

BRITISH NAVAL GUNS.

The armament of the British ship *Thunderer* is to consist of four 38-ton guns, originally intended for land service, but which have now been completed as naval guns. The accompanying engraving is a faithful representation of the improved *Enfant Terrible*. A comparison of its majestic proportions with those of the pigmy 7-pounder mountain gun, which the artist has introduced beneath, will enable the reader to form some idea of its actual size. The shells and cartridges for both guns will be seen standing between the wheels of the trolley on which the 38-ton gun rests. The 7-pounder is the weapon which gave such excellent results in the Abyssinian war. The dimensions of the 38-ton gun are as follows: Length, 19 feet; diameter at the thickest part of the breech, 57½ inches—being 1½ inches more in this respect than the 35-ton gun; diameter of trunnions, 13 inches; length of bore, 16 feet 6 inches; caliber, 12 inches. The rifling has an increasing twist from nothing at the breech to one turn in 35 calibers at the muzzle. The number of grooves is 9. The cartridge and projectiles are—for the present at least—to be similar to those of the 35-ton gun, namely, of 110 lbs. and 700 lbs. respectively. It is an acknowledged fact that, with the latter, a considerable quantity of the charge is blown out at the muzzle of the gun unconsumed, although, partly with a view of obviating such a difficulty, the weight of the powder employed has been reduced to a minimum. The evident cause of this is the impossibility of obtaining ignition of the cartridge throughout its entire mass in the momentary space of time that elapses before the projectile leaves the muzzle, owing to the extreme shortness of the bore, which is only 13 feet 6 inches in extent. But with the new gun, ample space is afforded for the expansion of the powder gas waves, and for the combustion of the charge, which, it is anticipated, will be entirely accomplished. Thus it may confidently be expected that better results will be obtained from actual practice with this weapon, both as regards range and penetration, than were arrived at in the trials already made with the 35-ton gun. The latter was proved capable of penetrating wrought iron plates 14 inches thick, as well as a backing of 18 inches of timber, and a skin of 1½ inches plate, at 500 yards; also of piercing, and very nearly of penetrating, wrought iron plates 15 inches thick, with a similar backing, etc., at 200 yards. It penetrated 12 inches armor and a similar backing up to 1,700 yards. The 38-ton gun will probably penetrate 16 inches of armor plate, with a corresponding backing, at a distance of 1,000 yards, as the addition of the 7 lbs. or 8 lbs. of powder to the charge—which was before wasted—must of course make a sensible difference in the amount of energy produced.—*The Engineer.*

PORTABLE STEAM WINCH.

The annexed engraving represents a handy little machine which was exhibited at the late Exposition at Vienna. It is a combined steam winch and pump, intended for the use of contractors and others. The whole machine is carried on a rectangular frame of 7 inches by 3 inches channel iron. The boiler is placed in the center of the frame; it is supported by wrought iron brackets, and fired from one side. The engine has a single cylinder, vertical and inverted, carried by light cast iron angle framing, which is bolted to the boiler at its upper end. The winch, in the construction of which there is nothing calling for special mention, is placed on the front of the frame, and driven from the engine in the usual way. A small centrifugal pump is placed at the hind end of the machine, and is driven by a strap from the

fly wheel of the engine, which has a turned rim for that purpose.

The engine can, of course, be used to drive a circular saw or other machinery, external to itself, when required, and is, in every respect, a handy affair. The whole is carried upon four wooden wheels, and fitted with shafts for horse transport. The boiler is intended to work at 90 lbs. pressure.

Recent Propeller Trials.

A recently published report of comparative tests, made by the Eagle line of steamers, between the Hirsch and the Grif-

The official reports of the engineers state that the engines driving the Hirsch screw worked exceedingly smoothly, and that there was a noticeable absence of any vibration.

Utilization of Slag.

During leave of absence in August last, Mr. C. R. Roelker, of the United States Navy, visited the ironworks of the "Georg's-Marien Hutte," near Osnabrück, in the province of Hanover, Prussia, and witnessed there some processes which, from their novelty and usefulness, he thinks will be of general interest

The most important, he says, are those which turn the slag of the smelting furnaces into useful material. This necessary product in the manufacture of iron, which is a source of such considerable inconvenience and expense, has been heretofore used for making road beds; it is also sometimes run into molds and formed into building stones. The process invented by Mr. Hartmann, the former manager of the above mentioned works, turns it into more extensive usefulness.

The high furnaces are provided with a continual overflow for the slag, which runs through a narrow gutter formed in the sand into a shallow pit, through which a small stream of water is kept running. By this chilling process the slag assumes the form of a fine gravel. An endless

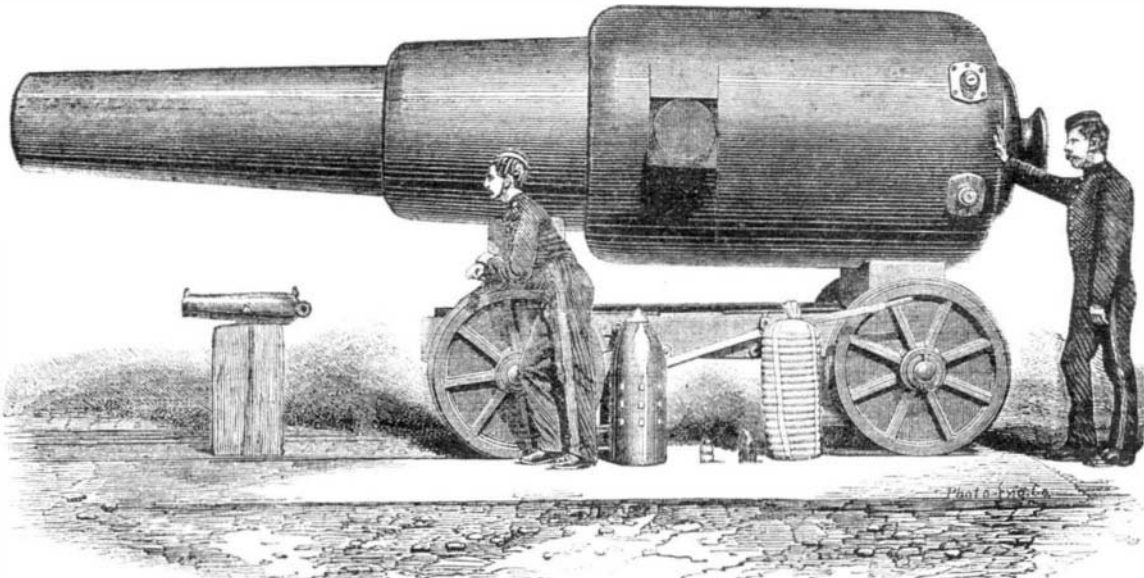
chain at once lifts the slag out of the pit and loads it upon cars. By grinding this material fine in a cement mill, it is formed into an excellent sharp building sand; the great bulk of it, however, is used, without further reducing its grain, for making bricks.

For this purpose it is mixed with one half of its bulk of mortar in a trough in which three shafts provided with long blades are revolving. It is then shoveled into the brick machines, each of which turn out about twenty-five bricks a minute. These bricks are piled up in the open air for drying, and are ready for use after about six weeks. They continue to harden on exposure to the air, and are said to possess greater strength than ordinary burnt bricks. They are extensively used for all kinds of buildings, their light gray color producing a very pleasing effect, and the roughness of their surface fitting them particularly well for retaining a coating of mortar. They cannot be used, however, for foundation walls, as by the absorption of moisture their cohesiveness is impaired.

The most interesting process is the following: As a thin stream of the fluid slag, falling from a narrow gutter, passes the nozzle of the steam pipe, a jet of steam is blown through it, and by this simple process it is solidified in the form of most delicate fibers, resembling asbestos or spun glass; and it falls to the ground like a loose mass of grayish wool. This material is an excellent non-conductor of heat, and is used for covering steam pipes, boilers, etc. The sole expenditure in its manufacture is that of the steam, the exact amount of which could not be ascertained. The material is sold for about \$5 per hundred cwt. The steam pipe is about 1½ inches in diameter, and the nozzle is simply a pipe, flattened and then curved into

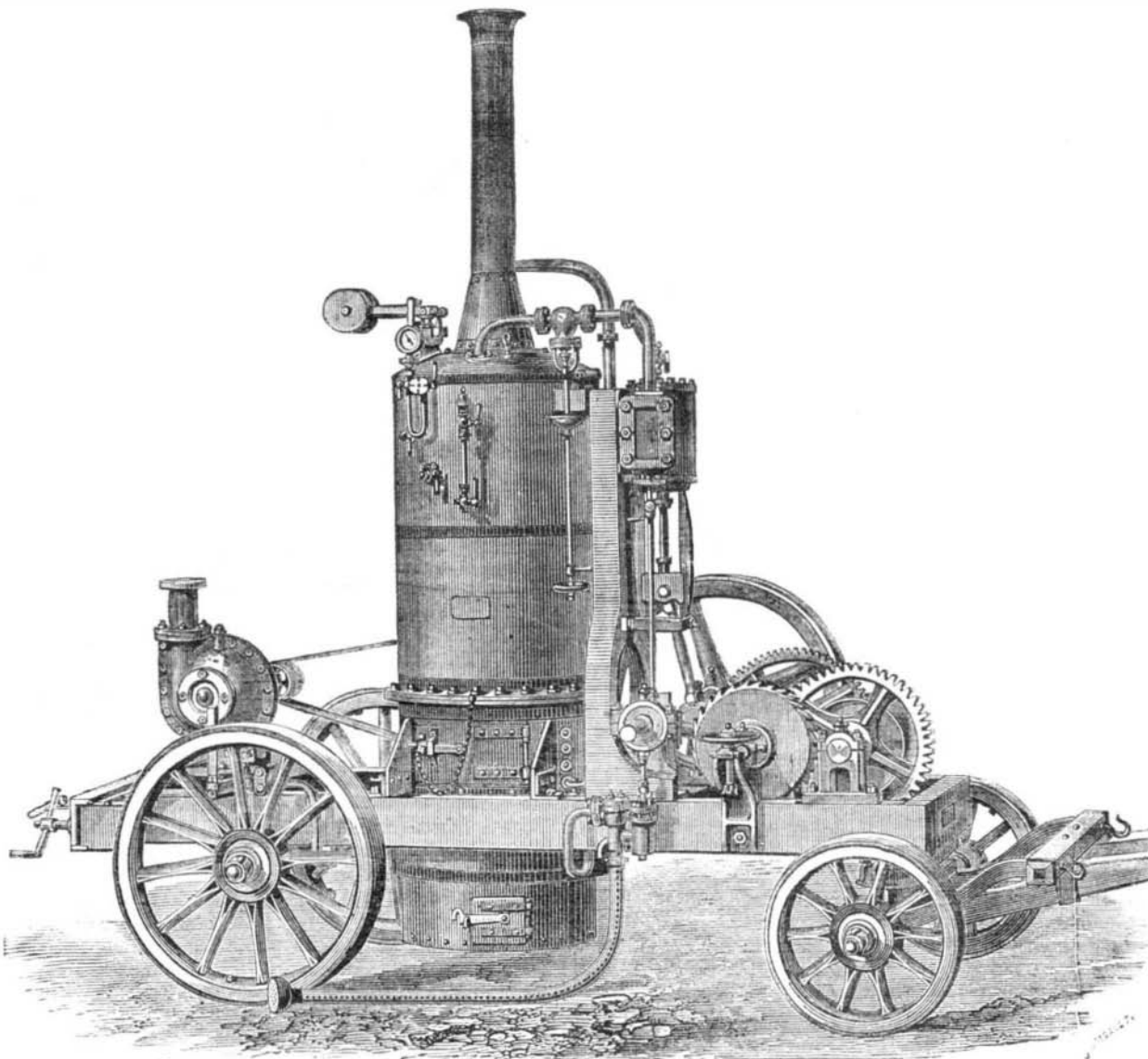
a semi-circular form, in order to give the most advantageous shape to the steam jet. The steam used has a pressure of about 50 lbs. per square inch.

MERCURIAL OINTMENT IN BOILS AND CARBUNCLES.—Dr. T. Roth lauds, in the *Deutsche Klinik*, the local application of gray ointment in boils and carbuncles, especially the early stages. He anoints the affected part with the ointment four times daily, and thereby reduces the inflammation and "back ans" the boil most satisfactorily.



THE BRITISH NAVY 38-TON GUN.

fiths propellers, shows a strong preponderance of advantages in favor of the screws of the former system. The steamship *Herder* was fitted with a Hirsch screw built for an increased speed, and also with a Griffiths propeller. The mean results of ten voyages between Hamburg and New York show for the Griffiths a speed of 11:59 knots; time under steam, 10 days, 17 hours, 30 minutes; coal consumed on passage, 572 tons; and 519.05 miles run on 100 tons of coal. For the Hirsch, 13 knots; 9 days and 13 hours; 505 tons and 582.79



PORTABLE STEAM WINCH AND PUMP.

miles: a gain of 1½ knots per hour, and an economy of 67 tons of coal. The *Goethe*, of the same line, the engines of which, like those of the *Herder*, are of 600 horse power nominal, was fitted with a Hirsch screw designed for saving in coal. The saving effected was 4 tons per twenty-four hours, and this although the draft of the vessel was 1 foot 7 inches more than when the Griffiths screw was in place. On board the *Leasing*, another vessel belonging to the same company, the Hirsch propeller caused a gain of 14.7 percent in speed.