

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of special design, having long cores, and this mechanism being incased within a small box can be easily and instantly withdrawn from the typewriter keyboard when desired.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.

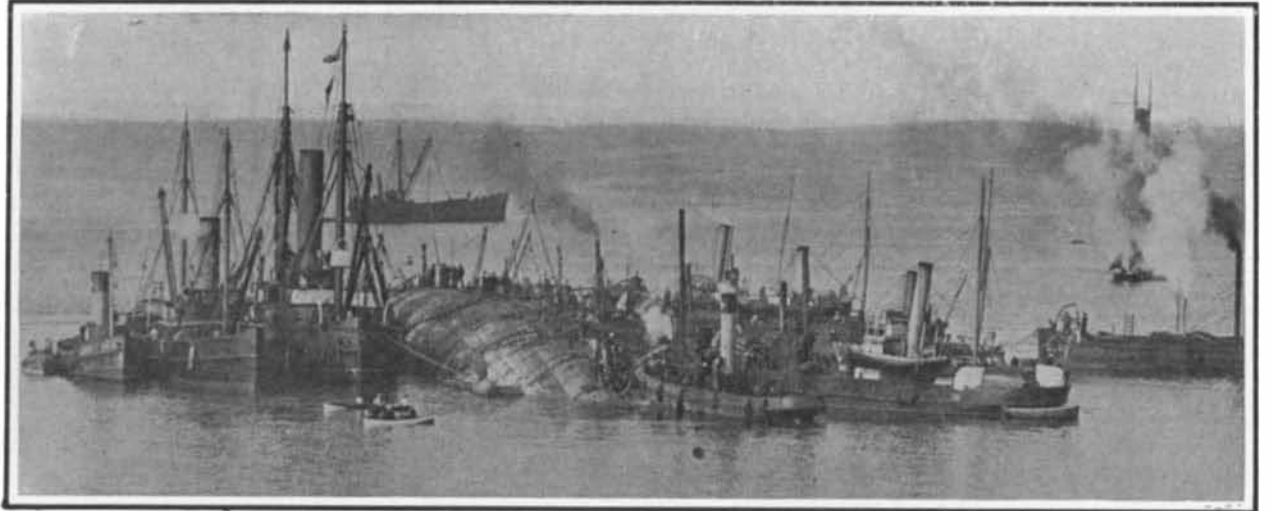
After five months of almost uninterrupted work, the British protected cruiser "Gladiator," which was run down by the American liner "St. Paul," has been raised and towed into dock. The disaster occurred on April 25 last in the Solent, during a blinding snow-storm, the cruiser proceeding at a speed of 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.

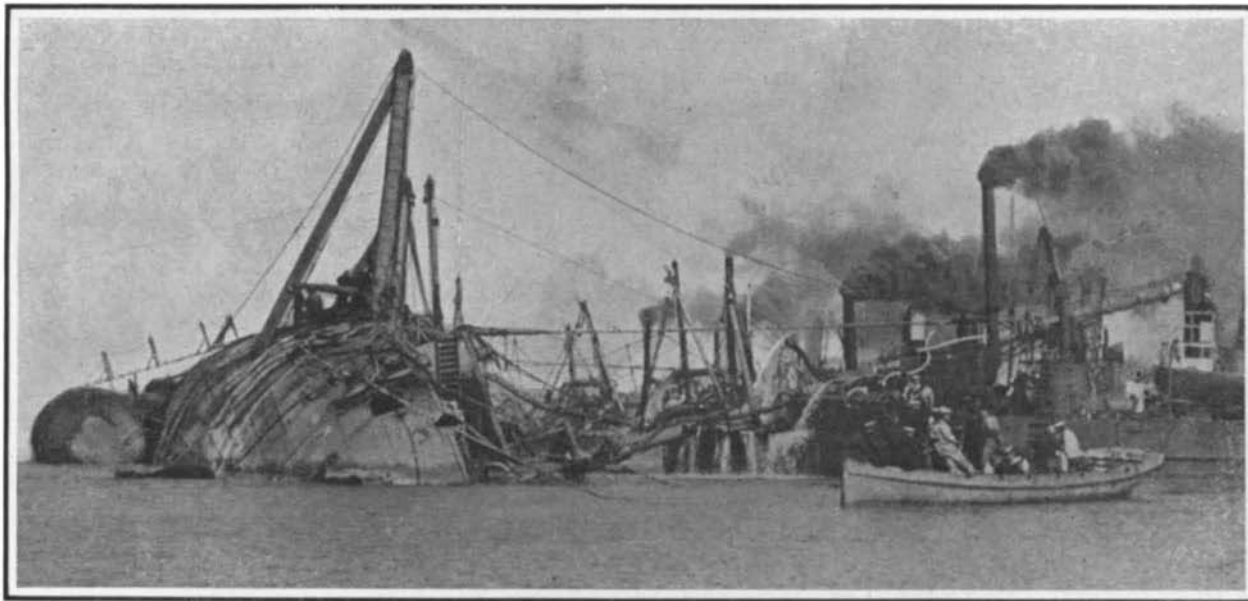
The wrecked cruiser was a vessel of 5,750 tons, built in 1896 at a cost of \$1,500,000. Her armament con-



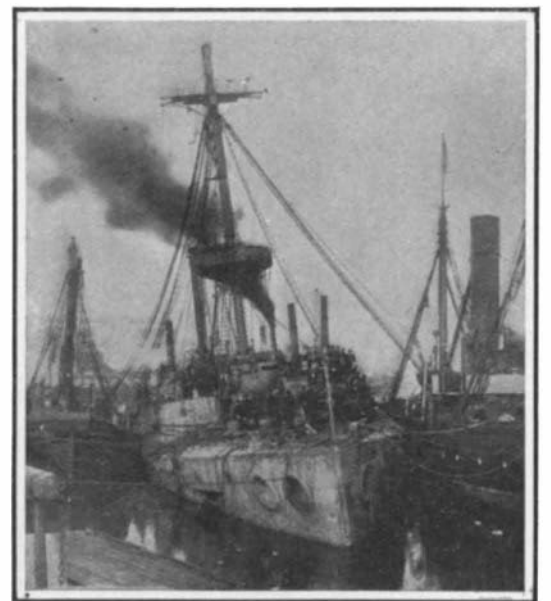
The "Gladiator" righted. The derrick, now nearly horizontal, may be seen on the left, and the "camels" on either side.



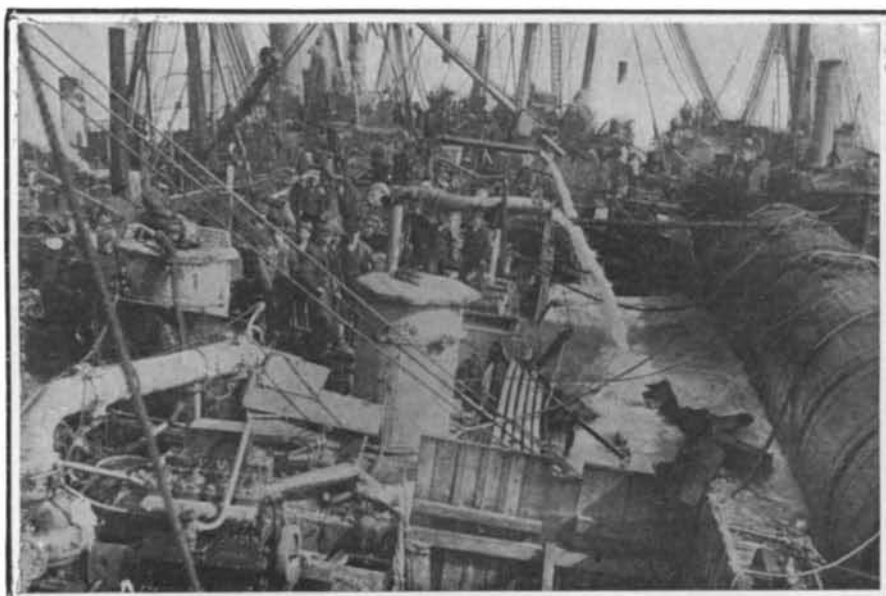
General scene during the attempt to right the "Gladiator." On the extreme right a tug is supplying compressed air to the "camels" after the water has been pumped out. The "camels" are lashed to the under side of the wreck.



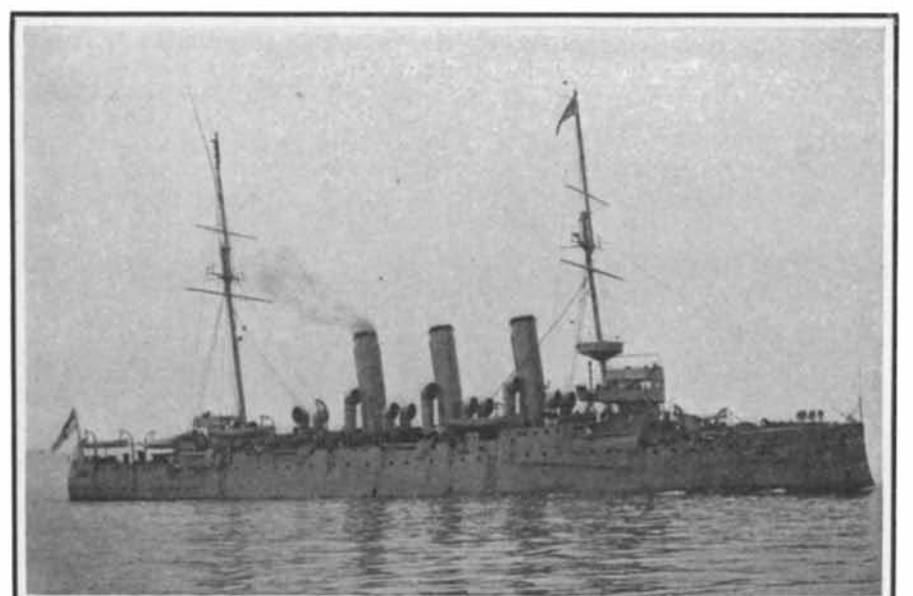
Preparing for the final effort to right the wreck. Powerful tugs hauled on the derrick, which can be seen projecting vertically from the side of the wreck.



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-

hausted in an attempt to swim ashore, and a few being caught by the bows of the liner as they crashed into the cruiser's side.

Immediately after the collision the "St. Paul" went astern, and the captain of the "Gladiator," seeing that his vessel was listing heavily to starboard—on which side she was struck—headed her for the shore of the Isle of Wight. Here she was safely beached, but almost immediately turned right over until she lay, with masts and funnels completely submerged, at an angle of about 93 degrees with the vertical.

In this position the ship offered no obstruction to traffic; but the British authorities decided at once to salvage her. At first it was thought possible that this might be effected with the appliances at the disposal of the Admiralty; but after two or three days' work, during which the light guns, boats, and all the portable fittings were removed from the deck, it was decided to give the work to a private company: The contract was awarded to the Liverpool Salvage Company.

The first thing done was to send divers down into the ship to close as many watertight doors as possible, in order to isolate the damaged portion. The salvage company sent two special ships, and several tugs and lighters were supplied by the Portsmouth dockyard authorities, with the result that in a short time nine pumps, capable of pumping from 600 to 850 tons of water an hour, were at work on the wreck. Those furnished by the company were the most powerful, and these can be seen in some of the accompanying photographs. They were of the motor type, operated by gasoline.

The next difficulty encountered was that of the tides. These flow at a very rapid rate through the Solent, and round the shores of the Isle of Wight, where the "Gladiator" lay, often reaching a speed of five knots. As the ship lay at right angles to the shore, stern foremost, the full force of these currents was felt, and it was therefore decided to get the vessel broadside on. To this end, two powerful steam winches were erected on shore, special concrete foundations having to be laid for them. Strong wire hawsers were laid to the bows of the ship, but at the first attempt at hauling, they gave way under the strain. Before another effort was made, a number of steel "camels" were constructed in the dockyard to assist in the work. These are huge water-tight cylinders, 100 feet long and ten feet in diameter. They were sunk round the bows of the wreck, the water was pumped out, and a supply of compressed air was kept up, enabling them to exert a lifting force of 200 tons each. With these camels giving such great assistance it was not long before the ship was brought into the desired position, and the salvage party were then able to proceed with the work of getting the ship on an even keel.

This proved to be the most difficult task of all, for the ship had been lying so long that she had made a bed for herself in the muddy bottom. The divers had not been able to prevent the ingress of water, with the result that the pumps had to be kept continuously at work; indeed, they scarcely ceased from the time the operations were commenced to the moment when the vessel was lying safely in dock. Bad weather, too, interfered considerably with the work, and it was only after a dozen unsuccessful efforts that the vessel was at last got upon an even keel. The difficulties attending the operations will be appreciated from the photographs accompanying this article. The camels played a very important part in this phase of the work, which was assisted by powerful derricks hauling on the top-sides and on the masts of the wreck.

After the righting, the rest was comparatively simple. Divers were able to construct a wooden cofferdam round the damaged parts, and the pumps were thus able to keep the water well under. The camels were then sunk again and made fast to the ship by 8-inch hawsers, and the pumps were transferred to the deck of the ship.

The final efforts to get the vessel clear of the bottom were commenced early on October 1, but ended in disappointment, as by the end of the day she had developed a dangerous list, and seemed likely to collapse into her original position again. However, the operations were resumed on the following day, and on October 3 the ship came up and was finally towed off the bank on which she had so long rested.

Needless to say the ship presented a sorry spectacle. Her funnels and topmasts were gone, and her deck, although clear of the usual impedimenta of a warship, was a scene of chaotic confusion. Astern, the name was out of the water, but amidships there was only about eighteen inches clear, while the hull was begrimed with mud, and huge cascades of water were pouring over the sides, ejected from the interior by the powerful pumps. She still had a slight list to starboard, and on that side four of the camels were attached. Two tugs were lashed to either side. It was dark before the procession was able to get under way and head for Portsmouth harbor, and it was a

sight never to be forgotten by those who saw it. A government tug led the way, and a cable's length behind her came a swarm of small craft with the disabled hulk of the wrecked cruiser in their midst. The moon was shining brightly, and several of the tugs had powerful searchlights at work to illuminate the ship for the benefit of those at work on her. Thus the cruiser was taken into the harbor.

She was allowed to settle down in the mud for the night, and two days after she was raised again and taken into the basin, and finally into the dock. It was then possible to see the extent of the damage. It had been thought the "St. Paul" struck her an almost direct blow, but this was at once shown to be impossible. From a little forward of amidships the entire side plating from the upper deck right down to the keel has been cut away for a length of over forty feet, most of the plating being folded back against the side abaft of the aperture. All the decks are left bare, but the decks themselves have not been crushed in, but are intact right up to the aperture. It is obvious, therefore, that the liner must have struck the cruiser a glancing blow, and not a direct one.

The intentions of the Admiralty with regard to the future of the "Gladiator" have not yet been made known. A detailed report will be forwarded, and from this they will decide what is to be done with her. As the reconstruction will cost at least half a million dollars, it is not thought that she will be brought forward for service again, as her small fighting value would not justify such an expenditure. She will probably be broken up.

Prizes for Improvements in the Manufacture of Ferro-boron.

The committee of the Society of Chemical Industry, consisting of Messrs. Isakovics, Roeber, and Baekeland, appointed to draw up the regulations governing the competition for the award of the Pacific Coast Borax Company's prize of \$500, have submitted the following report:

The sum of five hundred dollars has been paid to the American Electrochemical Society, and deposited in trust, as a research fund, to be awarded as a prize for improvements in the commercial method of manufacturing ferro-boron, by a direct process, from colemanite.

It is essential that the process should be sufficiently economical and suitable to be applied on a large scale, so that the finished product may be available for commercial purposes. (Commercial ferro-boron, as now made, contains 20 per cent or more of boron, less than 3 per cent of carbon, and sulphur and phosphorus are practically absent.)

Competitors are notified that they must comply with the following conditions:

1. The treatise must be typewritten, and accompanied by a sample produced by the process described in same. It must be inclosed in a plain, sealed envelope, not bearing the author's name, but identified by a pseudonym. The outside of the envelope, containing the paper, must be labeled with the pseudonym, and with it should be sent another plain sealed envelope, also labeled with the same pseudonym, which should contain inside the envelope the name and address of the competitor. Both these envelopes should be sent to Prof. Morris Loeb, 273 Madison Avenue, New York.

2. All papers competing for the prize must be in the hands of Prof. Loeb before October 1, 1909. Prof. Loeb shall retain the small sealed envelope, containing the address of the competitor, and forward the large envelope containing the treatise, as well as the sample of the product, both merely labeled with the pseudonym, under cover, to the secretary of the American Electrochemical Society, to be submitted to the board of directors, who will award the prize. The competitors for the prize forfeit none of their property rights in the process submitted.

3. As soon as the board of directors has agreed upon the best treatise, it will request from Prof. Loeb the address of the author thereof, who will then be required to demonstrate his process, before the prize will be finally awarded.

4. The Pacific Coast Borax Company, 100 William Street, New York city, has offered to supply anyone who desires to compete for the prize seriously, with all the crude colemanite that the parties making the experiment may require, provided that the request for this colemanite be accompanied by a letter signed by one member of the board of directors of the American Electrochemical Society, indorsing the application for the material. Information will be furnished to prospective competitors on application to the American Electrochemical Society.

Barcelona has, perhaps, one of the best and most complete electric tram services in Europe, some 156 miles of line being worked by the different companies within the boundaries of the city and suburbs; none of these concerns, however, are British enterprises, the whole system being controlled by German and Belgian syndicates. During the past year about 12½

miles of new rails have been laid, mainly in completion of small branch lines in several of the more important streets. The overhead trolley system is the only one employed. A service of motor omnibuses has been started running from the suburb of Gracia to the central square, "Plaza de Cataluña," by a Catalan company, but as yet the "taxicab" has not made its appearance.

Telegraphic Cables Endangered by Modern Fishing Methods.

In the last few years a great change has taken place in the methods of fishing with trawls or drag nets. Small nets drawn by fishing boats have given place to great machines towed by steamers. Steam trawlers originated in England. They have multiplied rapidly and now France possesses a fleet which, after having been tried in French waters with remarkable success from the fishermen's point of view, though not from that of persons interested in the preservation of marine fauna, has extended its field of operations to Iceland and Newfoundland, where it is rapidly destroying the time-honored industry of fishing with hooks and lines. This is not the only damage done by the steam trawlers. Their heavy nets become entangled with telegraphic cables and either break them or drag them to the surface, where the fishermen often cut the cables in order to free their nets. The hooks of the old Newfoundland fishing boats never inflicted any such damage, for they were not dragged along the bottom, and if a hook happened to foul a cable, the line simply parted and the hook was lost, while the cable remained uninjured.

As the steam trawlers mark wide furrows on the sea bottom in every direction they cannot fail to encounter the cables and break them, to the great injury of the cable companies and their service. It has cost the Commercial Cable Company \$100,000 to repair the damage caused by trawlers in three months. In May last there was an almost daily interruption of service on some one of the thirteen cables which connect America with Europe, and these interruptions occurred 40 miles from shore in the waters frequented by the trawlers.

The cable companies demand laws prohibiting trawling in the vicinity of their cables, and the fishermen complain that the cables interfere with their work and damage their nets.

Death of Dr. F. A. C. Perrine.

Dr. Frederic Auten Combs Perrine, well known as a consulting engineer and authority on electrical science, died in his home in Plainfield, N. J., after a long illness. He was forty-six years old.

Dr. Perrine was born in Manalapan, N. J., and was educated in the Freehold Institute. He was graduated from Princeton in 1883, and later received a diploma from the scientific department. After holding the positions of manager of the insulated wire department of the John A. Roebling's Sons Company and treasurer of the Germania Electric Company he became a professor in electrical science at Leland Stanford University. From 1898 to 1900 Dr. Perrine was chief engineer of the Standard Electric Company of California, and in 1900 he was made president of the Stanley Electrical Manufacturing Company, in Pittsfield, Mass. He retired in 1904 to become a consulting engineer, with offices in this city. He was editor of the Journal of Electricity, in San Francisco, from 1894 to 1896, and also of Electrical Engineering, in Chicago, from 1896 to 1898. He wrote "Conductors for Distribution."

The Current Supplement.

The current SUPPLEMENT, No. 1713, opens with an article by the English correspondent of the SCIENTIFIC AMERICAN on the "Flip-Flap," a new amusement apparatus which was one of the sensational side shows at the Franco-British Exhibition. George E. Lynch writes on the operation of coal-cutting machinery. The production of high-frequency oscillations is discussed by no less an authority than William Duddell, to whose indefatigable investigations we owe so much. Edward Hausbrand contributes an article on a new method of desiccation, in which he describes an apparatus which has demonstrated its efficiency in the condensation and desiccation without injury of milk and many pharmaceutical substances easily decomposed by heat. Perhaps the most important article in the SUPPLEMENT is an elaborate account of the Wright aeroplane, in which the construction of that wonderful flying machine is described in detail. Many illustrations elucidate the text. Monsignor Talon in a little work entitled "The Marvelous Story of the Traditional Picture of Jesus," gives an interesting version of a tradition which dates from the time of the Apostles. The tradition is in part translated in the current SUPPLEMENT. Illustrations of early portraits of Christ are published. Among the minor articles may be mentioned those entitled "Stereoscopic Projection," "Artificial Silk," "The New Map of Greenland," "Apparatus for Measuring the Heat of the Sun," and "Our Losses by Fire."