

crib, and the cribbing ring laid in, the circular scaffold is so lowered that it is slung immediately inside the crib, and between it and the crib a stout rubber tube is provided which, being connected with the compressed air main, may be inflated, thus making an absolutely water-tight joint, compelling all the dropping water to flow to the crib channel, and thence to the pump sump. The circular opening to allow the free passing of the hopped, is fitted with automatically closing doors, so that when the hopped is above the scaffold, there is not only a complete floor for the bricklayers, but a dry and protecting roof for the sinkers.

Another important point is the advantage obtained by the guide ropes for the sinking frame. These serve as a steady for the hopped when being lowered, thus abolishing all risk of a swaying rope when the banksman has improperly signalled for lowering. The motive

power for driving the apparatus is compressed air. Experiments have been tried with electricity, but this motive power has not given very great success, while steam of course is out of the question. But the utilization of air serves a dual purpose; for since approximately 100 cubic feet of free air may be discharged from each drill in the bottom, it will be seen that the atmospheric conditions for the workmen are always highly satisfactory; a very important factor in shaft sinking

The rapidity of boring naturally fluctuates with the nature of the soil to be penetrated; but through hard limestone a speed of 30 feet per week 25 feet 6 inches diameter has been attained, with an average (including all stoppages) of 22 feet. In the softer and coal measures power drills are unnecessary and hand drills may be applied to the frame and the proportional speed of sinking equally well maintained. Another noticeable feature of this contrivance is that when the desired depth has been reached the greater part of the plant may be efficiently used for driving and general purposes.

**SCHNEIDER-CANET LAUNCHING APPARATUS FOR SUBMARINE TORPEDOES.**

The Schneider-Canet torpedo launching apparatus consists essentially of a tube or barrel, a guiding spoon or bar, and a launching reservoir.

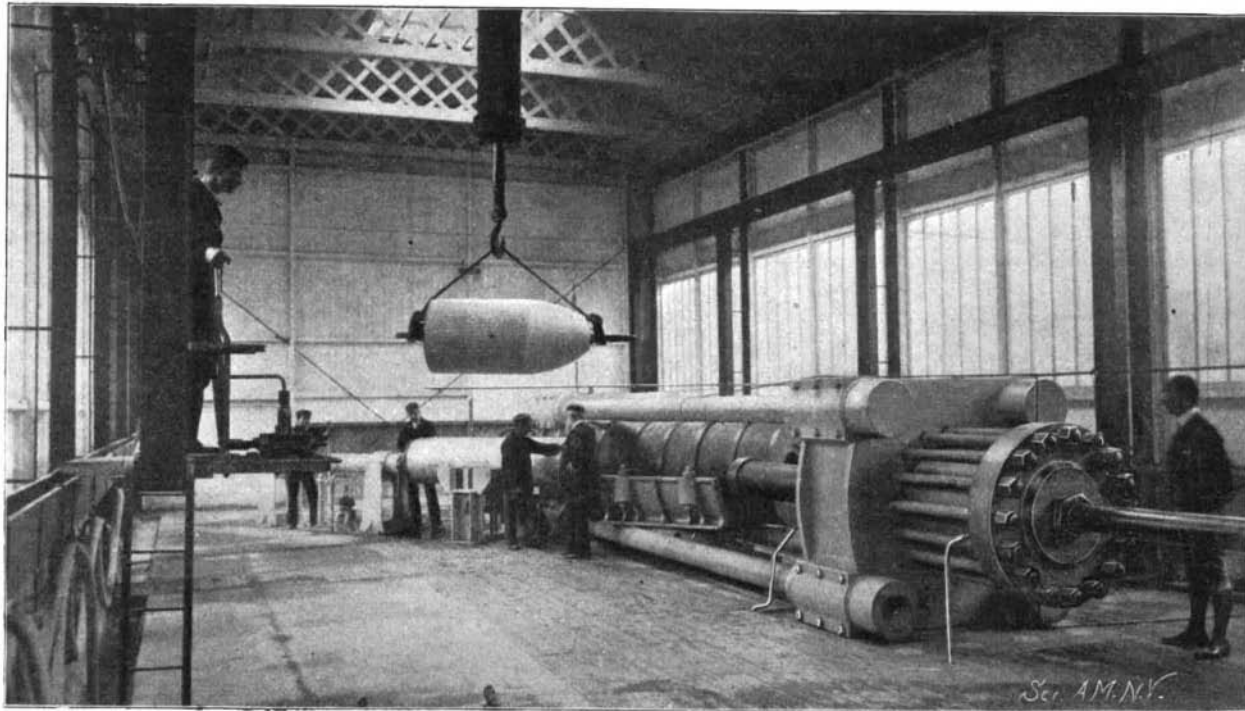
The tube proper is formed of a cylinder fixed to the side of the vessel and closed at one end by a gate, or valve, and at the other end by a breech-block. In this tube the spoon is arranged to slide, and is grooved to form guides for the torpedo.

This spoon is formed with a cylindrical portion and with a semi-cylindrical portion. The latter portion is formed with openings to permit the passage of the liquid, in order to regulate the pressure as much as possible on the entire surface of the torpedo at the moment of launching. The spoon is operated by means of a hydrostatic ram situated at one side of the tube. When the spoon has been run out, the launching of the torpedo is effected by means of compressed air, contained in the reservoir which is seen situated above the tube.

The gate being closed and the tube empty, the torpedo is launched in the following manner: The breech is opened; the torpedo introduced; the breech closed; the gate or valve opened; the spoon ejected; the torpedo launched; the spoon returned; the gate or valve closed; the tube is emptied, and the necessary

precautions taken to prevent improper operation of the mechanism.

The necessary steps preceding the actual launching can be taken beforehand so that the torpedo can be ejected at any given moment or at command.



**PRESSING AND MOLDING GUNCOTTON IN SOLID BLOCKS OF HIGH DENSITY BY THE HYDRAULIC PRESS.**

The principal merits of this system are the following: First, simplicity of construction; second, durability; third, trustworthiness and regularity of launching; and finally, exact estimation of the time of launching by reason of the operator's precise knowledge of the volume and the pressure of air.

**HYDRAULIC PROCESS FOR MANUFACTURING GUNCOTTON CHARGES.**

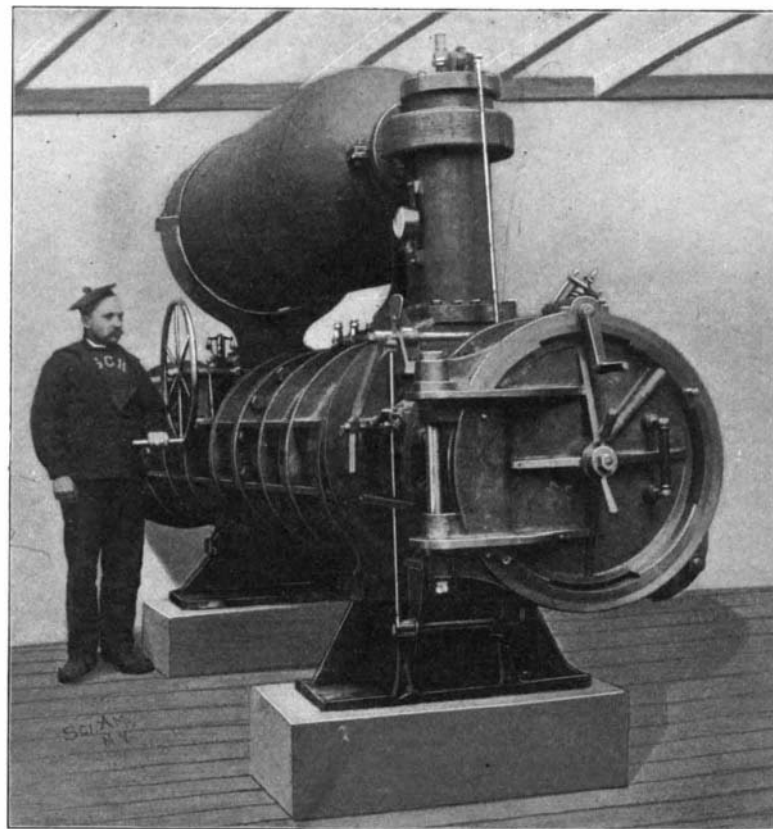
A new process of manufacturing guncotton charges for torpedoes, shells, submarine mines, etc., has been devised by the New Explosives Company, Ltd., of Stow-

market, England. Large charges are made by hydraulic pressure in a single homogeneous block, instead of being built up of a number of small segments. Hitherto it has not been possible to make a block exceeding a maximum weight of 9 pounds or over 2 inches in thickness in one piece. For instance, the number of small sections contained in the guncotton charge of an 18-inch Whitehead torpedo is about one hundred. The introduction of the hydraulic process has involved several important changes in the manufacture of the guncotton, particularly in the working up of the pulp, by which means all air is forced out of it. Several safety devices are introduced into the hydraulic machinery, by means of which all danger of detonation is absolutely obviated.

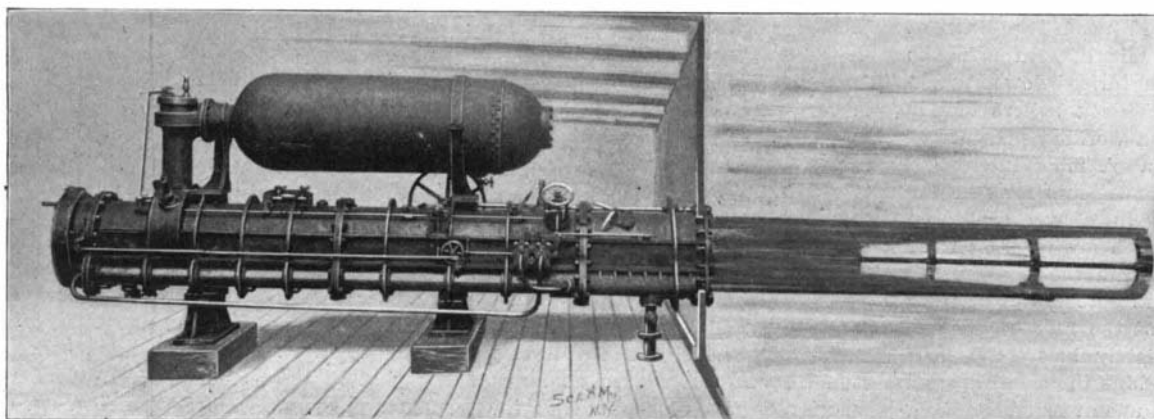
The guncotton pulp is first placed in a vertical cylinder made of finely-perforated sheet metal surrounded by a strong casing. Here all air that may be contained in the pulp is removed, which is a most important essential in the manufacture of the charge. A vertical shaft, equipped at the lower end with a small propeller-like screw and numerous agitators, fixed to a sleeve mounted to rotate independently of the propeller, descends into the vessel, and thoroughly disintegrates the pulp. The shaft not only revolves, but works up and down, so that the pulp is tightly compressed. By this means, all the water is forced out and it carries the air with it, through perforations in the cylinder. The cylinder is fixed to a table which has a perpendicular travel actuated by a screw. As the kneading proceeds and the charge is formed, the table leaves the screw, but the same pressure is excited by the agitators and propeller, and even distribution of the pulp is preserved throughout the charge, no matter what its length may be. One important point that has to be observed in the manufacture of the charge by this process, is that once the agitators have been set in motion, they must continue without cessation until the charge is finished; for should a breakdown occur, the agitators when restarted would cause a plane of cleavage in the block, which would subsequently result in a break at that point.

The accompanying photograph illustrates the machinery employed for the compression of the larger charges of guncotton. With this press blocks 2 feet 6 inches in diameter and 3 feet 6 inches in length can be produced. Moreover, the specific gravity of the guncotton is appreciably increased, being 1.523 as compared with the previous maximum gravity of 1.4. The perforated container in which the guncotton is placed is held within an outer holder, between which is a space for the admittance of water under pressure, which prevents the pulp being forced through the orifices in the container, and also acts as a lubricant when the guncotton is forced out of the container into the mold where the guncotton is forced into its desired ultimate form, by the hydraulic

ram. The container, with its charge of guncotton, is attached on a cradle, fixed at an angle to the center line of the press. At the back of the container is a side hydraulic ram, which forces the guncotton from the container into the mold mounted on a swiveling carriage. The mold is constructed with an inner lining, divided longitudinally into two or three sections surrounded by a jacket, also in longitudinal sections, but more numerous than in the case of the lining. Outside this jacket is a thick casing, wire-



**TORPEDO DISCHARGE TUBE; VIEW SHOWING BREECH CLOSED READY FOR FIRING.**



**ADSIDE VIEW SHOWING GUIDE "SPOON" PROJECTED THROUGH SIDE OF VESSEL IN PREPARATION FOR LAUNCHING A TORPEDO.**