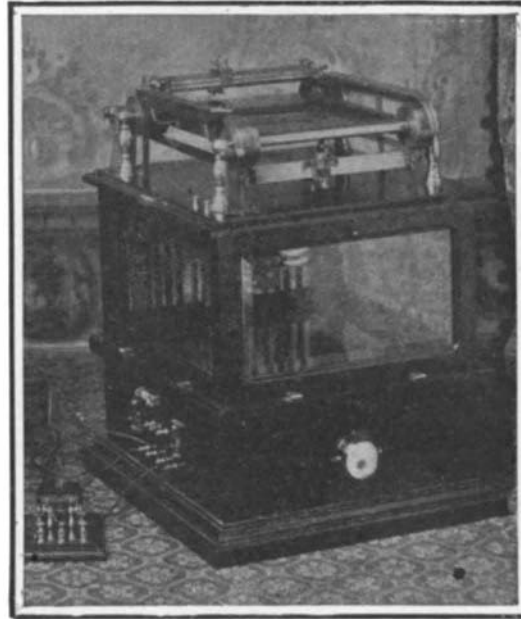
In its general appearance and dimensions the receiver is very similar to the transmitter. There is a contact frame corresponding to the pin frame of the transmitter, only in this instance there are no projecting pins. Instead, the board comprises an insulated strip, into which are inserted narrow strips of metal, the surface of which is flush with the board. These contacts are spaced in precisely the same manner as the contact pins on the transmitter, and from each extends a wire communicating with the magnets of the corresponding type key of the typewriter keyboard. There is a similar endless band system carrying two traveling carriages. These are spaced precisely the same as the transmitter, only instead of a contact piece they carry a small brush, which sweeps over the inlaid contact pieces on the contact frame. The two instruments are in absolute synchrony. When the contact piece of the transmitter carriage strikes a pin, the brush of the receiver carriage is sweeping over the corresponding letter contact, and the impulse received by the coherer closes the circuit of the corresponding magnet, energizing the key on the typewriter, and thus printing the character. When the carriage of the receiver has passed across the table it is arrested, as is the carriage of the transmitter, and when the two are synchronized in position, an electrical impulse is automatically dispatched, releasing the carriages of the two instruments simultaneously. This system of synchronization constitutes the most important feature of the apparatus. The means by which it is accomplished are very simple. A countershaft is fitted to the electric motor mechanism of the transmitter, on which is mounted a magnetic clutch and braking gear. When the traveling contact carriage of the instrument has reached the extreme limit of its travel to the right, it strikes a ball and socket contact stop. This passes a current through the magnets, releasing the magnetic clutch, and at the same time applies a brake to the countershaft and traveling carriage, bringing it to an instantaneous dead stop and holding it firmly there, so that it cannot slip. The main driving mechanism, however, is uninterrupted. The traveling carriage of the receiver has similarly been brought to a standstill at exactly the same point of its travel. By an automatic device an electrical impulse is transmitted from the transmitter to the receiver, and simultaneously the two carriages resume their travel. Under actual working circumstances this stoppage is merely momentary; but should the operator wish to prolong the stop, he can easily do so by the movement of a switch, which exercises precisely the same effect without stopping the main drive. The automatic make and break is effected by means of a small fiber disk mounted on a small countershaft in the driving motor.

When the contact piece of the transmitter carriage strikes a pin, the brush of the receiver carriage is sweeping over the corresponding letter contact, and the impulse received by the coherer closes the circuit of the corresponding magnet, energizing the key on the typewriter, and thus printing the character. When the carriage of the receiver has passed across the table it is arrested, as is the carriage of the transmitter, and when the two are synchronized in position, an electrical impulse is automatically dispatched, releasing the carriages of the two instruments simultaneously. This system of synchronization constitutes the most important feature of the apparatus. The means by which it is accomplished are very simple. A countershaft is fitted to the electric motor mechanism of the transmitter, on which is mounted a magnetic clutch and braking gear. When the traveling contact carriage of the instrument has reached the extreme limit of its travel to the right, it strikes a ball and socket contact stop. This passes a current through the magnets, releasing the magnetic clutch, and at the same time applies a brake to the countershaft and traveling carriage, bringing it to an instantaneous dead stop and holding it firmly there, so that it cannot slip. The main driving mechanism, however, is uninterrupted. The traveling carriage of the receiver has similarly been brought to a standstill at exactly the same point of its travel. By an automatic device an electrical impulse is transmitted from the transmitter to the receiver, and simultaneously the two carriages resume their travel. Under actual working circumstances this stoppage is merely momentary; but should the operator wish to prolong the stop, he can easily do so by the movement of a switch, which exercises precisely the same effect without stopping the main drive. The automatic make and break is effected by means of a small fiber disk mounted on a small countershaft in the driving motor.

This fiber disk carries a small contact, while on either side of its flat surface a thin brass flat spring presses. When the disk revolves and brings the contact into connection with the metal springs, the current is dispatched through the synchronizing circuit, energizing the magnetic clutch gear and brake, the circuit being

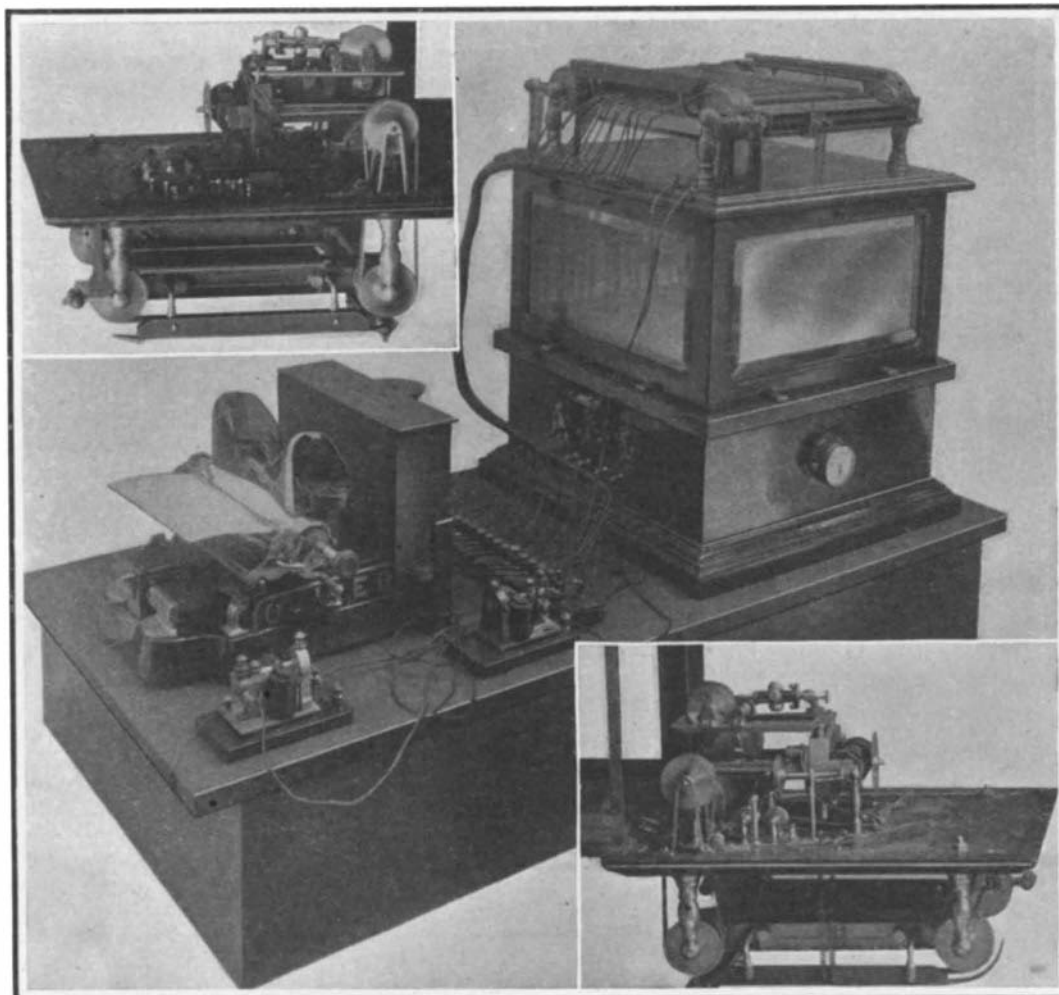


Transmitter, showing contact piece which strikes pins of letters below.



Receiver, showing traveling carriages and brush contact.

which task is considerably facilitated by the momentary stoppage of the traveler directly its journey across the table is completed, for synchronization. Suppose, however, the word *boyish* is to be transmitted. It will be observed here that after the *y* (twenty-fifth letter) has been struck, the operator has to return to *i* (ninth letter) followed by *s* (nineteenth letter) and lastly *h* (eighth letter). Should the whole word be written straight away, owing to the sequence of the pins and letters the resultant word *dhiosy* would be an unintelligible assembly of letters due to the printing of the letters in alphabetical sequence. To overcome this, the operator, after depressing the *y* (the final letter of the first syllable) allows the traveling bar to pass across the table; and before the second trav-



The synchronizing mechanism.

Motor mechanism of the receiver.

The receiver connected up to a typewriter.

THE KNUDSEN WIRELESS TYPEWRITER.

eler makes its journey, he depresses *i* (ninth letter) and *s* (nineteenth letter), then allows the second bar to pass over, when the final *h* is depressed, and the succeeding traveling bar in its journey completes the transmission of the word in its correct form. From a description the process appears somewhat complicated, but in operation it is perfectly simple, since

This fiber disk carries a small contact, while on either side of its flat surface a thin brass flat spring presses.

When the disk revolves and brings the contact into connection with the metal springs, the current is dispatched through the synchronizing circuit, energizing the magnetic clutch gear and brake, the circuit being

interrupted again directly the revolving contact has passed the flat springs.

Upon the keyboard of the typewriter itself is placed a small box carrying the magnets by which the keys are actuated. A wire extends from each contact of the contact frame of the receiver to its corresponding letter on the typewriter keyboard. The magnets are of special design, having long cores, and this mechanism being incased within a small box can be easily and instantly withdrawn from the typewriter keyboard when desired.

By means of a magnetic clutch and a ratchet the typewriter is automatically moved forward the desired

SALVING THE WRECKED BRITISH CRUISER "GLADIATOR."

BY PERCIVAL HISLAM.

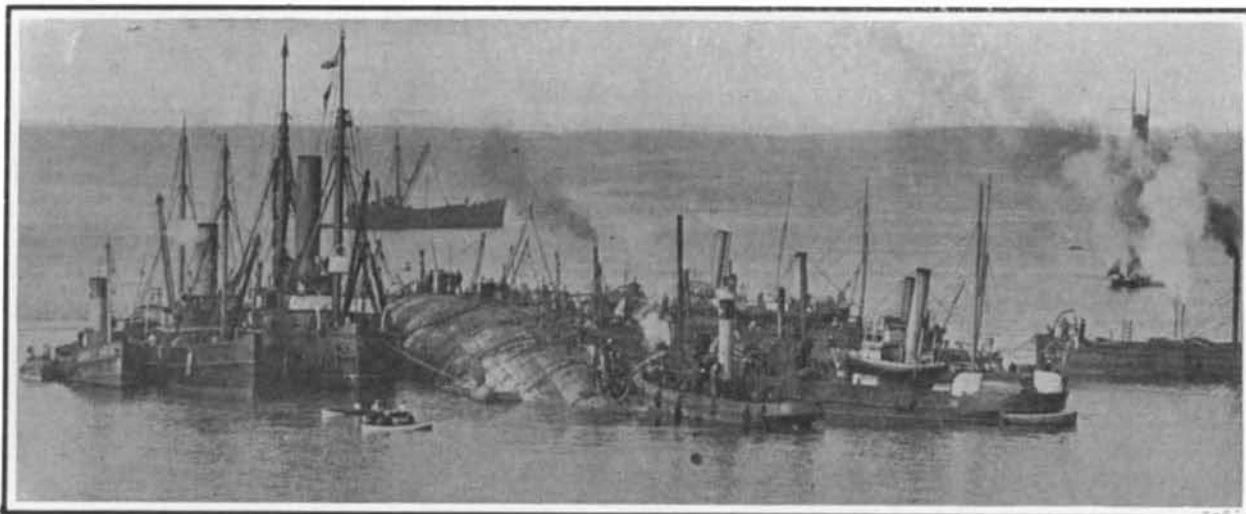
After five months of almost uninterrupted work, the British protected cruiser "Gladiator," which was run down by the American liner "St. Paul," has been raised and towed into dock. The disaster occurred on April 25 last in the Solent, during a blinding snow-storm, the cruiser proceeding at a speed of about nine knots and the liner, according to the evidence of Capt. Passow, at about 14 or 15 knots. Two courts were held in England as a result of the wreck. In the civil court it was decided that the "St. Paul" was

prevention of collisions at sea, and also taking into consideration that all possible steps were taken by the prisoner to prevent loss of life and the high state of discipline of the officers and men under his command, adjudges him to be reprimanded and dismissed H. M. S. "Victory" (to which ship he had been appointed on the loss of the "Gladiator"). It should be mentioned that the articles referred to deal with the signals to be made by ships during foggy or misty weather—the blowing of sirens, etc., and with the speed at which they should proceed.

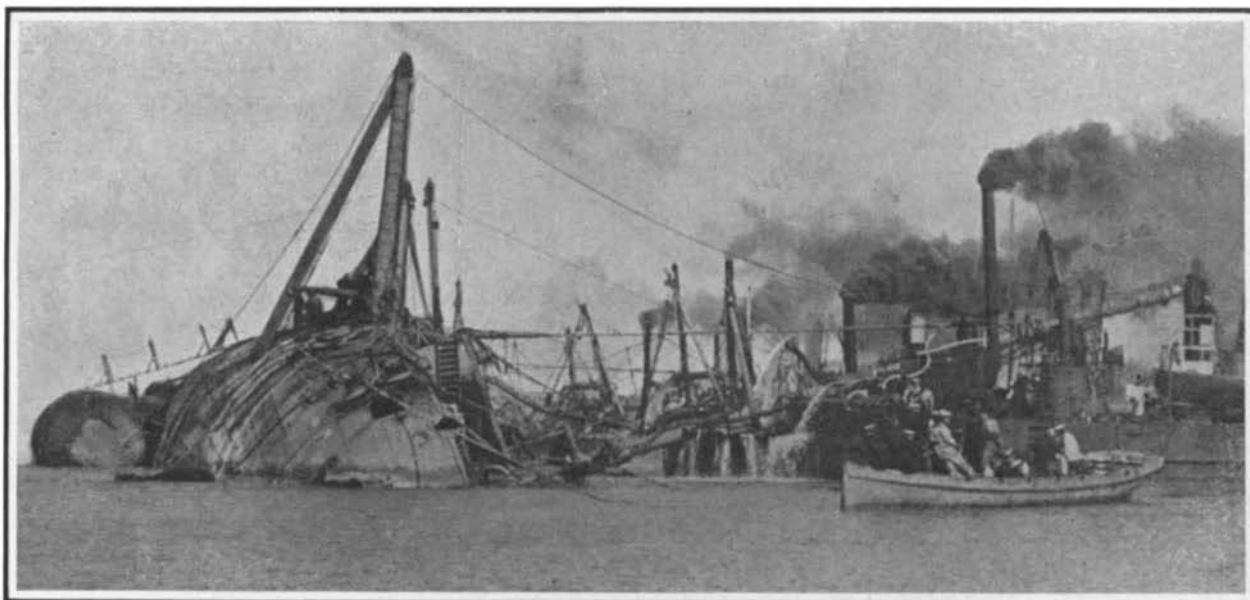
The wrecked cruiser was a vessel of 5,750 tons, built in 1896 at a cost of \$1,500,000. Her armament con-



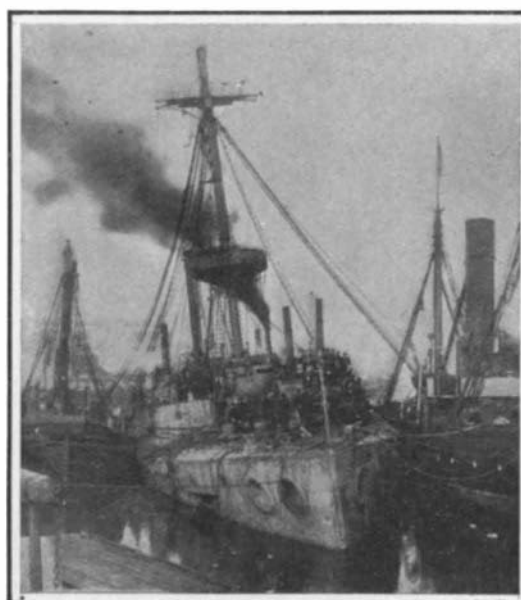
The "Gladiator" righted. The derrick, now nearly horizontal, may be seen on the left, and the "camels" on either side.



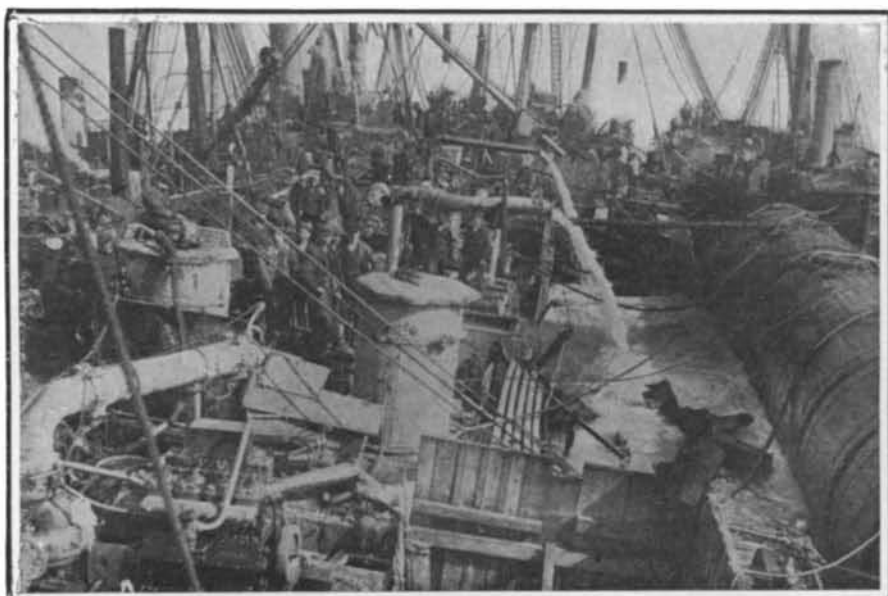
General scene during the attempt to right the "Gladiator." On the extreme right a tug is supplying compressed air to the "camels" after the water has been pumped out. The "camels" are lashed to the under side of the wreck.



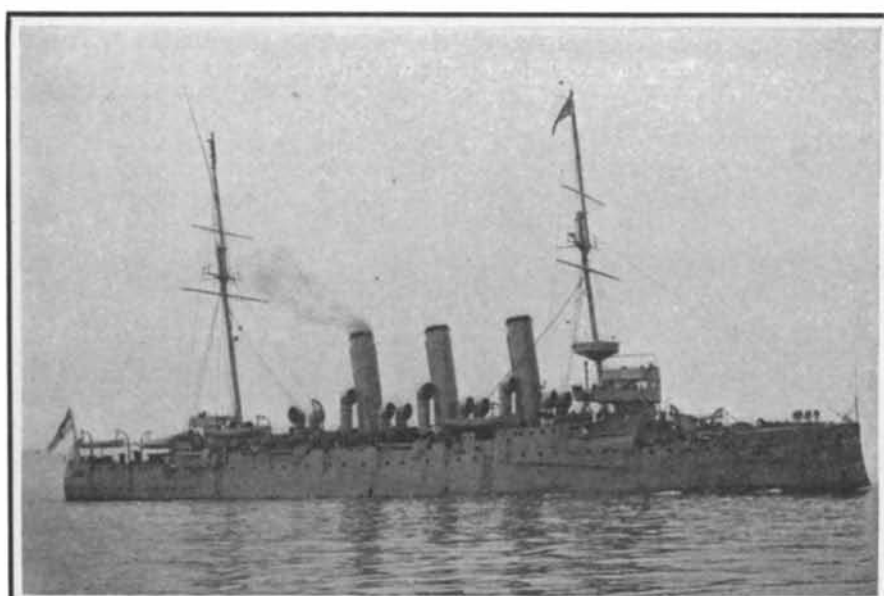
Preparing for the final effort to right the wreck. Powerful tugs hauled on the derrick, which can be seen projecting vertically from the side of the wreck.



Bow view of the wrecked cruiser, taken in the basin at Portsmouth dockyard.



A deck view of the "Gladiator" after she was righted. The pumps were working almost continuously up to the time she was docked



The British protected cruiser "Gladiator" as she appeared when in commission. Displacement, 5,750 tons. Speed, 19 Knots. Ten 6-inch guns.

SALVING THE WRECKED BRITISH CRUISER "GLADIATOR."

distance, and the carriage returned to the left to commence a new line.

We understand that a contract has been made for raising the cruiser "Yankee," which recently went aground at Spindle Rock, by the same system which was used in the salvage of the large steamship "Bavarian" of the Allan Line. The method consists in rendering the lower deck watertight and driving out the water by forcing air into the lower hold.

in no way to blame for the accident; but the naval court martial which tried Capt. Lumsden, the commander of the "Gladiator," decided that there were extenuating circumstances. The court found "that the charge was partly proved, and that the prisoner hazarded his ship by default, and not by neglect." The sentence passed by the court was as follows: "The court, having found the charge against the prisoner partly proved, and taking into consideration the difficult position in which he was placed by the 'St. Paul' not complying with Articles 15a and 16 for the

sisted of ten 6-inch and fourteen smaller weapons, and her speed, obtained with engines of 10,000 horse-power, was 19.1 knots on trial. She is not, it will be seen, a very useful vessel, judged by modern standards, particularly in the matter of speed. Her nominal complement is 23 officers and 424 men; but at the time of the accident she was attached to the home fleet, and manned with a nucleus crew of 13 officers and 257 men. One officer and 28 men were lost in the collision, some being thrown overboard and drowned by the force of the impact, some being drawn down ex-