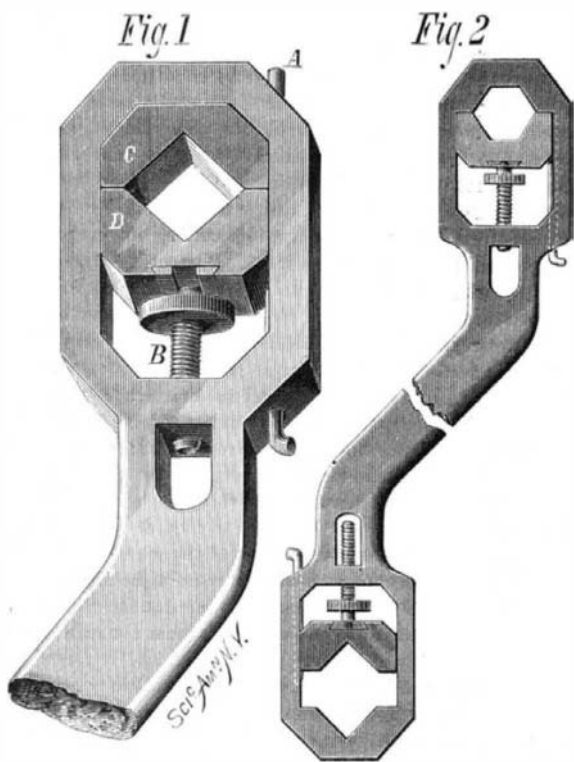


IMPROVED WRENCH.

The improved wrench illustrated herewith is so constructed as to prevent slipping and to obtain a large bearing on the nut. It is a strong and durable tool, embodying many mechanical niceties, which will be understood from the following description. The frame has two parallel sides, on the interior at top and bottom, and in it are placed two movable jaws, C D, Fig. 1, which are held therein by a



PHILLIPS' IMPROVED WRENCH.

loose wire, A, along the top, working in a groove, which is cut one half out of the frame, and the remaining half out of the jaws. This wire acts as a rib to prevent the jaws from falling out, and also as a guide for the rear jaw.

The jaw, D, is moved by means of a milled head screw, B, so as to adjust it to different sizes of nuts, the rear end of the screw passing through a tapped hole in the frame. The front end of the screw in the jaw, D, is tapered to a point so as to revolve true, and it causes the jaw, D, to travel forward with it. The backward movement of the jaw is controlled by means of a shoulder or offset cut on the screw, back of which a small slotted plate is inserted and held in place in the jaw by a dovetail. This slotted plate, in connection with the loose wire, is for the purpose of removing the jaws and inserting others to be used for nuts of a different shape.

The wrench can also be made with only one jaw movable. In this case the forward portion of the frame is fashioned to the shape of the nut, as shown in Fig. 2.

The jaws, C D, are so constructed as to obtain a bearing on four sides of the nut, or double that obtained in the ordinary wrench, thus preventing slipping, and preserving the faces of finished nuts. In hexagon nuts, and especially when heavy strain is put on a wrench, the corners are apt to be rounded. This objection is overcome in the Phillips wrench.

Patented April 16, 1878. For further particulars relative to the sale of the entire patent, address the inventor, Mr. Thomas H. Phillips, Kalmia Colliery, Orwin P. O., Schuylkill county, Pa.

Defying the Burglars.

A recent patent by a Western jail builder consists in using steel bars with a wrought iron core, and, after cutting them to desired lengths and drilling them, heating them to a red heat and merging

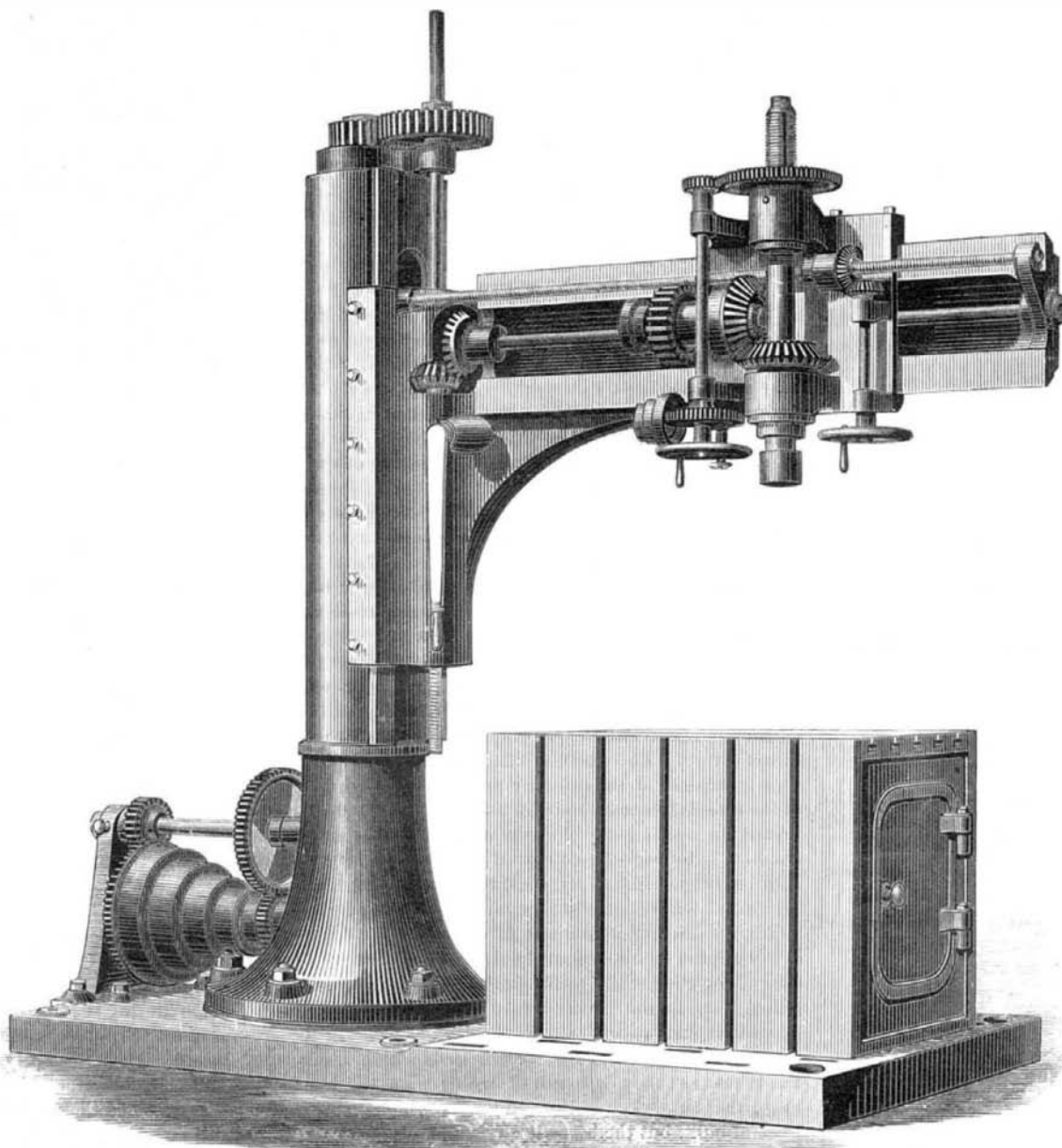
them into water while tightly held in clamps of the exact size, so as to render the edges of the bars as hard as flint, perfectly resisting the file or chisel, and impossible to be broken on account of the iron core. The clamp holds the bar so that warping is prevented.

A Dry Goods Palace Car.

A correspondent of the *American Manufacturer* says: "The United States Rolling Stock Company, at their shops in Chicago, are getting up what may be called a new departure. This is a palace dry goods car, to be used on railroads by dealers in dry goods, carrying samples along as well as stock to be delivered when sold. This car is 60 feet long, not including platforms at each end, or 66 feet long over all. Is built as light as possible and yet is strong. The construction of the body is very simple, having only two large windows on each side for lighting purposes, but at each end there is to be a stateroom for the traveling merchants to occupy nights or days, while on the roads. These staterooms are lighted by three small windows each. The inside of the car was not finished for use, so we cannot tell just how it is to be arranged, but no doubt convenient for the purpose. This car has a sub-cellar, as they call it, between the fore and aft trucks, where may be stored large quantities of domestic goods while in transit, and it has what may be called a mansard roof, or double deck, for light and ventilation, giving it the appearance of a sleeping car—except the finish. This is a new enterprise, and it remains to be seen upon trial if it shall prove a successful one."

RADIAL DRILLING MACHINE.

In the annexed engraving is shown a double-gear independent radial drilling and boring machine, exhibited at Paris by Messrs. Sharp, Stewart & Co., of Manchester, England. The machine is provided with a prolonged base plate, which carries the main standard and outer bearing for the double gear, and which is also planed to receive large articles. The table is movable, and is, when required, mounted on the base plate, as shown, so that small objects may be readily and accurately set and fixed to it. The table forms a cupboard for drills, etc. The radial arm which carries the drill spindle swings through an arc of 280°, while radially the spindle can be adjusted from a radius of 2 feet 7 inches to one of 6 feet. The shifting of the spindle carriage on the radial arm is effected by a hand wheel close to the spindle itself, so that the man in charge of the machine can make the adjustment while keeping his eye on the drill. The radial arm is also adjustable vertically by either hand or power, so as to enable the machine to take in objects from 4 feet to 6 feet in height. *Engineering*, to which we are indebted for the illustration, speaks highly of the workmanship of all the parts.

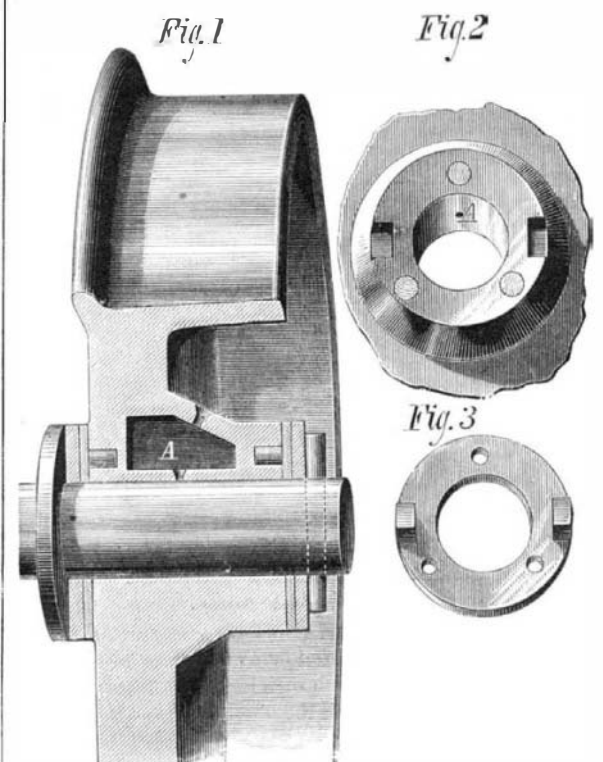


ENGLISH RADIAL DRILLING MACHINE.

IMPROVED SELF-OILING CAR WHEEL.

We illustrate herewith a new self-oiling car wheel, which is so constructed as to retain the lubricating oil, and to be easily removed when desired, so that another wheel may be substituted in its place.

Fig. 1 is a vertical section, and Figs. 2 and 3 are details of the parts. The hub is formed with an interior oil chamber, A, having an inlet on the outer side of the wheel, and



PHILLIPS' SELF-OILING CAR WHEEL.

an outlet within the hub, for the passage of the oil to the axle. Into each end of the hub are cast a sufficient number of openings of any suitable shape, into which are driven wooden plugs, and their ends made flush with the face of the hub. Next to the hub is placed a washer of gum, cork, or other suitable packing, which binds tight around the spindle; over this washer there is placed the iron washer, Fig. 3, and by means of common screws, screwed into the wooden plugs, it is drawn against the packing and an oil-tight joint thus secured. These screws pass through holes in the iron washer, and have their heads countersunk in it, so as to be flush with its face.

On the iron washer are cast two lugs, which enter corresponding recesses in the hub, and in the revolutions of the wheel they serve to take the strain off the screws. The packing, while it serves to retain the oil, also prevents the admission of dirt and grit from the outside.

This device is simple and inexpensive, and, we are informed, can be adapted to wheels without necessitating any change in the axle or in the framing of the car. It allows the wheel to have free lateral motion on the axle, offers no impediment to "spragging," and in case of accident the old wheel can be removed and a new one substituted, by the simple withdrawal of the linch pin, an important feature in and around collieries where time is an object.

Patented April 16, 1878. For further particulars address the inventor, Mr. Thomas H. Phillips, Kalmia Colliery, Orwin P. O., Schuylkill Co., Pa.

Brain Feeding.

We are glad to find some small tokens that the need of "brain feeding" is beginning to be recognized by the lay public. For example, it is at length perceived that to perform intellectual work thoroughly men must be supplied with fresh air. This scrap of wisdom has been excogitated in connection with the contro-

versy about the ventilation of courts of justice. It is not unreasonable to anticipate that in process of time it may dawn on the consciousness of ordinary thinkers that just as muscle is fed and trained for physical exercise, so brain needs to be prepared and sustained in mind work. It has too long been the fashion to leave the nobler part of man's organization to struggle with its own peculiar difficulties and supply its special needs as chance might enable it. This policy of neglect was all very well while the strain upon brain-power and work was not relatively inordinate. So long as the brain endured no more than its share of the penalty of labor it might be left to pick up the nutriment it required from the common store supplied to the body as a whole. The faculty of self-repair in the brain was assumed to be equal to the needs of the organ, and in health it proved adequate to the task thrown upon it. Now, however, the equilibrium has been disturbed. The press of work and the strain of worry are so great in these days of hot haste and breathless enterprise, that, except under conditions rarely established and maintained, the power of self-nourishment and repair in the mind organ is not sufficiently strong to keep it in health. It follows that it must be fed and nourished by special design. An adequate supply of oxygen is the preliminary requirement. Then comes the question of food; and, whatever else may feed the brain, workers with this organ should be assured that alcohol will not sustain it. Alcoholization and oxygenation are directly antagonistic processes; and even if alcohol be food for the brain, the organ cannot feed when the nutrient fluid circulating in its vessels is disabled from the task of conveying oxygen, which happens whenever spirit is present in more than very moderate proportions in the blood. The relief afforded by alcohol from the sense of depression produced by a lack of oxygen is, therefore, illusory. It is procured by over-stimulating an organ which is both exhausted and impaired.—*Lancet*.

THE WHITEHEAD TORPEDO.

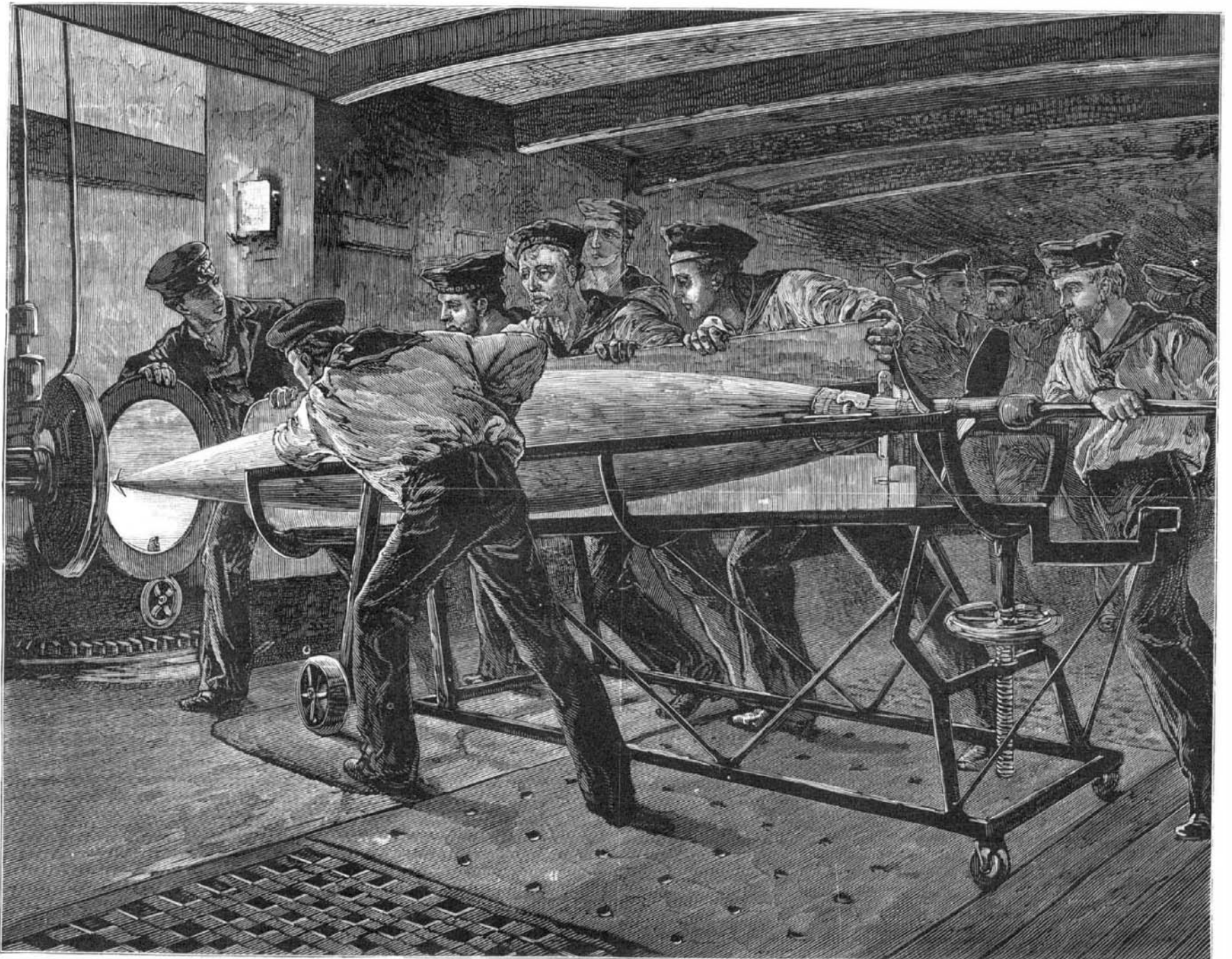
We are indebted to the *London Illustrated News* for the annexed engraving of the launching of a Whitehead torpedo from on board ship. This weapon consists of a long cigar shaped case of thin steel built in sections well screwed together, about 17 feet long from end to end, each section 15 inches wide in its widest part, and the steel about a sixteenth in thickness. The first compartment, at the head, contains the charge of gun cotton, to be fired by the forcing of a roughened pin into a cap of fulminate, on the torpedo coming into contact with anything after it has been

set in motion. The second compartment contains Mr. Whitehead's great secret contrivance, which gives the operator control over the machine, so that he can make it run at any required depth under water. The next section of the torpedo is the reservoir for compressed air, the motive power by which it runs along under water; then comes the machinery; and last of all the screw and rudders. The screw is four bladed, in appearance exactly like that of a steamer; but of the rudders there are two, one placed horizontally and the other vertically. It is the horizontal rudder which submerges the torpedo and keeps it at the required depth, until, its force being spent, it rises to the surface or sinks to the bottom, as may have been arranged in the manufacture. Outside the case nothing is to be seen but a smooth, polished surface, with a small trigger on the upper part of the air chamber, and a few screws recessed for the reception of keys. One of these, at the side of the second section, has an index attached, marked in feet, and this has merely to be turned to the required number for setting the torpedo to submerge itself and proceed along at the depth indicated. The trigger above mentioned is merely a lever for opening the air valve; and this is either done by hand when the torpedo is merely launched from a boat, or it is drawn back by a catch at the muzzle when it is shot out of a tube. In order to prevent accidents there are two safety pins, which will not allow the fuse to act. The one is drawn at starting, but the other can be so arranged as to remain in its place until a certain number of revolutions of the screw have been made, by which the torpedo is carried to a safe distance.

The preparation and use of the Whitehead "fish" torpedo on board ship may now be described. The sections of the torpedo are put together below, outside the torpedo room, and it is run along the flats on a small truck until it is beneath the hatchway in nearly the center of the battery deck, or citadel; through this it is hoisted by means of two Western's tackles and one rope tackle, and placed in a light iron framework carriage, in which it is run from the hatchway to the torpedo tube; here the carriage is placed so that the nose of the torpedo is pointing into the tube, and the tail is close to the torpedo charging column. The torpedo crew consists of six men, No. 6 being stationed at the torpedo magazine below, the remaining five men with the torpedo. Now, the torpedo being in its place, it is charged with compressed air by means of a small copper pipe, one end being screwed to the charging column, the other to a small hole in the left side of the torpedo, No. 1 of the torpedo crew opening the valves in the charging column to

admit 750 lbs. of compressed air; this is the amount usually used for practice, 1,000 to 1,200 lbs. being the amount that the torpedo would be charged with for actual warfare. On the gauge showing 750 lbs., No. 1 shuts off his valves and unscrews the charging pipe, and then proceeds to set the wheel for the number of teeth ordered by the officer, the little wheel in the stern regulating the distance the "fish" is required to go, as it runs forty yards for every tooth. This wheel also pulls out a safety wedge when the torpedo has gone eighty yards from the ship. The depth having been set, and the amount of pressure in atmosphere for the required speed (which works up to twelve knots and a half an hour), the pistol, or firing apparatus, is screwed in, the safety pin is withdrawn, and the torpedo is run into the tube. The impulse tube is then put on, and the torpedo is reported, through a tube to the pilot tower, to be ready for firing. The impulse tube is an affair very much resembling a telescope in form, which is forced out by compressed air, and, pushing the tail of the fish, gives it a good start on its journey clear of the ship, the compressed air afterward forcing the telescope in again. As the torpedo is forced out a small projection on the top of the inside of the tube catches a small lever on the top of the torpedo, and throws it back. This action opens the air valve, and admits the air from the air chamber to the engines, and so sets the screws going. For practice, a boat is sent out about 200 or 300 yards from the ship, either to pull past her or remain stationary, and a shot is taken at the boat, the torpedo being set to a sufficient depth to pass under her. When the torpedo has finished its run, it rises to and floats on the surface of the water, and the boat then attaches a line to its nose and tows it back to the ship. Brought alongside, a pair of tongs is lowered over the side and placed over the center of the fish, and when fairly placed the catch that keeps the tongs open is pulled up, and the tongs close firmly round the body of the fish, the safety pin having previously been put in over the air lever, so that by any accident the engines should not be again started and the fish run away with its tongs. When the tongs are firmly secured, the torpedo is pulled inboard, and is either taken to pieces, or stowed away, or put together again and treated with another run.

A CALIFORNIAN WHEAT FARM.—The largest farmer in the State is Dr. Glenn, of Colusi county. He farms 20,000 acres. He sold his last year's wheat crop for more than \$600,000. His farms are constantly being improved by fencing, the erection of good, permanent buildings, etc., and his stock of farming machinery is extensive and complete.



LAUNCHING A WHITEHEAD TORPEDO.