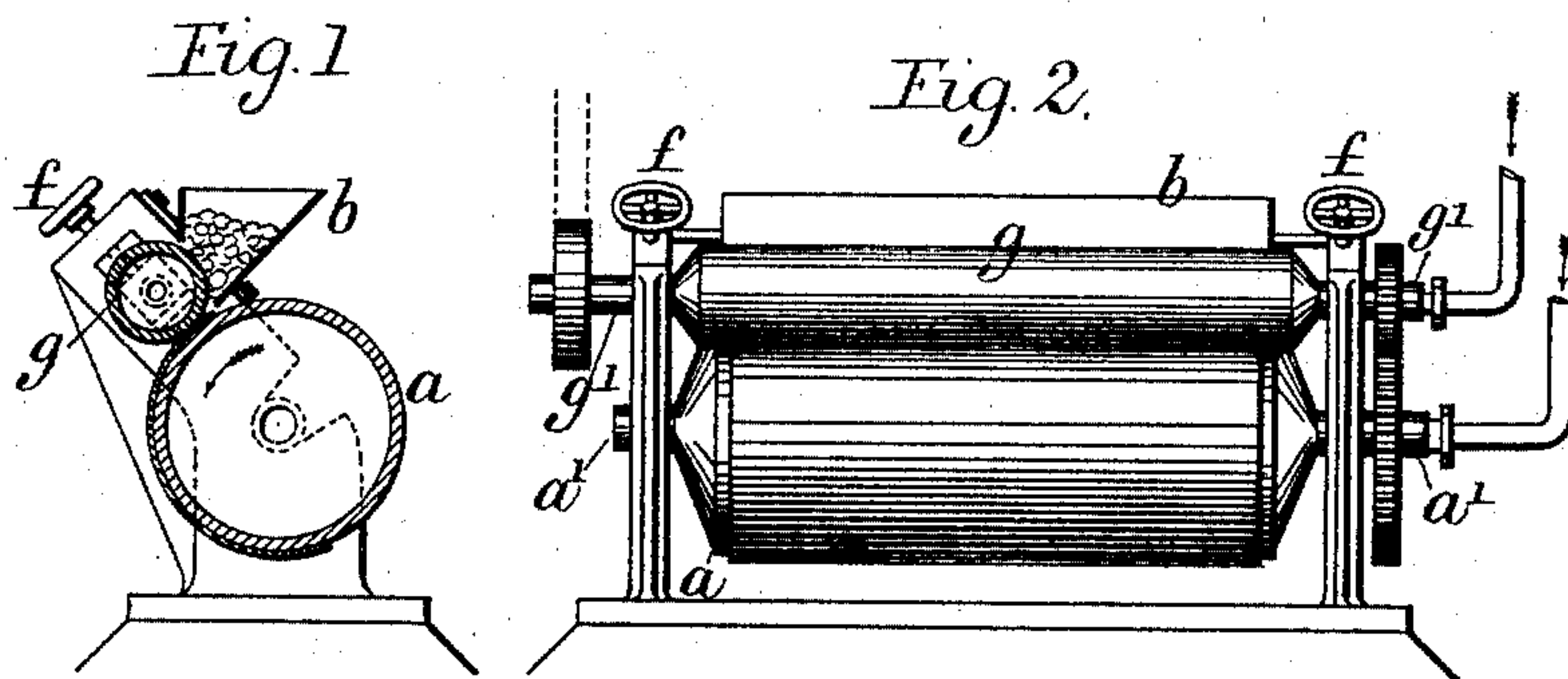


(No Model.)

F. E. ELMORE.
MANUFACTURE OF MANDRELS FOR ELECTROLYTIC DEPOSIT OF TUBES.
No. 485,919. Patented Nov. 8, 1892.



Witnesses:-

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UNITED STATES PATENT OFFICE.

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

MANUFACTURE OF MANDRELS FOR ELECTROLYTIC DEPOSIT OF TUBES.

SPECIFICATION forming part of Letters Patent No. 485,919, dated November 8, 1892.

Application filed August 12, 1891. Serial No. 402,446. (No model.) Patented in England May 22, 1890, No. 7,932; in France March 26, 1891, No. 212,385; in Sweden May 14, 1891, No. 3,568; in Switzerland May 15, 1891, No. 3,539; in Norway May 19, 1891, No. 2,282; in Luxemburg June 1, 1891, No. 1,456; in Italy June 10, 1891, LVIII, 229; in Cape of Good Hope June 18, 1891, No. 695; in Victoria July 3, 1891, No. 8,848; in Tasmania July 6, 1891, No. 951/10; in New South Wales July 7, 1891, No. 3,104; in South Australia July 7, 1891, No. 1,974; in Queensland July 8, 1891, No. 1,357; in New Zealand July 16, 1891, No. 5,095; in Spain July 18, 1891, No. 12,111; in Brazil July 29, 1891, No. 1,258; in Western Australia February 2, 1892, No. 312; in Canada February 22, 1892, No. 38,323; in India April 19, 1892, No. 179/91, and in Austria-Hungary May 11, 1892, No. 41,093 and No. 9,431.

To all whom it may concern:

Be it known that I, FRANCIS EDWARD ELMORE, a citizen of England, residing at Spring Grove, Hunslet, Leeds, in the county of York, England, have invented certain new and useful Improvements in the Manufacture of Mandrels for Electrolytic Deposit of Tubes, (for which I have obtained patents in Great Britain, dated May 22, 1890, No. 7,932; in France, dated March 26, 1891, No. 212,385; in Austria-Hungary, dated May 11, 1892, Nos. 41,093 and 9,431; in Switzerland, dated May 15, 1891, and January 9, 1892, No. 3,539; in Sweden, dated May 14, 1891, and February 18, 1892, No. 3,568; in Norway, dated May 19 and September 30, 1891, No. 2,282; in Spain, dated July 18, 1891, No. 12,111; in Italy, dated June 10, 1891, Vol. LVIII, 229; in Luxemburg, dated June 1, 1891, No. 1,456; in Victoria, dated July 3, 1891, No. 8,848; in New South Wales, dated July 7, 1891, No. 3,104; in New Zealand, dated July 16, 1891, No. 5,095; in South Australia, dated July 7, 1891, No. 1,974; in Tasmania, dated July 6, 1891, No. 951/10; in Queensland, dated July 8, 1891, and January 28, 1892, No. 1,357; in Cape of Good Hope, dated June 18, 1891, No. 695; in India, dated April 19 and May 20, 1892, No. 179/91; in Canada, dated February 22, 1892, No. 38,323; in Brazil, dated July 29, 1891, No. 1,258, and in Western Australia, dated February 2, 1892, No. 312,) of which the following is a full, clear, and exact 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 bur- nisher pressing against it and traveling to and fro longitudinally while the mandrel revolves.

When the metal has been deposited to the desired thickness on the mandrel, it is removed in the form of a tube.

My present invention relates to the preparation of suitable mandrels for operating as cathodes to receive the electrolytic deposit. In forming the mandrel I employ a thin but stiff metal tube, preferably one made by electrolytical deposit and selected as being true and even. I coat this tube with material fusible at a moderately-low temperature. It may be fusible metal or paraffine-wax or similar substance, which when cold sets to a firm consistence. The coating may be applied in various ways; but preferably I adopt the following method to obtain a coating with a true and smooth surface. I cause the tube that is to be coated to revolve as a roller (more or less) nearly in contact with another roller, and in the gap between the two rollers I place a body of the material that is to form the coating. I keep the mandrel-tube cool by circulating water through it or otherwise, and I keep the roller by its side heated by steam or otherwise, so as to melt the coating material which adheres to the cold mandrel and is smoothed off and polished by the hot roller, the mandrel being thus coated to a thickness which can be varied according as the axis of the roller is adjusted nearer to or farther from that of the mandrel.

Figure 1 of the accompanying drawings is a transverse section, and Fig. 2 is a side view showing a tube receiving a coating of fusible material to constitute an electrolytic mandrel.

The tube *a* has its ends provided with tubular trunnions *a'*, mounted in bearings in a suitable framing, so as to be free to revolve. In the same framing are bearings adjustable by screws *f* for the tubular journals *g'* of the hollow roller *g*. By means of pipes connected to the trunnions *a'* and *g'*, respectively, cold water and steam can be admitted to the in-

teriors of *a* and *g*, while they revolve the readily-fusible material contained in a feed-trough *b* being melted and deposited as an even-polished coating on the tube *a*.

5 When the coating is of paraffine-wax or such like material, which is a bad conductor of electricity, I may prick through it in numerous places to the metal of the mandrel; or I may in the first instance mix with the molten
10 material some substance soluble in water—such, for instance, as common salt—which when the mandrel is in the electrolytic bath will dissolve out, leaving the coating more or less porous. I cover the surface of the coat-
15 ing with plumbago or other conducting substance; but this is not necessary when fusible metal is employed as the coating. After the metal is deposited on the mandrel to the desired thickness the mandrel may be heated
20 sufficiently to melt the coating material, and then I can readily withdraw the mandrel from the shell deposited on it.

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

1. The process of manufacturing mandrels for electrolytic deposit of tubes thereon, which consists in coating said mandrels with easily-fusible material and simultaneously polishing such easily-fusible material. 30

2. The process of manufacturing mandrels for electrolytic deposit of tubes thereon, which consists in coating said mandrels by revolving the same in contact with easily-fusible material while said material is in contact with a heated polishing-surface. 35

3. The process of manufacturing mandrels for electrolytic deposit of tubes thereon, which consists in coating cool metal tubes with easily-fusible polished material by passing such material in contact with said tubes and a heated polishing-surface. 40

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 29th day of July, A. D. 1891. 45

FRANCIS EDWARD ELMORE.

Witnesses:

A. S. TOYED,
S. D. ELVIN.