(No Model.)

F. E. & A. S. ELMORE.

METHOD OF MANUFACTURING TUBES.

No. 480,186. Patented Aug. 2, 1892.

Fig. 1.

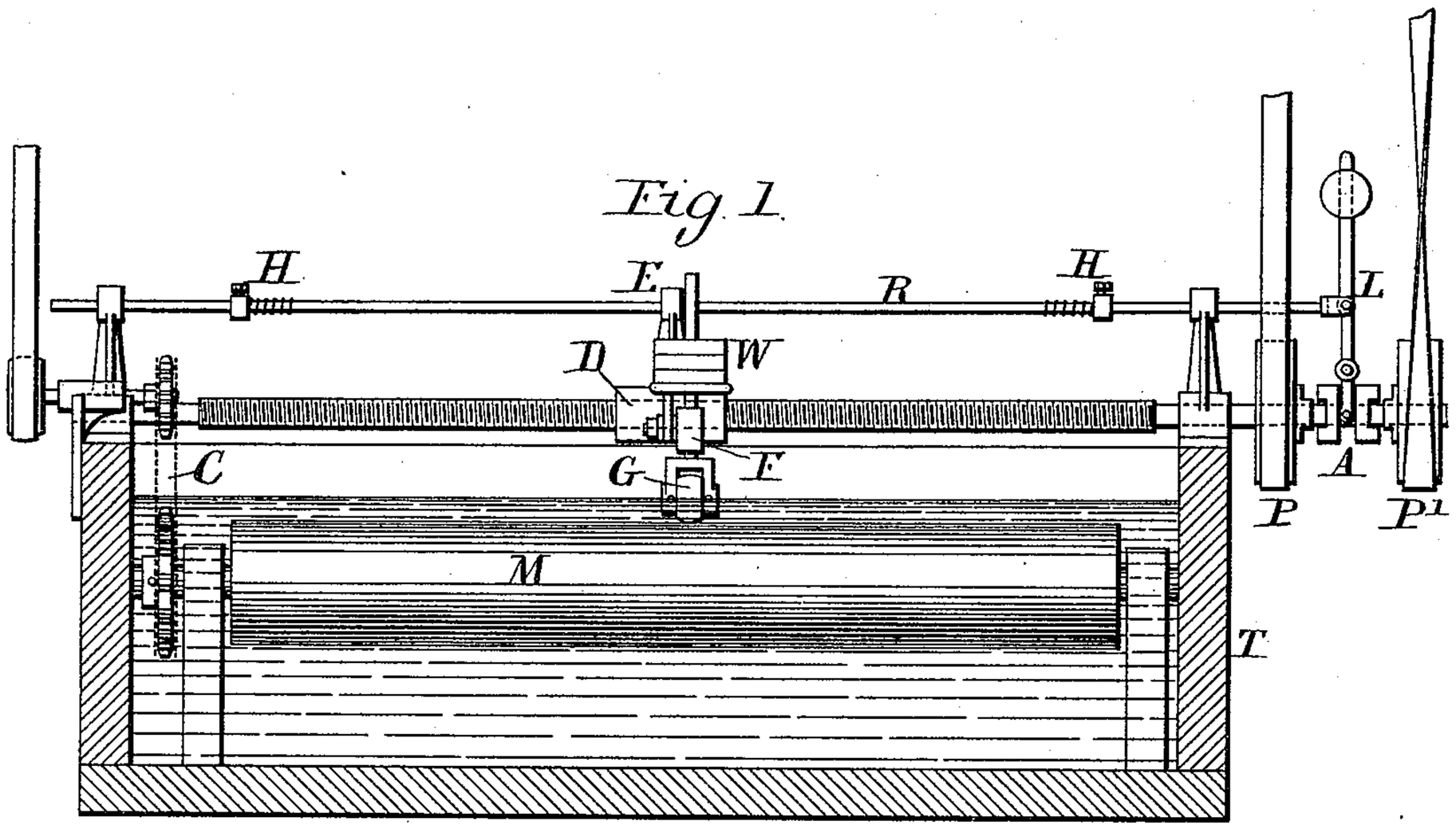
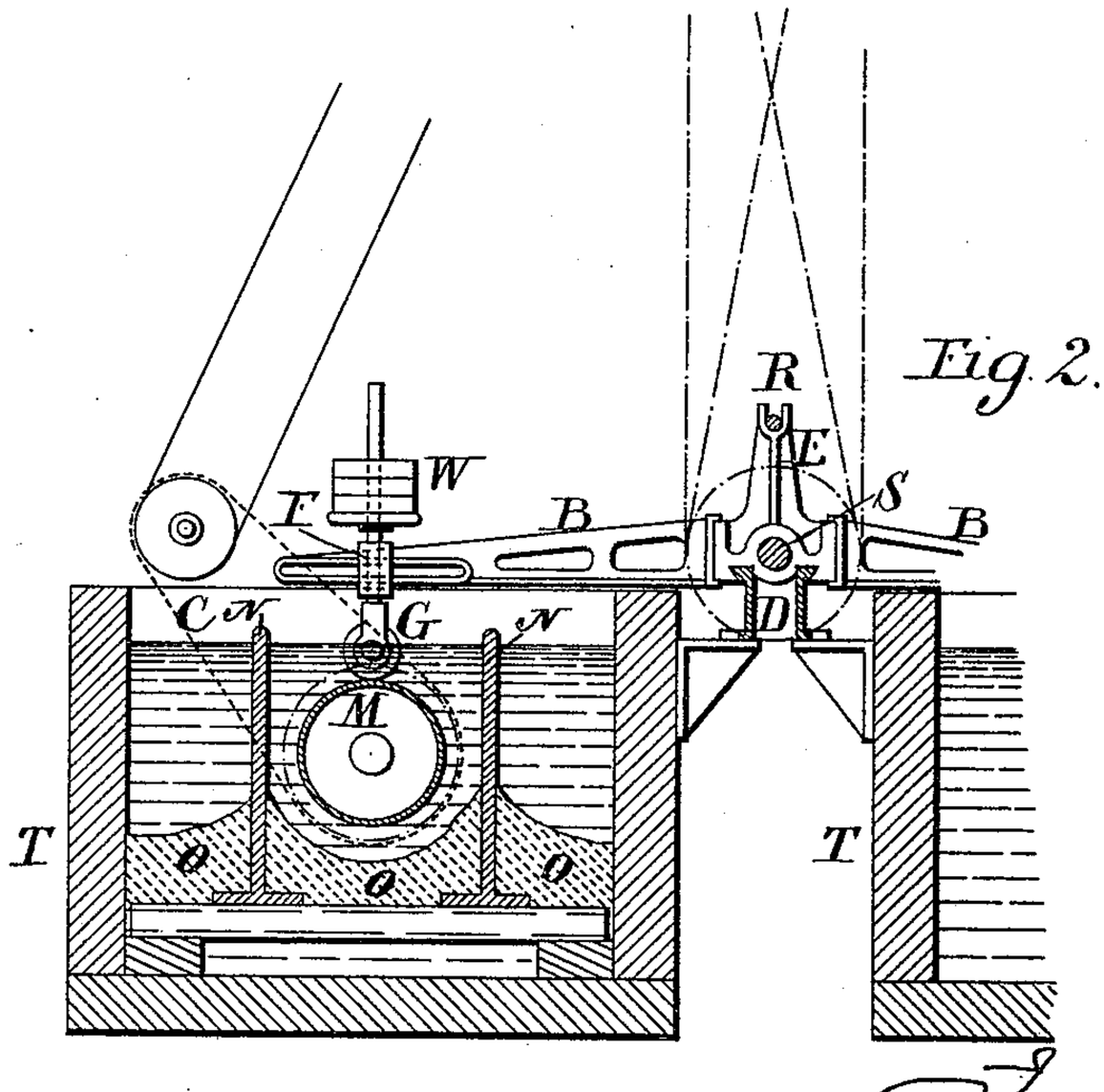


Fig. 2.



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UNITED STATES PATENT OFFICE.

FRANCIS EDWARD ELMORE AND ALEXANDER STANLEY ELMORE, OF LEEDS, ASSIGNORS TO ELMORE'S AMERICAN AND CANADIAN PATENT COPPER DEPOSITING COMPANY, LIMITED, OF LONDON, ENGLAND.

METHOD OF MANUFACTURING TUBES.

SPECIFICATION forming part of Letters Patent No. 480,186, dated August 2, 1892.

Application filed August 12, 1891. Serial No. 402,447. (No specimens.) Patented in England March 23, 1891, No. 5,167; in Luxemburg June 1, 1891, No. 1,456, and in Italy June 10, 1891, LVIII, 229.

To all whom it may concern:

Be it known that we, FRANCIS EDWARD ELMORE and ALEXANDER STANLEY ELMORE, citizens of England, residing at Spring Grove, Hunslet, Leeds, in the county of York, England, have invented a new and useful Method of Manufacturing Tubes, (for which we have obtained a patent in Italy, dated June 10, 1891, Vol. LVIII, 229, and in Luxemburg, dated June 1, 1891, No. 1,456, and made application for a patent in Great Britain, which patent when granted will bear date March 23, 1891, No. 5,167,) of which the following is a specification.

For the manufacture of tubes by electrolysis, as described in former specifications, a mandrel operating as a cathode is caused to revolve in an electrolytic bath in which there is an anode of the metal to be deposited, and the anode and cathode being connected to a source of electricity. The metal as it is deposited on the mandrel is rendered dense, compact, and homogeneous in structure by a burnisher pressing against it and traveling to and fro longitudinally while the mandrel revolves. Tubes thus deposited in order that they may be removed from the mandrels have to be loosened thereon. This has usually been done by subjecting the deposited metal to the pressure of rollers, by which it is somewhat stretched, so that it can be taken off the mandrel. As, however, in order to save labor in moving mandrels, they are preferably made very light in structure, they are not sufficiently strong to bear the great rolling pressure required for loosening a deposit of considerable thickness. Our present invention relates to a method of manufacturing tubes in such a manner that they can be removed from the mandrels without subjecting these mandrels to severe strain, notwithstanding that the deposit may be of considerable thickness. For this purpose when a thin shell of metal has been deposited on the mandrel, this deposit being burnished in the usual way, we remove the burnisher and substitute for it a narrow roller, which is pressed against the deposited metal and is, like the burnisher, caused to travel along it, but not quite to one of the ends. This has the effect of slightly stretching the deposited shell circumferentially and loosening it from the mandrel. During the subsequent depositing process, which may be continued for the required time to produce a deposit of desired thickness, the looseness on the mandrel remains as at first, and when the deposit is completed it is only necessary to part off and remove the narrow band of metal at the one end which had not been loosened by the roller, and then the tube can be readily slid off the mandrel.

For mandrels of considerable length we prefer to employ two rollers pressing on opposite sides or three rollers arranged equidistant around the mandrel, so as to prevent flexure of the mandrel by pressure on one side only.

Figure 1 of the accompanying drawings is a longitudinal section, and Fig. 2 is a transverse section, of one of a pair of electrolytic tanks, showing apparatus, such as is above referred to, for loosening the thin shell of metal deposited on the mandrel.

M is the mandrel, caused to revolve continuously by a chain C, driven from any suitable motor.

N N are the upright copper plates which are located one on each side of the mandrel M, and O represents a quantity of granulated copper constituting anodes.

S is a shaft mounted in bearings between a pair of tanks T and provided with a clutch A, which can be engaged with either of two pulleys P and P′, driven in opposite directions by straight and crossed bands. The shaft S is screw-threaded and fits in a nut in a slide D, from which project horizontal brackets B and an upright bracket E. The bracket E has at its top a fork, in which lies a rod R, linked to the tumbling lever L of the clutch A. Either of the brackets B carries a dog F, adjustably fixed on it by a screw and nut, and through this dog is free to slide a rod loaded with a variable weight W and forked at its lower end to receive a roller G, which bears on the mandrel M. On the rod R are fixed by set-screws two tappets H with short springs in front of them. When by the falling of the lever L over to the one side the

clutch A is engaged with one of the pulleys P P′, the screw-shaft S is caused to revolve in the one direction, moving the slide D and bracket B, and thus causing the roller G to travel along the mandrel as it revolves. When the bracket E is thus brought to act on one of the tappets H, the lever L is caused to tumble over to the other side, reversing the direction of revolution of the screw-shaft S and reversing the travel of the roller G along the mandrel. The springs in front of the tappets H sustain the pressure of the bracket E for a time until the strain is sufficient to cause the movement of the lever L, which is thus made to tumble quite over instead of resting midway, as it might otherwise do.

Having thus described the nature of this invention and the best means we know of carrying the same into practical effect, we claim—

The herein-described method of manufacturing tubes, which consists in subjecting a thin shell of metal first deposited on a mandrel to the pressure of a narrow roller or set of rollers caused to travel along it short of one end to loosen the same, thereafter depositing to desired thickness on the shell thus loosened, and separating therefrom the portion over which the roller or rollers have not been caused to pass.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 29th day of July, A. D. 1891.

FRANCIS EDWARD ELMORE.
ALEXANDER STANLEY ELMORE.

Witnesses:
A. S. FRYER,
G. D. ELVIN.