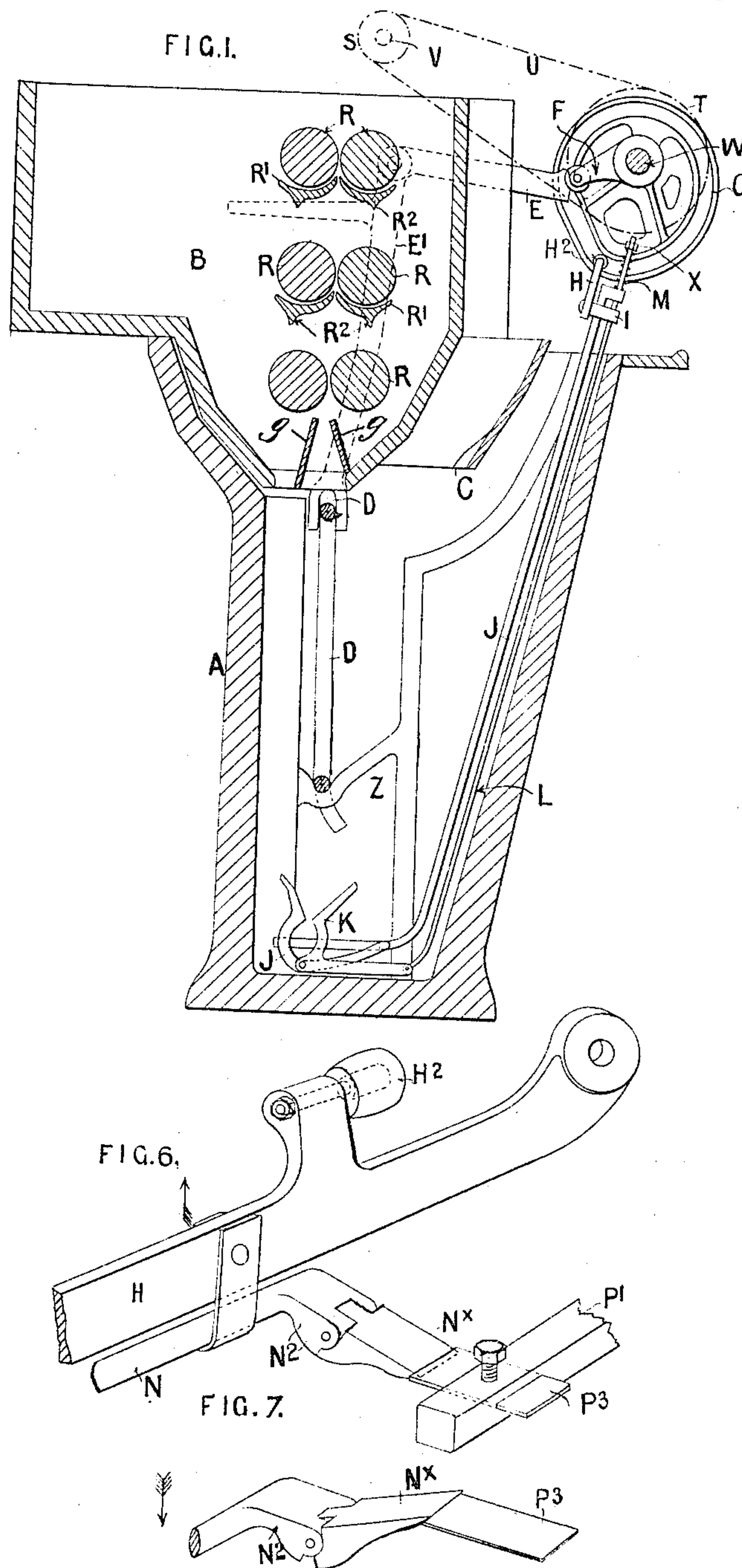


(No Model.)

3 Sheets—Sheet 1.

H. F. TAYLOR.
APPARATUS FOR COATING WITH TIN, LEAD, OR OTHER METALS, &c.
No. 581,791.

Patented May 4, 1897.



Witnesses:
B. S. Ober.
Henry M. J.

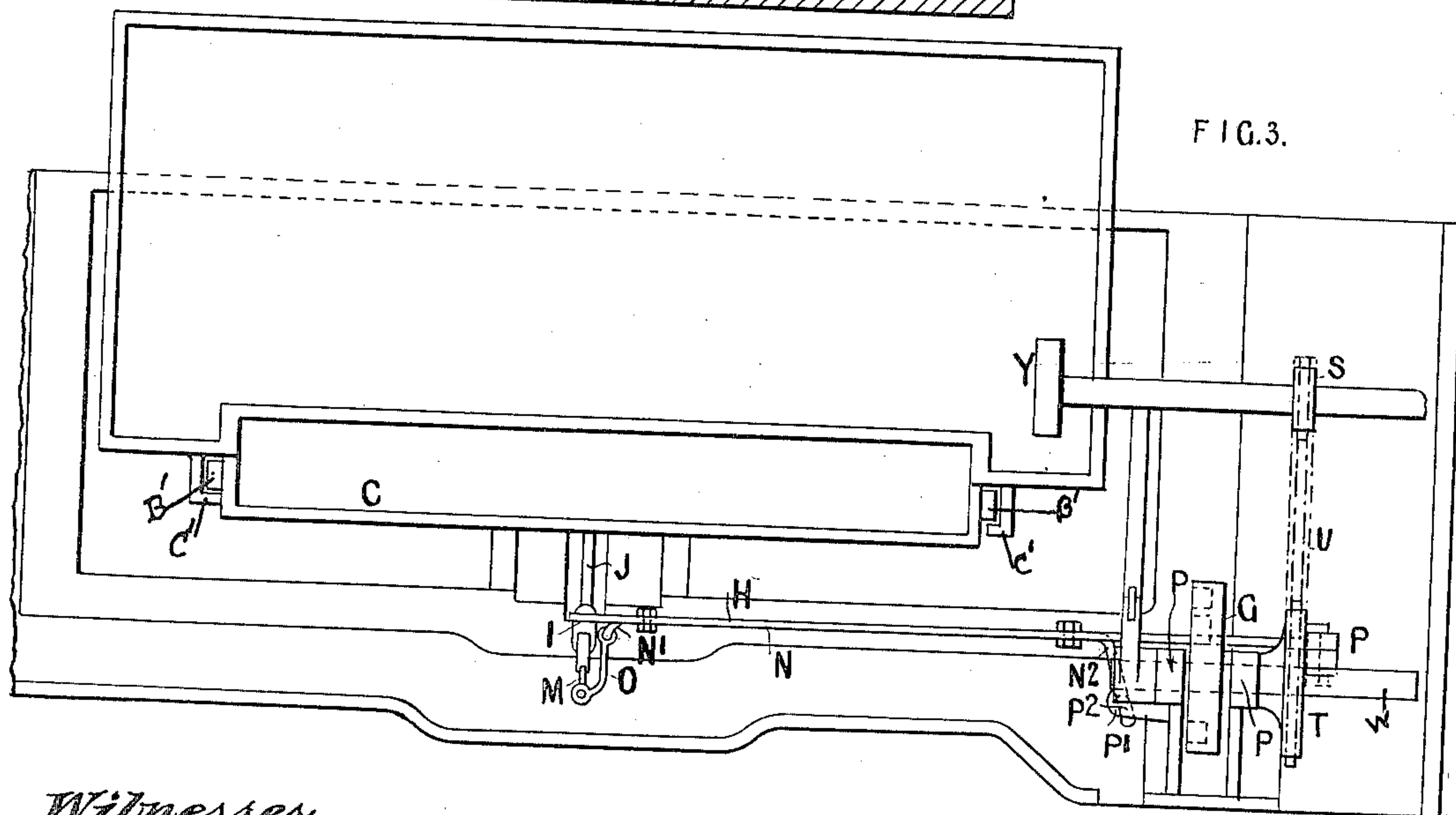
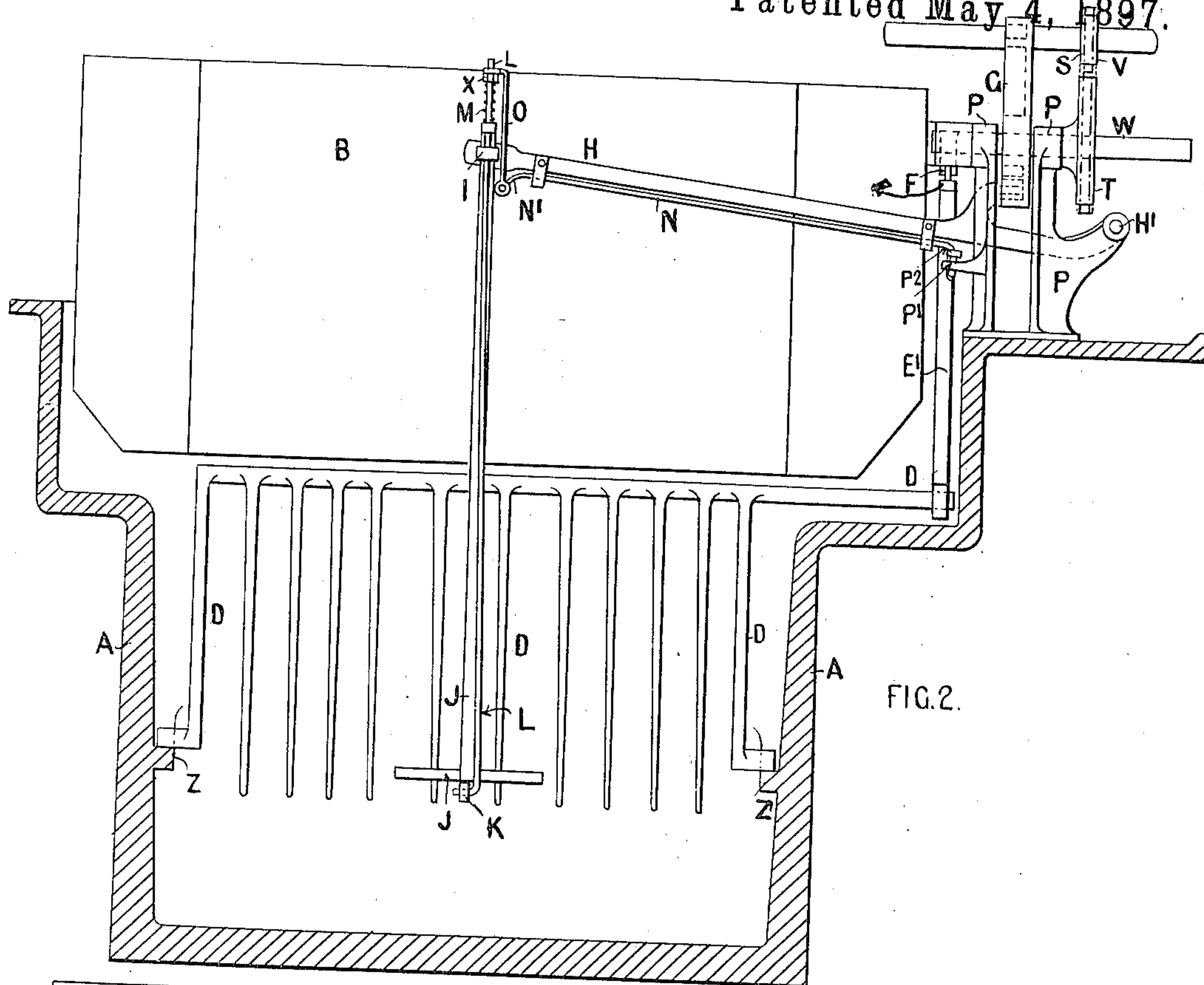
Inventor:
Henry Francis Taylor.
by Henry M. J.
att'y.

(No Model.)

3 Sheets—Sheet 2.

H. F. TAYLOR.
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No. 581,791.

Patented May 4, 1897.



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Henry Francis Taylor.
by Henry Orth

(No Model.)

3 Sheets—Sheet 3.

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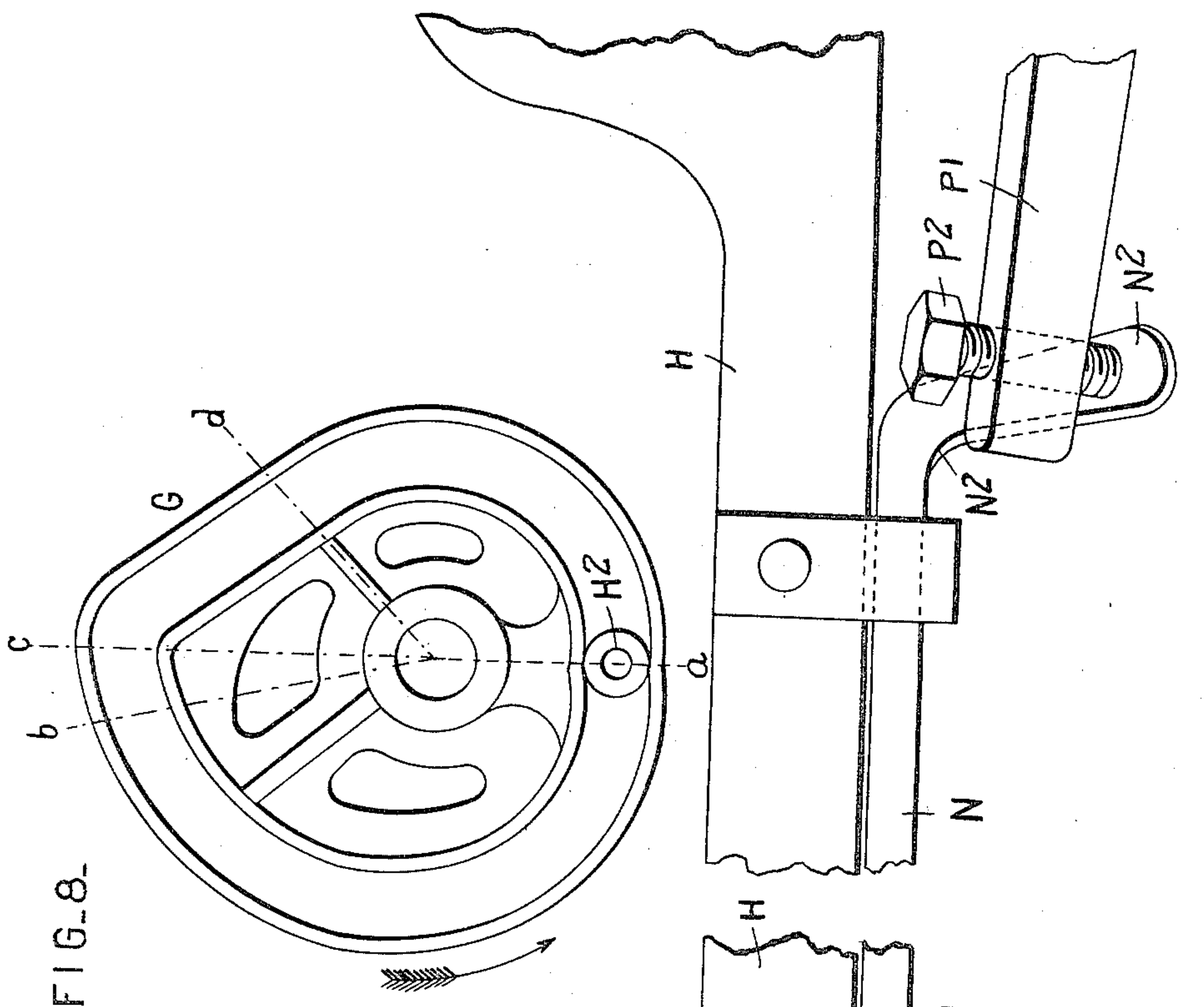


FIG. 8.

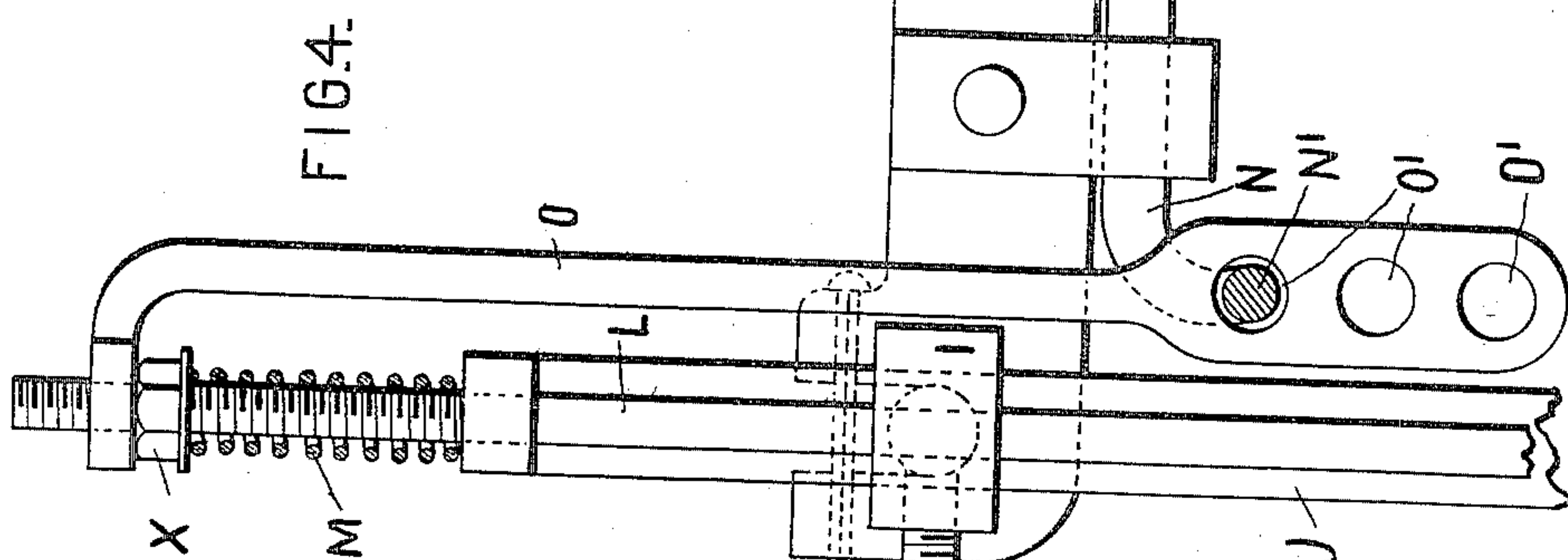


FIG. 4.

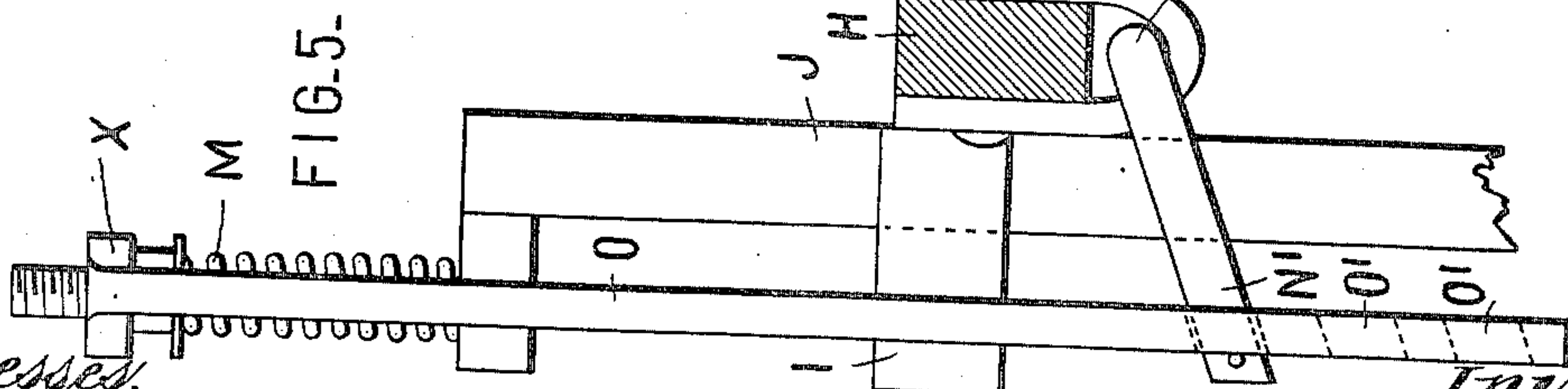


FIG. 5.

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Henry Taylor

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Atty.

UNITED STATES PATENT OFFICE.

HENRY FRANCIS TAYLOR, OF TYNANT, NEATH, ENGLAND.

APPARATUS FOR COATING WITH TIN, LEAD, OR OTHER METALS, &c.

SPECIFICATION forming part of Letters Patent No. 581,791, dated May 4, 1897.

Application filed October 2, 1894. Serial No. 524,766. (No model.) Patented in England November 11, 1893, No. 21,530, and in Germany October 14, 1894, No. 83,945.

To all whom it may concern:

Be it known that I, HENRY FRANCIS TAYLOR, engineer, a subject of the Queen of Great Britain, residing at Tynant, Neath, in the county of Glamorgan, in the Principality of Wales, in the United Kingdom of Great Britain and Ireland, have invented new and useful Improvements in Apparatus for Coating with Tin, Lead, or other Metals or Alloys of Same, (for which I have obtained Letters Patent in Great Britain, dated November 11, 1893, No. 21,530, and in Germany, dated October 14, 1894, No. 83,945,) of which the following is a specification.

These improvements refer to apparatus operating in a novel manner and serving to mechanically or automatically carry the plate down into the pot and cant it and raise it, so that the rolls on the exit side of the pot may take hold of it and carry it up and out of the machine.

According to this invention the plate to be coated is by the workman inserted between the open jaws of a nipping appliance, which then by suitable machinery is closed and depressed for the plate to be coated in the tin or other metal or alloy. The plate is then canted and raised while still being held in proper position by the nipping appliance, (which never rises out of the coating medium,) and after the plate has been taken hold of by the rolls the nippers are returned to their original position and opened ready to receive the next plate. All this is done mechanically or automatically and at a speed which is varied in the different parts of the action, as hereinafter described. Moreover, (and this forms an important part of my invention,) in the mechanism operating as described I provide means for adjusting the opening of the nippers according to the thickness of the plate to be coated, and I afford great facility for effecting this adjustment by doing it outside of the pot. I also provide means for regulating the time of opening the nippers in the upstroke for receiving the plate and also the time for closing them in the downstroke. I also simplify the construction of the entrance flux-box, whereby I am enabled to save space and coating-metal surface in the pot.

One suitable form of apparatus for operat-

ing in the novel manner described is illustrated in the vertical cross-section, Figure 1, the vertical longitudinal section, Fig. 2, and the plan, Fig. 3. Fig. 4 is an enlarged side view, and Fig. 5 a sectional end view, of the appliance for opening and closing the nippers wherein the plate to be coated is inserted. Fig. 6 is a perspective view of a modified arrangement of device for operating the nippers, and Fig. 7 a like view of part of the device in another position. Fig. 8 is a face view of a cam for operating the apparatus.

On a spindle W, which may be suitably rotated from the roll-driving shaft—for instance, by sprocket-wheels S and T and chain U—is fixed a groove-cam G and a plain cam F. For changing the speed of the cam-shaft W to suit different depths of plates, so as to bring up the plates as near to each other as required for the maximum output, I use a very simple and efficient arrangement, whereby a screw is merely slackened, so that the sprocket-wheel T can be slipped off and another substituted, which is again fixed by means of a screw. In the groove-cam G works a bowl, which is fitted to a lever II, having its fulcrum at one end II', while its other end is connected to the rod L of the nipping appliance by means of a block I, which by means of the set-screw J' can be adjusted according to different depths of plate to be coated. The link O is then exchanged for another of the required different length, or the link may be made with holes O' answering to the different depths. The cam-groove is so shaped as to accomplish the aforesaid movements of the nipping appliance—that is to say, for producing the highest possible amount of output by the plates following each other quite closely, and so that the speed of motion both in the up and down passage of the plate shall be varied according to requirements. Thus in the top position, when the bowl II² of the lever II is at a, Fig. 8, the nipper-fingers being open to receive the plate, the latter is inserted and the nippers then close while commencing to descend, the speed being such as to allow the plate to take the tin, and such speed is slightly accelerated as the bowl II² approaches the point b after the plate has passed through the flux. Between

the points *b* and *c* there is a pause or dwell while the plate is being canted. In the upstroke the speed is sharply accelerated between the points *c* and *d* of the cam until the upper edge of the plate has passed the guides *g* and is brought nearly into the nip of the bottom pair of rolls *R*, whereupon it is slowed between the points *d* and *a* to such a degree that the rolls shall take the plate out of the nippers and the upward motion of the latter is continued to the top—that is to say, to the said point *a*—the nippers meanwhile being opened to receive a fresh plate, and so on.

The plain cam *F* operates against one arm *E* of a bell-crank lever, the other arm *E'* of which actuates the gate *D* of the canting appliance, which by preference is made much shorter or shallower than heretofore, having in fact its fulcrum at *Z*, some distance from the bottom of the pot, thus minimizing the amount of throw and the consequent agitation of the metal by its movements. The adjustment for nipping plates of different thicknesses is, as shown more particularly in Figs. 4 and 5, effected by a nut *X* on a screwed rod *L*, forming a part of the nipping appliance and fitted with a helical spring *M* for giving the required yielding pressure for nipping the plate between the parts *J* and *K*, such nut and spring being outside of the pot. The helical spring *M* also serves for a yielding connection by means of the link *O* to one lever *N'* on a small weigh-shaft *N*, another lever *N''* on the same being acted on by an adjustable stop or a set-screw *P''* on a fixed snug *P'* on the cam-shaft bearing *P*. This weigh-shaft *N*, which may be a round bar with bent ends forming the levers, as shown, is attached to the aforesaid cam-bowl lever *H*, so as to partake of its motion, and serves to open the nippers, while the small helical spring *M*, as acted on by the turning of the lever *N'*, serves to close them at the required times with the required soft or yielding pressure.

The lever end *N''* of the spindle *N* under the arm *H* may be so arranged with a catch or trigger, as shown in Figs. 6 and 7, that the nippers would be opened, as before described, in the upper part of its upward movement, and by allowing the trigger *N''*, which is jointed to the end of lever *N''*, to pass or slip by the flat adjustable stop *P''* on the bracket *P'*. The nippers would then close on the top part of its stroke, taking the plate from the tongs of the workman sooner than by the arrangement described with reference to Fig. 4. Fig. 6 shows the position of the trigger *N''* in the upstroke ready for opening the nipper-finger *K*. Fig. 7 shows the position of the trigger *N''* in its descent after it has come to the end of its upstroke and passed the stop *P''*, the plate having been inserted and nipped.

H'', Fig. 6, is the bowl which works in the groove-cam *G*.

The plate having been raised between the guides *g g* into the nip of the lowest pair of rolls *R* is by them and the next following pair

or pairs carried up and out of the machine, where it is taken hold of and removed by a boy or by some mechanical contrivance. The upper pair or pairs of rolls are provided with troughs *R'*, supplied with clear-finishing metal, as described and claimed in Morewood's British patent specifications, Nos. 3,125 and 3,126 of 1873; but in order to prevent any overflowing metal from one pair of troughs running into the nip of the next lower pair of rolls *I* form the troughs with a triangular rib *R''* on the under side, so placed that the drip therefrom shall come over the descending side of the roll below it and run down into the next lower trough and ultimately into the pot below and without unduly adding to the thickness of coating on the plate, as was heretofore the case when troughs were used.

The entrance flux-box heretofore made with four sides *I* prefer to make with three—that is to say, *I* omit the side against the exit grease-hopper *B* and attach it thereto by lugs *C'* and slots *B'* in the usual manner. By this means *I* save space and coating-metal surface in the pot and cheapen the manufacture of the flux-box, making it lighter for the tinmen to remove when necessary; or, if the inner side is retained, *I* carry it down to a less depth into the molten metal than heretofore, as shown in Fig. 1.

By my aforesaid improvements *I* economize in time, labor, and coating material, while producing coated plates of excellent quality with a minimum consumption of material.

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

1. In machines for coating with tin, lead or other metal or alloy, the combination with the metal-pot, the tongs or nippers for receiving, taking down and again raising the plate, the pivoted gate and the gate-lever for canting the plate with means for reciprocating said gate, of a lever adjustably and elastically connected to one limb of said tongs and provided with a bowl *H''*, a groove-cam, such as *G*, on a rotating shaft, said bowl meshing with the groove in the cam which is so shaped relatively to the parts that when the plate has been put into the tongs in the raised position at the entry side of the pot, the bowl is at the point *a* and the tongs are closed upon the plate taken down therewith, the bowl passing to the point *b*, the plate being then canted while the bowl rests between the points *b* and *c* and the tongs and plate while the bowl travels from *c* to *d* and from *d* to *a* raised for the rolls on the exit side of the pot to pull the plate up and out of the machine, the tongs rising therewith, whereupon the gate and tongs are returned to their original position, the tongs being opened ready to receive the next plate and so that the speed of motion both in the up and down passage of the plate is varied in that the speed of descent of the plate is slightly accelerated after it has passed through the flux, sharply accelerated in the following upstroke,

that is while the bowl passes from *c* to *d*, and slowed down considerably while the plate approaches and is carried up by the rolls, that is, while the bowl passes from *d* to *a*, substantially as set forth.

2. In a machine for coating with tin, lead or other metal or alloy, the combination with the metal-pot and the tongs or nippers, of revoluble cam-shaft *W*, the groove-cam *G*, the lever *H* with pivoted bowl *H*² meshing with said groove-cam, the weigh-shaft *N* journaled on the lever *H* and provided with levers *N*¹ and *N*², the nippers *J K*, connections *O* and *L* between the lever *N*¹ and one limb *K* of the nippers, the block *I* pivoted to the lever *H* and adjustably fixed to the other limb *J* of the nippers, an adjustable stop on a fixed part of the machine which comes against the lever *N*² for automatically opening the nippers and a spring *M* for closing them, substantially as set forth.

3. In a machine for coating with tin, lead or other metal or alloy, the combination with the metal-pot and the tongs, of the revoluble cam-shaft *W*, the groove-cam *G*, the lever *H* with bowl *H*² meshing therewith, the weigh-shaft *N* journaled on the lever *H* and provided with levers *N*¹ and *N*², the nippers *J K*, the connections *O* and *L* adjustably connected to the lever *N*¹ and one limb *K* of the nippers, the spring *M* and nut *X* for adjustable elastic connection with the limb *L* of the tongs, the link *N*³ pivoted to the lever *N*² and the adjustable fixed stop *P*² for automatically opening the tongs, the spring *M* serving to close them, substantially as set forth.

4. In a machine for coating with tin, lead or other metal or alloy, the combination with the metal-pot and the tongs *J K* of the rod *L* connected to the limb *K* and having screw-thread on its upper end outside the metal-pot, a spring *M* on said end, a nut *X* for adjusting the tension of said spring, a block *I* with set-screw *J*¹ for adjustably fixing it on the limb *J* of the tongs according to the depth of plate to be coated, the lever *H* jointed to the block *I*, the groove-cam *G* meshing with the lever *H*, a weigh-shaft *N* having its bearings on said lever, the lever *N*¹ on said weigh-shaft, the rod *O* connected to the lever *N*¹ and to the limb *L* of the tongs, the lever *N*² on the weigh-shaft *N* and the adjusting screw-stop *P*² on

the lug *P*¹ of the machine-frame for opening the tongs against the pressure of the spring *M*, substantially as set forth.

5. In a machine for coating with tin, lead, or other metal or alloy, the combination with the two upper pairs of nipping-rolls, of a catch-trough for each roll for catching the surplus metal, and means for directing the overflow of such metal from said troughs away from the nip of said rolls outwardly beyond the plane of their vertical axes, for the purpose set forth.

6. In a machine for coating with tin, lead or other metal or alloy, the combination with superposed pairs of nipping-rolls, of a trough *R*¹ for each roll, having their proximate inner walls of greater height than their outer walls, and being provided on their under side with ribs diverging outwardly beyond the plane of their vertical axes, for the purpose set forth.

7. In a machine for coating with tin, lead or other metal or alloy, means for lowering the plates to be coated into and lifting them out of the metal-pot, comprising tongs and three pairs of nipping-rolls, having their nip in the same vertical plane, said tongs and rolls arranged within and above the metal-pot respectively in combination with a catch-trough for each of the two upper pairs, and means for directing the overflow from said troughs outwardly beyond the plane of the vertical axes of the rolls, for the purpose set forth.

8. In a machine for coating with tin, lead or other metal or alloy, the combination with the metal-pot, of the pivoted gate *D*, a revoluble cam-shaft, the cam *F* thereon, and the bell-crank lever *E*¹ for operating the gate, substantially as set forth.

9. In a machine for coating with tin, lead and other metals or alloy, the combination with the nipping-rolls of a catch-trough for each roll for catching the surplus metal, said troughs having their under surfaces constructed to direct the overflow of such metal away from the nip of said rolls beyond the plane of their vertical axes, for the purpose set forth.

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Witnesses:

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HENRY PARMINTER.