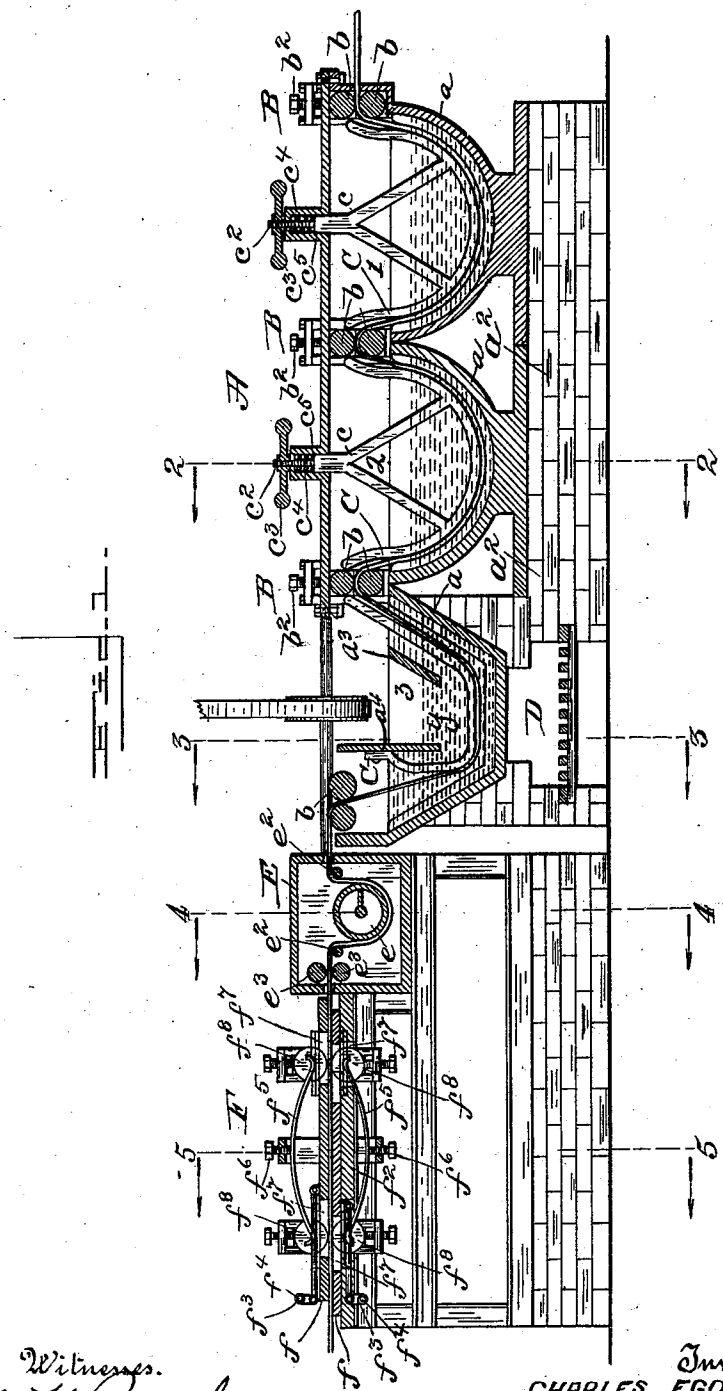
(No Model.) 3 Sheets—Sheet 1.

J. H. FINLEY & C. EGOLF.

MACHINE FOR COATING METAL PLATES.

No. 550,367. Patented Nov. 26, 1895.



Witnesses.
W. N. Dumphrey.
F. B. Owen.

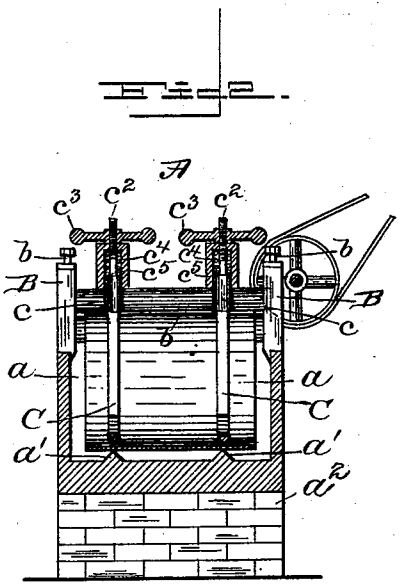
Inventors,
CHARLES EGOLF
and JAMES H. FINLEY,
by Geo. H. Holgate
their Attorney.

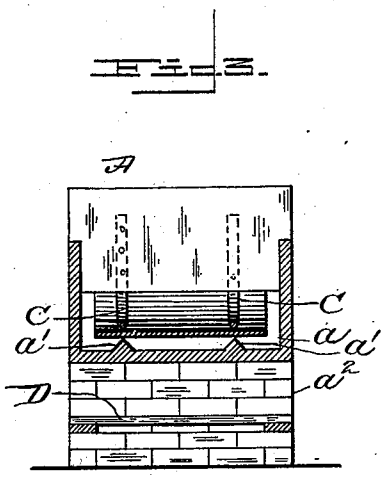
(No Model.) 3 Sheets—Sheet 3.

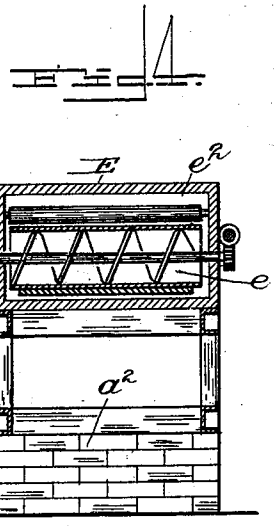
J. H. FINLEY & C. EGOLF.

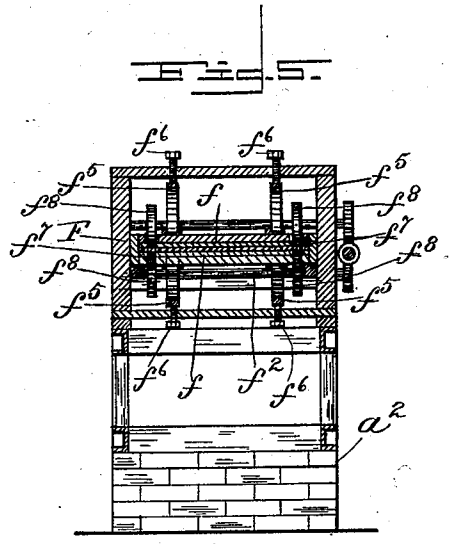
MACHINE FOR COATING METAL PLATES.

No. 550,367. Patented Nov. 26, 1895.









Witnesses.
W. H. Humphrey.
F. B. Owen.

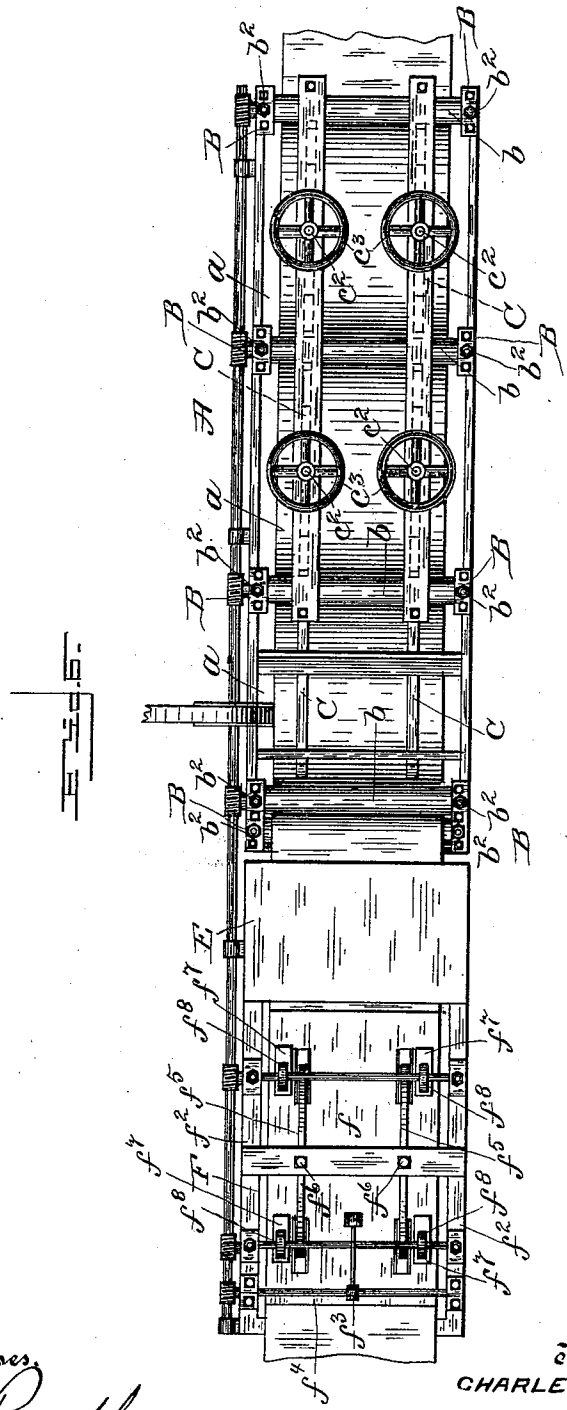
Inventors,
CHARLES EGOLF
and JAMES H. FINLEY,
by Geo. H. Holgate
their Attorney.

(No Model.) 3 Sheets—Sheet 3.

J. H. FINLEY & C. EGOLF.

MACHINE FOR COATING METAL PLATES.

No. 550,367. Patented Nov. 26, 1895.



Witnesses.
W. N. Humphrey.
F. B. Owen.

Inventors,
CHARLES EGOLF
and JAMES H. FINLEY,
by Geo. H. Holgate
their Attorney.

UNITED STATES PATENT OFFICE.

JAMES H. FINLEY AND CHARLES EGOLF, OF NORRISTOWN, PENNSYLVANIA.

MACHINE FOR COATING METAL PLATES.

SPECIFICATION forming part of Letters Patent No. 550,367, dated November 26, 1895.

Application filed June 5, 1894. Serial No. 513,520. (No model.)

To all whom it may concern:

Be it known that we, JAMES H. FINLEY and CHARLES EGOLF, citizens of the United States, residing at Norristown, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Coating Metal Plates; and we hereby declare that the following is a full, clear, and exact description of our invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to metal-coating machines.

The object is to produce an apparatus by which an equable distribution of a coating, such as tin, applied to sheet metal will be effected in an expeditious manner; further, by which the thickness of the coating may be varied without alteration in the speed of travel of the sheet, and, further, to increase the efficiency of the machine in the employment of a construction that is at once simple, inexpensive, and durable.

The invention is illustrated in the accompanying drawings, in which like letters and figures indicate corresponding parts.

Figure 1 is a view in central vertical longitudinal section of one embodiment of the invention, showing a series of liquid baths in the form of receptacles or tanks properly aligned and supported upon a bed of masonry, feed-rollers journaled in the main frame and arranged in pairs, the upper roller of each pair being adjustable, yielding guides adjustable vertically, a finishing device by which the coating is rendered uniform, a line-shaft, and gearing for imparting motion to the feed-rollers. Fig. 2 is a view in vertical transverse section taken on the line 2 2 of Fig. 1, showing the construction and arrangement of the yielding guides and the manner in which the metal sheet is directed thereby. Fig. 3 is a similar view taken on the line 3 3 of Fig. 1, showing the crucible and furnace and the guides for the sheet; and Fig. 4 is a similar view taken on the line 4 4 of Fig. 1, showing the cooling-chamber, the rotary blower, idlers, and feed-roller therein, and the gearing. Fig. 5 is a similar view taken on the line 5 5 of Fig. 1, showing the evening and burnishing device for finishing the sheet, also the driving-gear; and Fig. 6 is a view in plan of the machine, showing the baths, the feed-rollers journaled in the frame and driven from a line-shaft by worm-gear, and the finishing devices, also driven from the line-shaft.

In the drawings, A represents a series of baths in the form of tanks or troughs a supported side by side on a suitable foundation or bed a^2 of masonry, the tanks being preferably of a semicircular or equivalent cross-section, for a purpose to be hereinafter explained.

B represents feeding mechanism comprising feed-rollers b, arranged in pairs, adjacent to the adjoining edges, above the tanks and journaled one above the other in suitable bearings on a supporting-frame. The upper roller of each pair is vertically movable by means of adjusting-bolts b^2, whereby the pressure of the rollers upon the metal sheet may be regulated to effect the required feeding thereof, also to act in preserving a uniformity of surface.

C represents guides for the sheet, by which it is introduced into the baths and its period of contact therewith varied according to the action desired. These guides are of a curved or semicircular form to conform approximately to the inner curved walls of the tanks, and are yieldingly held in the tanks by being provided with spring-seated braces c of an inverted Y shape. The upper extremities of the braces are movably held in sockets in beams of the frame above the tanks and are reduced to form threaded shanks c^2, which project through openings in the bottom of the sockets to receive hand-wheels c^3, the central aperture of which is also screw-threaded, by which the guides may be raised or lowered. Encircling the threaded shanks within the sockets are spiral springs c^4, acting downward against shoulders c^5, formed at the base of the shanks, whereby the guides will yield to facilitate the ready passage of the sheet thereunder.

By the use of the adjustable guides C it is obvious that the length of the period of contact may be varied without the change of speed of the sheet, inasmuch as the lower the guides are placed in each bath the sheet will necessarily be immersed a longer period in said bath, as the liquid or other contents of

the baths remain at the same height, regardless of the change in the guides.

The contents of each of the tanks are different, and as the sheet passes through each tank in succession the sheet is prepared for the reception of the molten metal with which it is to be coated.

The tank 3 contains a flux, (shown in Fig. 1 at x,) consisting of sulfuric acid and zinc in about the proportion of eleven parts of acid to four parts of zinc. This tank also contains the molten metal, (shown at v, Fig. 1,) and also contains palm-oil, (indicated at z, Fig. 1,) the purpose of which will be described in the operation of the machine.

In order that the tank 3 may contain molten metal, oil, and flux, it has been found desirable to provide two transverse partitions a^3 a^4, by which the oil and flux may be confined within a predetermined space.

In the present embodiment of the invention the form of crucible or tank containing the alloy or coating differs from the construction above described in that the guide is adjustably secured to a plate extending transversely between the inner walls and the **Y**-shaped brace dispensed with, and also in that the feed-rollers are journaled horizontally side by side.

D represents a furnace beneath the crucible, by which the metal may be reduced to a state suitable for adhering to the sheet in the form of a coating.

E represents a receptacle or chamber provided with a number of idlers e^2 and guide-rollers e^3 to guide the sheet through the chamber and around the blower e to remove surplus metal and produce a uniform coating.

F represents the combined burnisher and evener, comprising duplicate plates f, between the adjoining surfaces of which the sheet is designed to be passed, movably supported one upon the other in guides or on a table f^2 and being connected, respectively, to cranks f^3 of shafts f^4 by rods f^5, the crank-shafts being driven from the line-shaft, by which the plates are given a reciprocatory motion in opposite directions. Acting upon the plates to force them together are springs f^5, the tension of which may be regulated by the screw-bolts f^6 working through threaded openings in a transverse support from the main frame. At f^7 the plates are slotted to receive feed-rollers f^8, by which the travel of the sheet will be made continuous.

The operation of our apparatus is as follows: The sheet is first introduced by being passed between rollers at the outer side of the pot marked 1 and enters the diluted acid bath, passing beneath the adjustable guide C in said bath. Upon emerging from this bath all foreign matter will have been removed and the sheet brought to a high temperature. The sheet is then passed between rolls into the bath 2, in which is the cold water, which serves to remove any acid on the sheet and also serves to partially reduce the temperature of the sheet. The sheet is now passed into bath 3 between rollers, said bath containing the molten metal. Before passing into the molten metal the sheet is first passed through the acid and zinc flux, which serves to dry the sheet and prevent any explosion which would occur if the sheet were to pass into the molten metal while wet. After passing through the metal the sheet passes into the palm-oil, which serves the purpose of allowing the sheet to cool gradually, which is desirable, as a sheet if chilled would be ruined. The passing of the sheet through the oil allows it to receive a thin coating, which serves to partially retain the heat and thereby allow the sheet to cool gradually. The sheet is then passed through the roller-box, which removes the coating of oil, and is passed to the polishing-boards and finishers, where, by the rubbing action of the reciprocating plates, the coating will be rendered uniform and given the required finish.

Any means may be employed for applying motion to the different rolls; but the means shown in Fig. 6 are thought to be preferable, it being readily seen that all of the parts will be driven at a uniform speed and thereby keep the sheet taut as it passes through the machine.

As the thickness of the coating applied to the sheet is proportionate to the period of contact with the molten metal or alloy, the guide in the crucible, which is adjustable therein, is raised or lowered, as desired, and thereby regulates the length of time the sheet occupies in passing through the metal.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. An apparatus for coating sheet metal consisting of a plurality of tanks containing liquid baths and molten metal, guides arranged in the tanks and means for adjusting the guides vertically, a casing containing a blower around which the sheet is guided, and burnishers oppositely reciprocating, between which the sheet is finally passed, for the purpose described.

2. The combination, with metal coating apparatus, of a combined evener and burnisher, comprising plates arranged in pairs and adapted to receive a coated sheet of metal between their adjoining surfaces, and means for imparting motion to the plates, whereby they reciprocate in opposite directions, as specified.

3. The combination with metal coating apparatus, of a combined evener and burnisher, comprising yieldingly-mounted plates arranged one above the other and adapted to receive a coated sheet of metal between their adjoining surfaces, and means for imparting motion, to the plates, whereby they reciprocate in opposite directions, as specified.

4. An apparatus for coating metal plates, comprising a plurality of tanks; guides adjustable vertically therein for regulating the

period of contact in said tanks; means for feeding the sheet successively into each tank; burnishing plates oppositely reciprocating, between which the sheet is guided, substantially as described.

5. An apparatus for coating metal plates, comprising a plurality of tanks; guides adjustable vertically therein for regulating the period of contact in said tanks; means for feeding the sheet successively into each tank, said means having a common motion, whereby the plate will be kept taut; in combination with oppositely reciprocated burnishers, between which the sheet is fed, as and for the purpose described.

In testimony whereof we have affixed our signatures in the presence of two witnesses.

JAMES H. FINLEY.
CHARLES EGOLF.

Witnesses:
SAMUEL MITCHELL,
GEO. W. ROSHONG.