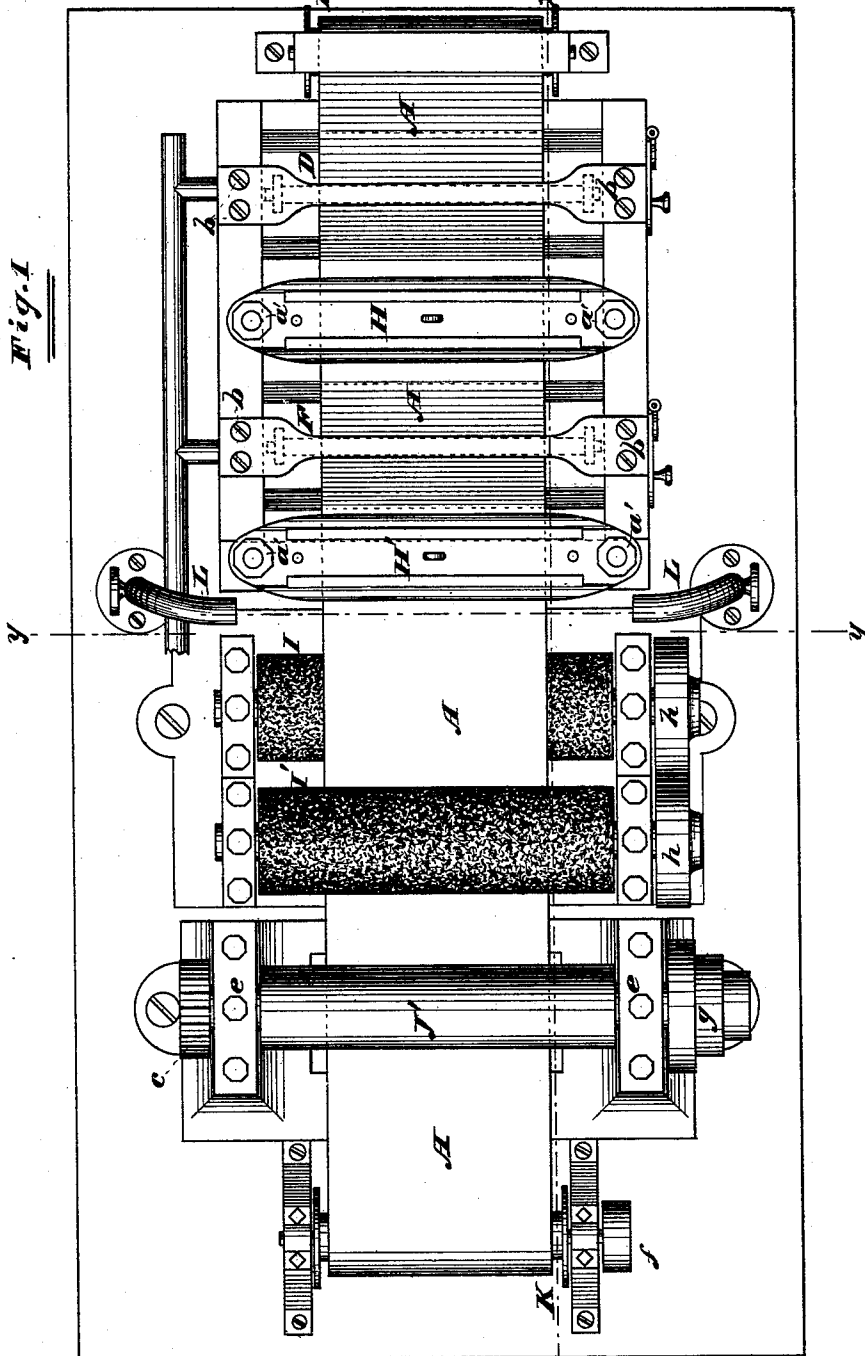


J. F. DUFFY.
Machine for Coating Sheet-Iron or other Metals with
Tin, &c.

No. 229,527.

Patented July 6, 1880.



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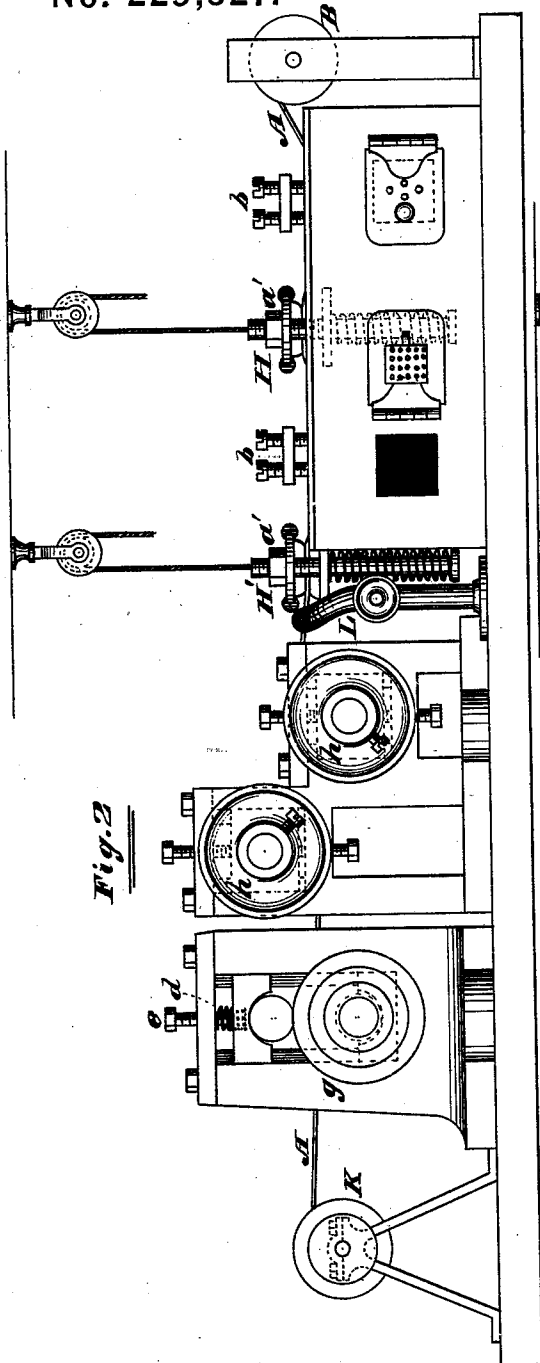


Fig. 2

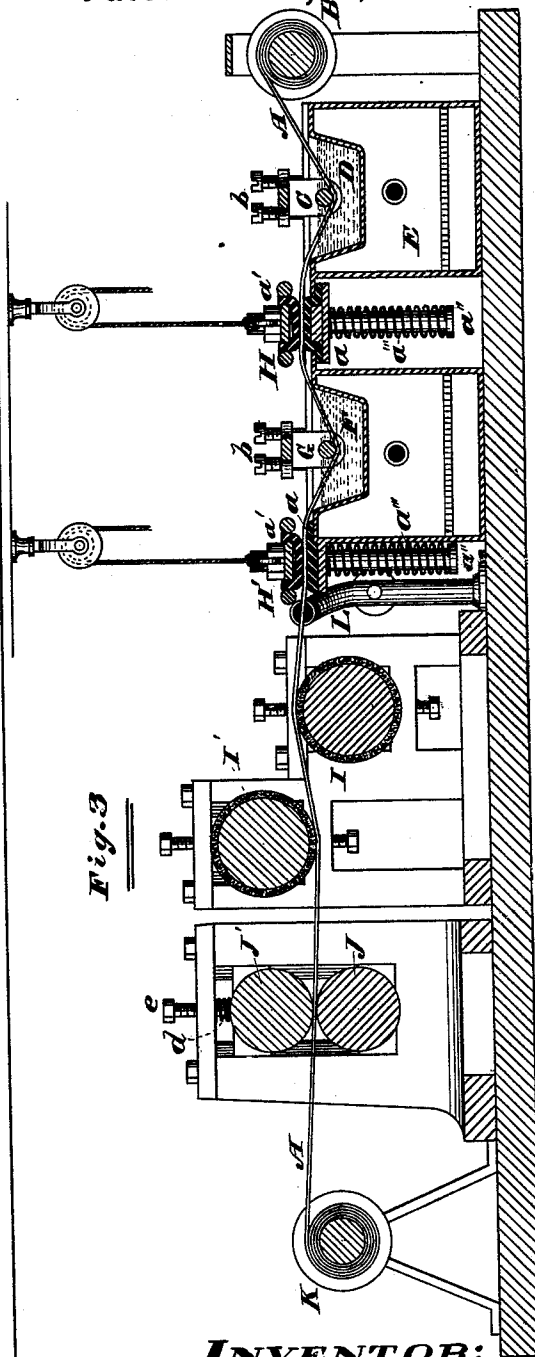


Fig. 3

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Fig. 6

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UNITED STATES PATENT OFFICE.

JAMES F. DUFFY, OF CHICAGO, ILLINOIS, ASSIGNOR TO JAMES MOONEY, OF NEW YORK, N. Y., AND JOHN L. BURLEIGH, OF ANN ARBOR, MICHIGAN; ONE-EIGHTH TO EACH.

MACHINE FOR COATING SHEET-IRON OR OTHER METALS WITH TIN, &c.

SPECIFICATION forming part of Letters Patent No. 229,527, dated July 6, 1880.

Application filed April 5, 1879.

To all whom it may concern:

Be it known that I, JAMES F. DUFFY, of Chicago, in the county of Cook and State of Illinois, have invented a new, useful, and Improved Machine for Coating Sheet-Iron or other Metal with Tin or other Metal or Alloy, of which the following, in connection with the accompanying drawings, is a specification.

In the drawings, Figure 1, Sheet 1, is a top or plan view of an apparatus or machine embodying my invention; Fig. 2, Sheet 2, a side elevation of the same; Fig. 3, Sheet 2, a vertical longitudinal section at *xx* of Fig. 1; Fig. 4, Sheet 3, a side elevation, showing the opposite side from that shown in Fig. 2; Fig. 5, Sheet 3, a cross-section at *yy*, Fig. 1; and Fig. 6, Sheet 3, a like representation, showing a modification in the construction of the air-blast pipe.

Like letters of reference indicate like parts.

The object of my invention is to improve the construction and operation of machines for coating sheet-iron or other metal with tin or other metal or alloy; and to that end it consists in certain novel features of construction, substantially as hereinafter set forth.

My first step is either to unite the small sheets to each other at or near the edges, so as to produce a long continuous sheet or strip, or to manufacture the sheets in that form and ready for use in connection with a machine embodying my invention. I then wind this long strip (indicated at *A* in the drawings) upon a drum or large spool, *B*. I then carry the strip underneath a presser-roller, *C*, which, by preference, should be adjustable vertically, so that the degree of pressure may be regulated. This presser-roller I arrange in a vat, *D*, underneath which is a furnace, *E*. In the vat *D* I place a quantity of tin or other metal or alloy, with which the strip *A* is to be coated, and bring it to a state of fusion.

The roller *C* should be below the surface of the fused mass; and it is to be understood, of course, that the coating material will come to a state of fusion under a much lower temperature than would injuriously affect either the strip *A* or the roller *C*.

F is a vat which may, in all respects, be like

the vat *D*; and *G* is a duplicate of the roller *C*, but arranged in the vat *F*. In the vat *F* I place tallow or other melted matter for annealing the metal strip. A separate furnace should also be provided underneath the vat *F*.

As many sets or pairs of vats may be employed as may be deemed best or expedient.

H *H'* are wipers, arranged alternately after the vats. These wipers consist of the fixed tables *a a*, arranged flush, or nearly flush, with the tops of the vats, and of the vertically-yielding plates *a' a'*, arranged directly over the tables *a a*. The interior faces of the parts *a* and *a'* are covered with rubber, leather, or other like material. The sheet *A* is passed through the wipers and underneath the roller *G*, as is clearly indicated in Fig. 3.

In order to regulate the pressure of the wipers upon the strip *A*, I connect a cord or rope to the parts *a' a'*, pass the cord or rope upward over a pulley, as is also shown in Fig. 3, and weight the end of the rope according to the pressure desired, the force of the pressure being downward excepting as resisted by the weights. To produce this downward pressure with facility, I provide the lower faces of the parts *a' a'* with the downward-extending pins *a'' a''*, headed at their lower ends, and having thereon the open spiral springs *a''' a'''*, bearing against the heads and against the lower faces of the parts *a a*, the said pins passing freely through the latter parts, substantially as shown.

To render the rollers *C* and *G* easily adjustable vertically, screws *b b* are passed through the ends of their carriers and into the upper edges of the furnace-walls, as indicated.

I I' are planishing-rollers, which are journaled in vertically-adjustable boxes or bearings, and covered with any soft fibrous or other material suitable for planishing. These rollers *I I'* are arranged one in advance of the other, and so that their cylindrical faces or perimeters will meet or slightly intersect a horizontal plane passing between their centers, as shown.

J J' are feed-rollers journaled in the frame of the machine and geared to each other at one end by means of the driving spur-wheel *c c*.

The upper roller, *J'*, is vertically yielding, and arranged to rest with a greater or less degree of pressure upon its mate, the pressure being exerted by means of open spiral springs *d d*, arranged as shown. To limit the upward movement of the upper roller, *J'*, and vary the distance of its movement I employ the screws *e e*, arranged to act as stops, for this purpose.

K is a receiving-drum, upon which the sheet is to be wound after passing through the apparatus now described. This drum is rotated by means of a belt-wheel, *f*; and *g* is a driving-wheel on the roller *J*, and *h h* are belt-wheels for driving the rollers *I I'*. (See Fig. 1.)

The strip *A*, after leaving the last wiper, is carried between the rollers *I I'* and *J J'*, and attached to the winding drum, spool, or roller *K*, substantially as shown, and all the parts are adjusted so as to bring the proper pressure and strain upon the strip to receive the coating.

L L are air-blast pipes, arranged after the last wiper *H'*, and their mouths or open ends are at such a height and so arranged as to impinge the blast of air across both faces of the strip *A*, the blast being produced by means of any suitable blower, and its temperature being controlled in any well-known way, the object of the air-blast being to impart to the sheet a proper or desirable color, which may be varied to a greater or less extent by varying the temperature of the blast.

In Fig. 6 I have shown a modification in the construction of the blast-pipe, the pipe there shown being divided into two trunks or branches, one on each side of the sheet, and the trunks being perforated so as also to impinge the blast on both faces of the strip *A*.

The operation of the machine or apparatus now described is as follows: When the machine is set in motion the rollers *J J'* will draw the strip *A* through the machine at the proper degree of speed, and as fast as it is delivered from the feed-rollers it will be wound upon the receiving spool or drum. The first presser-roller, *C*, holds the moving strip *A* down into the contents of the vat *D*, which contains the coating material in a molten condition, and the strip will be thus coated with a coating more or less thick. From the vat *D* the strip *A* is drawn through the wiper *H*, and the superfluous coating material on the strip is wiped therefrom and runs back into the vat *D*. From the wiper *H* the strip passes underneath the roller *G* and into the contents of the vat *F*, where it is annealed, and from the vat *F* it passes through the wiper *H'*, and all superfluous annealing matter is wiped therefrom and flows back into the annealing-vat. If the coating is not now heavy enough, this process may be repeated by carrying the strip through other vats and wipers, like those already described, and which may form a part of the machine; but I have not here shown such other parts, as they would be the mere duplicates of those already shown.

From the wiper *H'* the strip passes over one

of the planishing-rollers and underneath the other, as represented, and is planished; but before the strip reaches the planishing-rollers it is exposed to the air-blast from the pipes *L L*, and the color is thereby brought out. The blast, according to its temperature and the rapidity with which it acts, will produce a color from silver-white to sky-blue, and the coating will be cooled and set, so that the planishing-rolls may act upon it with advantage.

From the planishing-rollers the strip is carried between the rollers *J J'*, one of which, being vertically yielding, adjusts itself to any inequality of thickness which may occur in the coated strip. The wipers, being also vertically yielding, adjust themselves in like manner; but this self-adjustment is not necessary in all the other parts which are in contact with the strip during its passage through the machine, as will be perceived. The parts which are not self-yielding, however, are adjustable, to admit of the proper degree of pressure being applied to the strip and to hold it down properly in the vats. All these parts, however, need not necessarily be adjustable.

It will be perceived that none of the work is performed by hand after the machine is properly regulated, which may be done with facility by those familiar with the nature of the work to be accomplished. On the contrary, the entire work of supplying the coating to the long strip is performed automatically, and the machine, during its operation, needs no more care and attention than other automatic machines require.

I deem it best to employ independent driving-belts for the feed-rolls and for each planisher.

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

1. The combination, with the vats of a machine for coating metal sheets with metal or alloy, of the wiper *H*, consisting of a fixed table, *a*, and a vertically-yielding plate, *a'*, covered, as described, substantially as and for the purposes specified.

2. The combination, in a machine for coating sheet metal with other metal or alloy, of the air-blast pipes *L L*, the planishers *I I'*, the vats, and one or more wipers, all arranged, substantially as shown and described, with relation to each other for the purposes set forth.

3. The combination, in a machine for coating sheet metal with other metal or alloy, of the planishers *I* and *I'*, the vats *D* and *F*, the rollers *C* and *G*, and the furnaces, substantially as and for the purposes specified.

4. The combination, in a machine for coating sheet metal with other metal or alloy, of the vats *D* and *F*, the furnaces, the pressers or rollers *C* and *G*, and the wipers *H* and *H'*, substantially as and for the purposes specified.

5. The combination, in a machine for coating sheet metal with other metal or alloy, of the vats *D* and *F*, the adjustable rollers or

pressers C and G, the wipers H and H', the pipes L L, and the furnaces, substantially as and for the purposes specified.

6. The combination of the vats D and F and
5 their furnaces, the adjustable rollers or pressers C and G, the wipers H and H', the planishers I and I', and the pipes L L, substantially as and for the purposes specified.

7. In combination, substantially as herein-
10 before described, a reel or spool, B, a furnace,

E, two or more vats, D F, the presser-rollers C and G, the wipers H H', the air-blast pipes, the planishers, and the feed-rolls, all arranged for operation together in connection with the same strip of sheet metal, for the purposes 15 specified.

JAMES F. DUFFY.

Witnesses:

F. F. WARNER,

JAMES H. COYNE.