(No Model.)

C. C. COFFIN.

APPARATUS FOR OBTAINING SHEETS OF METAL BY ELECTRO DEPOSITION.

No. 415,024. Patented Nov. 12, 1889.

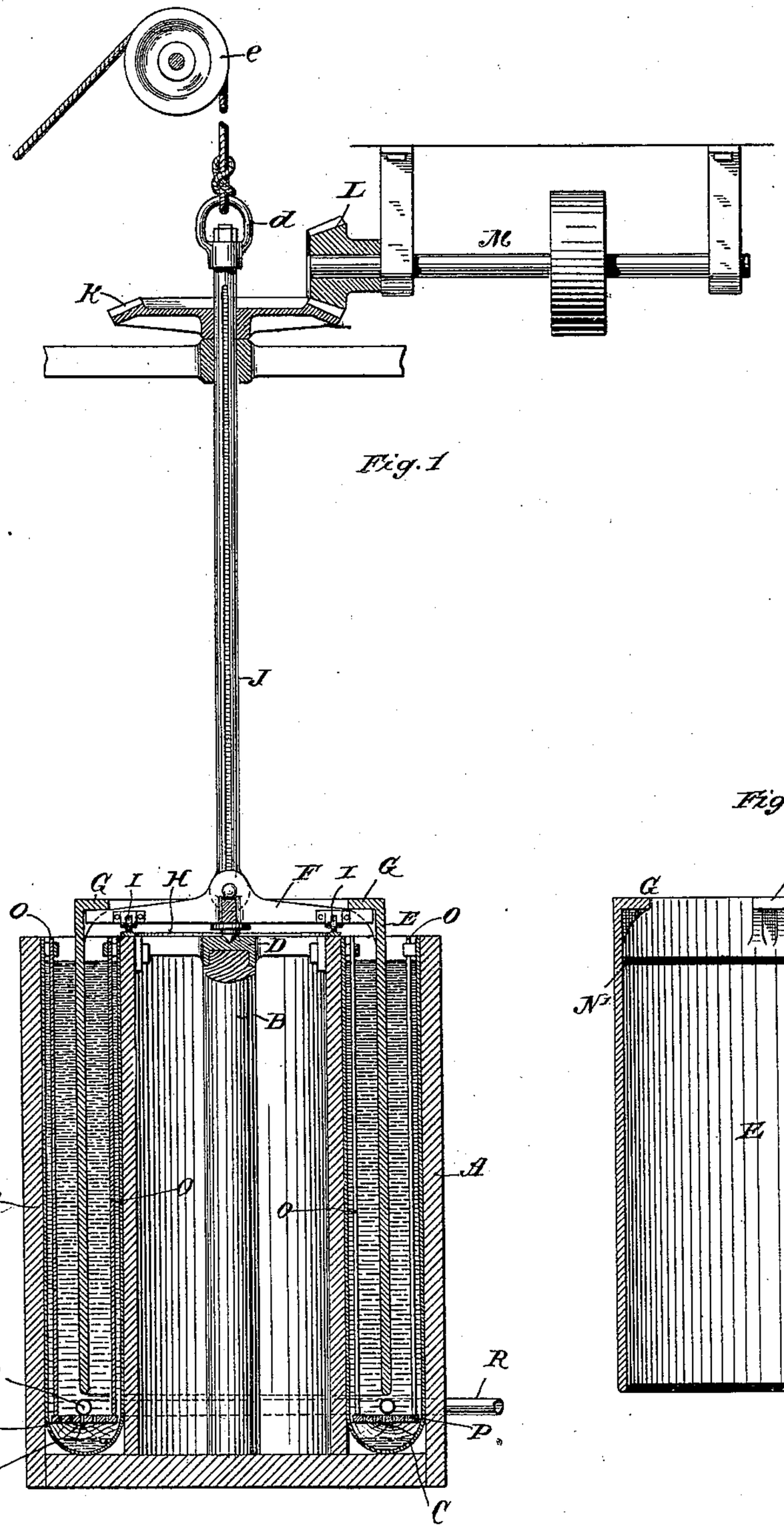

Fig. 1

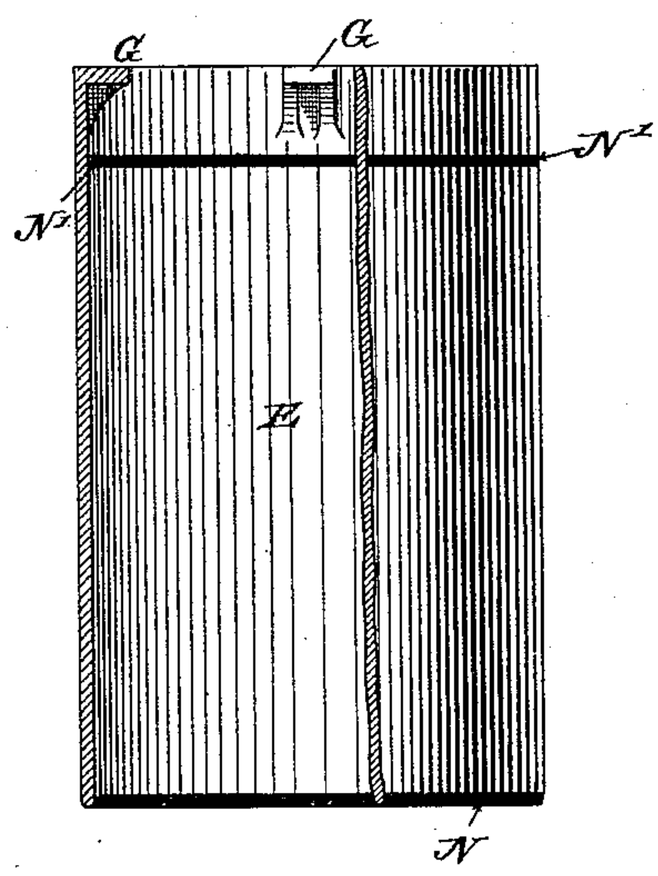

Fig. 2

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR OBTAINING SHEETS OF METAL BY ELECTRO-DEPOSITION.

SPECIFICATION forming part of Letters Patent No. 415,024, dated November 12, 1889.

Application filed January 10, 1889. Serial No. 295,942. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. COFFIN, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Apparatus for Obtaining Sheets of Metal by Electro-Deposition, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

This invention is an improvement in the art of obtaining metal in sheets and in a pure state from ingots or masses of the same, particularly such as contain impurities, by the the process of electro-deposition.

While applicable generally to the production of electro-deposited sheet metal, the special object of the present invention is to produce from impure ingots of copper large sheets of the same in a purer state, and useful generally for architectural and other mechanical purposes. The description herein, therefore, will be confined to the use or treatment of copper alone, although it will be understood that nickel or other metals may be substituted.

In carrying out this and similar processes previous to my invention it has been usual to support a cylinder composed of or faced with lead or some conducting material from which the deposited metal could be readily stripped and mounted horizontally in suitable bearings in a solution in a tank containing also anodes generally curved to conform to the shape of the cathode-cylinder. A rotary movement was imparted to the cylinder in order to facilitate the deposition of an even film of metal thereon. Such constructions, while useful and practicable in their way, are still open to certain objections which it has been my object to avoid. I have therefore devised an apparatus the essential features of which, broadly stated, are as follows: I employ a tank or vat, preferably circular, or, what is still better for general purposes, I construct the vat in the form of a circular trough. I suspend or support vertically in this trough a cathode-cylinder open at its lower or bottom end and couple it in any suitable manner with a source of motion which will cause it to revolve slowly about a vertical axis. In the trough or vat I suspend or support the anodes around the cylinder, and on the outside of the same, or both inside and outside, I also provide means for maintaining an even density of the solution and for disposing of the impurities and mechanical contrivances for the better manipulation and control of the apparatus. These details will be more fully described by reference to the accompanying drawings.

Figure 1 is a central vertical section of my improved apparatus and the supporting and motion-transmitting mechanism. Fig. 2 is a view in elevation of the cathode-cylinder with a portion broken away.

A is any suitable tank or vat, preferably, as I have before stated, in the form of a circular trough. It may be made of wood or other materials such as are commonly used for this purpose, and has, preferably, a lining C of sheet-lead.

B is a post or pedestal secured in the center of the tank or trough and surmounted by a metallic head D, containing a socket.

E is the cathode-cylinder. It is composed of or faced with lead with a smooth surface, or of other material from which the deposited metal may be stripped. This cylinder I support in the solution in the trough in any desired manner in which it can be slowly rotated therein and readily lifted therefrom. In the present case I have shown as the means for doing this a series of radial arms F, extending from a central hub and engaging with lugs or ears G, cast on the inner side of the cylinder at or near its upper edge. The hub or junction of these arms finds a pivotal support in the head D of the post B, and in order to reduce to a minimum the tendency of the cylinder to rock or wabble I sometimes provide a circular track H on the inner wall of the trough, upon which rollers I on said arms bear.

In raising and lowering the cylinder I use a bar or rod J, which, if round, should be provided with a groove or feather, by means of which motion is imparted to it by a wheel K, through which it is adapted to slide, and which has a corresponding spline or groove, as the case may be. The rod and cylinder are raised by a cord connected to a swivel *d* on the end of said rod, and any convenient pulley *e* or tackle may be employed to raise and lower the

cylinder. Motion is imparted to the bevel-wheel K by a pinion I, or by any other means, from a counter-shaft M. With respect to the details of the construction of the devices for supporting or suspending and for lowering, raising, and rotating the cylinder, however, I would say that they are merely selected as best illustrating the object which I have in view, and that they may be greatly modified without departing from the invention. The cylinder at its lower edge and for a short distance up its sides is varnished, as shown at N, Fig. 2, to prevent the deposit of metal thereon. A line of varnish N′ is also applied to the cylinder near the upper end for the same reason.

Within the trough I support in any simple manner an anode or anodes O. I prefer to use a number of bars of the metal to be deposited; but if only a few wide anodes are employed they should be curved to conform to the surface of the cathode-cylinder. If it be so desired, a series of anodes may be placed inside the cylinder as well as outside, and metal deposited both on the inner and outer surfaces of the cylinder; or the outer series only may be used and the inner surface of the cylinder protected by varnish or other non-conductor. Near the bottom of the trough or tank is a perforated or slatted flooring P, upon which, if desired, the anode plates or bars may rest, and through which the impurities and foreign particles set free by the decomposition of the anodes will find their way. Above the flooring P are one or more perforated pipes R, which are connected to a pump that alternately draws into and expels from the pipe the solution in the tank, or which takes in the solution at the bottom of the tank and delivers it near the top, or which in any other well-understood way maintains a certain agitation and circulation and consequent even density of the solution, a matter essential to the obtainment of a film or sheet of uniform quality and thickness. Such impurities as are set free, as above intimated, find their way beneath the perforated flooring, where they remain comparatively undisturbed by the action of the pumps or the circulation of the solution however obtained.

I propose in carrying out my invention practically to employ a number of devices similar to that described and to connect up a certain number of tanks in series in the circuit. It will be understood that for this reason each tank should rest upon insulating-supports.

The means or apparatus for removing and replacing the cylinders for stripping off the deposited metal and the like is not herein shown or described, as many convenient forms of the same may be devised or apparatus at present in vogue utilized for the purpose.

Having now described the general nature of my invention and the preferred appliances by which the same is or may be carried into effect, what I claim is—

1. The combination, with the receptacle or bath having the central post or pedestal and provided with anodes, of the cathode-cylinder disposed in said receptacle or vat, and radial arms having their outer ends engaging lugs upon said cylinder at its upper edge, said arms having their central hub portion supported through a pivot and bearing-head upon said post or pedestal and coupled to a driving-shaft, substantially as set forth.

2. The combination, with the receptacle or bath having the central post or pedestal and provided with anodes, of the cathode-cylinder disposed in said receptacle or vat, radial arms having their outer ends engaging lugs upon said cylinder at its upper edge, said arms having their central hub portion supported through a pivot and bearing-head upon said post or pedestal and coupled to a shaft, and said shaft having a sliding connection with its driving-gear, and means applied to its upper end to effect its vertical movement, substantially as specified.

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