

No. 617,526.

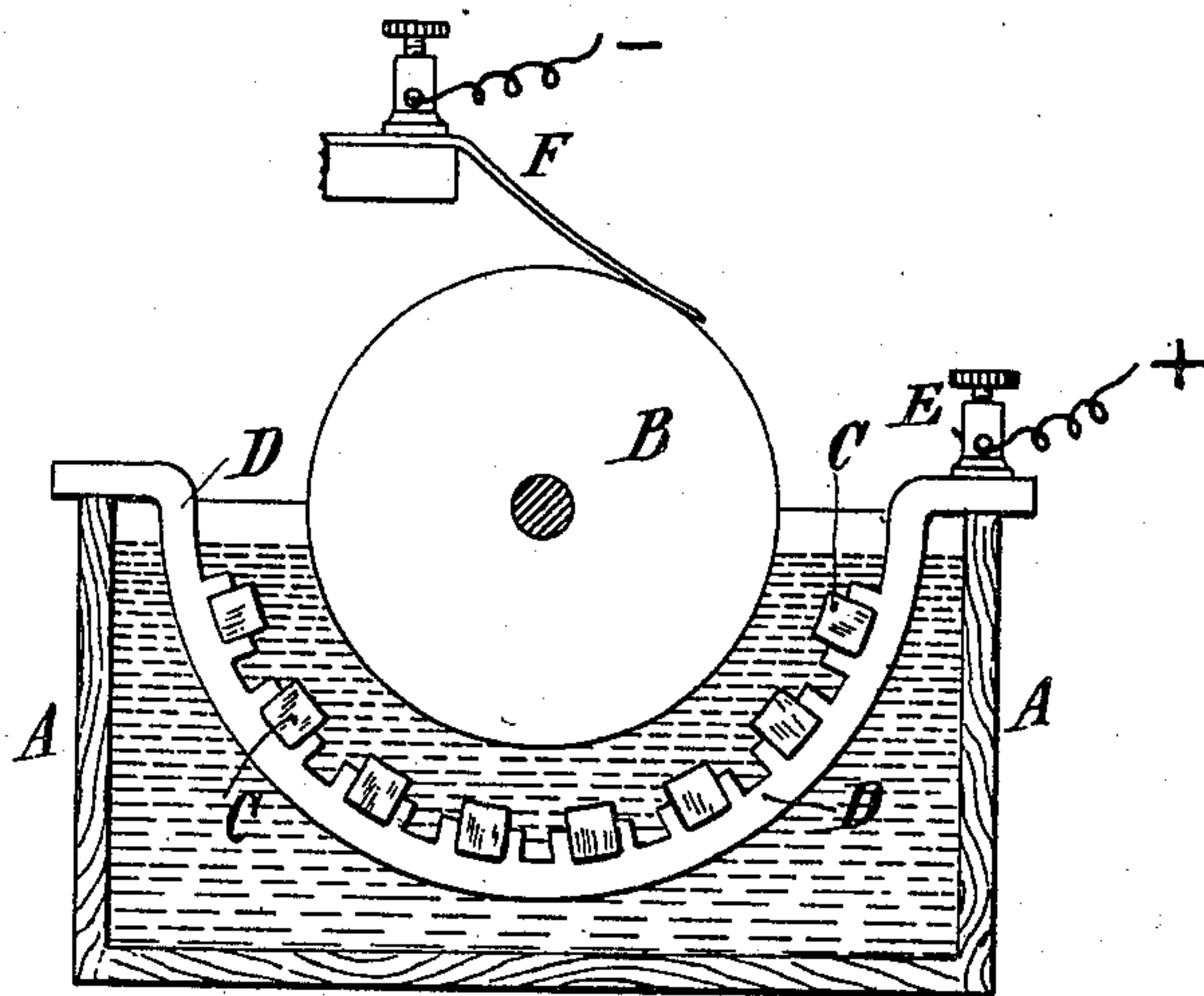
Patented Jan. 10, 1899.

**E. EMERSON.**  
**APPARATUS FOR ELECTRODEPOSITION OF METALS.**

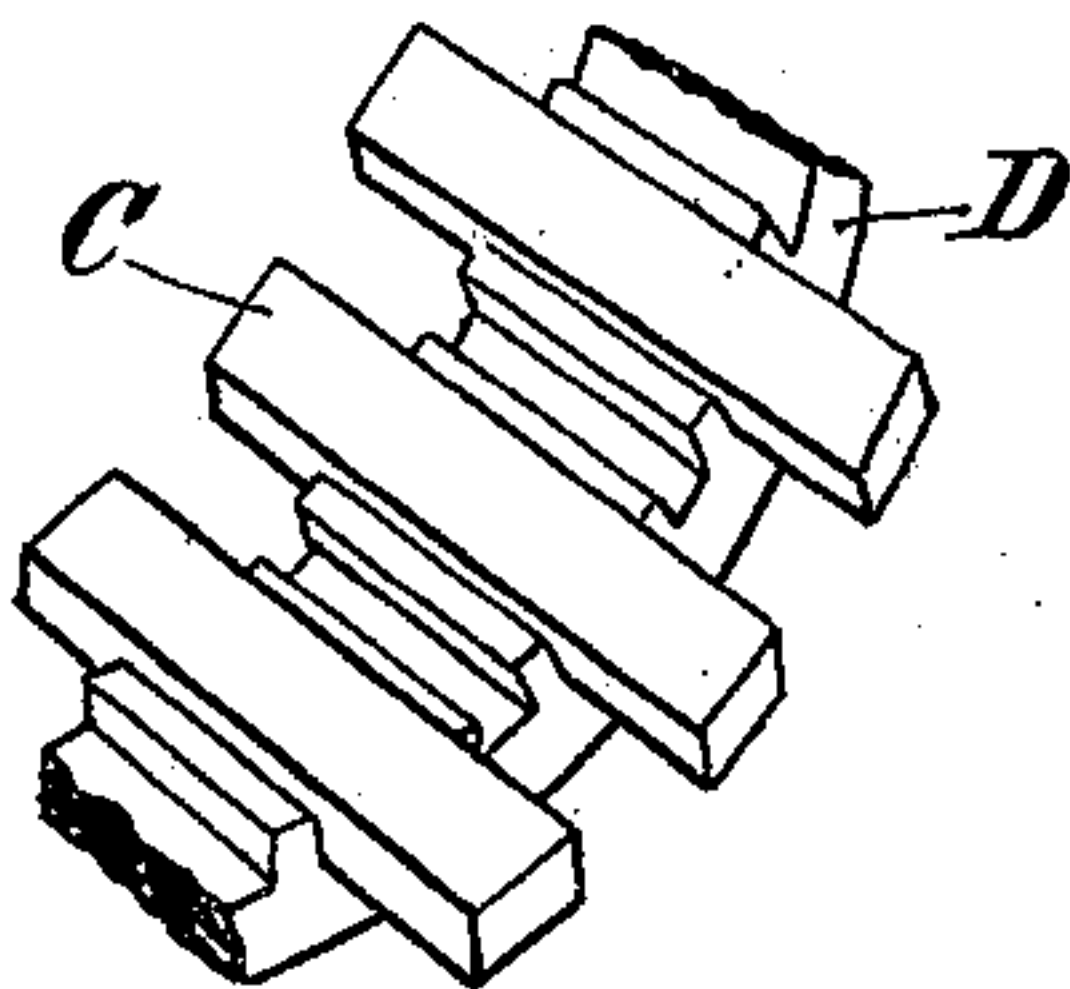
(Application filed Dec. 16, 1896.)

(No Model.)

*Fig. 1*



*Fig. 2*



*Witnesses:*

*Edwige B. Hopkinson,*  
*M. Lawson Dyer.*

*Elisha Emerson, Inventor*

*by Ken. Curtis & Sage, Att'ys*



# UNITED STATES PATENT OFFICE.

ELISHA EMERSON, OF BUFFALO, NEW YORK.

## APPARATUS FOR ELECTRODEPOSITION OF METALS.

SPECIFICATION forming part of Letters Patent No. 617,526, dated January 10, 1899.

Application filed December 16, 1896. Serial No. 615,901. (No model.)

*To all whom it may concern:*

Be it known that I, ELISHA EMERSON, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Apparatus for the Electrodeposition of Metals, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

This invention pertains to apparatus for the electrodeposition of metals, and is an improvement in the same applicable to the anodes, especially of copper, and the means of supporting them in an electrolytic vat and making the proper electrical connections therewith.

It has been found in the process of refining metals by electrolysis and in other work of this nature that as the impurities which are present in the anodes accumulate upon their surfaces as a result of the dissolving action of the electric current an increased resistance to the passage of the current is produced by what is termed "polarization" or "counter electromotive force" and that the current enters the electrolyte largely from the edges of the anodes instead of from the more extended faces or sides of the same. This action gives rise to an uneven deposit of metal upon the cathode, particularly when the latter is in the form of a horizontally-supported cylinder, such as are now largely employed for the manufacture of tubing or the production of metal in comparatively thin sheets.

It is quite usual in the construction of electrolytic apparatus of the character under consideration to employ in connection with a cathode a plurality of anodes supported in a vertical position; but when cathodes of cylindrical form, such as are adapted for making cylinders of sheet metal, are used it is necessary, in order to reduce the electrical resistance of the vat, to have the anodes conform to the surface of the cathode, for which purpose the anodes are made of curved form and supported vertically in the vat. It, however, happens that when a plurality of anodes are thus supported side by side in a vertical position and the electrical contact with one becomes in any way impaired a smaller proportion of current passes from such anode

and a larger proportion from the others, and this results in an uneven deposit upon the surface of the cathode opposite to the series of anodes. The same inequality of deposit upon the cathode occurs in vats furnished with a series of vertical anodes when by the accumulation of impurities on the surface of the latter the current is caused to pass to a large extent from the edges of the anodes. In such event the deposit on the cathode will be thickest opposite the spaces or divisions between the several anodes.

The increase of counter electromotive force in an electrolytic vat is partially overcome by frequently removing and cleaning the anodes, but this involves considerable labor, particularly in large plants, and in some cases becomes wholly impracticable.

The invention which I have made for the purpose of overcoming these difficulties consists in the combination, with the cathode, of a plurality of comparatively narrow anode-strips of the metal to be deposited and supports therefor of conducting material which is practically insoluble in the electrolyte and through which the current is conveyed to the anode-strips. These supports are composed, preferably, of lead and are formed with lugs or ribs of the same metal, which retain the anodes in position. By such means I am enabled to reduce the counter electromotive force or polarization to a minimum without the necessity of removing the plates or anodes from the vat to secure a uniform thickness of deposit on a horizontally-supported cathode and to effect a saving in labor of bending and time of handling the anodes of curved form. I may also make the supports self-sustaining or support them in turn by the walls of the vat or other insulating-bodies placed therein. This will more fully appear from the following description of the preferred form of the invention, which I have illustrated in the accompanying drawings.

Figure 1 is a vertical sectional view of an electrolytic apparatus embodying my improvement. Fig. 2 is a perspective view of a portion of the conducting-anode support.

A designates an ordinary electrolytic vat, in which is mounted a cathode-cylinder B.

C C designate a plurality of strips or bars of the metal to be deposited supported in



proximity to the cathode by a strip or bar of  
conductive metal which is insoluble in the  
electrolyte in which it is immersed. The  
strips C may be connected with the support  
5 D in any proper manner, as by being forced  
between lugs or projections formed or cast  
on the support.

One of the terminals of the source of cur-  
rent is connected to the support D, as at E,  
10 while the other is connected in any proper  
manner, as by a brush F, to the cathode-cyl-  
inder.

In practice I have found with a support of  
lead and anode strips of copper in a sulfate  
15 solution that the above-described device  
yields the most satisfactory results and that  
although the conducting-support is in contact  
with the electrolyte practically all the current  
passes to the latter through the anode-strips.  
20 The conducting-support should of course offer  
as little surface to the electrolyte in compari-

son with that offered by the copper as is con-  
sistent with other conditions of practical  
working. It may be made in any form to  
suit the requirements of different cathodes, 25  
and after one set of anodes has been used up  
another set may be placed on it.

Having now described my invention, what  
I claim is—

In an apparatus for the electrodeposition 30  
of copper, the combination with a cylindrical  
cathode, of a series of horizontal anode-bars  
in proximity thereto, and curved supports  
therefor composed of lead with lugs or ribs  
forming receptacles for the anode-bars, where- 35  
by the latter are maintained out of contact  
with each other and in the same relative po-  
sitions as they are dissolved.

ELISHA EMERSON.

Witnesses:

LIZZIE M. EMERSON,  
CHAS. H. EMERSON.