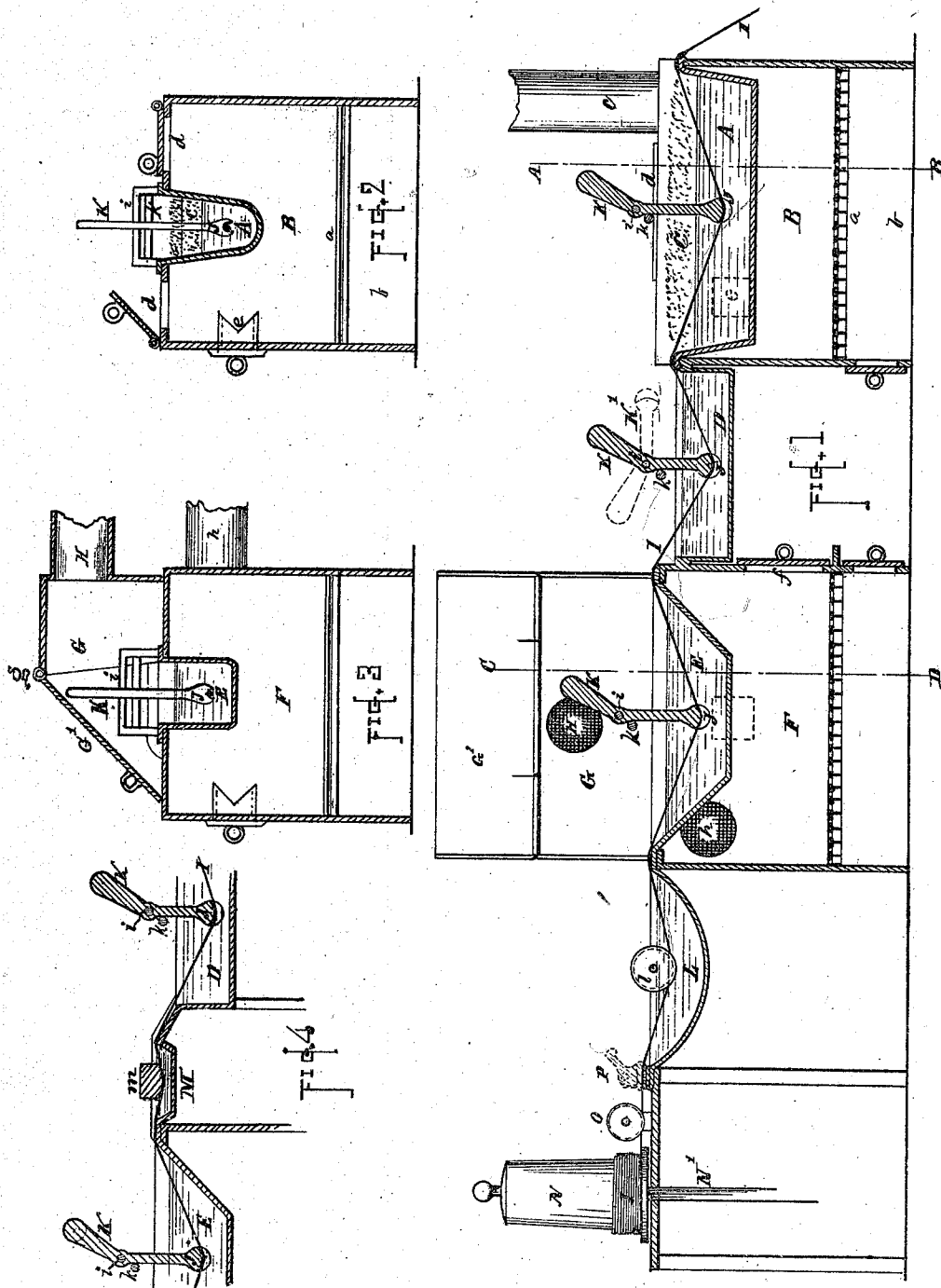


E. H. HILL.

Improvement in Apparatus for Annealing and Tinning Wire.

No. 131,681.

Patented Sep. 24, 1872.



Witnesses { *Thos. C. Dodge* Inventor *Edwin H. Hill*
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UNITED STATES PATENT OFFICE.

EDWIN H. HILL, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO WASHBURN & MOEN MANUFACTURING COMPANY, OF SAME PLACE.

IMPROVEMENT IN APPARATUS FOR ANNEALING AND TINNING WIRE.

Specification forming part of Letters Patent No. 131,681, dated September 24, 1872.

CASE B.

To all whom it may concern:

Be it known that I, EDWIN H. HILL, of the city and county of Worcester and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Apparatus for Annealing and Tinning Wire by one continuous and combined operation; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing which forms a part of this specification, and in which—

Figure 1 represents a longitudinal vertical section of an annealing and tinning apparatus constructed in accordance with my invention; Fig. 2 represents a transverse vertical section of the annealing apparatus; Fig. 3 represents a transverse vertical section of the tinning apparatus; and Fig. 4 represents a longitudinal vertical section of an additional vat or modification of the apparatus, which may be used when desired.

This invention relates to certain improvements in the manufacture of tinned wire; and consists in the combination of devices or apparatus, as hereinafter described, for facilitating the annealing and subsequent operations required in the application of the tin coating to the wire.

In the drawing, the parts marked A represent a vat of lead arranged over a furnace, B, whereby the lead may be kept in a melted condition. *a* indicates the furnace-grate; *b*, the ash-pit; *c*, the flue to the chimney-stack; *d*, the openings for the entrance of coal or other fuel; and *e*, an air-damper above the fire for admitting air to cool the fire when too hot. The vat A extends across the furnace, as shown, and its sides are made somewhat higher than its ends, and a supply of fine charcoal, C, is placed upon the surface of the lead to prevent oxidation and to assist in retaining it at a melting temperature; also, to protect the wire from the effect of the air as it is withdrawn in a heated condition from the melted lead. At the end of the furnace B, and in line with the lead vat A, I arrange a vat, D, as shown, to contain diluted muriatic acid for cleaning the surface of the wire, and at the opposite end of

the acid-vat D I place the tinning-vat E and its furnace F. The tinning-vat furnace F may be made similar to the furnace B, except that the door *f* for the entrance of fuel is arranged in the side instead of the top, and the upper part of the furnace and tin-vat are covered with a hood, G, having a flue, H, extending to the chimney-stack for the purpose of carrying off the fumes which arise from the acid as it is burned off the wire by the melted tin. The front part G' of the hood G is hinged at *g*, so that it can at any time be turned back to allow access to the tin-vat E. *h* indicates the smoke-flue from the furnace F to the chimney. The wire I to be annealed and tinned is first passed through the burning coal and melted lead in the vat A, which heats and anneals the wire. It then passes through the acid-bath D, which cleans its surface, and next through the vat of melted tin E, where its surface is coated with tin. The wire is held beneath the surface of the liquids in the several baths or vats by means of swinging guides K, which are pivoted to transverse supporting-bars at *i*, and are prevented from swinging forward with the motion of the wire I by means of stop-bars *k*. The upper part of the guides K are made inclined, so that the weight thereof will hold the guides in position against the stop-bars, and their feet J are grooved to receive and guide the wire, as shown. These guides K can be swung up, as indicated in dotted lines at K', Fig. 1, when it is desired to raise the wire from the vats. The guides K may be constructed in different form from that shown, if desired; but I prefer to make them as illustrated, and to operate in the manner set forth. L indicates a water-bath arranged at the end of the tinning-vat E, and through which the wire is passed to cool it after it leaves the melted tin. The wire is held under the surface of the water by means of the grooved wheel *l*. When desired, an additional vat, M, (see Fig. 4,) may be arranged between the vat D and the tinning-vat E. The vat M is to contain muriate of zinc. A presser-block, *m*, covered with lead, is arranged across the central part of the vat M for holding the wire below the

surface. This block *m* may be hinged at one side, so that it can be swung back, when desired, to free the wire from the liquid. *N* indicates the cylinder upon which the finished wire is wound, and *O* indicates a friction-roll for regulating the tension on the wire as it winds upon said cylinder. Any suitable mechanism may be combined with the spindle *N'* of the cylinder *N* for imparting to it a rotary motion for winding the wire. A wiper, formed of cotton-waste or similar material, supported in a suitable frame, may be arranged at the end of the water-bath, as indicated at *P*, for removing the adhering water from the surface of the wire. The annealing, tinning, and other vats may be made of sufficient width to allow any desired number of wires to pass through at the same time, and a number of winding-cylinders *N* may be arranged at the end of the apparatus to correspond with the number of wires, each wire being wound upon a separate cylinder. The cylinder *N* is formed slightly tapering toward the top, so as to allow the wire to rise up as it is filled onto the cylinder at the bottom, and the coils of finished wire are removed from the upper part of the cylinder as it accumulates thereon. Wires of iron, brass, or other material can be annealed and tinned with my improved apparatus with equal facility.

It will be observed that with my improved apparatus the operation of annealing and tinning wire can be performed in a very convenient and expeditious manner, and at considerably less cost than by the method heretofore practised, which method is as follows, viz: The wire is first placed in closed annealing-pots, which are subjected to heat in a suitable furnace for about twenty-four hours, when they are taken out and allowed to cool. The wire is then removed from the pots, dipped in boiling diluted sulphuric acid to clean or scale its surface, and afterward dipped or soaked in a liquor formed of rye-meal and water, to prevent it from rusting. The wire is then drawn through dies, in the usual manner, to give it

the required size, it being passed through from one to four different dies, according to the size to which the wire is required to be reduced. After drawing, the wire is passed through a bath of muriate of zinc, and then through a bath of melted tin. This old process is laborious, and the apparatus therefore occupies much space, and is quite expensive. A long time is also consumed in the process, while the wire produced is rendered stiff and hard, from the fact of its having to be drawn after it is annealed and before it is tinned, and which hardness and stiffness render the tinned wire thus constructed objectionable for many purposes.

The wire produced by my improved apparatus is of a superior quality, of excellent finish, and is very soft and pliable, whereby it is rendered particularly valuable for use in the manufacture of wire-cloth or for covering the bass-strings of pianos, for both of which purposes large quantities are used annually.

My improved apparatus occupies but a small space, and can be constructed at comparatively small cost. The apparatus can readily be used for zincing wire by substituting zinc in place of tin in the vat *E*, the operation of the apparatus being the same whether zinc or tin is used.

Having described my improved apparatus for annealing and tinning wire, what I claim therein as new, and of my invention, and desire to secure by Letters Patent, is—

An improved apparatus for annealing and tinning wire by one continuous and combined operation, consisting of the annealing-vat *A* and its furnace *B*, acid-vat *D*, tinning-vat *E* and its furnace *F*, water-vat *L*, and winding mechanism, consisting of the cylinder *N* and tension-roll *O*, together with the wire-depressing guides *K* and roll *I*, substantially as shown and described.

EDWIN H. HILL.

Witnesses:

THOS. H. DODGE,
CHAS. H. BURLEIGH.