H. WILDE.

PROCESS AND APPARATUS FOR COATING METAL-ROLLERS.

No. 193,204. Patented July 17, 1877.

Fig. 1.

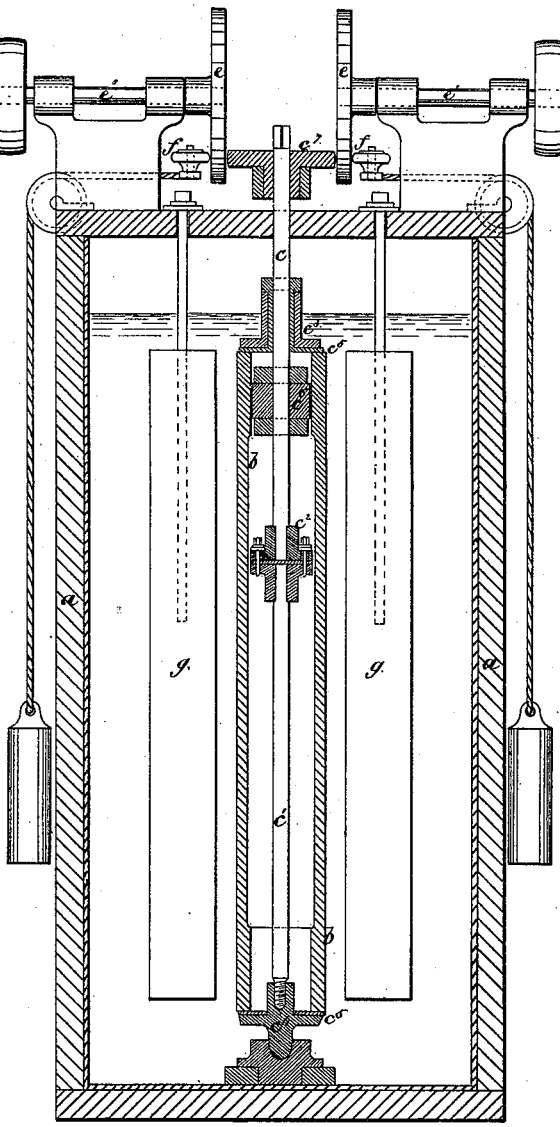
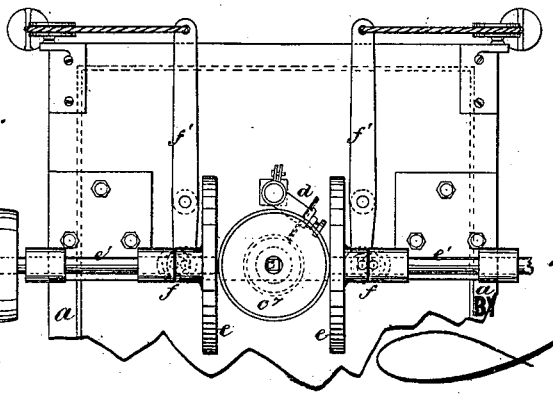


Fig. 2.



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IMPROVEMENT IN PROCESSES AND APPARATUS FOR COATING METAL ROLLERS.

Specification forming part of Letters Patent No. **193,204**, dated July 17, 1877; application filed April 20, 1877.

To all whom it may concern:

Be it known that I, HENRY WILDE, of Manchester, in the county of Lancaster, in England, engineer, have invented certain new and useful Improvements in the Manufacture of Metal Rollers for Printing Textile Fabrics, and for other purposes; and I hereby declare the following to be full, clear, and exact description thereof, reference being had to the annexed drawings, forming part of this specification.

Attempts have been made from time to time to substitute iron rollers covered with a thin layer of copper by means of electricity for the solid copper rollers used in calico-printing, and in other processes; but, owing to the expense of the battery-power and the slow rate at which the copper was deposited in the reguline state, such attempts have not hitherto been commercially successful.

Now, my invention consists, first, in a method of securing a sufficient amount of adhesion between the iron and deposited copper surfaces to enable the roller to withstand the various engraving and other operations without the separation of the metals. For this purpose the iron roller, before receiving a coating of copper from a hot cyanide solution of copper, is heated to a temperature ranging from 150° to 212° Fahrenheit, by plunging it into boiling water, or by other means. The said roller, after receiving a film deposit of copper from the cyanide solution, is then transferred to the bath containing a sulphate solution of copper, where it receives one or more thin coatings of copper. These coatings are subjected to considerable pressure by the action of a burnishing-roller of hardened steel, for the double purpose of forcing the deposited copper into closer contact with the iron, and detecting any want of adhesion between the two metals. The burnished coppered roller is then replaced in the bath of sulphate of copper solution, and subjected to the action of the electric current until the desired thickness of copper deposit is obtained. Before each of the depositing operations the surface of the roller is thoroughly cleansed by scouring and washing in clean water, as is well understood.

My invention consists, secondly, in giving to the electrolyte or depositing liquid, in which the roller to be coated is immersed, or to the positive and negative electrodes themselves, a motion of rotation in order that fresh particles of the electrolyte may be brought successively in contact with the metallic surfaces. By this means powerful currents of electricity may be brought to bear upon small surfaces of metal without detriment to the quality of the copper deposited, while the rate of the deposit is greatly accelerated.

Referring to the drawings, Figure 1 is a sectional elevation, and Fig. 2 a plan, of the apparatus which I employ in the manufacture of metal rollers.

a is a vat containing the electrolyte or depositing liquid, and *b* is the iron or other metal roller to be coated, which is secured to the axle of rotation $c\ c^1$. This axle is made in two parts united together by the flange-coupling c^2, but insulated from each other by a disk of ebonite or other insulating material placed between the flanges of the coupling. The ends of the roller *b* are closed by the brass caps c^3 and c^4, and the gutta-percha or wood washers c^5, the whole being tightened together by the screw at the lower end of the axle c^1, for the purpose of insulating the caps from the roller and for excluding the depositing liquid from the interior of the roller. The pivot on the cap c^4 rotates in a footstep made of lignum-vitæ or other suitable material. The cap c^3 is insulated from the axle *c* by a bush of ebonite, and electrical contact is established between the axle *c* and the roller *b* by the piston-block c^6, which is provided with metal packing-rings which is press against the internal surface of the roller. At the upper end of the axle *c* is fixed the friction-pulley c^7, the boss of which is provided with a copper hoop, on which acts the copper brush *d* connected with the negative pole of the electro-magnetic machine or other electro-motor. The friction-pulley c^7 is driven by the disks *e*, fixed on the driving-shafts *e*. The disks *e* are pressed against the friction-pulley c^7 by the bowls *f*, mounted on the ends of the weighted levers f^1.

g g are the positive electrodes, the number of which can be varied. These electrodes are plates of copper, which are suspended from

the top of the vat *a* by copper rods connected with the positive terminal of the electro-magnetic machine or other electro-motor.

Instead of producing the whirling motion of the electrolyte by the rotation of the roller *b*, as described, it may be produced by paddles revolving in the annular space between fixed electrodes and a stationary roller.

In order to prevent the iron printing-rollers from splitting at the ends by the conical wedge mandrels of the engraving and polishing machines, or when split to prevent the fracture in the cast-iron from extending to the engraved copper surface of the roller, the ends of the roller are turned down externally for a short distance, and hoops or rings of malleable iron or steel are either shrunk or forced over the ends, and the copper is deposited over the hoops uniformly with the surface of the roller.

In defining more clearly the scope of my invention, I would state, with respect to the feature of heating the rollers before immersing them in the copper bath to secure a more intimate union of the plate, that I do not claim, broadly, such step, as objects have been similarly treated in nickel-plating; but as the heating of the object to be coated decomposes some solutions, I have been obliged to resort to a special bath of the cyanide of copper during the heated condition of the roller to obviate this decomposition, after which I continue the deposition from the ordinary sulphate bath.

With respect to the whirling of the depositing solution, also, I am aware that in electroplating wire the coils of the latter have been slowly revolved in vertical planes to secure uniformity of coating; but this does not impart a whirl or horizontal rotation in bulk to the depositing solution, which in my method is necessary, my object being not so much to secure uniformity of coating as it is an acceleration of the same.

Having thus stated the nature and particulars of my invention, I declare that what I claim herein as new, and desire to secure by Letters Patent of the United States, is—

1. The method, herein described, of securing a more intimate union between the roller and an electroplate of copper by heating the roller and subjecting it in this condition first to a bath of the cyanide of copper, and afterward continuing the deposition of the copper from a bath of the sulphate, as and for the purpose described.

2. The method of forcing the coating into closer contact with the roller, and detecting any want of adhesion between the two metals, which consists in burnishing one or more thin coatings from a sulphate solution before the final coating is deposited, substantially as described.

3. The method of accelerating the deposition of plating metal upon the surface to be plated by imparting to the depositing solution a whirling or rotating motion in horizontal planes, as and for the purpose described.

4. The combination, with the roller immersed in the bath, of the insulated shaft $c\ c^1$, the friction-pulley c^7, and the friction-disks e', substantially as and for the purpose described.

5. The shaft $c\ c^1$, carrying the friction-pulley c^7 and the roller to be coated, in combination with the disks e, shafts e', and levers f', having bowls f arranged to effect a contact between the disks e and pulley c^2 through the action of weights, as and for the purpose described.

6. The combination, with the roller *b*, of the shaft $c\ c^1$, having insulated coupling c^2 and conducting-piston c^6, together with the insulated end caps $c^3\ c^5$, as and for the purpose described.

In testimony whereof I have hereunto set my hand before two subscribing witnesses.

HENRY WILDE.

Witnesses:

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Manchester.

JOHN G. GARNETT,
Clerk to Henry Charlewood, Notary Public, Manchester.