(No Model.) 2 Sheets—Sheet 1.

C. C. ROBERTS & L. S. STODDARD.

APPARATUS FOR COATING SHEET METAL PLATES.

No. 588,478. Patented Aug. 17, 1897.

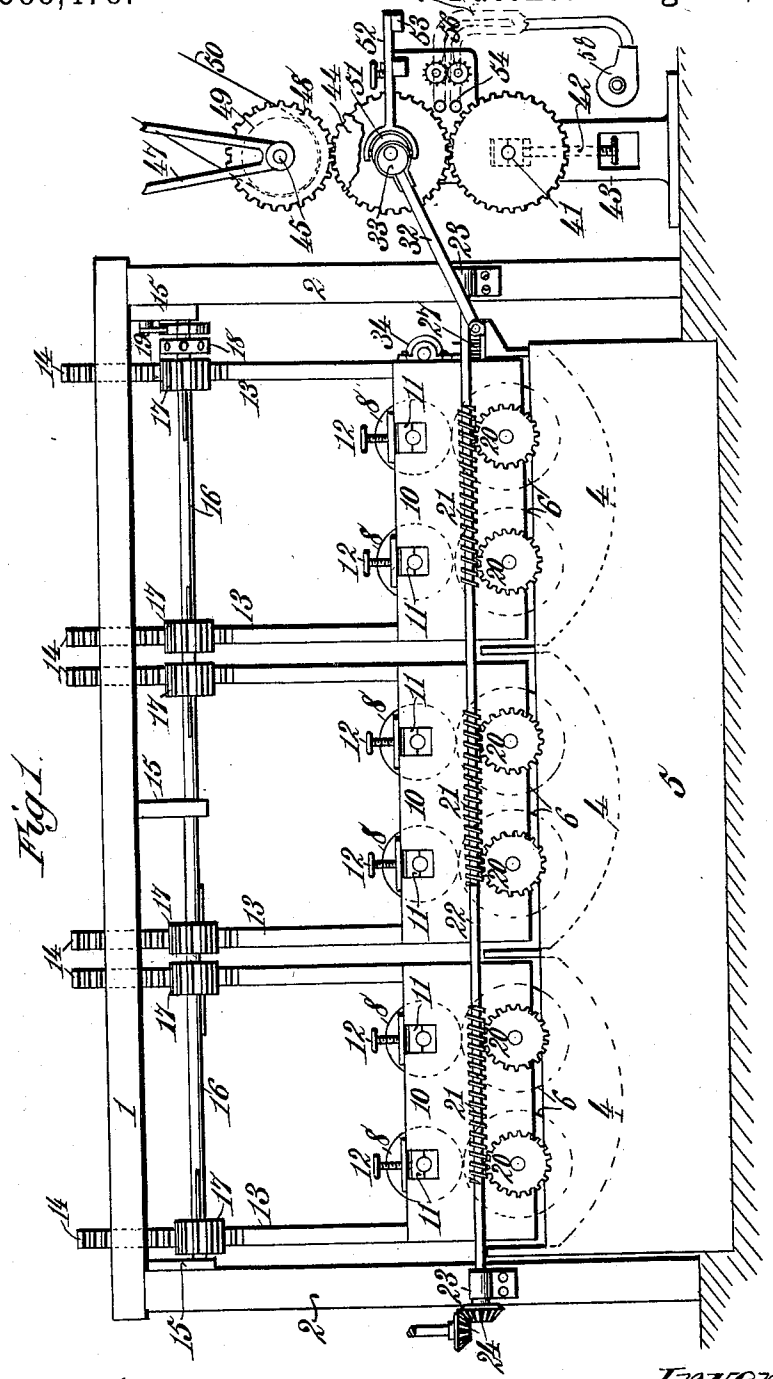


Fig. 1.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

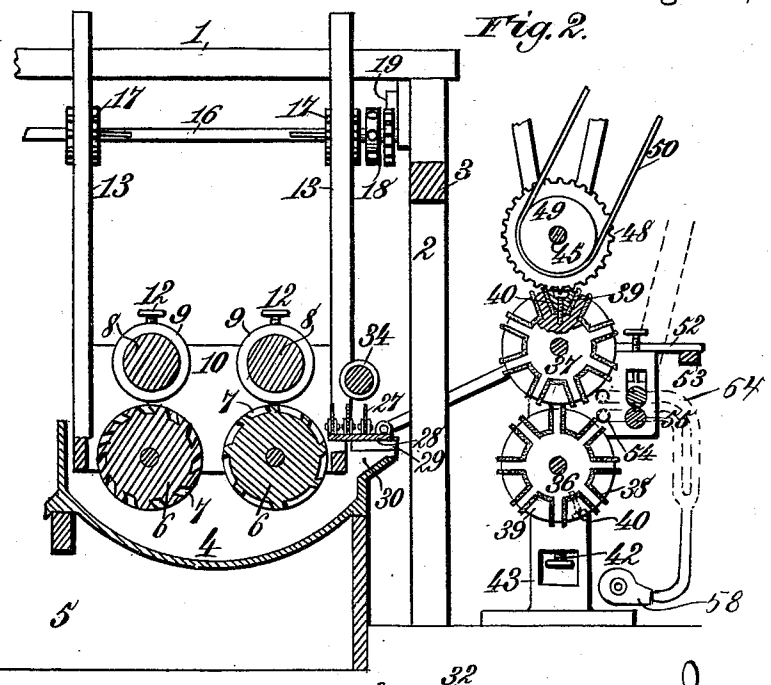


Fig. 3.

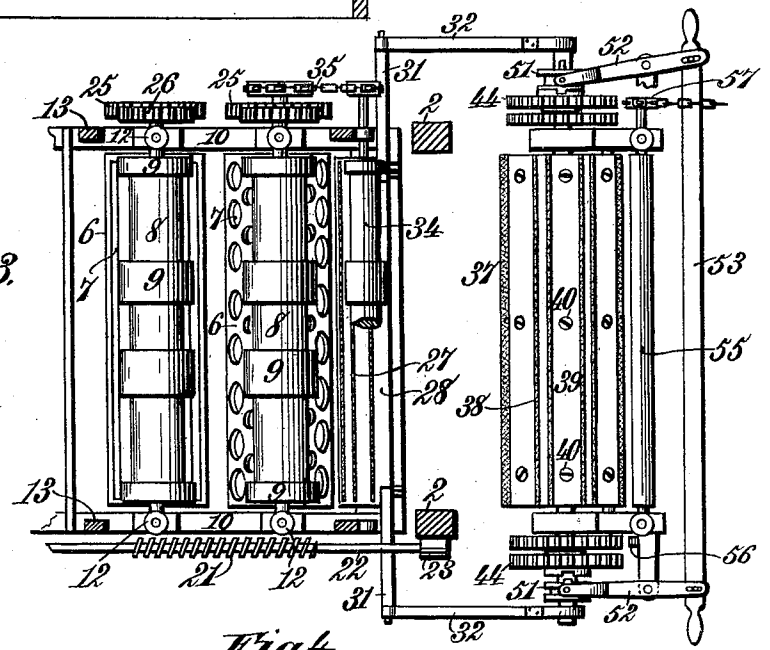
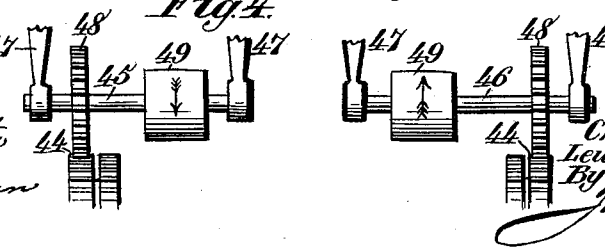


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES C. ROBERTS AND LEWIS S. STODDARD, OF ANSONIA, CONNECTICUT.

APPARATUS FOR COATING SHEET-METAL PLATES.

SPECIFICATION forming part of Letters Patent No. 588,478, dated August 17, 1897.

Application filed October 10, 1896. Serial No. 608,515. (No model.)

To all whom it may concern:

Be it known that we, CHARLES C. ROBERTS and LEWIS S. STODDARD, citizens of the United States, residing at Ansonia, in the county of New Haven and State of Connecticut, have invented new and useful Improvements in Apparatus for Coating Sheet-Metal Plates, of which the following is a specification.

This invention relates to apparatus for coating sheet-metal plates with tin or tin alloys, leaded tin, or the like molten metal; and it consists in features of construction and novel combinations of devices for use in tinning sheet metal, as hereinafter particularly described and claimed.

In the annexed drawings, illustrating our invention, Figure 1 is a side elevation of a sheet-metal-tinning apparatus embodying our improvements. Fig. 2 is a part vertical longitudinal section of the delivery end of the apparatus or machine. Fig. 3 is a horizontal section of the delivery end of the machine. Fig. 4 is an elevation of the shafts or divided shaft for transmitting power, first in one direction and then in an opposite direction, to operate the rotary wiping-brushes.

The frame of the machine may comprise the longitudinal beams 1, supported by uprights 2, that may be braced by cross-bars 3, arranged at any suitable points.

The molten metal to be used in tinning or coating metal sheets is contained in a series of pots 4, set in a furnace 5, arranged at the base of the apparatus.

For the purpose of applying the molten metal to the under side of a sheet-metal plate we prefer to arrange in each pot one or more carrier-rolls 6, provided with suitable recesses or pockets 7, into which will enter the molten metal as the roll or rolls revolve therein. These recesses or pockets 7 may have any suitable or preferred form and arrangement. As shown, for instance, in the left side of Figs. 2 and 3 the pockets or recesses may be extended lengthwise of the carrier-rolls and may have inclined sides so arranged that as the roll rotates the molten metal taken up in the said pockets or recesses will gradually flow out of the same and spread itself over the periphery of the roll, thus facilitating its application to the under side of the metal sheet or plate passed over said rolls. In the right side of Figs. 2 and 3 the carrier-roll recesses or pockets are shown as having a circular form, with an inclination of their sides to promote the spreading of the molten metal over the surface of the rotating roll, and a consequent uniform application to the metal sheet to be coated. The carrier-rolls may be provided with either form of recesses or pockets, or any other form suitable to the purpose of causing the molten metal to flow over the roll-periphery, and in a series of rolls several different forms of pockets may be employed, if desired.

The metal sheet or plate to be coated is held down onto the carrier-rolls 6 by means of pressure-rolls 8, which are geared with and revolved from the said carrier-rolls in such manner as to feed the metal sheet or plate forward as the coating is applied. These pressure-rolls 8 are preferably provided at intervals with collars 9, designed to relieve the pressure on the metal sheet or plate sufficiently to prevent spattering of the molten metal over the sheet or plate edges. The lower rolls 6 in each pot are journaled in vertically-adjustable side pieces 10, and the upper rolls 8 are journaled in boxes 11, that are mounted in said side pieces and provided with adjusting-screws 12 for regulating the pressure on the metal sheet or plate. One pair of side pieces 10 is provided for the set of rolls pertaining to each pot. These side pieces are provided at their ends with vertically-extended rack-bars 13, the upper ends of which are provided with offsets or shoulders 14 to rest on the beams 1 when the rolls are lowered to the fullest extent.

In hangers 15, depending from the beams 1, there are mounted on opposite sides of the machine two longitudinally-arranged shafts 16, on which pinions 17 are keyed or splined at suitable points in position to mesh with the racks 13 for raising and lowering the hereinbefore-described rolls. If it is desired to raise or lower the rolls of one or more pots and leave others undisturbed, some of the pinions 17 may be shifted out of mesh with the rack-bars to which they pertain, and thus the rolls of the several pots may be raised or lowered independently or simultaneously, as

desired. As a means for operating the pinions 17 each shaft 16 may have secured thereon a disk 18, provided with peripheral recesses for insertion of a hand bar or lever to rotate the pinion-shafts, or the said shafts may be provided with hand-wheels or any suitable operating mechanism. In order to lock the pinion-shafts, they may be provided with pawl-and-ratchet mechanism 19, Figs. 1 and 2, or any suitable device.

The shafts of the rolls 6 and 8 are extended beyond the side pieces 10, as shown in Fig. 3. On one end of the shaft of each lower roll 6 is secured a worm-wheel 20, meshing with and driven from a worm thread or screw 21, formed at intervals on a shaft 22, journaled in bearings 23, secured to the uprights 2 at the ends of the machine-frame. This shaft 22 may be driven by power applied through bevel-gearing 24, Fig. 1, or in any other convenient manner. On the opposite end of each lower-roll shaft is a spur-gear 25, meshing with a pinion 26 on the shaft of the corresponding upper roll 8, as shown in Fig. 3, for driving the upper rolls from the lower ones.

While the sheet or plate of metal to be coated or tinned is being fed forward by the rolls 6 and 8, the revolutions of the lower rolls 6 cause their pockets to take up molten metal from the quantity contained in the pots 4, and at a certain point in the revolution of each pocketed or recessed roll the molten metal in the pockets starts to flow slowly backward and outward, thus covering the face or periphery of the roll with molten stock free from all dross. Now as the metal sheets pass over the lower or carrier rolls 6, pressed down by the top rolls 8, they receive a thorough coating on the under side, leaving the upper side of the sheet or plate free from all spatters. The metal sheet or plate next passes over a series of wipers 27, to which reciprocating movement is imparted for the purpose of wiping off from the plate or sheet all surplus stock and permitting it to flow back into the last pot of the series.

The wipers 27 may consist of flax, or sheepskin with the wool on, or other suitable material, or they may comprise a series of ribs, bars, or fingers covered with suitable wiping material. These reciprocating wipers 27 are attached in any convenient and secure manner to a horizontal plate 28, supported in guideways 29 at the farther side of the last pot in the series, and beneath is a passage 30, through which the surplus coating metal can drop back into the pot. In order to provide for reciprocating the wipers 27, the supporting-plate 28 is provided at its ends with arms 31, Fig. 3, for attachment of connecting-rods 32 for transmitting motion from eccentrics 33, connected with rotary wiping-brushes to be presently described. Above the reciprocating wipers 27 is a collared pressure-roller 34, arranged to bear on the upper side of the metal sheet or plate and driven in the same direction as the upper rolls 8 by means of sprocket-gearing 35, Fig. 3, from the shaft of the last upper roll.

From the reciprocating wipers 27 and accompanying pressure-roller 34 the metal sheet or plate next passes to a finishing mechanism comprising a pair of rotary wiping-brushes 36 and 37, arranged one above the other. These rotary brushes 36 and 37 consist of rolls that are longitudinally grooved or recessed for reception of strips 38, of wool, covered sheepskin, flax, or suitable wiping and burnishing material, held in place by filling pieces or strips 39, secured by bolts or screws 40, Figs. 2 and 3. As shown in Fig. 1, the rotary brushes 36 and 37 are geared together to normally revolve in the same direction as the carrier-rolls and pressure-rolls. The lower rotary brush 36 has its shaft journaled in boxes 41, Fig. 1, provided with screws 42 for vertical adjustment in the frame or standards 43, in which both brushes are mounted.

The shaft of the upper rotary brush is extended at both ends and carries thereon the eccentrics 33, from which the reciprocating wipers 27 are actuated. The upper-rotary-brush shaft is also provided near its ends with spur-gears 44, each of which is capable of being clutched or unclutched, to be made either fast or loose with the brush-shaft, so as to permit a rotation of the brushes either forward or backward and allow their direction of rotation to be reversed as required. This is accomplished by means of a divided counter-shaft or rather two shafts 45 and 46, Fig. 4, mounted end to end at a suitable distance apart in hangers 47, as shown. Each of these shafts 45 and 46 carries a spur-gear 48 for meshing with one of the spur-gears 44 on the shaft of the upper rotary brush. Each of said shafts also carries a pulley 49 for attachment of belting 50, the only difference being that the belting of one pulley is arranged to drive its shaft in one direction, while the other pulley is driven to rotate its shaft in the opposite direction.

The position of the spur-gears 44 on the shaft of the upper rotary brush 37 is controlled through any suitable clutches 51, connected by levers 52 with a shipper-bar 53, by means of which either gear 44 can be shifted to mesh with its driving-gear 48, while at the same instant the other gears 44 and 48 will be thrown out of mesh, thus providing for actuating the rotary brushes 36 and 37 from either the shaft 45 or the shaft 46, according to the direction in which it is desired to revolve said brushes. In the greater part of the operation of the machine the shipper-bar 53 is set to cause rotation of the brushes 36 and 37 in the same direction that the sheet or plate of metal is moving; but while the rear end of the metal sheet or plate is passing between these brushes their direction of rotation is reversed by shifting the shipper-bar 53, so that the coating metal will be brushed backward to finish the rear end of the sheet as completely and neatly as the forward end.

It is preferable to provide the machine with both brushes 36 and 37, for while only the lower brush 36 is immediately concerned in the operation of coating the under side of a metal sheet the upper brush 37 will serve to wipe off any beads of molten metal that might pass upward over the edges of the sheet or plate, especially if the edges should be broken or irregular, as is frequently the case, also, as the metal sheet or plate is generally to be tinned or coated on both sides the upper brush will wipe off any dirt or oxid from the already-tinned surface and give the plate the same finish on both sides.

From the rotary wiping-brushes 36 and 37 the coated metal sheet or plate passes between perforated cold-air-blast pipes 54, arranged close to the said brushes and adapted to deliver currents of cold air onto the upper and lower sides of the metal plate or sheet to cool the same and set the coating of tin or leaded tin so that it will not smear. The tinned or coated sheet next passes between a pair of small-diameter rolls 55, connected by gears 56, Fig. 3, and driven by sprocket-gearing 57 or otherwise at the same speed and in the same direction as the carrier-rolls hereinbefore described. As the metal sheet passes between these rolls 55 the shipper-bar 53 should be shifted by the machine-operator to reverse the direction of rotation of the brushes 36 and 37 and thus cause the last end of the sheet to be wiped as carefully and neatly as the forward end. This completes the operation of the machine in applying the coating metal to one side of the metal plate or sheet, and in order to tin or coat both sides it is only necessary to reverse the sheets and repeat the operation already described.

The cold-air-blast pipes 54 may connect with a blower 58 in any convenient manner.

What we claim as our invention is—

1. In apparatus for tinning metal sheets or plates, the combination of a pot for molten metal, a roll mounted to rotate in said pot and provided with a number of pockets or recesses to receive the molten metal and permit it to flow over the periphery or face of the roll, a pressure-roll to hold down the metal plate or sheet onto said pocketed roll, gearing for rotating said rolls to carry the sheet or plate forward, and means for removing surplus coating metal and finishing the coated metal plate or sheet, substantially as described.

2. In apparatus for tinning metal sheets or plates, the combination of a series of furnace-heated pots for molten metal, rolls mounted to rotate in said pots and each provided with a number of pockets or recesses adapted to take up the molten metal and permit it to flow over the faces of the several rolls, a series of pressure-rolls to assist in feeding the metal plate or sheet forward and to hold it down onto the pocketed rolls, a series of reciprocating wipers for acting on the under side of the metal sheet or plate to remove surplus coating metal and permit its return to the last pot of the series, and rotary wiping-brushes for finishing off the coated metal plate or sheet, substantially as described.

3. In apparatus for tinning metal sheets or plates, the combination with a pot for molten metal, of a roll or rolls mounted to rotate in said pot and provided with a number of recesses or pockets to receive the molten metal, the sides of said recesses or pockets being inclined in such direction that at a certain point in the rotation of the roll or rolls the molten metal will flow out from said pockets or recesses and spread over the roll or rolls, one or more pressure-rolls to hold the plate or sheet of metal onto the pocketed roll or rolls, and means for removing surplus metal from the under side of the metal sheet or plate, substantially as described.

4. In apparatus for tinning metal sheets or plates, the combination with mechanism for applying coating metal to a plate or sheet, of rotary wiping-brushes mounted and arranged one above the other to operate on both the upper and lower sides of said sheet or plate, the shafts of the said upper and lower brushes being geared together, the shafts 45 and 46 mounted adjacent to one of said brushes in line with each other and arranged to be revolved in opposite directions, gearing to connect said shafts with a brush-shaft, and means for shifting said gearing to reverse the direction of rotation in the brushes, substantially as described.

5. In apparatus for tinning metal sheets or plates, the combination of recessed rolls for applying a metal coating to the sheet or plate, a series of pots for containing molten metal and in which said rolls are arranged, horizontally-reciprocating wipers for removing surplus coating from the under side of a metal sheet, rotary wiping-brushes between which the metal plate or sheet is passed, and means for reversing the rotation of said brushes to cause the metal sheets to be finished cleanly to their ends, substantially as described.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

CHARLES C. ROBERTS.
LEWIS S. STODDARD.

Witnesses:
AUSTIN P. KIRKHAM,
H. J. DUGAN.