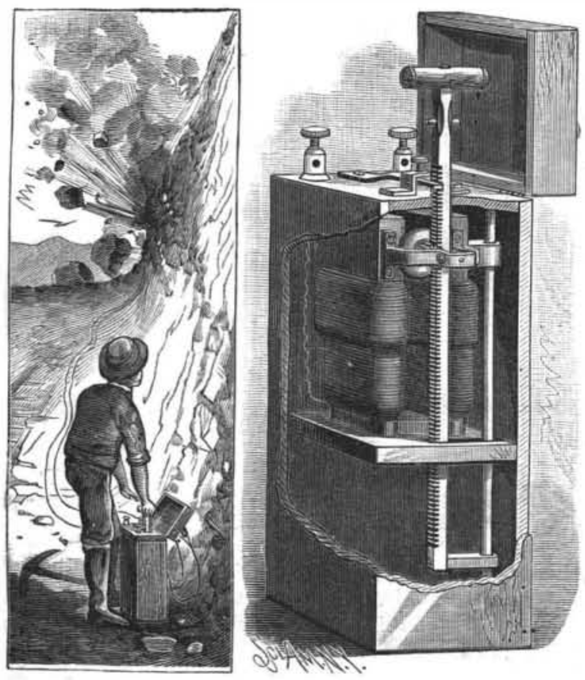
DYNAMO ELECTRIC IGNITING MACHINE.

It is well known that the field magnet and armature of a small dynamo electric machine may be quickly brought to saturation; and that when the current is at its maximum, the breaking of the circuit will cause the extra current generated in the coils to be discharged, either through the air at the point of rupture or through a derived circuit connected with the terminals of the field magnet. In the machine here illustrated this fact is taken advantage of, and also the fact that



SMITH'S DYNAMO ELECTRIC IGNITING MACHINE.

an accelerated motion of the armature is more effective in bringing the field magnet and armature to magnetic and electric saturation than a uniform rotation of the armature. The field magnet and armature—which is preferably of the Siemens I type—are of the usual construction. Mounted upon that end of the armature shaft opposite the commutator is a pinion, with which engages a rack bar passing through the top of the casing supporting the machine and extending downward toward the bottom. The upper end of the bar is provided with a handle, between which and the top of the casing a pin is inserted in the bar and allowed to project a short distance upon each side.

When the handle is raised in operating the machine, the pinion is rotated on the shaft without turning the armature, the clutch connection between the pinion and armature permitting of this action. When the rack bar is pushed down, a quickly accelerated rotary motion is imparted to the pinion, and the armature is rotated between the poles of the field, generating a current, which is so conducted that very little of it passes through the external or derived circuit, on account of its comparatively low electromotive force and the high resistance of the circuit. The current increases rapidly as the rack bar descends, and charges the armature and field to saturation. Just before the bar reaches the limit of its travel, its pin strikes a spring key secured to the top of the casing, and breaks the electrical connection at the instant the maximum of current and of magnetization of the field magnet is reached, so that the extra current flowing from the winding of the field and armature is compelled to pass through the external circuit, and thus heat the wires of the fuses included in that circuit, causing their explosion. The high electromotive force of the extra current enables it to readily pass through the external circuit, whose great resistance prevents the passage of the normal current.

This invention has been patented by Mr. H. Julius Smith, of Mountain View, N. J.

IMPROVED HOPPER DREDGER.

There is now being completed on the River Cart, at the works of Messrs. William Simons & Co., Renfrew, a 1,000 ton hopper dredger for the corporation of Bristol, to be used for dredging the River Avon. This fine dredger is of quite a peculiar type. It is built of steel, of light draught, broad beam, and great carrying capacity. In order to avoid the necessity of canting in the river, the vessel is fitted with twin screws, fore and aft, or four in all, and is provided with three rudders, two aft and one forward. The principal dimensions are: Length, 218 ft.; beam, 43 ft.; depth, 17 ft. There are three hoppers amidships, capable of containing 1,000 tons of dredgings.

The propelling machinery consists of two independent sets of triple-expansion engines, which will work up to 1,300 horse power. A compound auxiliary engine is used to work the bucket ladder and other gearing when the main engine is not in use. The boilers, three in number, are double furnaced, and are of mild steel. The furnaces are corrugated. The boilers are intended to work at 150 lb. pressure. The bucket ladder is fitted upon Messrs. Simons' patent traversing arrangement, by which the ladder is supported upon a horizontal fore and aft frame. By means of this frame, the latter can be projected beyond the stern of the dredger, so that a bank may be cut into by the buckets, and the vessel thus enabled to excavate its own flotation. The traversing gear is so arranged that it can be operated at any desired speed, and thrown promptly out of gear when required. The buckets are capable of raising 500 tons of dredgings per hour, and can dredge to a depth of 36 ft. below the surface of the water. The other appliances on board are similar to those fitted by Messrs. Simons on the vessels of the hopper barge type which they have recently built.

Messrs. Simons were the first to introduce the combined hopper and dredger. The first vessel of this type was built in 1872, for the Canadian Government. Since then, Messrs. Simons have constructed twenty-four vessels of the same character, ranging in capacity from 200 to 1,300 tons. The advantages claimed for the hopper dredger are that it unites in one vessel the capacities of a dredger, barge, attendant tugs, etc. A single crew is, therefore, able to perform the work of several.

According to a log recently published of the performances of an 850 ton hopper dredger supplied by Messrs. Simons to the Belfast Harbor Commissioners, the following were the results: 14,450 tons of free sand and clay were dredged and deposited at sea, at a distance of ten or twelve miles, in seventy-four hours and five minutes of engine time, at a cost for both operations of under one penny per ton for working expenses. It is calculated that the working expenses of the dredger which we illustrate this week will approximate to these figures.—*Industries.*

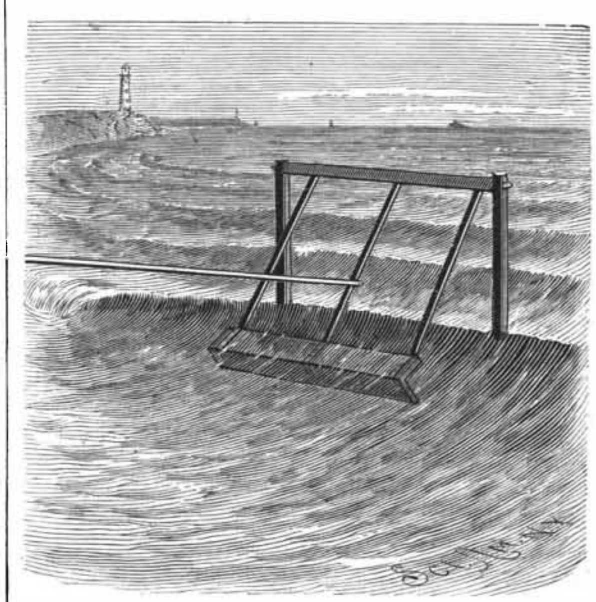
Soldering Copper.

A practical smith says in one of our contemporaries that when copper is soldered and the solder to be colored like the surrounding copper, this can be done by moistening the solder with a saturated solution of vitriol of copper and then touching the solder with an iron or steel wire. A thin skin of copper is precipitated, which can be thickened by repeating the process several times. If a brass color is desired, a saturated solution of one part of vitriol of zinc and two parts of vitriol of copper is used on the previously coppered solder and the latter rubbed with a zinc wire. To gild the soldered spot, it is first coated with copper in the manner indicated above, and then with gum or isinglass and powdered with bronze powder. A surface is obtained which, after drying, can be very brightly polished.

WAVES UTILIZED TO PUMP WATER.

I send herewith a description of a wave-operated force pump I constructed last summer, to supply my cottage with water, at Thousand Island Park, St. Lawrence River, N. Y. The water was delivered through a three-quarter inch pipe, 200 feet, with 40 feet elevation to tank. The power was obtained from the momentum of the waves, which proved ample.

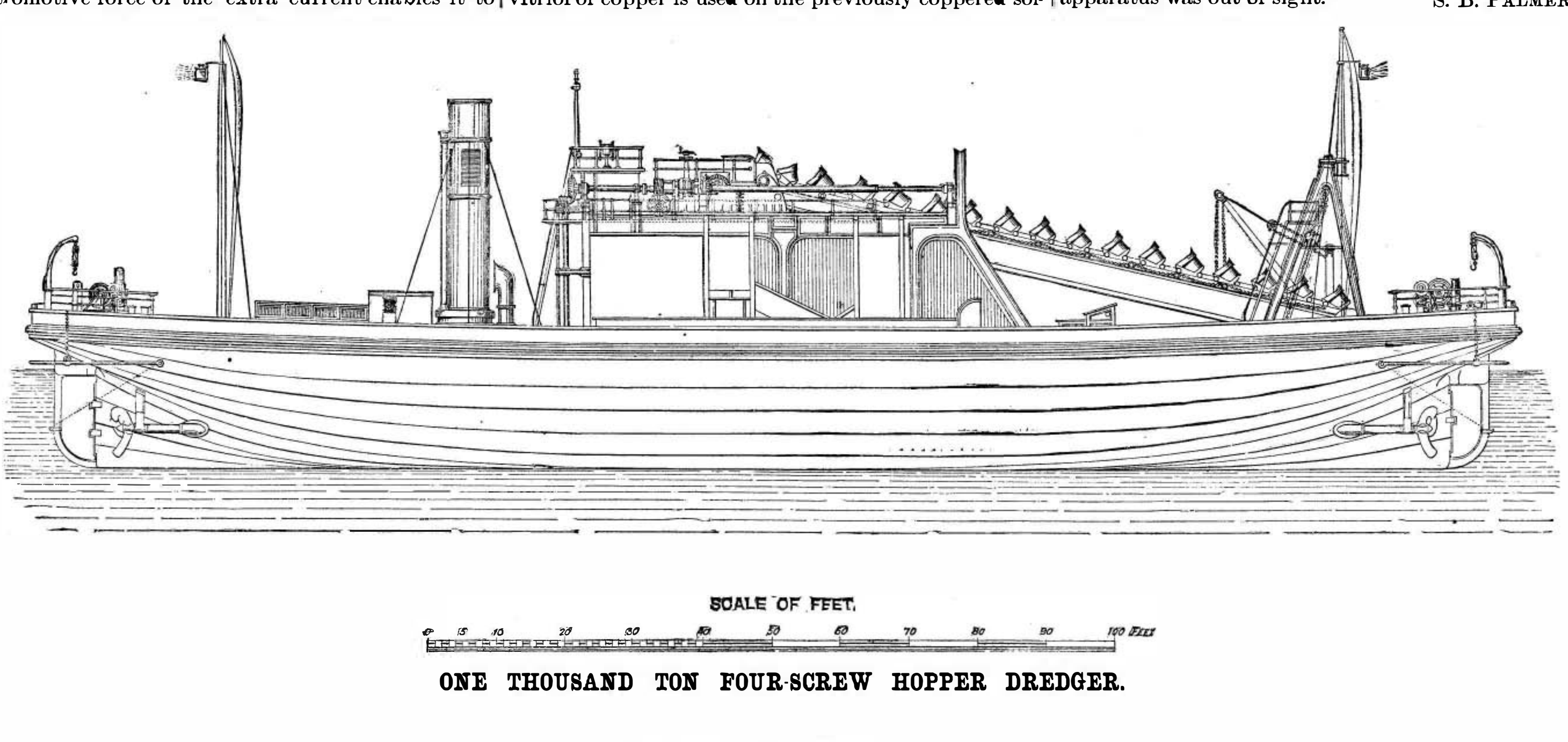
The first method by which I endeavored to obtain the power was by a float upon the water, which operated beautifully when detached, but when required to work, very little power was developed. I then hung a shaft, about six feet long, from supports an-



HOW TO RUN A PUMP BY WAVE FORCE.

chored in cribwork, as shown in the sketch, and from the shaft suspended three arms, three feet long. Suspended from the end arms was a plank trough, six inches wide. Practically, the apparatus represented a six foot wheel, like the paddle wheel of a steamer, with barely one bucket, and that having a trough-like section. A cross arm at right angles projected from the central arm, to which was attached the pump. The incoming wave would impart its force or momentum to the swinging pendulum, carrying it much or little, according to the size. It was a surprise to see how small waves could do work; that is, little swells, which would swing the bucket but a few inches, would deliver a corresponding amount of water, frequently in drops, rather than in a stream. Another lesson was learned by constructing the bucket eleven inches wide. At first, when a stream came sufficient to fill the bucket, there was not only a large waste of power, but great danger of destruction of the machine. Six inches proved to be the best width. For increase of power, increase in length is preferable. I am well aware that such apparatus might not be as practical as a windmill where heavy seas are liable to occur, as the construction of the piece to stand the shocks would be expensive. In this experiment the cost was not one-quarter that of a windmill, while the apparatus was out of sight.

S. B. PALMER.



ONE THOUSAND TON FOUR-SCREW HOPPER DREDGER.