

(No Model.)

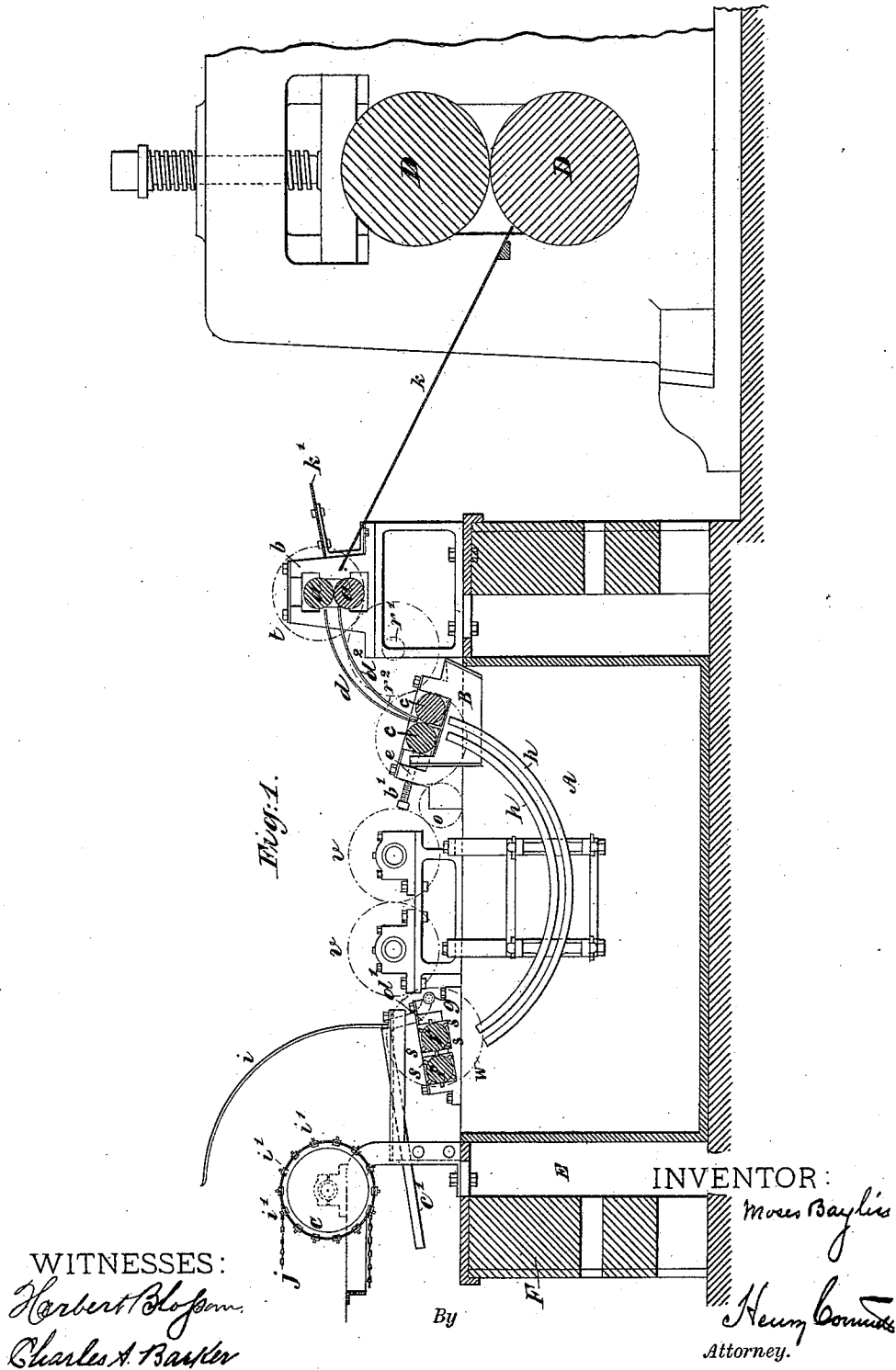
2 Sheets—Sheet 1.

M. BAYLISS.

APPARATUS FOR GALVANIZING SHEET METAL.

No. 471,065.

Patented Mar. 15, 1892.



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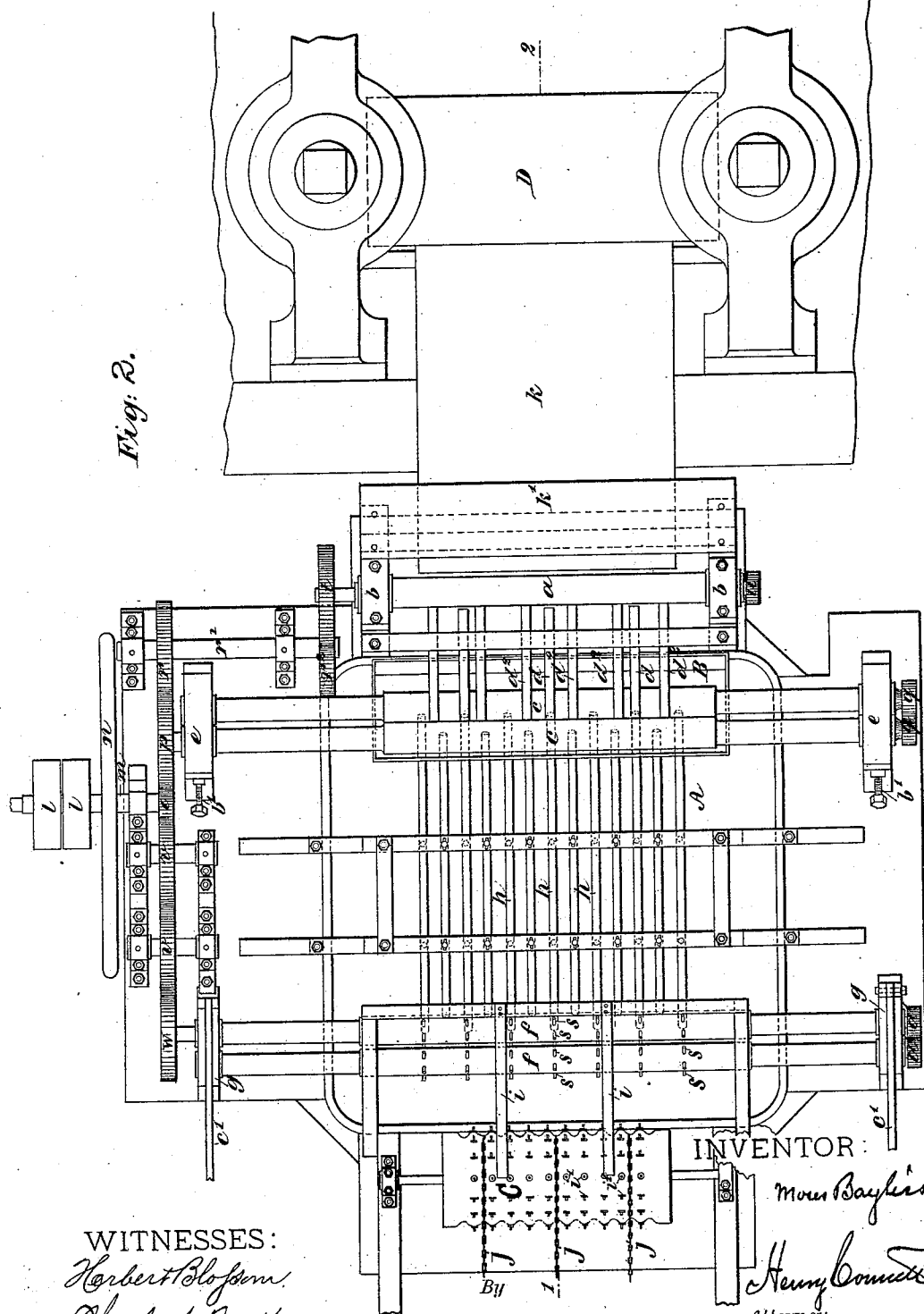
2 Sheets—Sheet 2.

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APPARATUS FOR GALVANIZING SHEET METAL.

No. 471,065.

Patented Mar. 15, 1892.



WITNESSES:

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UNITED STATES PATENT OFFICE.

MOSES BAYLISS, OF LONDON, ASSIGNOR TO DAVIES BROTHERS & COMPANY,
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APPARATUS FOR GALVANIZING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 471,065, dated March 15, 1892.

Application filed March 25, 1891. Serial No. 386,286. (No model.)

To all whom it may concern:

Be it known that I, MOSES BAYLISS, a subject of the Queen of Great Britain, residing at St. Cuthberts, Hampstead Heath, London, N. W., England, have invented certain Improvements in and Connected with Apparatus for Galvanizing Sheet Metal, of which the following is a specification.

This invention relates to means employed in connection with the bath of molten coating-metal for carrying the sheet through the same, and these improvements are adapted especially, but not necessarily, for use with the cold rolls employed for primarily rolling the sheets after they have been pickled, as described in the Letters Patent No. 435,661, dated April 15, 1890, granted to Davies Brothers & Company, Limited, as assignees of Albert Davies, the inventor.

The invention has for its object to improve the means heretofore employed in dispensing with manual labor in the conveyance of the sheets from the cold rolls through the galvanizing-bath to the place where they are to be next treated by rolling or corrugating or to mechanism for brushing the surfaces of the sheets previously to their being delivered for handling.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a sectional elevation of the cold rolls, the galvanizing-bath with its sheet-carrying mechanism, and a part of the off-bearing mechanism. The plane of the section is indicated by the line 1 2 in Fig. 2. Fig. 2 is a plan of the apparatus.

A pair of rolls *a* are carried in suitable carriages *b* in position to revolve one above the other at the forward or feeding-in side of the pot A, which holds the galvanizing-metal. The rolls *a* are located some distance above the upper edge of the pot A. The pot A contains the molten galvanizing metal or spelter, which is fed into the pot from time to time as it is consumed. The maximum level of the spelter within the pot is determined by any suitable overflow. In the drawings the overflow-level of the pot, and consequently of the spelter, is determined by the upper edge of the pot, which constitutes the overflow. Consequently the spelter can never rise above

the upper edge of the pot, and when the level of the spelter falls below a proper minimum it is replenished by an attendant. A pair of rolls *c* are carried in suitable carriages *e* in position to revolve side by side just above the overflow-level of the pot A and in the flux-pot B, through which the sheets enter into the galvanizing-metal. The hinder roll *c* is preferably somewhat higher than the forward roll, for a purpose which will be presently described. Downward guides *d* *d*² are fixed in position to guide sheets passing from the pair of rolls *a* into the rolls *c*. A pair of rolls *f* are carried in suitable carriages *g* in position to revolve side by side a short distance above the overflow-level of the pot and at the rear or delivery side of the pot, and of this pair the forward or inner roll is preferably somewhat higher than the other roll, for a purpose which will be presently explained.

Curved guides *h* are carried within the pot and extend downwardly below the overflow level thereof in position to guide sheets from the rolls *c* through the molten metal and into or between the rolls *f*. Curved guides *i* are fixed in position to direct the sheets as they pass up from the rolls *f* onto endless chains, wires, or wire ropes of a carrier system, by which they are conveyed away from the bath.

The sheets pass direct from the cold rolls D D, such as those described in the specification of Edward Albert Davies' said invention, up or along a guide (or guides) *k* to the pair of rolls *a*. A guard (or guards) *k'* prevents the forward edges of the sheets from rising, so as to pass up over the top of the upper roll instead of passing between the rolls, as intended. The sheets are caught between the rolls *a* and are conveyed thereby between the downward guides *d* *d*² to the pair of rolls *c*. The latter rolls feed the sheets down into the pot A and through the curved guides *h* therein, thence through the opposite side of the pot and between the rolls *f*, by which they are drawn out of the pot. The sheets are directed, as before explained, by means of the curved guides *i* onto the carrier system as they are delivered by the rolls *f*.

The hinder roll *c* is set in position somewhat higher than the other or forward roll *c*, in order that the sheets may be carried down-

ward at an inclination corresponding approximately with a tangent to the curve of the receiving ends of the guides *h* to facilitate their entrance into such guides, and the forward or inner roll *f* is placed somewhat higher than the corresponding hinder roll, so that the pair of rolls *f* may be in convenient relative position to receive the sheets as they pass in an inclined direction from the guides *h*.

The pair of rolls *f* draw out the sheets by a steady movement at a uniform rate of speed, and in order that they may not by rolling over the entire surface of the sheets on each side cause the premature setting of the coating-metal and interfere with its free crystallizing or spangling the rolls are provided with flat-ended studs or projections *s*, of which each one on the rolls comes as the roll revolves opposite to a corresponding stud on the other roll, so as to hold the sheet between them. The pressure of the studs is exerted only here and there on the opposite surfaces of the sheets and does not interfere with the proper crystallizing or spangling of the coating-metal. The sheets, being thus drawn out by a steady movement at a uniform rate of speed and with a pressure exerted for such purposes only at a few places of small area on their surfaces, are much improved in appearance when set, compared with sheets drawn out of the bath in the usual or other manner heretofore practiced.

Both the feeding-in rolls *c* and the delivery-rolls *f*, it will be noted, are located above the overflow-level of the pot *A*, and consequently above the surface of the molten metal. This is an important feature of the invention. It is essential that the sheet-iron passing through the bath of spelter should receive a uniform coating of zinc on both surfaces. This coating should be uniform both in thickness and in purity. To enable this result to be accomplished in the most perfect and efficient manner, it is necessary that while the sheet-iron is passing through the bath of molten metal it should not be subjected to any pressure, such as would be caused by feed-rolls pressing upon the same. The pressure of rolls upon the sheet metal while in the bath would cause the zinc to be unevenly spread upon the sheet-iron, and should there be any dross in the zinc the same would be forced by the rolls onto the sheet metal. In the present improved construction, however, the feed-rolls are above the overflow-level of the pot *A*, and consequently above the surface of the bath of molten metal, and the guides *h* *h* are arranged so as to conform to the curve in which the sheet-iron easily hangs, so that they simply direct the course of the sheet-iron through the bath of molten metal without exercising any undue pressure thereupon. The delivery-rolls *f* gently pick the sheet-iron coated with zinc out of the pot and deliver it in perfect condition. The coated sheet-iron thus produced has over its entire surface in a uniform condition the spangled appearance characteristic

of galvanized iron, which would be destroyed by any pressure upon the coated metal. This spangled appearance is the result of the adherence of the zinc to the sheet metal and its subsequent contraction thereon, and the positions which the particles of zinc thus naturally assume would be destroyed by pressure exerted thereon when in the act of contraction and solidification.

There is nothing special in the mechanism by which the rolls are operated. According to the particular mechanism illustrated a pair of fast and loose pulleys *l* are carried upon a shaft *m*, on which is also mounted a fly-wheel *n*. A pinion *o* on the inner end of the shaft *m* drives the hinder roll *c* through the medium of a spur-wheel *p*, mounted on the outer end of one of the necks thereof, and the pair of rolls are geared together by pinions *q*. The spur-wheel *p* gears also with a wheel *r* on an intermediate shaft *r'*, and a second wheel *r''* on this shaft drives the upper roll *a* through the medium of a spur-wheel *t'*, carried on the outer end of one of the necks of such roll, and the pair of rolls *a* are geared together by a pair of pinions *u*, one of which is shown in Fig. 3. The pinion *o* drives the inner roll *f* through the medium of the idler-wheels *v* and the wheel *w*, carried on the outer end of one of the necks of such roll, and the pair of rolls *f* are geared together by pinions *a'*. The hinder roller *c* is set up toward the other roll of the pair by set-screws *b'*, passing through the rear ends of the carriages *e* and abutting against sliding bearings which carry the roll, and the forward or inner roll *f* is automatically set up toward the opposite roll of the pair by means of bent levers or arms *c'*, having curved or slanted portions *d'*, which bear against correspondingly-shaped shoulders on sliding bearings which carry the roll. These arms may be of sufficient weight of themselves for the purpose or weight may be added to them, as required. Either of the rolls *c* and *f* may, however, be set up toward its corresponding roll in any convenient manner by springs, weighted levers, or otherwise.

Any suitable means may be employed for heating the galvanizing-bath. That herein shown consists of a coke-furnace *E*, constructed exteriorly about the pot *A* and inclosed by a wall *F*. The coke is fed into the furnace at the top as needed and no grate is required. I make no claim to this form of furnace.

I have not deemed it necessary to show the pickling-bath in the drawings, as this is an old and well-known device. It will suffice, in order to make my mode of operation perfectly clear, to state that the sheets to be galvanized are taken from the pickling-bath and passed while wet through the cold rolls *D*, and thence along the inclined way *k* to the rolls *a* at the front of the galvanizing-bath.

The sheets coming from the pot *A* may be delivered onto any suitable form of traveling carrier or off-bearing device, of which a part is seen in the drawings, *C* being a grooved

drum, over which pass endless chains, wires, or ropes *j*. The drum may have pegs or studs *i'* in its periphery, and curved guides *i* may be provided for deflecting the sheets onto the studs which project from the drum C. I do not claim the carrier or off-bearing device herein, and it may have any form or construction, so far as my present invention is concerned.

10 The sheets which have been cold-rolled after pickling, as described in the specification of Edward Albert Davies' said invention, develop a specially fine crystallization or spangle, which is not interfered with by the drawing-out rolls constructed in the peculiar manner described, and the formation of which is facilitated by the steady movement at a uniform rate of speed by which the sheets are drawn out of the pot, and by the employment of this invention all labor is dispensed with between the cold rolls and the point at which the sheets are delivered, as described, ready for handling.

25 If it is desired to dispense with the cold rolls, or if when such rolls are employed it is not desired to carry the sheets automatically therefrom to the pot, the pair of rolls *a* may be dispensed with and the sheets be fed down by hand from a raised platform into the pair of rolls *c*.

30 The rolls *f*, having bearing-surfaces of small area occurring at intervals, as described, may be employed for drawing out the sheets from the bath, in combination with any convenient means by which the sheets are passed up to such rolls.

What I claim as my invention, and desire to secure by Letters Patent, is—

40 1. The combination, with the pot for the molten metal and means for heating the same, of the curved guides *h*, arranged in said pot, a pair of positively-driven delivering-rollers *f*, arranged next adjacent to the discharging end of said guides, said rollers being just above the overflow-level of the pot and provided with studs *s* on their surfaces to bear

upon the sheet passing between them, and mechanism for positively driving said studded rollers.

2. The combination, with the pot for the molten metal, means for heating the same, the curved guides arranged in said pot to guide the sheet through the metal therein, and the flux-pot arranged at the receiving ends of the guides, of the positively-driven forwarding rollers *c*, arranged at the receiving ends of the guides, the positively-driven studded rollers *f*, arranged next adjacent to the delivery end of the curved guides and above the overflow-level of the pot, and the mechanism for positively driving the rollers *c* and *f*.

3. A galvanizing apparatus comprising a pot for the molten metal, means for heating the same, a pair of positively-driven delivery-rollers *f*, having pegs *s* in them arranged to register those in one roller with those on the other, as described, and mechanism for positively driving said rollers.

4. The combination, with the pot for the molten metal and means for heating said pot, of the pair of receiving-rolls *a*, arranged in front of the pot and one above the other, whereby they are adapted to receive the sheet presented horizontally, the pair of rolls *c*, arranged below the rolls *a*, the downwardly-curved guides *d* *d'*, arranged to receive the sheet from the rolls *a* and deliver it to the rolls *c*, the delivery-rolls *f*, said rolls *c* and *f* being located above the overflow-level of the pot for the molten metal, the guides *h*, arranged within the pot between the pairs of rolls *c* and *f* and having the form of part of a circle, and mechanism for driving the rolls *a*, *c*, and *f*, as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

MOSES BAYLISS.

Witnesses:

STEPHEN WATKINS,
ROBERT M. LISTER.