

(No Model.)

F. E. ELMORE.

PROCESS OF MAKING METAL TUBES, &c., BY ELECTRO DEPOSITION.

No. 442,428.

Patented Dec. 9, 1890.

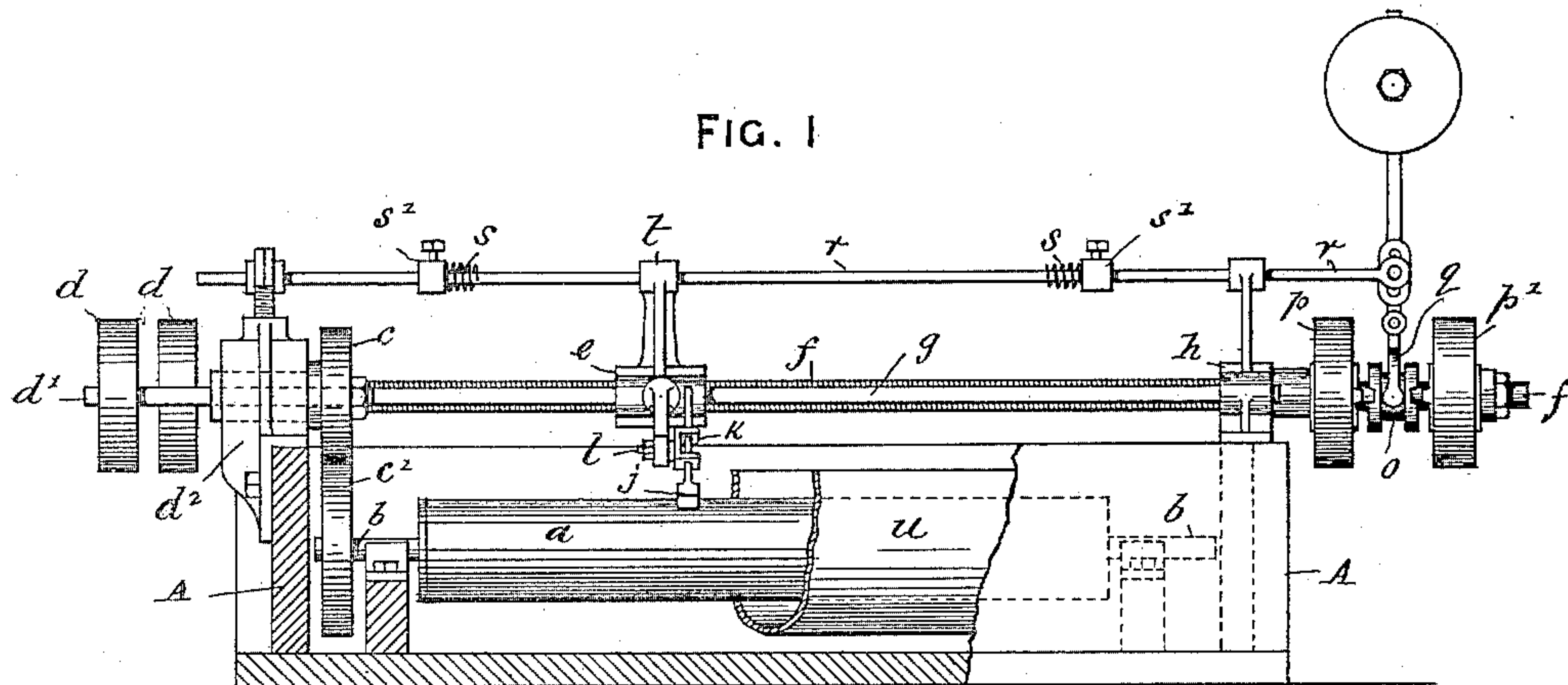
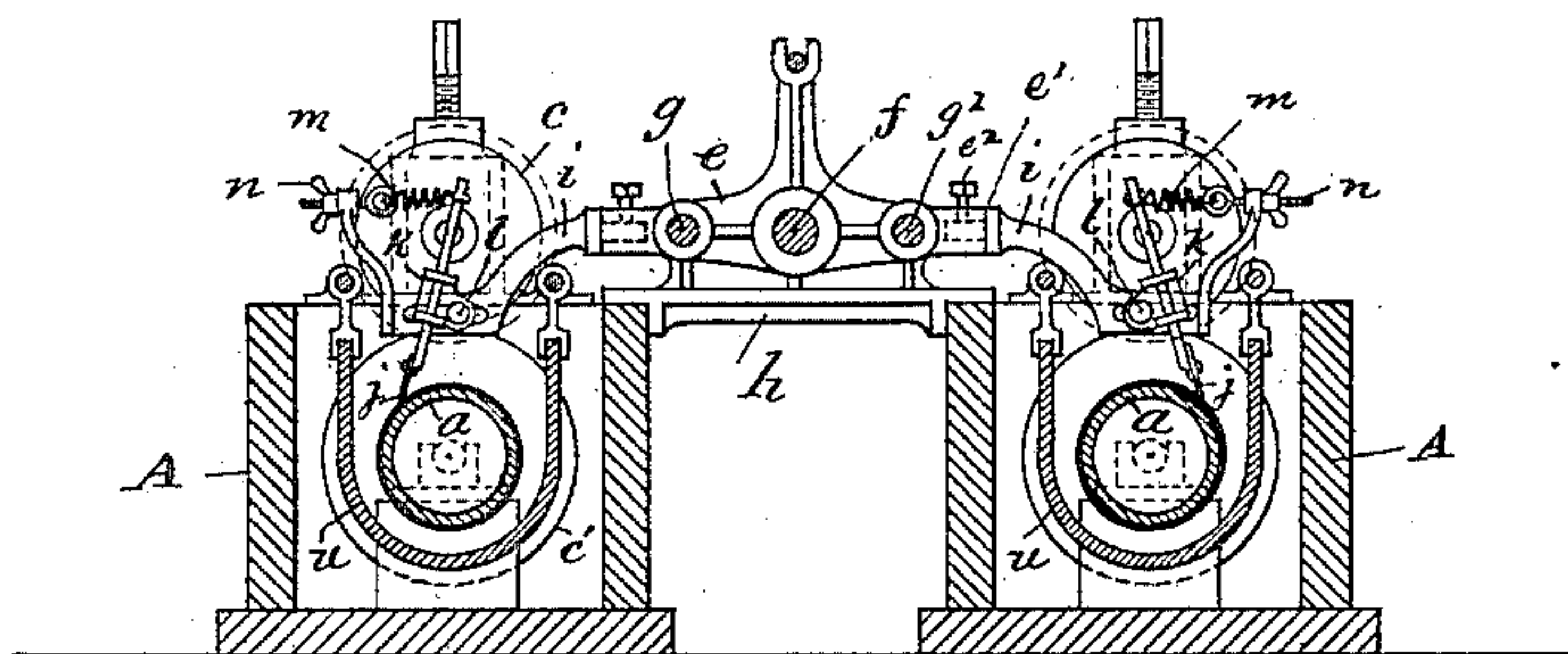


FIG. 2



WITNESSES.
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PROCESS OF MAKING METAL TUBES, &c., BY ELECTRO-DEPOSITION.

SPECIFICATION forming part of Letters Patent No. 442,428, dated December 9, 1890.

Application filed January 17, 1889. Serial No. 296,573. (No model.) Patented in England April 4, 1885, No. 4,499.

To all whom it may concern:

Be it known that I, FRANCIS EDWARD ELMORE, a subject of Her Britannic Majesty, resident at Armaside, Cockermouth, in the
5 county of Cumberland, England, have invented certain Improvements in and pertaining to the Process of Making Metal Tubes, &c., by Electro-Deposition, (for which I have been granted Letters Patent in Great Britain,
10 No. 4,499, dated April 4, 1885,) of which the following is a specification.

This invention has for its object certain means for the reduction of the cost of and otherwise for improving the process for the
15 manufacture of tubes, cylinders, rings, and other finished metal wares directly by the electrolytic process.

In carrying the invention into effect I proceed as follows: I have impure copper cast
20 into convenient size and shape to serve the purpose of anodes or positive electrodes of the depositing tank or tanks, in which the anode or anodes will be hung or otherwise arranged and connected to the positive pole of the
25 dynamo-electric machine or other source of electricity. The electrolyte in the tank or tanks of the series should be such that the impurities, metallic or otherwise, contained in the anode are either practically insoluble
30 or that they shall by secondary or other action or reaction be prevented from being electrically deposited at the cathode or cathodes—for instance, as follows: In a solution of sulphate of copper containing free or uncom-
35 bined sulphuric acid, and a copper anode containing bismuth, antimony, and tin or other foreign metals, on passing a current from the anode into and through the solution the copper of the anode or anodes is con-
40 verted into copper sulphate, which is dissolved. The bismuth, antimony, and tin are principally left at the anode as sulphates and oxysulphates of bismuth, antimony, or tin and eventually fall to the bottom of the tank,
45 a small quantity only being dissolved, which by the action of the atmosphere on the bismuth, antimony, or tin in solution are converted into basic or oxy salts of these metals. The copper will be deposited at the cathode
50 or cathodes, and the other foreign metals

which may be combined with the copper in the anode—such as gold, silver, lead, and sulphur—will fall to the bottom of the tank. The core, mold, mandrel, or other object to receive the deposit is connected to the nega-
55 tive (cathode) pole of the dynamo-electric machine or other source of electricity, or where the tanks are to be worked in series, the core, mold, or mandrel or other object placed to receive the deposit in any one tank of the se-
60 ries is connected to the anode-rod of the next tank in the series. The aforesaid cathode is there kept revolving or otherwise moving during the whole time that the current is passing, and during such revolution or mo-
65 tion of the core a burnishing implement or device is kept pressed against the surface being deposited upon.

To burnish the surface of the deposited tube or other article during the time at which
70 the deposit will be going on in the tank, the said core, mold, or mandrel to receive the deposit will be mounted in the tank by its axle, and upon the side of the bath or tank will be mounted guides, and a traveler will be pro-
75 vided fitted with worm and change motion for traversing the said traveler to and fro over the bath, as is hereinafter more particularly described. The traveler will have a carrier at-
80 tached, upon which will be mounted burnishing-surfaces, such as agates, bloodstones, flints, or glass having a highly-polished surface—that is, a non-conducting substance capable of burnishing and which is not acted
85 upon by the electrolyte. The said burnisher will operate upon the surface of the deposited metal and a motion of rotation will be given to the core, mold, or mandrel receiving the deposit.

In the accompanying drawings, Figure 1 is
90 a side elevation, partly in section. Fig. 2 is a cross-section of my improved device.

A indicates the depositing-tank.

a is the core, mold, or mandrel upon which the tube or cylinder is to be produced, said core
95 being mounted by its axle *b* in bearings provided for that purpose within the tank.

Rotary motion is imparted to the core, mold, or mandrel *a* by means of the friction or spur
wheels *c c'*, or in any well-known manner, 100

said wheels being operated by the driving-pulley *d* upon the horizontal shaft *d'*, which is mounted in an adjustable bearing *d*², attached to the end of the tank.

5 Above the core, mold, or mandrel *a* is mounted the burnishing apparatus, which I will now more particularly describe.

e is the traveler, mounted upon a screw-shaft *f* and guide-bars *g g'*, said screw-shaft and guide-bars being carried by the bracket-supports *h*, provided at each end of the tank. The carrier-arms *i*, attached to the traveler *e*, extend over the tank *A* and carry the burnishing tool or tools *j*, said tool or tools being
15 mounted in a suitable holder *K*, attached to the carrier-arm *i* so as to pivot upon the stud *l*, the pressure of the burnishing-tool upon the work being regulated by the spring *m* and the adjusting-screw *n*, provided on the end of the carrier-arm. The carrier-arm *i* is attached
20 to the traveler *e* by the socket *e'* and set-screw *e*², so as to be readily removed when the cores and tubes within the tank have to be manipulated for adjustment or removal. The
25 traverse of the burnishing tool or tools *j* is effected by the reversing-clutch *o* upon the screw-shaft *f*, operating between the driving-

pulleys *p p'*, having motion in opposite directions.

q is the fork of the striking-bar *r*, acting on the clutch *o*, and said bar *r* is fitted with buffer-springs *s* and adjustable stops *s'* for regulating the traverse of the traveler *e* in accommodating differing lengths of work, the stops *s'* being acted upon by the striking-arm
35 *t*, formed upon or attached to the traveler *e*.

u indicates the anodes, suspended or mounted in the tank in any convenient manner.

Having now particularly described the nature of my said invention, what I claim is—
40

In the manufacture of articles by electro-deposition, the method of producing a compact deposit, which consists in simultaneously revolving the cathode in an electrolytic bath, passing a current from the anode through the
45 bath to the cathode, and subjecting the deposited metal to the action of a burnisher gradually moved from one portion to another of the cathode, substantially as set forth.

FRANCIS EDWARD ELMORE.

Witnesses:

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