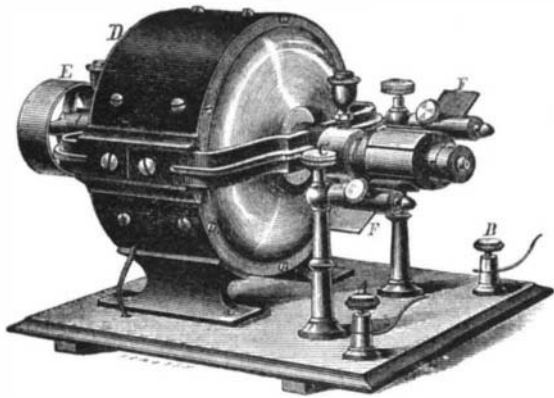


[Continued from first page.]  
of the commutator slips over the shaft and rests upon the thimble, and is pressed against this brass washer; the other half of the commutator slips upon the shaft, but there is

Fig. 3.



placed between the two halves a thin rubber washer, so as to insulate them from each other. The ends of the wires from the armatures are connected to the shaft, and through the shaft to that half of the commutator which bears upon it. A nut is used to keep the two parts of the commutator together and upon the shaft. Two springs, F F, made of thin, hard rolled sheet copper—silver plated to prevent oxidation—are used to secure good contact with the commutator. These springs are fixed in adjustable clamps, C, supported on brass pillars.

The operation of the machine is as follows: When the apparatus is first made, the electro-magnets are for a moment connected to a battery, or other source of electricity which renders them permanently magnetic. Now if a belt from any source of power be put on the pulley, E, and the machine set in motion, weak currents will be induced in the wires surrounding the armatures, which are picked up by the springs, F F, and carried to the two pillars. If the two wires, A and B, leading from coils of the electro-magnets be placed in contact with these pillars, the weak currents will pass around the electro-magnets and will strengthen them; this will again increase the strength of the currents induced in the armatures, and so on until a maximum is reached. To utilize the currents from such a machine, it would be simply necessary to place the work to be done in circuit with the electro-magnets and armatures, so that the currents induced in the armatures may pass through that circuit, and through the coils of the electro-magnets.

The machine as described would have limited applications, as the currents resulting from the polarization of the electrodes in the vat would, when the speed of the machine fell below a certain point, reverse the polarity of the electro-magnets and the direction of the current, thus undoing what it had previously done, and spoiling the work.

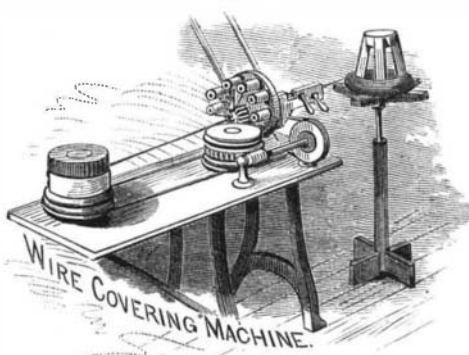
In order to prevent this an automatic device called a governor is employed, which accomplishes the purpose admirably. A metal pillar is fixed to the base of the machine, on the top of which is a cup containing mercury, which cup is made to rotate by a belt running from the shaft of the machine. At a little distance from this pillar is placed another one, with its top part at a right angle and projecting over the cup of mercury. An amalgamated wire is so adjusted in the end of the bent portion that it just touches the mercury in the cup. If the cup be stationary, the mercury will remain in the bottom of the cup; and there is a metallic connection. If the cup be rotated the mercury will rise on the sides of the cup by centrifugal action, and the connection is broken. Fig. 4 shows the process of covering the wire for the magnets, and in Fig. 5 the

process of winding them. One of the machines is also shown in Fig. 2 as arranged for work, together with tanks, press, black-leading machine, and other paraphernalia used by electrotypers—electrotyping being one of the uses in which the machine is largely employed. A shell can be obtained by the machine in from 2 to 2½ hours, being equal to that from the usual batteries employed in 10 to 12 hours.

Among the advantages of the machine, as used for electroplating, is the automatic adjustment of current to the surface of the work to be plated, preventing the burning of small quantities of work; economy by dispensing with batteries; a saving of time and cost of material, as the machine supplies the current the moment the power starts it; uniformity of deposit, as a given speed always gives the same results. A deposit can be made in about one half the time used by batteries.

The machines are made with 6, 8, 12, and 16 inch cylinders. The 12 inch machine is considered as a standard with

Fig. 4.



electrotypers and in large electro-plating establishments. They are in some of the largest silverware plating establishments in the country, and are also being rapidly adopted by manufacturing jewelers, etc.

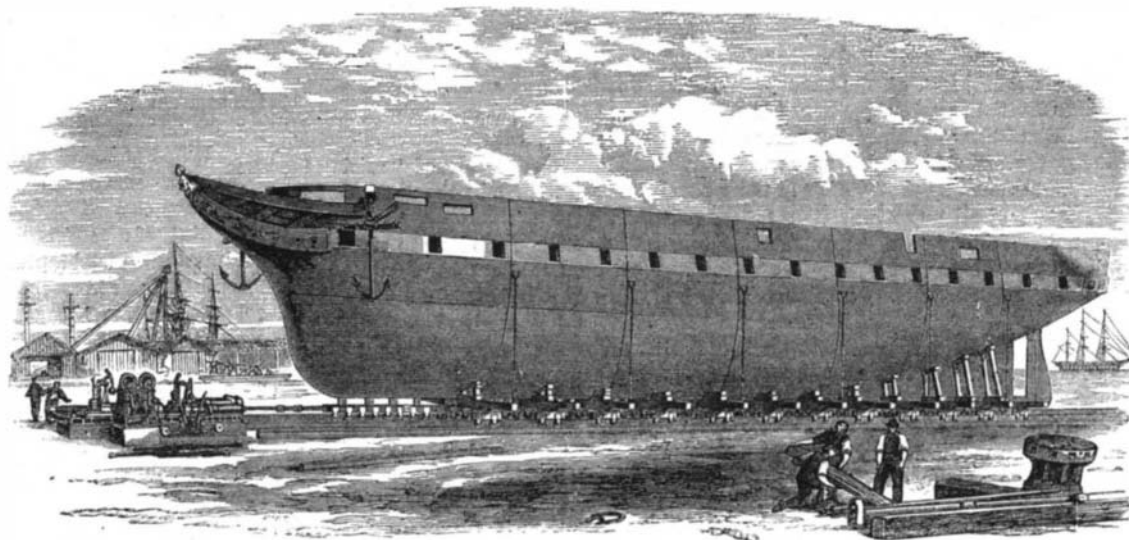
Further information regarding the machines may be ob-

and by which the delay and other inconveniences arising from intermittent action are avoided. Hydraulic machinery for this purpose has for a number of years superseded the less efficient application of steam power, and the cruder ar-

Fig. 5.



rangment of capstans worked by men or horses. One of the great objections to the older systems of lifting arose from the fact that, at intervals corresponding to the stroke of the ram, the forward movement of the cradle had to be arrested until one length of the traction rods was removed and the ram brought back and connection made with the next section of the traction rod. Such a process is unavoidably slow, while the successive arrests of the cradle expose the ship to a series of shocks and a liability to strain. These difficulties are removed by the arrangement illustrated, which was designed by Mr. George Jenkins, of Portsea, England. It consists, as shown in Fig. 1 and in detail in Fig. 2, of four hydraulic cylinders laid parallel and in pairs as shown. The rams of each pair are connected by a crosshead through which the traction links pass, these latter extending down the slip to the cradle and being supported by a central guide



HYDRAULIC HAULING MACHINERY FOR INCLINED SLIPS.—Fig. 1.

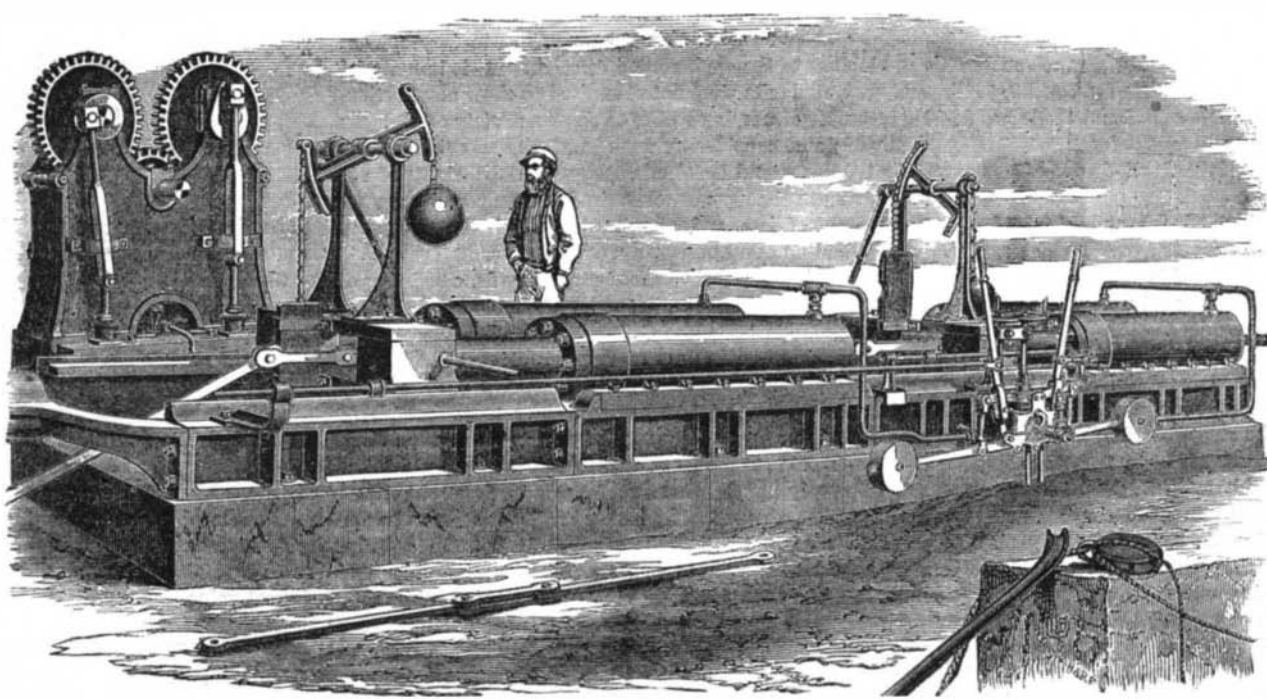
tained of the agents, Messrs. Condit, Hanson & Van Winkle, 236 Market St., Newark, N. J., who are also manufacturers of nickel and electro-plating material, chemicals, etc.

IMPROVED HYDRAULIC HAULING MACHINERY.

We illustrate herewith from *Engineering* a new arrangement of hydraulic machinery for raising vessels up inclined slips,

when there is no pressure against it; and by turning the lever on the end of the horizontal shaft the stopper is thrown down into its place between the short pair of links and against the crosshead which couples the pair of rams.

The action of the machine is as follows: When the traction rods have been connected to the cradle and led up to the cylinders, the forward stopper is depressed into its position



HYDRAULIC HAULING MACHINERY FOR INCLINED SLIPS.—Fig. 2.

between the links, and the rams are put in motion, carrying forward the traction rod, and hauling the vessel up the slip. Immediately before the travel of the first pair of rams is completed the second stopper is thrown down to engage between another pair of links, and the other two rams then are set in motion, continuing the work. As soon as the strain is thus taken off the first stopper, the latter is raised clear of the links by the balance weight on the segment, and is thrown down a gain only when the second pair of rams has nearly completed its stroke, when the operation is repeated, the rams having been previously run back, hauling the cradle up proceeds.