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ELECTRO-PLATING MACHINERY.

There are many advantages in an electro-deposit of nickel, silver, gold, etc., to prevent and protect the surfaces of inferior metals from oxidation, but the source of electricity from the various batteries employed has always been an obstacle to its greater development.

In the machine we illustrate there is shown a mechanical source of electricity of constant uniform power, light cost of running, and of easy management. Mr. Edward Weston, a practical electro-metallurgist, and the electrician of the Weston Dynamo-electric Machine Company, of Newark, N. J., is the inventor, and Condit, Hanson & Van Winkle, also of Newark, are the agents.

The interior of a large plating works is shown in the cut, Fig. 1. The dynamo-electric machine, as it is termed, and the method of driving it is shown upon the right. It is rotated about 800 revolutions per minute, and furnishes the current for plating. It is connected by means of wires to rods running across the various tanks containing the metal solution to be deposited. On the tanks are rods supporting the anodes or metals to be deposited, and also the work to be plated.

It is usual to place the tank containing the nickel solution nearest the machine, as this solution offers the greatest resistance to the electrical current. A solution of cyanide of copper is used in many cases as an intermediate deposit upon iron or steel before the nickel, as it prevents the tendency to rust upon exposure. This solution is also used for depositing copper on zinc and lead, or articles made up of several metals.

In Fig. 3 is shown a cut of the Weston dynamo-electric machine. As will be observed, an iron cylinder, D, forms the outside of the machine, and is attached to a wooden base. From the interior of this cylinder a number of radially projecting magnets are arranged, all pointing to a common center. These magnets consist of a case of iron, to which are fastened a number of tempered steel plates, insulated with copper wire, in the manner usually employed in making electro-magnets. They are so connected that the poles will be alternately positive and negative.

In the central space left between the inward ends of the magnets, is arranged a shaft which is rotated by the pulley, E. A series of armatures made in segments are firmly secured to this shaft. These armatures are of soft iron, and are also wrapped with wire. The outwardly projecting ends are thin pieces of iron, and so arranged that, when they are simultaneously revolved, by the turning of the shaft, these outwardly projecting ends will pass closely, but without touching, the inwardly projecting ends of the magnets. When the shaft, as it carries the armatures, is very rapidly revolved past the electro-magnets, currents of electricity will be induced in the wires surrounding the armatures; but as such currents are constantly changing their direction, a device called a commutator has to be used. This commutator consists of two pieces revolving on the shaft, on which they are mounted. One part is slipped upon the shaft and is insulated from it and from the other part. In construction a thimble of wood is slipped upon the shaft, and upon this thimble a brass washer is placed, to which the wires proceeding from the armatures through a steel bushing containing wooden tubes are passed. One half

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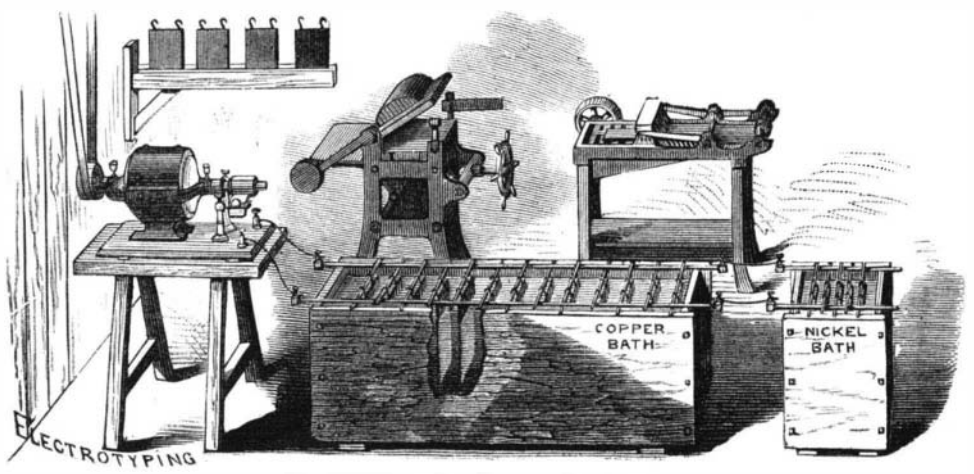
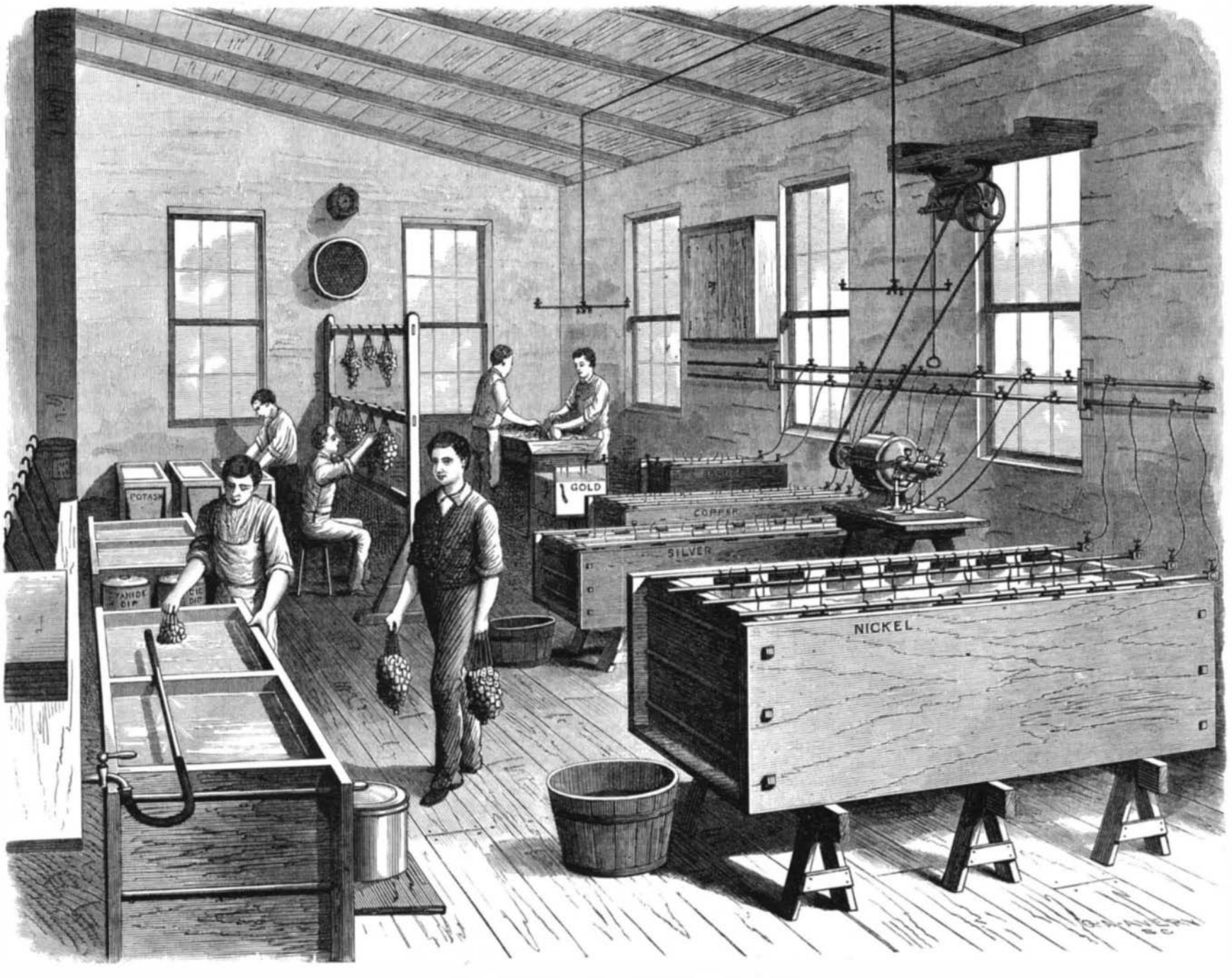


ELECTROTYPING APPARATUS.—Fig. 2.



MACHINERY FOR ELECTRO-PLATING.

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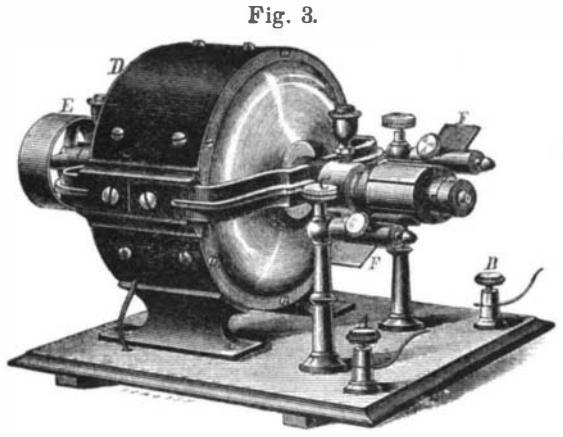
of the commutator slips over the shaft and rests upon the thimble, and is pressed against this brass washer; the other half of the commutator slips upon the shaft, but there is

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.

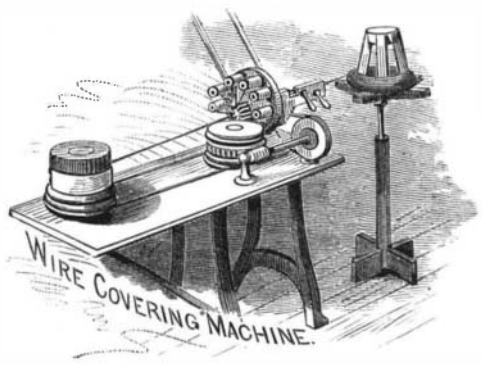
The machine as described would have limited applications, as the currents resulting from the polarization of the electrodes in the vat would, when the speed of the machine fell below a certain point, reverse the polarity of the electro-magnets and the direction of the current, thus undoing what it had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

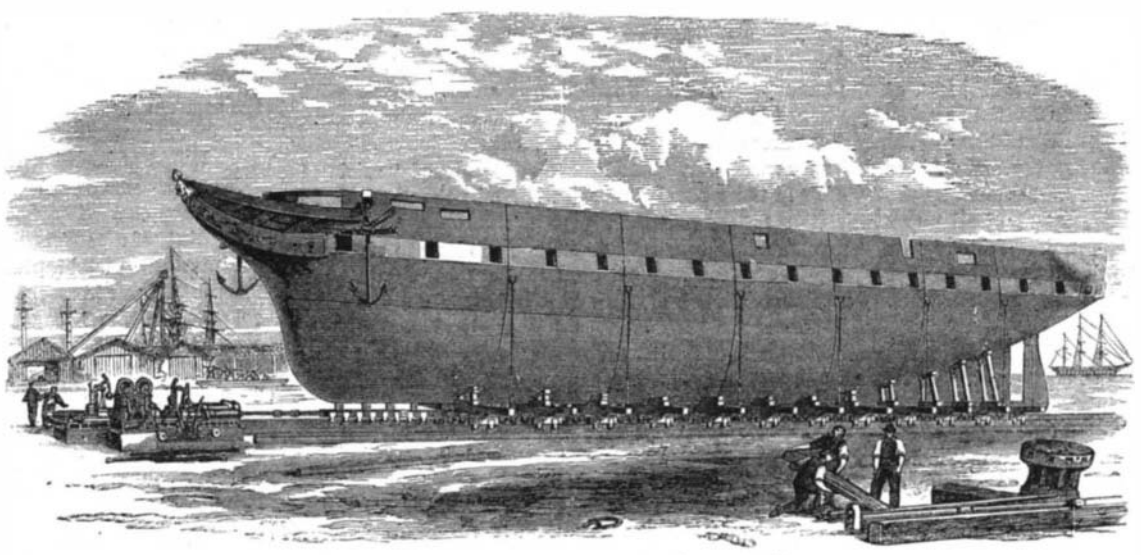
Fig. 4.



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 obtained 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.

Fig. 5.

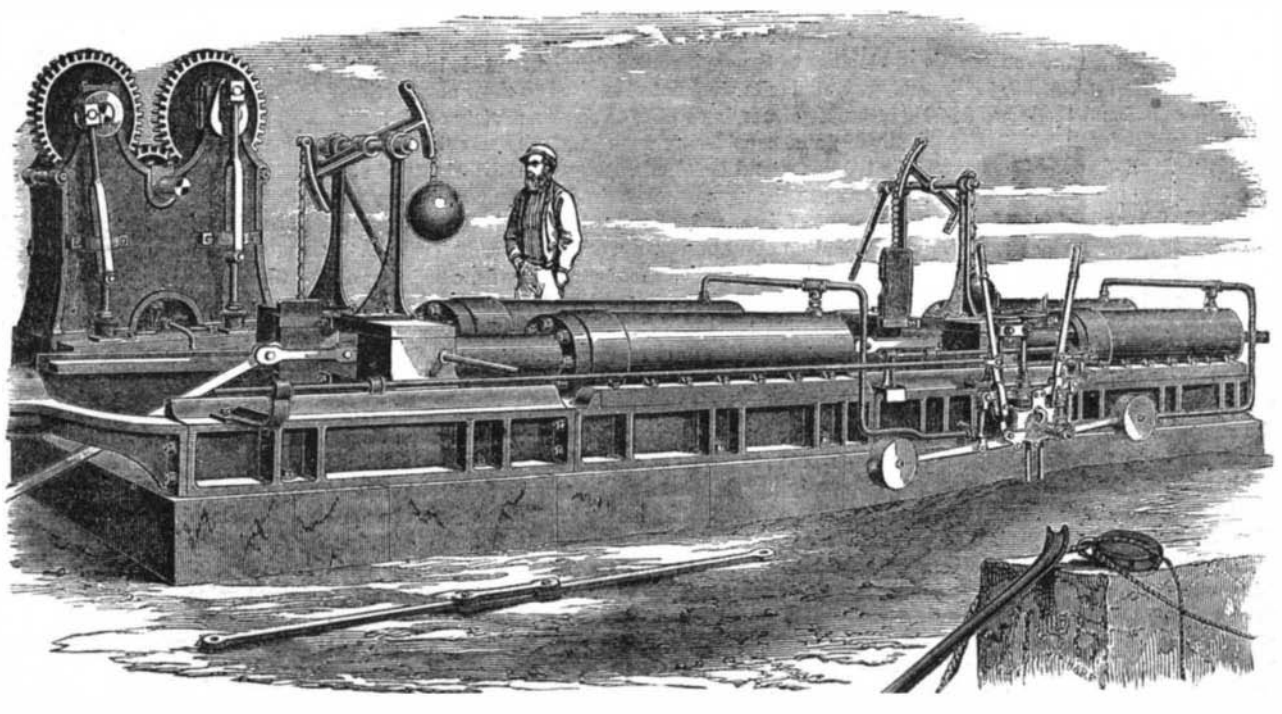


HYDRAULIC HAULING MACHINERY FOR INCLINED SLIPS.—Fig. 1.

IMPROVED HYDRAULIC HAULING MACHINERY.

We illustrate herewith from *Engineering* a new arrangement of hydraulic machinery for raising vessels up inclined slips, 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 arrangement 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 rail. On the top of each crossshead are bolted two standards, through the upper ends of which passes a horizontal shaft. In the center of this shaft is keyed a double segment, one arm of which is weighted as shown. On the end of each horizontal shaft a hand lever is fastened. On the other arm of the segment is attached a chain carrying at its lower end an iron block serving as a stopper, and so placed as to drop, while the segment is depressed, between a short pair of links in the traction rod. These links are placed at regular intervals corresponding to the stroke of the rams. The balance weight on the segment maintains the stopper in the position shown in the further pair of cylinders 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 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 again 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.



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