(No Model.) 2 Sheets—Sheet 1.

A. T. DAVIES.

APPARATUS FOR COATING TIN PLATES.

No. 478,051. Patented June 28, 1892.

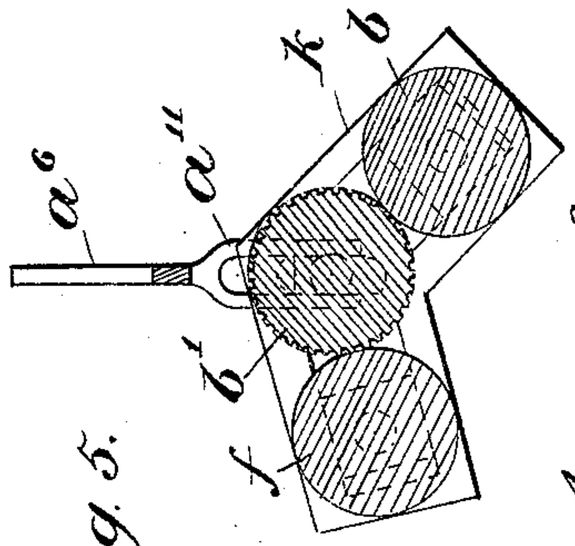
Fig. 5.

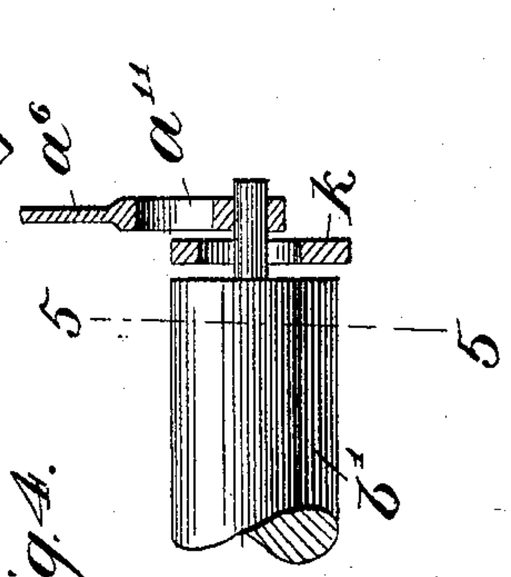
Fig. 4.

Fig. 1.

Witnesses
V. P. Wilson
F. Mackenzie

A. T. Davies Inventor
By his Attorney J. A. Finlay

(No Model.) 2 Sheets—Sheet 2.

A. T. DAVIES.

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Fig. 3

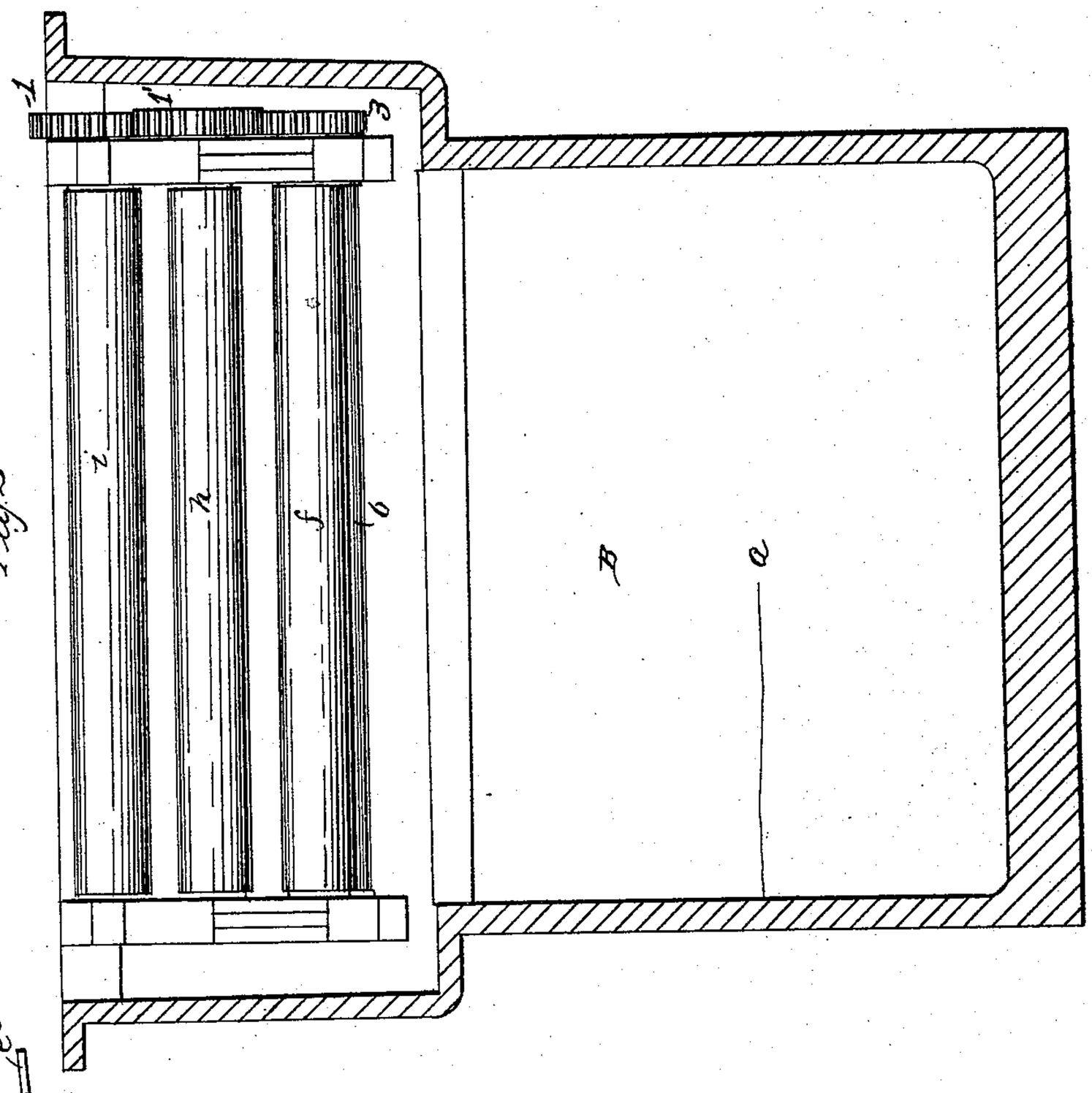

Fig. 2

Witnesses
W. T. Wilson.
F. MacKenzie

A. T. Davies Inventor
By his Attorney J. A. Fowler

UNITED STATES PATENT OFFICE.

ALBERT THOMAS DAVIES, OF MORRISTON, ENGLAND.

APPARATUS FOR COATING TIN PLATES.

SPECIFICATION forming part of Letters Patent No. 478,051, dated June 28, 1892.

Application filed July 24, 1891. Serial No. 400,649. (No model.) Patented in England February 22, 1886, No. 2,560; in France November 23, 1886, No. 179,835; in Belgium November 23, 1886, No. 75,345, and in Germany November 24, 1886, No. 39,483.

To all whom it may concern:

Be it known that I, ALBERT THOMAS DAVIES, a subject of the Queen of Great Britain, and a resident of Morriston, in the county of Glamorgan, England, have invented certain new and useful Improvements in the Manufacture of Tin and other Coated Metal Plates and Apparatus Employed Therein, (patented in Great Britain February 22, 1886, No. 2,560; in France November 23, 1886, No. 179,835; in Belgium November 23, 1886, No. 75,345, and in Germany November 24, 1886, No. 39,483,) of which the following is a specification.

The object of the invention is to improve the manufacture of plates of metal coated with tin, terne, or other similar alloy or substance employed as the coating material or as the covering matter, to economize such material and prevent waste in manufacture, and to enable the successive steps in the operation to be effected with greater celerity and certainty of excellence in results attained by means of improved apparatus employed in such manufacture.

In carrying the invention into effect and in order to attain the desired end so specified my invention consists in the construction and arrangement of parts hereinafter first fully described, and then pointed out in claims.

In the drawings which form a part of this specification, Figure 1 represents in section a side view of the tinning-pot. Fig. 2 is a cross-sectional view, and Fig. 3 a longitudinal section, of a modified form of pot constructed according to my invention. Fig. 4 is a side elevation, partly in section; and Fig. 5 a longitudinal section of the construction by which my feed-rolls are pressed together.

Like letters of reference, wherever they occur, indicate corresponding parts in the figures.

I will first give a general description of my invention and then a detailed explanation of the same. I pass the sheets to be coated through a chamber containing flux or other suitable substance that will beneficially act upon the sheet before it is passed into the alloy, and this may be effected by causing the sheet to enter the chamber at an oblique angle between a pair or successive pairs of rollers or through a chute, guide, or hopper, or a combination of the two, and so into the body of the molten terne, tin, or other metal, matter, or alloy adapted to coat the sheets. The sheets pass to the body of this bath and into a cradle or onto a suitable platform or support therein contained, which carrier or cradle is so balanced in the bath that it will under the pressure of the incoming plate be pressed downward when acted upon by these rollers. Each sheet as it is successively entered and immediately it leaves the rollers is raised out again therefrom by means of this cradle or supporting means, the sheet being thrown forward automatically by balanced fingers and delivered to another pair of rollers, which may conveniently be arranged horizontally and submerged in the molten matter in the bath, and these rollers either alone or aided by guide-bars serve to guide the plates upward to a chamber situated above the bath of molten matter, which chamber or vessel contains a substance such as grease, tallow, palm-oil, or other suitable lubricating and protective material, and also a pair or successive pairs of rollers, which rollers serve to equalize and remove superfluity of applied coating material and pass the plates successively out of the greasy material to be further treated by dipping or further coating in a bath of molten tin, terne, or coating material, if desired.

The shape or construction of the tinning-pot I employ is by its constricted or contracted form adapted to confine the molten metal to the least possible space consistent with a sufficient body of molten metal, and at the side of the pot are secured guides, which serve to control the motion of the cradle for lifting the plates. The lifting-cradle, which may be of wrought-iron or other suitable material, is adapted in form to receive and convey the successive plates to the rollers next to operate on each plate, aided by the said guides or bars.

One arrangement which I find convenient consists of a tinning-pot having its lower sides substantially parallel, and, while of about the width of the plates, yet of shallow depth from front to back, with its upper part in-

clined outward toward the front, so as to admit of a set of rollers, in pairs, being arranged, as already described, for supply of plates to and other sets for delivery of plates from the tinning matter, in order to pass them to the greasing pot or vessel, and a convenient number of sets of such rollers are four or five pairs, two pairs on the supply side and two pairs on the greasing-vessel, while the fourth or fifth pair, which are banded, is at the point where the plates diverge from the course of entry to the course of exit and may be arranged so that a central roller does double duty, alternately forming one of the inner pair of entering rollers and then of the inner pair of delivering-rollers, and this central roller may with advantage be grooved in a longitudinal direction. The upper rollers of the supply pairs are acted upon by parts (preferably under the influence of a spring or springs) borne upon by a lever or levers, which can be adjusted as to the pressure exerted—say by screw-pressure—and the effect of such pressure on the rollers is to give the desired nip. The longitudinal grooves guide the plate into proper position in the pot. The adjusting screw-nut referred to may be substituted by or supplemented by spring-pressure. The proper relative motions to the parts are obtained by suitable gearing. Finger-levers suitably pivoted and balanced serve to give inclination to the successive plates to cause them after entrance to present themselves correctly to the exit-rollers on the rising of the cradle. The plates from the previous operation pass to a pot B, Fig. 2, in which is placed molten material, and thence to a chamber C, containing grease, tallow, palm-oil or other suitable covering, coating, or "finishing" matter, in which the parts may be so arranged or duplicated that two coated sheets can be alternately lowered and raised therein by means of two cradles or supports, the action of which is the same as in the tinning-pot.

Referring again to the drawings, it will be seen that the lower side walls *a a* of my tinning-pot are substantially parallel and of about the width of the plates, but of shallow depth from front to back—*i. e.*, from *a* to *a*—the upper part *a'* inclining to the front to accommodate the rollers *b b'* for supplying the plates passed in by the chute or guide *c*, which may contain any suitable flux and which is located in the chamber A, to the bath B below. The plates pass down this guide *c* between the rollers *b b'* into the carrier or cradle *d* between guide-bars *d'*, also serving as guides to the lower portion of the carrier or cradle *d*, which is adapted to work up and down upon the same. The cradle or holder *d*, located in the pot B, containing the molten tin, is operated by means of a counter-weighted lever (having a center or rocking bearing d^3, Fig. 2, and two arms d^2 d^4, the arm d^2 being jointed to *d* at *d'* and the arm d^4 carrying the weight d^5) and serves to raise the plate dropped into it as soon as ever it is released from the entering rollers *b b'*, and this rising of the holder *d* brings the plate up to the rolls *f b'*, the finger lever or levers *e* aiding the operation by pressing the plate into a direct line with these rolls *f b'*, the swing finger or lever *e* being centered at *e'* and weighted at e^2 on its shorter arm e^3, so that on the rising of the carrier *d* by means of counter-weight or equivalent means (or it may be by hand-lever) the plate therein will be raised and delivered to the rollers *f b'* and by them be passed between the guides *g g* to the rollers *h h*, and thence to other rollers *i i* in the chamber C^2, which contains grease, tallow, or other suitable lubricating and protective material.

The framing of the apparatus a^2 may be of wrought-iron, cast-iron, or other suitable material provided with recesses or openings, into which are fitted block-bearings *k* to carry the rollers, arranged as shown, and above is a spring-lever a^3, acting upon the rollers *h h* and *i i* through the springs a^{10}, then a spring a^4, which acts on two pegs a^5 a^6, which peg a^6 again acts on the bearing-blocks *k* of the rollers *f* and *b'* and *b* by means of the spring a^{11}, bearing on the end of the roll *b'*, working on each side in a block *k*, and serves to tighten the rollers. The springs a^3 a^4 can be adjusted by a screw-nut a^* as to the pressure exerted, and the effect of such pressure on the rollers is to give the required nip. The roll *b'* may be provided with longitudinal grooves, as shown in Fig. 2, for the purpose of gripping and raising each successive plate to its vertical position. Spiral or similar springs may, if desired, be interposed between the pressing parts and the roller-bearings or be applied to the lever below the adjusting-nut a^*.

Motion to the parts is conveyed from the upper driver 1 and 1' through an intermediate wheel 2 to another driver 3, secured to the upper roll, and, as shown, this driver 1 on the upper roll gears into another driver 1' on the axis of the roll next below it, and like motion to the other rollers by another driver 3, the whole being provided with tooth-gearing. (Indicated by dotted lines.) The roller *b'*, acting as shown, acts in common with both the roller *b* and *f;* but as the sheet in entering comes in contact with one side of the roller *b'* the direction of motion imparted is inward or downward, while when pressed by the balanced finger *e* into contact with its other side and the roller *f* the direction of motion is outward or upward, thus enabling the roller *b'* to do double duty. From the upper chamber C^2 the plates are passed out to the workman, who takes them into a modified form of my invention, which I designate as a "grease-pot," (shown in Figs. 2 and 3,) which consists of a lower chamber adapted and arranged to contain molten metal or other desired material and provided with rollers *b*, *b'*, *f*, *h*, and *i*, and the operation of the parts of which is

substantially similar to that of the tinning-pot, Fig. 1, excepting that the fingers *e* are duplicated and the cradle *d* so arranged that two sheets can be lowered and raised therein at a time and thereby coated with the lubricating or protective material or other coating.

I claim—

1. In an apparatus for coating and finishing tin and terne plates at one operation, the combination of a vertical pot for the molten coating metal, a flux-box located above the tinning-pot, feeding-rolls located above a cradle, said counterbalanced cradle immersed in the pot and adapted to be depressed by the impact of the incoming plate and to be automatically elevated again, a pivoted weighted arm constructed and arranged to transfer the plate to the delivery-rolls, a superimposed chamber, and delivery-rolls, one of which is provided with longitudinal grooves located therein, and means for driving the said rolls.

2. In an apparatus for coating and finishing tin and terne plates at one operation, the combination of a vertical pot for the molten coating metal, a counterbalanced cradle adapted to be depressed by the impact of the incoming plate and to be automatically elevated again, a weighted arm constructed and arranged to transfer the plate to the delivery-rolls, three longitudinal friction-rolls located above the cradle, one provided with a grooved surface, two of which form receiving-rolls and two of which serve as delivery-rolls, and an adjustable spring-arm constructed and arranged to keep the central roll engaged with each of the outer ones, and means for driving said rolls.

In testimony of the foregoing specification I do hereby sign the same, in the city of New York, county and State of New York, this 15th day of July, A. D. 1891.

ALBERT THOMAS DAVIES.

Witnesses:
J. ODELL FOWLER, Jr.,
WM. M. V. FOWLER.