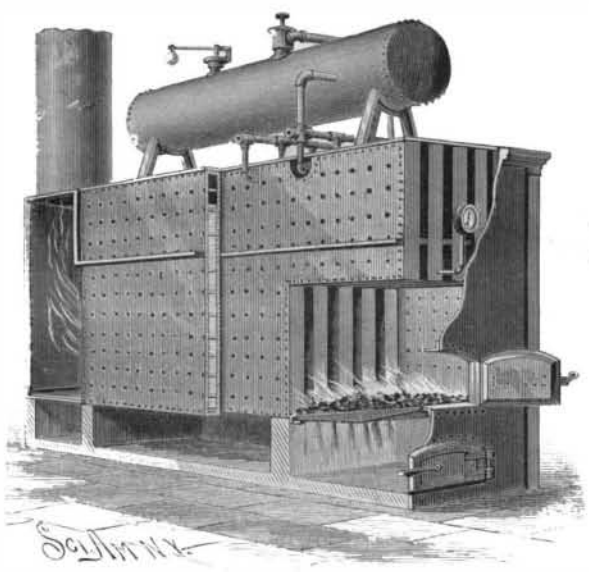
IMPROVED STEAM BOILER.

The boiler shown in the accompanying engraving has an extensive heating surface, and is capable of standing high pressure. The water boxes or sections are formed of sheets of iron or steel, connected by short bolts and retained apart a short distance by strips at the edges, so as to form boxes of flat form, the space between the sides being about an inch. Any suitable number of these boxes are placed side by side with narrow spaces between, and are connected by braces so as



COOPER'S IMPROVED STEAM BOILER.

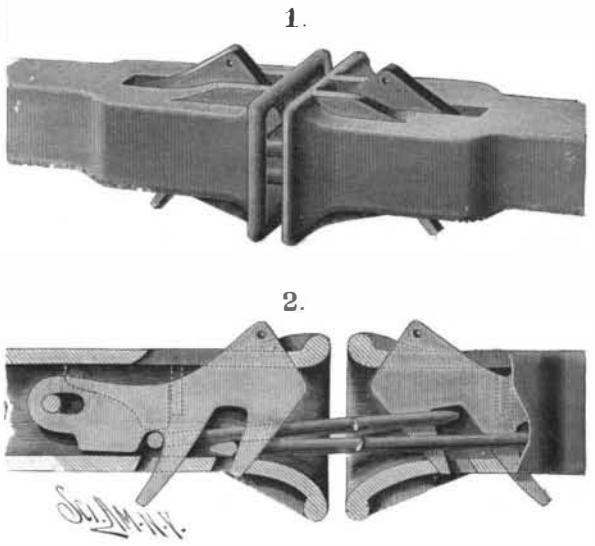
to form flues that terminate in a smokebox at the rear end of the boiler. Between the sections, a short distance below the water line, are placed bars which extend from the front plate to the smokebox, and are bent at the inner ends and extended upward to the top of the sections; these bars prevent the flame from rising too high between the sections. The interior boxes are cut out at the front end to form a firebox, the sides of which are formed by the outside boxes. Pipes connect the boxes with the steam dome; the feed water pipe is connected with the rear lower ends of the boxes. It will be seen that this boiler has extensive heating surface compared with the body of water, and can be made to stand a high pressure.

This invention has been patented by Mr. George H. Cooper, of New Westminster, British Columbia, Canada.

A DOUBLE-LINK, AUTOMATIC CAR COUPLING.

The top of the drawhead of the coupling herewith shown has a slot of sufficient size to allow the coupling hook to be readily inserted and removed through it, the hook having a short slot in its rear to receive a pin, by which it is secured in place, the pin being kept in position by a key or other suitable means, and so arranged as to allow the coupling hook the necessary play. Fig. 1 is a perspective and Fig. 2 a sectional view of the couplings linked together. The coupler has two hooks upon its lower side, for which there are corresponding slots in the lower side of the drawhead, the rear hook being made so long that it will never be raised out of its slot when the coupler is in use. The forward side of the forward hook is inclined or rounded so that it will be raised by the contact of the coupling link of the opposite car when the cars are run together, to allow the link to pass this forward hook, which then drops back into place and the cars are coupled. The coupling hook has three bearing points besides the pin on which it works—an inclined seat at the forward end of the slot in the top of the drawhead and two inclined seats at the forward end of the two slots in the bottom of the drawhead. With this construction, each drawhead is permanently provided with a coupling link, the inner end of which is held by the rear hook; and when two cars are run together, the draught strain will be sustained by two independent links, either of which is intended to be sufficiently strong for use should the other be broken, while, should both be broken, the cars can be coupled by an ordinary coupling link, and the coupling still be automatic.

This invention has been patented by Messrs. William H. Adams, James D. Felthousen, and Albert Lawtenslager, of Albany, N. Y., and is an improvement on a former patented invention of the same inventors. For further particulars in reference thereto address Mr. Albert Lawtenslager, 71 North Pearl Street, Albany, N. Y.



AN IMPROVED CAR COUPLING.

CONSTRUCTION OF TORPEDO BOATS.

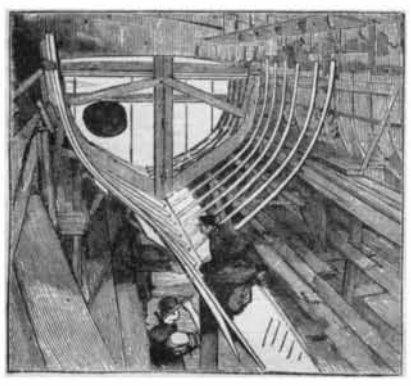
The construction of torpedo boats is an industry of very recent growth. It is one, however, which has of late attracted much attention, in consequence of the rapid increase in the number of such vessels in foreign navies, and the very few in our own. We are glad this deficiency is being fast put an end to; the British Government having in the course of construction at the present time no less than fifty thoroughly serviceable first-class, sea-going torpedo boats, all of which will be completed in the course of this year.

Among the most celebrated constructors are Messrs. Yarrow & Co., who, during the last few years, have supplied nearly every country in the world with boats of this type; and the British Government at the time of the Russian scare last spring contracted with them for the supply of twenty-four, which are now fast approaching completion. In addition to these, Messrs. Yarrow & Co. are building similar vessels for the Spanish, Austrian, Dutch, Italian, Japanese, Portuguese, and Chilian Governments; and at the present moment their works represent a scene of the greatest possible activity —a very pleasant contrast with the general depression of trade in other parts of the country.

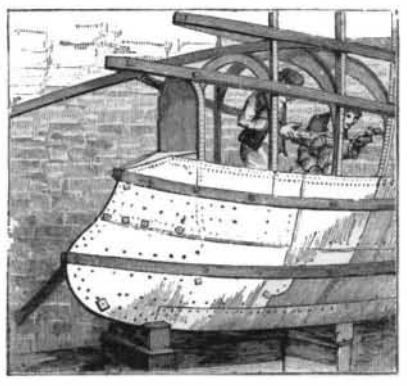
In these works, not only are the vessels themselves constructed from the very commencement, but also the machinery for propelling them, giving employment to over 1,200 men.

To give some idea of the amount of material which enters into the construction of a torpedo boat, it may be mentioned that the bars forming the skeleton work of the hull, if laid out in a continuous line, would extend for a length of over two miles, all of which has to be bent into shape, punched, and fitted up in its place, to which framework the outside skin plating of the hull is attached.

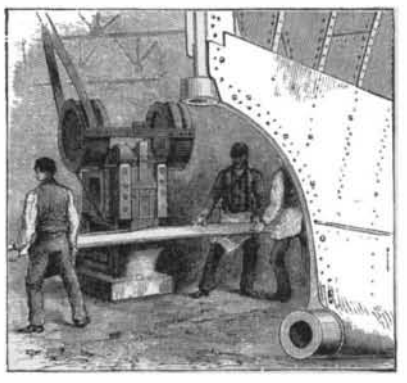
The longitudinal section represents probably the most interesting torpedo boat ever constructed, and shows very clearly what the internal arrangements of such a



TRAINING THE HULL.



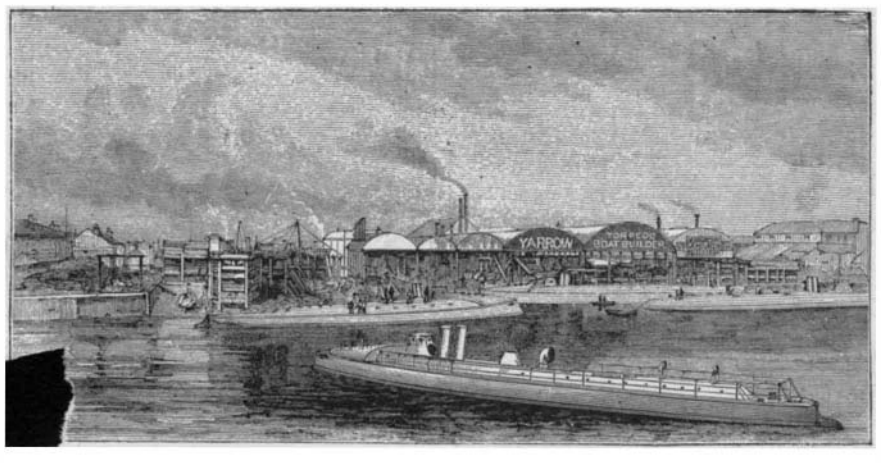
PUTTING A SKIN PLATING AT THE BOW.



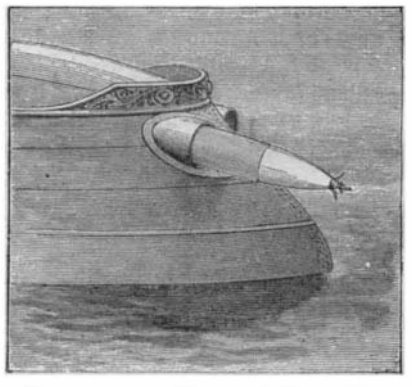
SHEARING A SKIN PLATING.

FORGING STEEL SCREW PROPELLER.

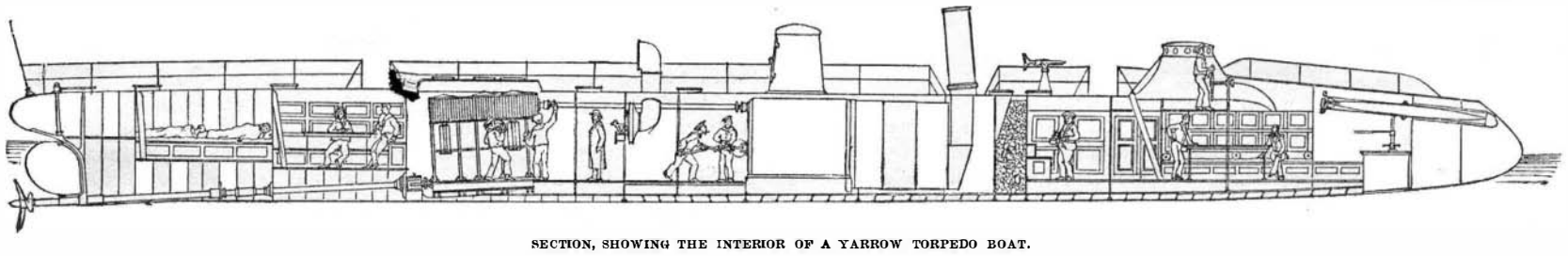
BORING OUT SCREW PROPELLER.



VIEW OF MESSRS. YARROW & CO.'S WORKS FROM THE RIVER THAMES.



VIEW OF BOW, SHOWING WHITEHEAD TORPEDO BEING DISCHARGED.



SECTION, SHOWING THE INTERIOR OF A YARROW TORPEDO BOAT.

CONSTRUCTION OF TORPEDO BOATS AT YARROW & CO.'S WORKS LONDON.