

No. 644,029.

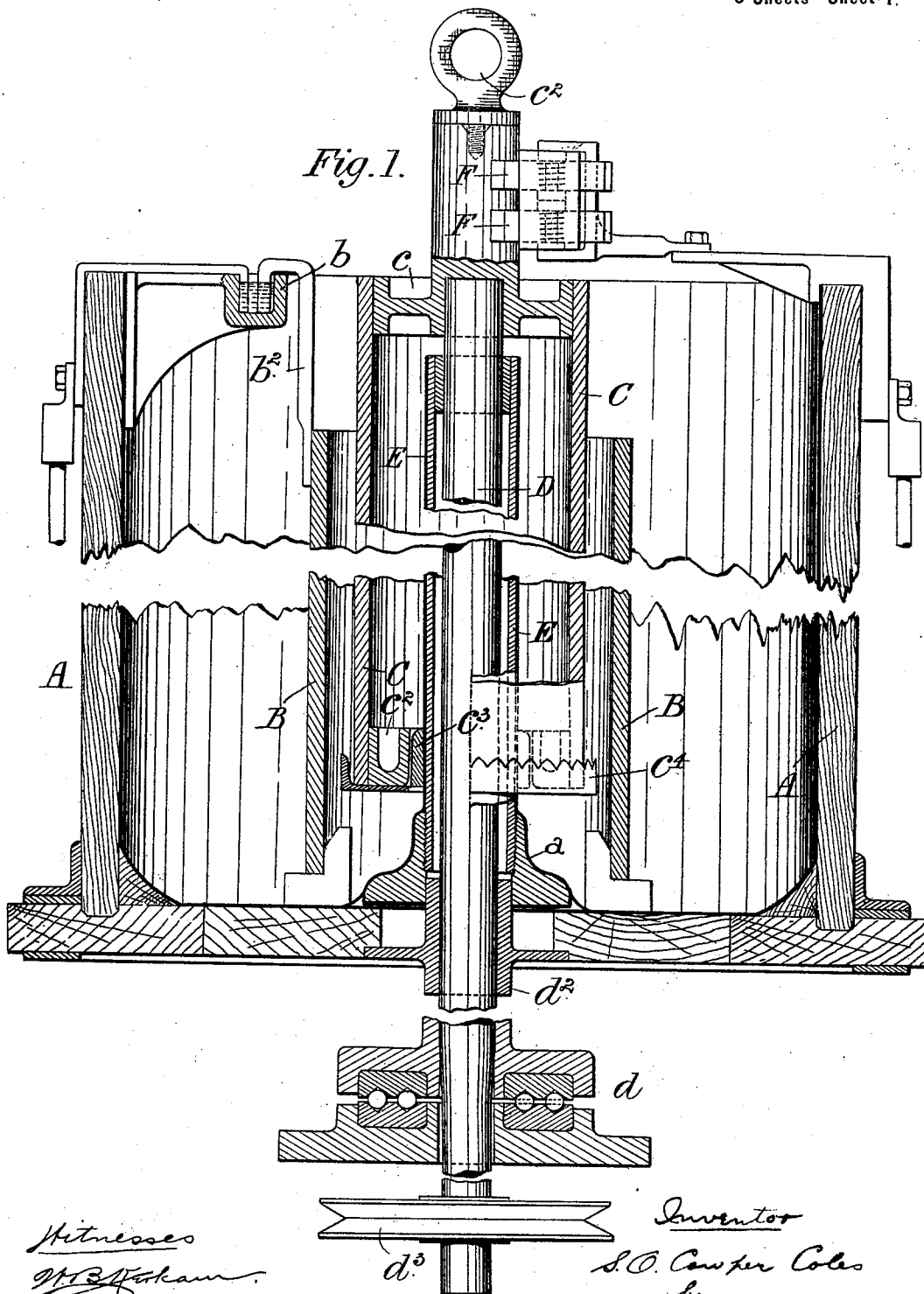
Patented Feb. 20, 1900.

S. O. COWPER-COLES.
PROCESS OF ELECTRODEPOSITION OF METALS.

(Application filed Aug. 28, 1899.)

(No Model.)

3 Sheets—Sheet 1.



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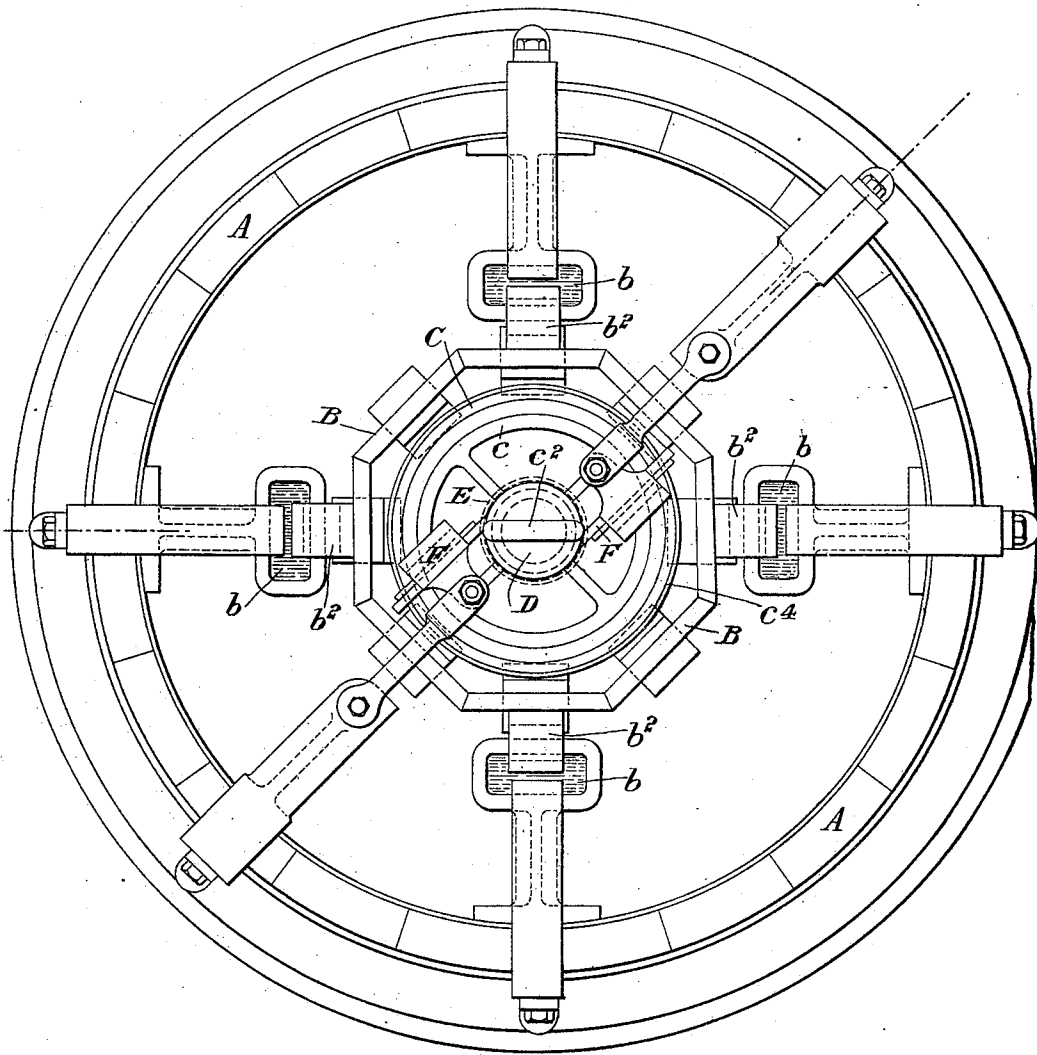
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Fig. 2.



Witnesses

W. B. Farkas
L. B. Muzzey

Inventor

S.O. Casper. Col.
by
Philip Hanes
arty.

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Fig. 3.

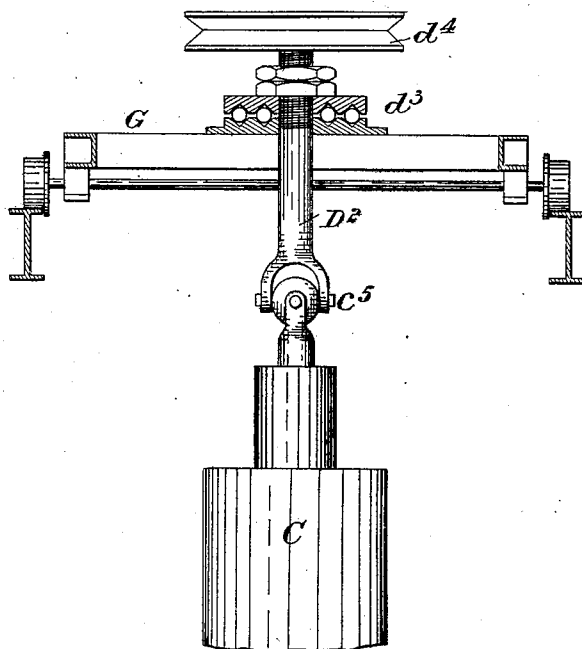
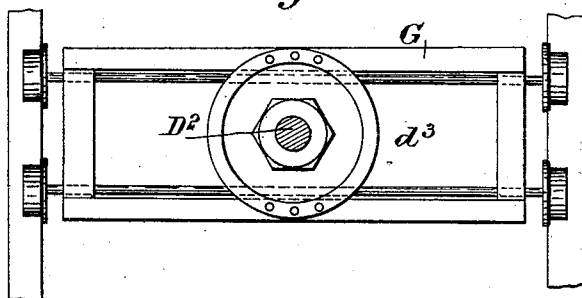


Fig. 4.



Witnesses
H. B. Forkum.
L. B. Muzzy.

Inventor
S. O. Cowper-Coles
by
Philip Haines,
att'y.

UNITED STATES PATENT OFFICE.

SHERARD O. COWPER-COLES, OF LONDON, ENGLAND.

PROCESS OF ELECTRODEPOSITION OF METALS.

SPECIFICATION forming part of Letters Patent No. 644,029, dated February 20, 1900.

Application filed August 28, 1899. Serial No. 728,751. (No specimens.)

To all whom it may concern:

Be it known that I, SHERARD OSBORN COWPER-COLES, engineer, a subject of the Queen of Great Britain and Ireland, and a resident of Grosvenor Mansions, Victoria street, Westminster, London, England, have invented certain new and useful Improvements in Processes for the Electrodeposition of Metals, (for which I have applied for a patent in Great Britain, No. 21,974, dated October 19, 1898,) which invention is fully set forth in the following specification.

My invention relates to improvements in processes for the electrodeposition of metals. Hitherto it has been the practice when smooth tough deposits of metal, and of copper in particular, have been required either in the form of sheets or tubes to burnish them either by means of agates or pads made of sheepskin or other suitable material. The employment of such burnishers necessitates the use of expensive machinery and introduces many mechanical difficulties. I overcome these objections by revolving the cathode or mandrel around its axis during deposition at a very high rate of speed, so as to obtain such friction between the deposited metal and the electrolyte as will cause the deposits made during such rotation to be tough and smooth, and it, moreover, causes the hydrogen bubbles to be thrown off from the cathode and enables me to employ a much higher current density than has hitherto been possible, the electrical resistance being reduced, and thus I effect great economy. The invention may be applied to the formation of deposits all of one kind of metal or to the formation of deposits of different kinds of metal—such, for example, as for the manufacture of "Sheffield" plate by depositing a layer of copper upon a layer of silver.

The accompanying drawings represent apparatus suited to the purposes of my invention.

Figure 1 is a vertical section, and Fig. 2 is a plan, of an apparatus wherein the driving of the cathode is effected from below. Figs. 3 and 4 are respectively a vertical section and a plan of a modification for driving the cathode from above.

A is the vat containing the electrolyte.

B is the anode, consisting of a cylinder or

of plates of the metal to be deposited (or it may be of other material if the electrolyte consists of a salt of the metal to be deposited) and resting upon insulating-supports below, the current being conducted to the said anode from the dynamo through the mercury-cups *b*, into which dip the terminal leads and the conducting-wires *b*², attached to the anode.

The vat A has a lining *a* of lead; but, of course, vats of any suitable construction may be employed.

C is the cathode or mandrel to receive the deposit, it being connected to a cross-head *c*, supported upon a vertical shaft D, supported below on ball-bearings *d* and passing through a bearing *d*² in the bottom of the vat A, and being surrounded by a tube E, extending from the bottom of the vat to above the level of the electrolyte therein. The cross-head *c* carries an eye *c*², so that the cathode or mandrel can be lifted and lowered by a crane or otherwise.

*d*³ is a pulley by which the shaft D is driven from any suitable motor which will give a high speed of rotation, preferably a circumferential speed of about one thousand feet per minute.

The lower end of the cathode or mandrel C is provided with a filling-piece *c*² to rotate around a collar *c*³ on the tube E.

*c*⁴ is a scalloped flanged piece which acts as a baffle-plate at the lower part of the cathode and prevents the formation of trees or nodules. The serrated edge of the piece *c*⁴ acts to taper off the deposit of copper more gradually, and thus further prevent treeing or noduling.

F are the brushes, which bear against the conducting-piece *c* to convey the current to the negative leads.

In Figs. 3 and 4 I have shown an arrangement for driving the cathode or mandrel C from above, for which purpose it is connected by a universal joint *c*⁵ to a shaft D², provided with a driving-pulley *d*⁴ and supported on ball-bearings *d*³, the whole being shown as being carried by a traveler G.

What I claim is—

1. In the electrodeposition of metals, the process consisting in passing an electric current from an anode to a cathode through an electrolyte containing the metal to be depos-

ited, at the same time moving the cathode through the electrolyte at such a rate of speed as will cause the hydrogen bubbles to be thrown off from the cathode and give such friction between the metal deposit on the cathode and the electrolyte as to yield tough and smooth deposits.

2. In the electrodeposition of metals, the process consisting in passing an electric current from an anode to a cathode through an electrolyte containing the metal to be deposited, and at the same time rotating the cathode at such a high rate of speed as will cause the hydrogen bubbles to be thrown off from the cathode and give such friction between the metal deposits on the cathode and the electrolyte as to yield tough and smooth deposits.

3. In the electrodeposition of metals, the process consisting in passing an electric cur-

rent from an anode to a cathode through an electrolyte containing the metal to be deposited, and at the same time moving the cathode through the electrolyte at a speed approximating one thousand feet per minute.

4. In the electrodeposition of metals, the process consisting in passing an electric current from an anode to a cathode through an electrolyte containing the metal to be deposited, and at the same time rotating the cathode at a speed approximating one thousand feet per minute.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

SHER. O. COWPER-COLES.

Witnesses:

WILLIAM FREDERICK UPTON,
JOHN EDWARD NEWTON.