

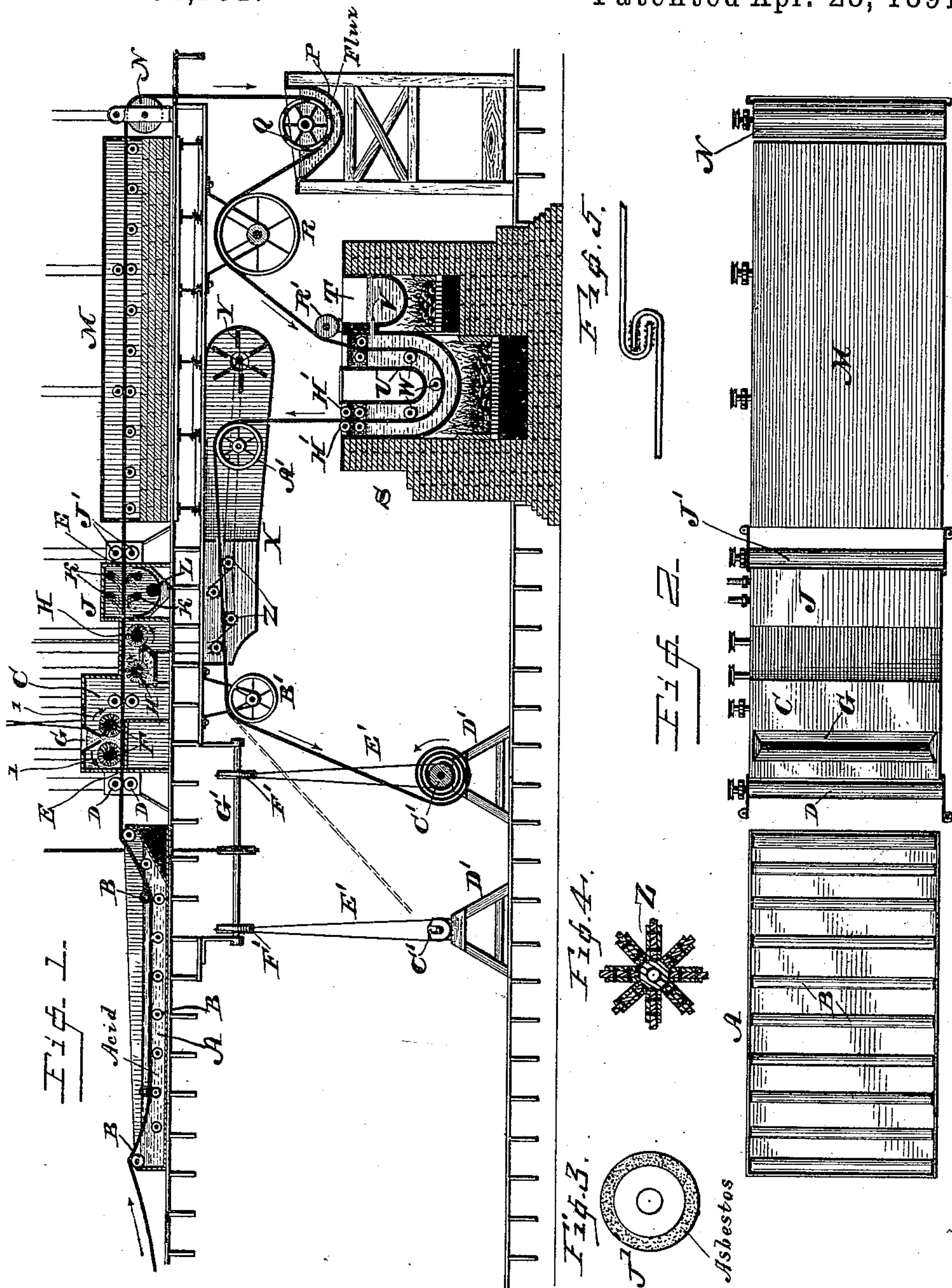
(No Model.)

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PROCESS OF AND APPARATUS FOR TINNING SHEET METAL.

No. 451,261.

Patented Apr. 28, 1891.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## PROCESS OF AND APPARATUS FOR TINNING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 451,261, dated April 28, 1891.

Application filed April 25, 1890. Serial No. 349,528. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL Y. BUCKMAN, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in the Method of and Apparatus for Coating Sheet Metal with Tin and Alloys Thereof, which improvement is fully set forth in the following specification and accompanying drawings.

My invention relates to improvements in the method of and apparatus for coating sheet metal with tin and alloys thereof; and it consists, first, of the method herein described of uniting the ends of sheet-metal plates.

It further consists of the apparatus or plant hereinafter described for coating or tinning sheet metal.

Figure 1 represents a vertical section of a plant or apparatus for carrying on the method herein described of coating sheet metal as embodied in my invention. Fig. 2 represents a plan view of the acid bath, cleansing-boxes, and drying-furnace. Figs. 3 and 4 represent vertical transverse sectional views, on an enlarged scale, of a felt-covered roller for drying and an asbestos-covered roller for burnishing the sheet. Fig. 5 represents a sectional view of two plates of sheet metal hooked or secured together preparatory to being cleansed and coated.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings, A designates a vessel or trough in which is prepared an acid bath, the said trough having a number of rollers B journaled in the sides thereof, and between which the sheet metal passes during its advance through the bath. Adjacent to one end of the trough A and between the same and the scrubbing and cleansing box C are the feed-rollers D D. The said cleansing-box C has slots E E in its sides, through which the sheet metal is drawn, and within the box, near one end and above the said slots, are the rotary brushes F F, journaled in the side walls of the box and provided with any suitable gearing for revolving them in opposite directions and in the directions of the arrows *ll*, so as to keep the fine gravel or sand fed through a chute G between them and the upper side of the sheet. In the other end of the box and

on the under side of the sheet are journaled two rotary brushes H H, which also revolve in opposite directions and for the same purpose as the brushes F F, except that these brushes scour the under side of the plate. Within a chambered portion J of the box through which the sheet is passed and above and below the slots in the sides of the box are perforated pipes K for spraying both sides of the sheet. An outlet or waste pipe L leads from the said chamber J. Adjacent to the end of the chamber J are the feed-rollers J' J', having a coating or covering of asbestos or felt for removing the surplus water before the sheet is passed to the oven.

Adjacent to and in line with the cleansing-box is a drying-oven M, wherein the sheet is guided on suitable supports. This oven is of any suitable construction and heated for drying the sheet in any suitable manner.

N designates a guide-wheel suitably supported and over which the metal sheet travels. Below the guide-wheel N, as shown in the drawings, but which, so far as the method is concerned, may be in the same plane as the acid bath, cleansing box, and drying-oven, is a vessel P, adapted to contain a sal-ammoniac bath for the purpose of forming a flux on the sheet previous to its being inserted into the dipping-pot. Q designates guiding-wheels in the said vessel P, under and around which the sheet is passed to and over the guiding-wheels R and R'.

The twin-pot furnace S has a suitable support of masonry, and is provided with a melting-pot T and a dipping-pot U, each of the said pots having a fire-chamber with grate underneath the same, and the fire-chamber of the melting-pot being on one side of the dipping-pot U, so that the said side receives heat from the fire-chamber of the pot U in addition to the heat received from its own fire-chamber, and is thereby heated to a higher temperature than the other side of the pot. The two pots are connected by a channel or passage V, through which the molten tin or alloy thereof flows from the melting to the dipping pot.

Within the dipping-pot, which has inner and outer walls of U-shaped form, are the guiding-rollers W, under which the sheet is passed, and in the upper portion of the exit-



limb are the adjustable squeezing-rollers H' H' for regulating the thickness of the coating.

Above the twin-pot furnace is a chilling and burnishing chamber X, having a revolving fan Y for cooling the coated sheet as it leaves the dipping-pot.

Z designates rotary brushes with an asbestos or felt covering adapted to contact with the coated sheet and burnish the same. The guide-wheels A' B' conduct the coated plate into and from the said chilling and burnishing chamber to a roller C', suitably journaled in a support or bearing D' and receiving rotary motion by means of a band E', connected with a pulley F' on a rotary shaft G'.

The various brushes, feed-wheels, fans, and shafts receive motion from a common driving-shaft by any of the usual connecting mechanisms; but as such mechanisms *per se* form no part of this invention the same are not shown in the drawings nor described herein.

In carrying out my method a number of sheets of ordinary metal plate are fastened together by bending and hooking the adjacent ends, first brushing or painting the contact portions of the folded ends with a paste formed of resin and grease mixed with a powder of the same composition as the metal coating which is to be applied. The plates thus form a continuous sheet, and the latter is then drawn through the vessel A, which is about thirty feet in length, and in which is prepared a vitriol or other similar bath for the purpose of loosening the scales on the surface thereof, the sheet being reliably held in the bath during its progress through the vessel by means of the guide-rollers therein. After leaving the bath the sheet is passed into the box C, where a mixture of fine gravel or sand and water is supplied through the chute G to the rotary brushes F F, which revolve in opposite directions, so as to have their strain or tension on the sheet neutralized or destroyed and also to keep the gravel or sand a greater time between them for scouring the sheet, thus requiring a less supply of the same. The brushes H H on the under side of the sheet are also rotated in opposite directions for the same reasons as the brushes F F are so rotated, as was described. The sheet is next drawn into the chamber J, where water is sprayed against both sides of the same from the perforated pipes K, so as to clear the sheet of any sand as well as of all loose particles of metal which might be thereon. From the spraying-chamber the sheet is passed between the two feed-rollers J' J', the asbestos covering of which removes the surplus moisture from the sheet before its passage into the oven M, where it is thoroughly dried. Leaving the oven, if the coating is to be an alloy of lead and tin or spelter, the sheet is passed into the vessel P, containing sal-ammoniac or muriatic or other acid, for the purpose of aiding in forming a flux thereon. If the coating is to be of other metal, the sheet is passed direct to the dipping-pot without being treated to a sal-

ammoniac bath, where it enters one limb, passing downward into a grease bath on top of the melted coating-metal, then into the melted coating metal, which latter enters the dipping-pot U from the melting-pot T through the channel V. The sheet is then passed through the dipping-pot U under the rollers therein and upward through the other limb thereof and through a clean grease bath on top of the metal in the said limb, where it is squeezed between the rollers H' H', so that the proper thickness of coating is obtained. It will be noticed that the metal in the limb where the sheet enters the pot is at a higher temperature than in the limb from which it leaves the same, so that it adheres to the sheet more readily on leaving the pot than on entering the same. On entering the chilling-chamber the sheet is subject to the action of the revolving fan, so that it is rapidly cooled or chilled, and it then passes between the burnishing-rollers Z, which have a covering of mineral wool or asbestos, by means of which a smooth and polished surface is given to the sheet, which is then passed over the guide-rollers R and R' and down to and around a rotary drum or roller C', so as to form a roll thereon. Two or more rotary drums C', suitably journaled, may be employed, so that when a roll of a required size is formed the sheet can readily be cut or separated therefrom and wound on a second roller, when the first roll can be removed from its roller, so that the apparatus need not be stopped while removing the roll.

All the different parts of the plant or apparatus may be placed on the same plane or floor, if desired, or may be on different floors, the essential feature being that they are in such positions as to perform a continuous operation, as described.

The scouring device and twin pots described herein do not form, *per se*, a part of this application, being fully described, illustrated, and claimed in separate applications for Letters Patent duly filed September 11, 1890, Serial No. 364,689, and August 30, 1890, Serial No. 363,498.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In tinning sheet metal, the process which consists in coating the contact-faces of the hooked ends of the plates with a fusible metallic powder and passing the plates thus joined successively through a tinning bath, substantially as and for the purpose set forth.

2. The method of coating sheet-metal plates, consisting in uniting the ends of the plates and coating the contact-faces of the said ends with a fusible metallic powder, passing the sheet thus formed through an acid bath, then scouring, spraying, and drying them, and then passing the sheet through a dipping-pot and squeezing-rollers, substantially as described.

3. The method of coating sheet-metal plates, consisting in first connecting the ends of the



plates and coating the contact-faces of the said ends with fusible metallic powder, passing the sheet thus formed through an acid bath, then scouring, spraying, and drying it 5 without turning it, and then passing the cleansed sheet into a dipping-pot, then squeezing, and finally cooling and burnishing the coated sheet, substantially as described.

4. The method of coating sheet-metal plates, 10 consisting in first connecting the ends of the plates and coating the contact-faces of the said ends with a fusible metallic powder, passing the sheet thus formed through an acid bath, then scouring, spraying, and drying 15 it on both sides without turning it, then passing the cleansed sheet into a dipping-pot containing the melted coating, and then after passing the coated sheet between squeezing-rollers cooling and burnishing it, substantially 20 as described.

5. The method of preparing coated sheet-metal plates, consisting in first connecting the ends of the plates and coating the contact-faces of the said ends with a fusible metallic 25 powder, cleansing and drying the sheet thus formed on both sides, simultaneously heating

the melted coating to different temperatures in opposite sides of the dipping-pot, then passing the cleansed sheet into the dipping-pot at one side and out thereof at the opposite side, and then cooling and burnishing the 30 coated sheet, substantially as described.

6. A tinning plant for coating a continuous sheet of metal, consisting of an acid bath with guiding-rollers thereon, a scouring device 35 with rotary brushes and spraying-pipes on both sides of the path of travel of the sheet, drying-rollers between which the sheet is passed, a drying-oven, guide-pulleys, a second bath, a dipping-pot with entrance and 40 exit limbs on opposite sides, cooling and burnishing devices, feed-rollers at and between said different devices, and mechanism connected with and operating said rollers, whereby a uniform and simultaneous motion is im- 45 parted to the same, said parts being combined substantially as described.

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Witnesses:

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