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S. O. COWPER-COLES  
PROCESS AND APPARATUS FOR COATING WIRE AND OTHER DRAWN  
AND ROLLED SECTIONS WITH OTHER METALS

Filed Jan. 2, 1924

3 Sheets-Sheet 1

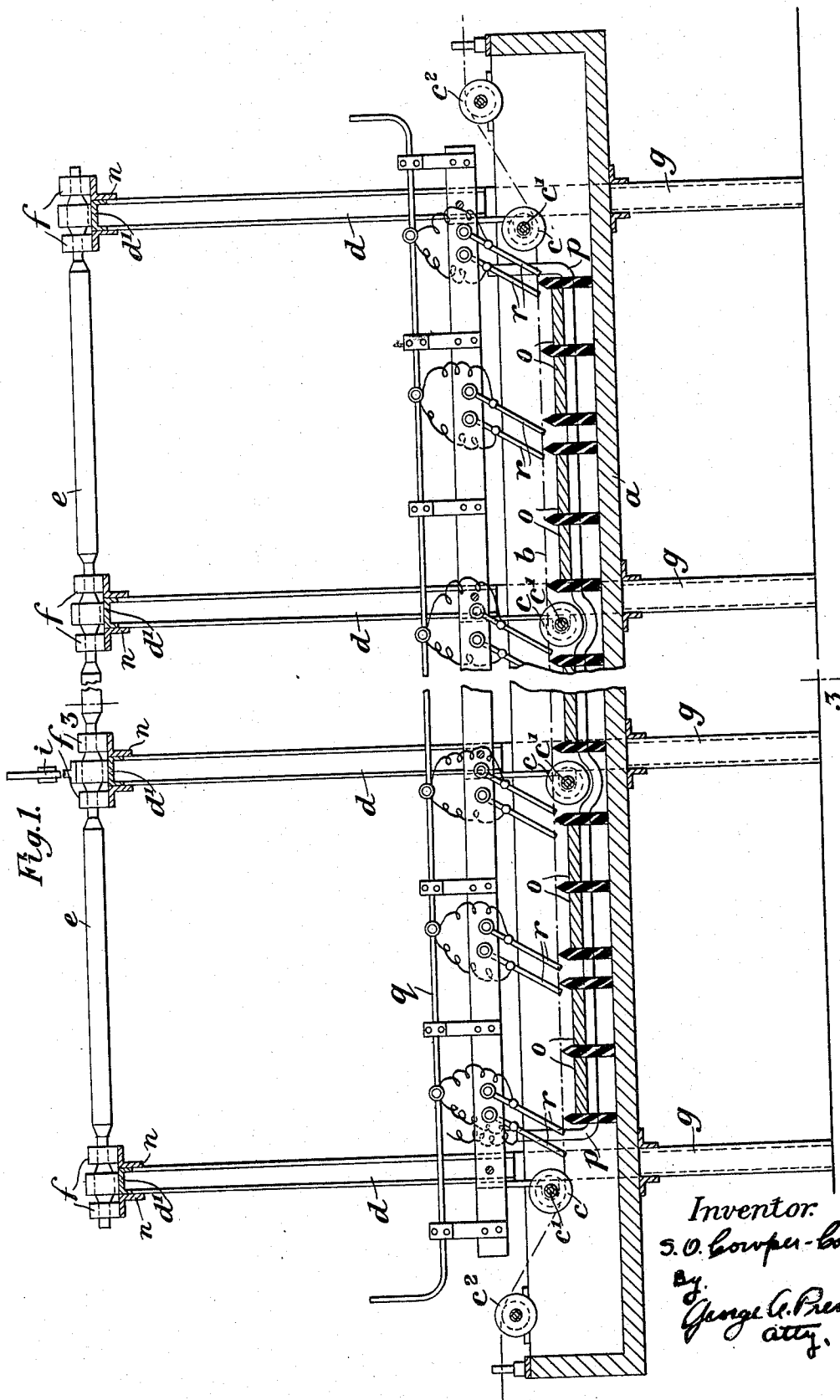


Fig. 1.

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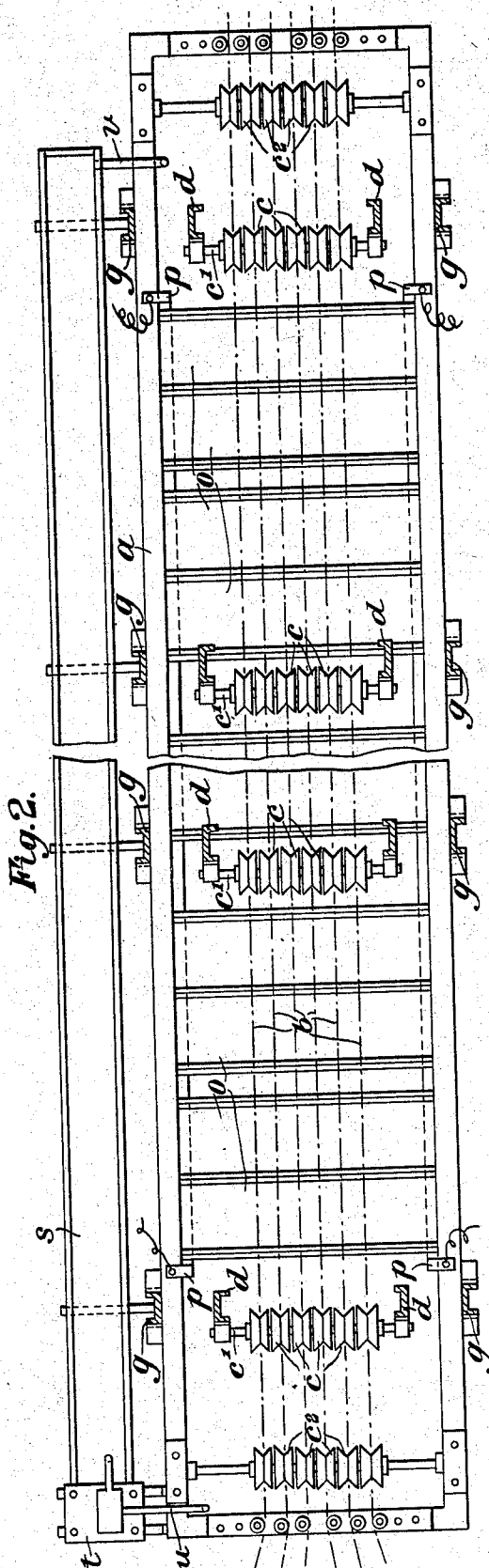
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

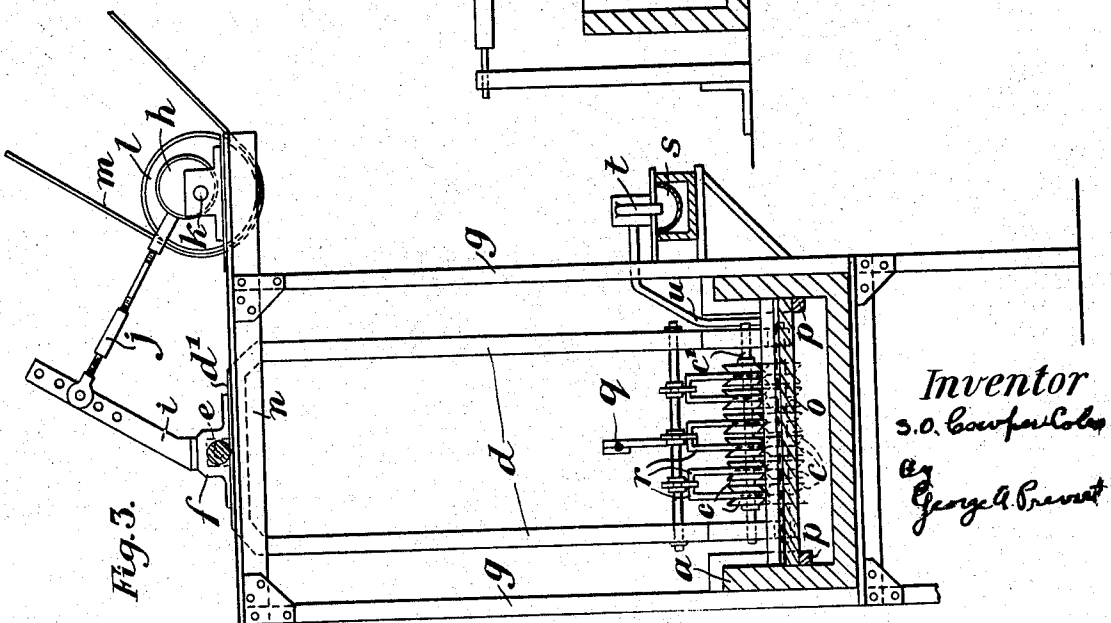
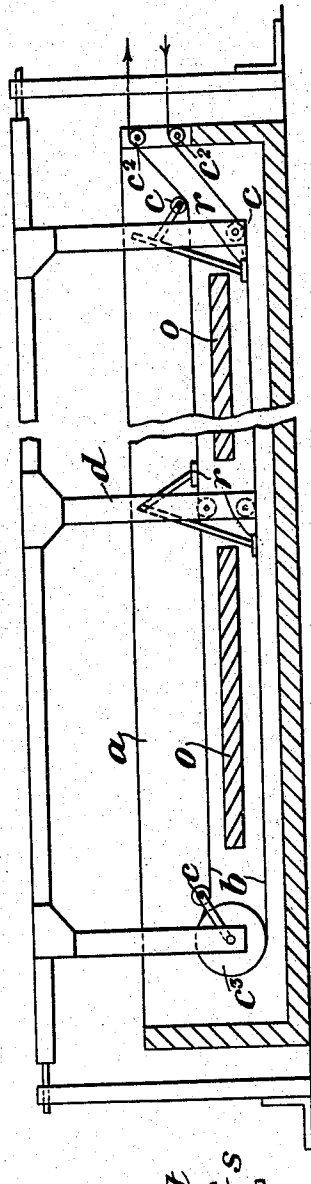


Fig. 3.

Fig. 4.



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# UNITED STATES PATENT OFFICE.

SHERARD OSBORN COWPER-COLES, OF SUNBURY-ON-THAMES, ENGLAND.

PROCESS AND APPARATUS FOR COATING WIRE AND OTHER DRAWN AND ROLLED SECTIONS WITH OTHER METALS.

Application filed January 2, 1924. Serial No. 683,951.

To all whom it may concern:

Be it known that I, SHERARD OSBORN COWPER-COLES, a subject of the King of Great Britain, residing at Rossall House, Thames Street, Sunbury-on-Thames, Middlesex, England, have invented a new and useful Improved Process and Apparatus for Coating Wire and Other Drawn and Rolled Sections with Other Metals, of which the following is a specification.

This invention relates to a process of electro-depositing upon iron and steel wire, strip or other drawn sections, zinc or metals other than iron or steel. Hitherto, with such processes, only a comparatively small output has been obtained from a large sized plant owing to the slowness of operation.

The object of this invention is to overcome this difficulty by enabling a high current density to be employed so that the desired thickness of zinc or other metal can be deposited in a few minutes, and to this end the wire or section of iron or steel to be coated, is arranged to travel through the electrolyte and to be simultaneously subjected to a rapid oscillating or reciprocating motion sufficient to throw off the adherent film of electrolyte.

In a suitable apparatus for carrying out the process, I employ a long shallow depositing vat, through which a number of wires or other sections to be coated travel longitudinally on guide rollers which are mounted on a frame movable in guides transversely of the said wires or other sections, the frame being given a rapid oscillating or reciprocating motion in the said guides by means of arms operated from a shaft suitably arranged with respect to the vat. Electrical contact is made with the wires or the like at numerous points by metal contacts resting thereon and insulated, with the exception of the part making contact with the wire or the like; horizontal anodes are fitted in the vat below the wires or the like and the solution may be circulated through a filtering tank to keep it free from suspended matter. The described arrangement permits of a high current density being employed of several hundred amperes per square foot, for instance, when depositing lead if 100 to 125 reciprocations per minute are imparted to the cathode, a current density of 100 amperes

per square foot or more of cathode surface can be employed.

It is found, in practice, that the wire becomes evenly coated on all sides, although the anodes are on one side only, as the wire in passing through the depositing tank turns on itself.

In another arrangement, the wires are passed both below and above the anodes by means of suitable guide rollers which are given a rapid reciprocating motion by means of the arms hereinbefore referred to.

Figure 1 is a sectional side elevation of a plant or apparatus constructed in accordance with the invention for the electro-deposition upon iron or steel wire, strip or other drawn sections, of zinc or metals other than iron or steel.

Figure 2 is a sectional plan of the apparatus, and

Figure 3 is a vertical transverse section on the line 3-3 Figure 1.

Figure 4 is a diagrammatic sectional side view illustrating a modified apparatus.

Referring to Figures 1 to 3, *a* is the long shallow depositing vat for the electrolyte and *b*, *b* the wires or other sections to be coated, which are arranged to travel longitudinally through the said vat. *c*, *c* are the guide rollers mounted on spindles *c*<sup>1</sup> for supporting and guiding the wires or the like *b* in their passage through the vat and *d* is the frame carrying the said rollers *c*. *c*<sup>2</sup>, *c*<sup>2</sup> are rollers carried by the vat for guiding the wires or the like *b* from the supply reels at one end of the vat to the rollers *c* and from the latter to the winding-drums at the other end of the vat, these reels and drums not being shown. The frame *d* is carried by a series of arms or frames *d*<sup>1</sup> arranged transversely of the vat *a*, and depending from, and fixed to, a common rock shaft *e* journalled in bearings *f* supported on a frame *g* extending upwardly from the vat sides. By rocking or oscillating the said shaft *e* it will be seen that the frame *d* will, by means of the arms *d*<sup>1</sup>, have imparted to it an oscillating movement transversely of the vat, which, if effected with the required degree of rapidity, will throw off the film of electrolyte from the wires or the like *b* which tends to adhere thereto.

In the drawings the rock shaft *e* is shown

as being rocked by an eccentric *h* through the medium of a lever *i* on the shaft and an eccentric rod *j*, the shaft *k* carrying the said eccentric being rotated by a pulley *l* driven by a belt *m*. Any other suitable means may, however, be employed for rocking the said shaft *k*.

The arms *d'* carrying the frame *d*, are guided at their upper ends, between pairs of guide bars *n, n* on the frame *g*.

*o, o* are the anodes arranged horizontally below the wires or the like *b* and extending across the vat *a* and being supported on and in electrical connection with the bus-bars *p, p* carried by the sides of the said vat, upstanding plates of wood or other insulating material being arranged between the said anodes to support the wires or the like *b* and maintain them in a horizontal position parallel with the surfaces of the said anodes. The upper or supporting edges of the said plates are of V-shape to reduce friction.

*q* is the bus-bar in electrical connection with the wires or the like *b* by means of the contacts *r, r* the said bus-bars and contacts being carried by the frame *d*.

*s* is the filtering tank arranged alongside the vat *a* and *t* is the pump for drawing the electrolyte from the vat by way of the pipe *u*, the electrolyte after filtration returning to the vat by way of the pipe *v*.

In the operation of the apparatus it will be understood that the wires or the like *b* will be caused to travel longitudinally through the electrolyte in the vat *a* and have simultaneously imparted thereto a sidewise oscillating or reciprocating motion, the latter being of a rapidity sufficient to throw off the adherent film of electrolyte.

Although the anodes are arranged on one side only of the wires or the like *b*, the wires become evenly coated as it is found that they turn on themselves in their passage through the vat.

Figure 4 illustrates the arrangement where the wires or the like *b* are passed both below and above the anodes *o*, the entry and delivery of the said wires or the like being at one and the same end of the vat. The wires or the like *b* after entering the vat over the rollers *c*<sup>2</sup> pass below the anodes *o* and one set of guide rollers *c* thence around larger guide rollers *c*<sup>3</sup> and then over the said anodes

and another set of guide rollers *c* to the rollers *c*<sup>2</sup> for guiding the coated wires to the winding-on drums.

What I claim and desire to secure by Letters Patent is:—

1. A process for electro-plating wire and the like which consists in passing the said wire through an electrolyte and over the anodes and simultaneously subjecting the same to a rapid oscillating or reciprocating motion sufficient to throw off the adherent film of electrolyte.

2. A process as claimed in claim 1 wherein the wire in its movement through the electrolyte is presented to opposite sides of the anodes in turn.

3. Apparatus for electroplating wire and the like, including an electrolytic cell, means for passing said wire through said cell, means for simultaneously oscillating said wire laterally of the cell, and anodes arranged in said cell.

4. Apparatus for electroplating wire and the like, including an electrolytic cell, a pivoted frame mounted in connection with said cell, guide rollers carried by said frame adapted to support and carry said wires in extended position from end to end of said cell, means for oscillating said frame on its pivot transversely of the cell, and anodes arranged in said cell.

5. Apparatus for electroplating wire and the like, including an electrolytic cell, anodes mounted in said cell, means for passing said wire through said cell in one direction on one side of said anodes and in the opposite direction on the reverse side of said anodes, and means for simultaneously oscillating said wires.

6. Apparatus for electroplating wire and the like, including a support, an electrolytic cell mounted in said support, a pivoted frame mounted in connection with said cell, guide rollers carried by said frame adapted to support and carry said wires in extended position from end to end of said cell, eccentric means for oscillating said frame on its pivot transversely of said cell, anodes arranged in said cell, insulating plates interposed between said anodes for supporting said wires, and means for filtering said electrolyte.

SHERARD OSBORN COWPER-COLES.