(No Model.)

A. S. ELMORE.

APPARATUS FOR THE ELECTROLYTIC MANUFACTURE OF TUBES.

No. 503,076. Patented Aug. 8, 1893.

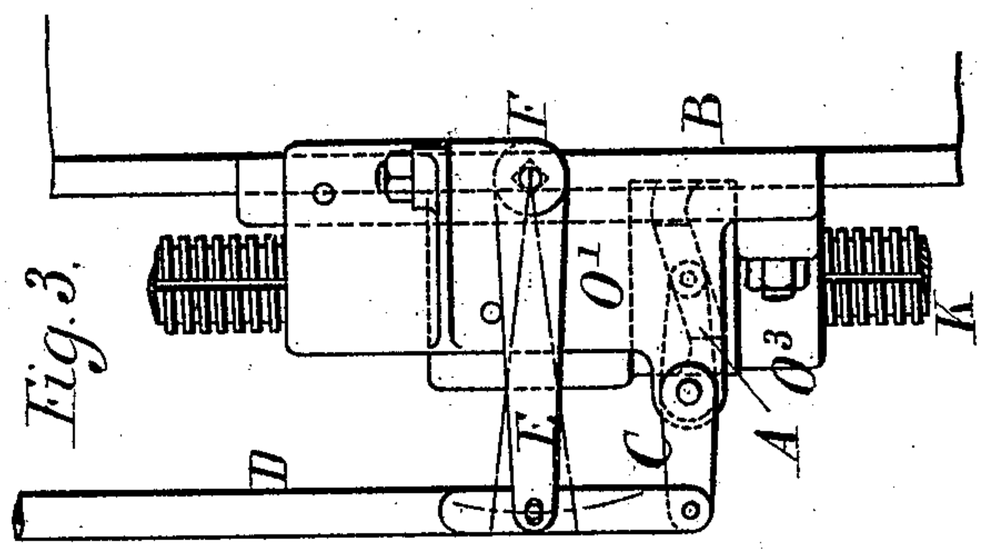

Fig. 3.

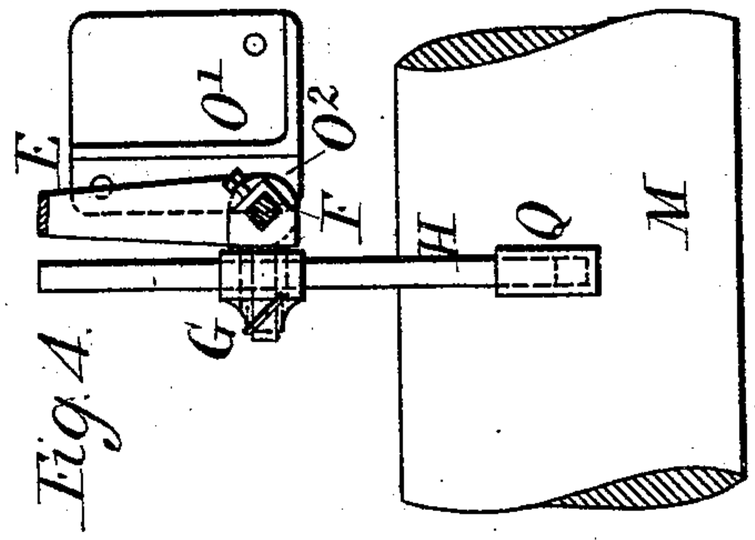

Fig. 4.

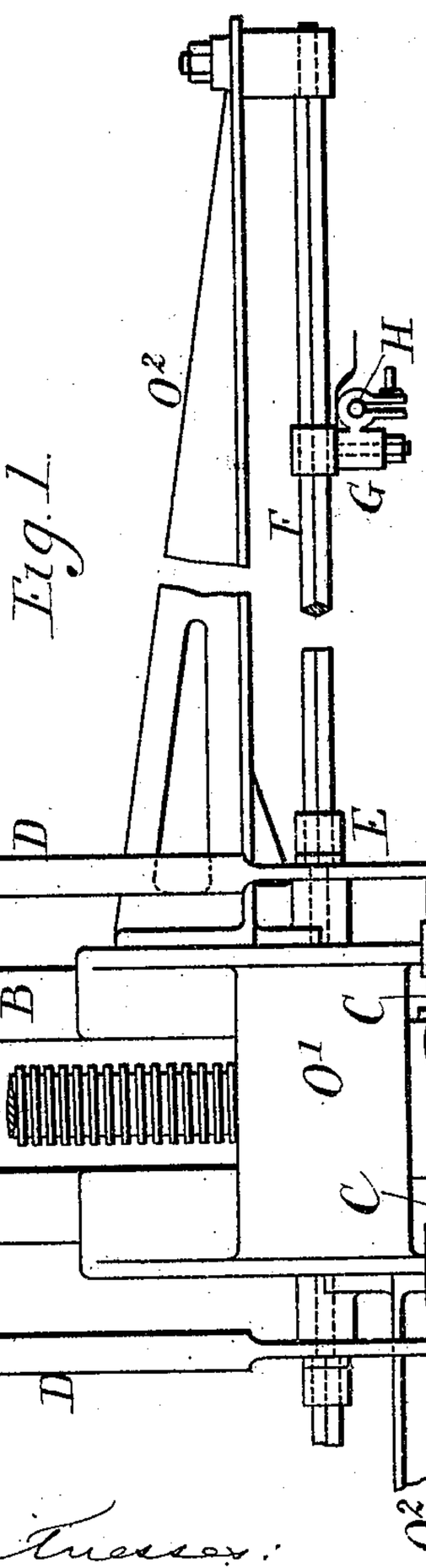

Fig. 1.

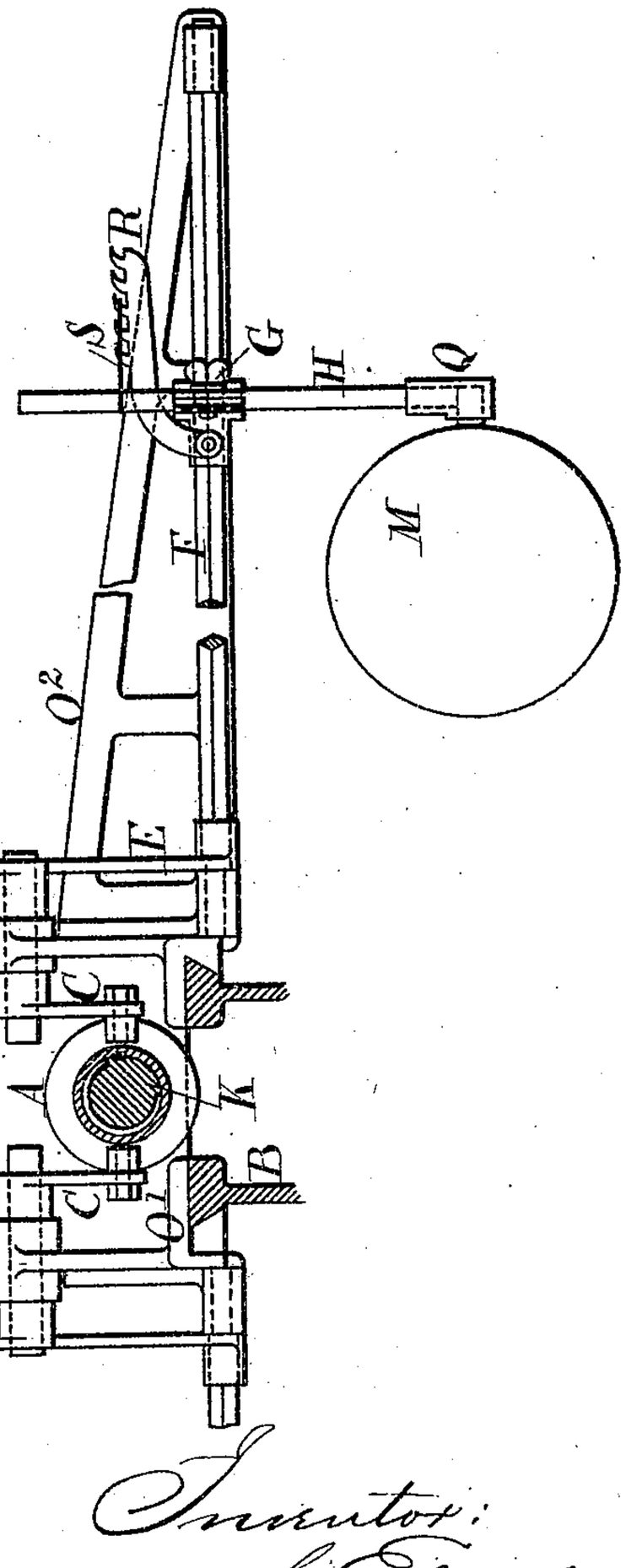

Fig. 2.

Witnesses:
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UNITED STATES PATENT OFFICE.

ALEXANDER STANLEY ELMORE, OF LEEDS, ASSIGNOR TO THE ELMORE'S AMERICAN & CANADIAN PATENT COPPER DEPOSITING COMPANY, LIMITED, OF LONDON, ENGLAND.

APPARATUS FOR THE ELECTROLYTIC MANUFACTURE OF TUBES.

SPECIFICATION forming part of Letters Patent No. 503,076, dated August 8, 1893.

Application filed September 21, 1892. Serial No. 446,425. (No model.) Patented in England October 15, 1891, No. 17,631.

To all whom it may concern:

Be it known that I, ALEXANDER STANLEY ELMORE, a subject of the Queen of England, residing at The Laboratory, Thwaite Gate, Leeds, in the county of York, England, have invented certain new and useful Improvements in Apparatus for the Electrolytic Manufacture of Tubes, Pans, and other Bodies of Circular Form, (for which I have obtained Letters Patent in Great Britain, No. 17,631, dated October 15, 1891,) of which the following is a specification.

In the specifications of United States Patents Nos. 442,428, 440,548, 464,351, and of pending applications Serial Nos. 400,414, 402,446, 421,083, are described means of manufacturing tubes, pans and other bodies of circular section, of copper or other metal, by electrolytically depositing the metal on a revolving mandrel or core, and causing a burnishing tool to travel along the surface of the metal while it is being deposited, thereby rendering the deposited metal compact, sound and strong. Means are also described of producing sheets, bars, wires and the like by cutting them from cylinders or disks of the deposited metal.

My present invention relates to a modification of the process and apparatus above referred to, whereby I insure greater soundness and more uniform strength and ductility in all directions, of the deposited metal. For this purpose, I so arrange the moving gear of the burnisher that instead of its following merely a helical line along the surface of the deposited metal, it follows a line which is undulating as well as helical, that is to say, while it advances continuously at the same time it oscillates in a longitudinal direction. The effect of this is to render the metal uniformly strong and ductile in all directions. The oscillation may be imparted to the burnishing tool by a suitable crank, cam or eccentric revolving while it is advancing along with the tool carrier; or the burnisher may be made to follow an undulating line by longitudinally oscillating as well as rotating the mandrel, while the burnishing tool travels rectilineally.

In my previous specification No. 464,351, I described apparatus whereby burnishers are caused to travel along a number of mandrels receiving electrolytic desposit, these mandrels revolving in two parallel rows of tanks, but the burnishers of all of them being moved from one set of gearing arranged over the first pair of the two rows as shown in the drawings accompanying the said specification. In carrying out my present invention I modify this gearing as I shall describe referring to the accompanying drawings.

Figure 1 is a part plan. Fig. 2 is a part transverse section showing the brackets for the burnishers in elevation. Fig. 3 is a side view of the traversing and oscillating gear and Fig. 4 is a part side view of the mandrel and oscillating burnisher.

B is the bed along which the slide O′ is caused to travel to and fro by the alternating forward and backward revolution of the screw spindle K, the slide O′ carrying on each side arms O^2 which project over the electrolytic tanks and carry the burnishing tools Q which are pressed against the deposited metal on the mandrels M. When there are a number of pairs of tanks in a row, the slide O′ is rigidly connected to similar slides, one for each pair of tanks in the row, so that as O′ with its arms O^2 moves to and fro, all the other slides with their arms also move to and fro as described in the specification above referred to. So far the gearing is substantially the same as that described in the said specification. The modifications applied to that gearing for the purpose of giving oscillatory movement to the burnishing tools Q are as follows:—Between the slide O′ and a cheek O^3 a boss A in which is formed a sunk cam path is caused to revolve with the screw spindle K, this boss having a key sliding in a groove of the spindle. Lever arms C C one on each side having rollers engaged in the cam groove of A are caused to oscillate and their oscillations are conveyed by connecting rods D to lever arms E on square spindles F mounted not only on the one pair of arms O^2 but also on the similar arms provided for the successive tanks of the row. On each spindle F at any part of its length is fixed by a screw and nut

a jointed socket G through which passes a rod H carrying the burnishing tool Q. The socket G carries a rack R to any tooth of which is hooked an india rubber band spring S which strains the rod H so as to push the burnisher Q against the surface of the mandrel M. The rod H can be adjusted higher or lower in the socket G and clamped where required. Thus as the screw spindle K revolves causing the to and fro movement of the slides O′ and their arms O^2 it also by means of the cam A causes the spindle F to rock and thus each burnisher Q not only travels to and fro along with the slide O′ but also oscillates in an arc of a circle struck from the center of F, and, as the mandrel M is at the same time revolving, the burnisher follows on its periphery an undulating helical path the effect of which is that the metal deposited on the mandrel has greater soundness and more uniform strength and ductility in all directions than when the path of the burnisher is simply helical.

Having now described the nature of this invention and the best means I know for carrying the same into practical effect, I claim—

In an apparatus for the electrolytic manufacture of tubes, the combination with a revolving mandrel, of an oscillatory burnishing tool, and means for causing the burnishing tool to travel along the mandrel, and for causing said tool to oscillate with relation to said mandrel during its travel, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 30th day of August, A. D. 1892.

ALEXANDER STANLEY ELMORE.

Witnesses:

GEORGE DYALL,
Solr.

HY. ATKINSON,
Clerk to Messrs. T. & H. Greenwood Teale, Solicitors and Notaries Public, Leeds, England.