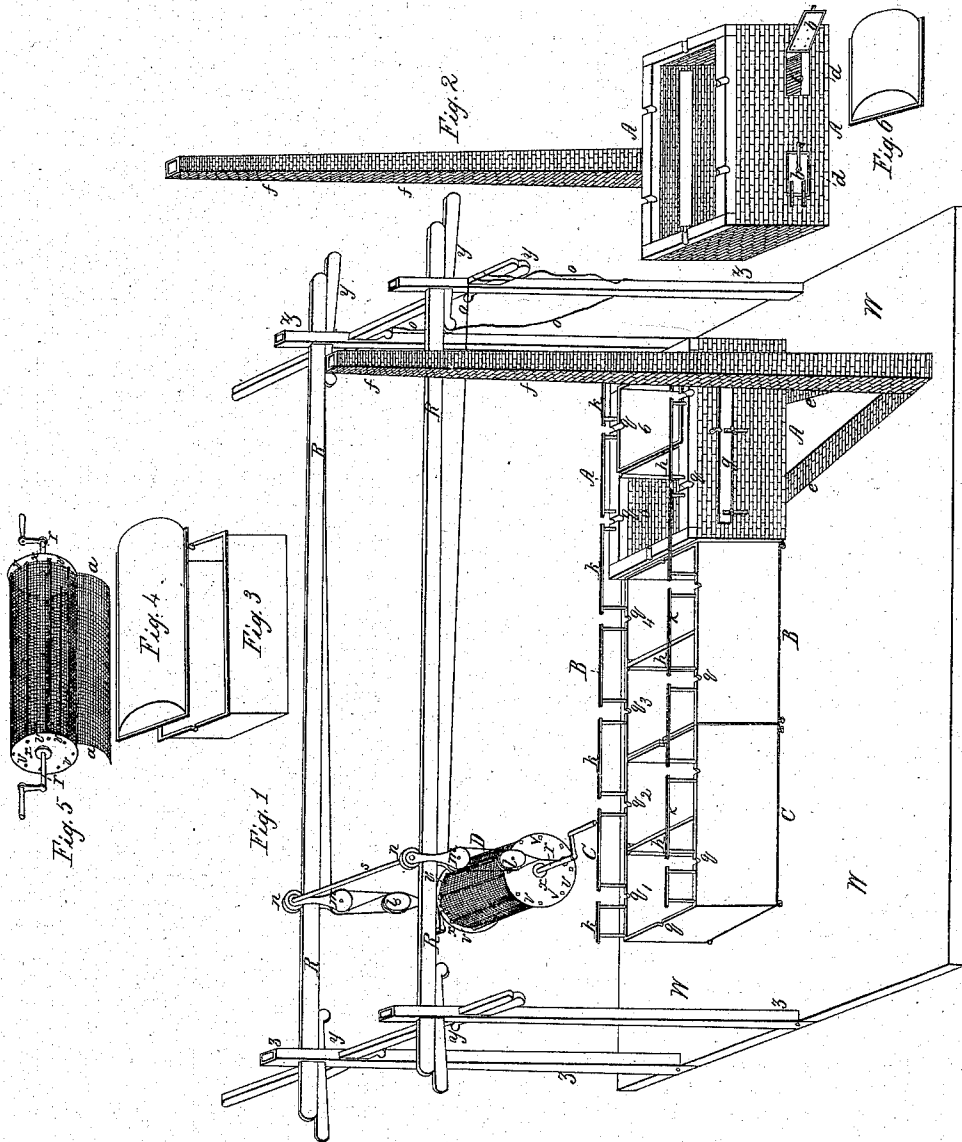


C. B. MILLER.
COATING METALS.

No. 10,976.

Patented May 30, 1854.



UNITED STATES PATENT OFFICE.

CHRISTIAN B. MILLER, OF WILMINGTON, DELAWARE.

IMPROVEMENT IN PROCESSES OF GALVANIZING METALS.

Specification forming part of Letters Patent No. 10,976, dated May 30, 1854.

To all whom it may concern:

Be it known that I, CHRISTIAN B. MILLER, of Wilmington, in the county of New Castle and State of Delaware, have invented and made certain new and useful Improvements in the Process or Method of Galvanizing or Coating Metals with Metals; and I do hereby declare that the following is a full, clear, and exact description of the method of construction and mode of operating the same, reference being had to the accompanying drawings, and making a part of this specification, in which—

Figure 1 is a perspective view of the whole apparatus complete, showing the platform or groundwork *w w w*, the framing and keys *z z z y y y*, the smoke-flues *e e*, and chimney-stack *f f f* to the furnace *A A*; *B B C C*, the tanks mounted on casters or wheels; *k k k k k*, the railings or connecting-timbers, used also as resting-bars, for the cylinder *D*; No. 1, vat of sulphuric acid and water; No. 2, vat of sand and water; No. 3, rinsing-tub of pure water; No. 4, dipping-bath containing water, copper, and lead; No. 5, the drying-chamber; No. 6, caldron or cruset; *g*, a side door or hot-air vent to the furnace; *h h h*, sliding or detachable divisions; *l l*, blocks, and tackle *o o o o*, pulleys *m m*, and rollers *n n*, working on the beams or ways *R R R R*, on which the reticulated cylinder *D* and a similar one to be used are shifted or moved from place to place; *s*, the stay or connecting rod.

Fig. 2 is a reverse view of the furnace *A A*, showing the fire-grating *c* and doors *b b*, with ash-pits *d d*.

Fig. 3 is the long portable caldron or cruset for coating large sheets or masses of metal; Fig. 4, the cover thereof.

Fig. 5 is the long cylinder used in coating large masses of metal or sheets, *a a* being the hinged door thereof.

Fig. 6 is the top to small caldron or cruset No. 6.

To enable others to be skilled in the use and application of my invention and improvements, I will proceed to describe the construction and operation thereof, the nature and principles of which consist in coating or galvanizing the harder metals by a process or method of rotary dipping or immersion in molten volumes of the softer fusible metals—such as zinc, tin, lead, or their various combinations—the

result being more effectually produced by the aid of chemical agents and mixtures used, together with peculiar mechanical apparatus described as follows, viz:

I construct a furnace *A A*, and fire-flues *e e*, and chimney or smoke-stack *f f f*, Figs. 1 and 2, having fire-gratings *c*, doors *b b*, ash-pits *d d*, and a hot-air vent *g g*, Figs. 1 and 2. This furnace may be built of stone or brick, or other suitable fire-proof material, and of required dimensions and durability, surrounded by sufficient groundwork or a platform *w w w*. A substantial frame-work is next constructed, and may be put together as shown in Fig. 1, or in any desired manner or form of construction, observing though that this framing must have two stout longitudinal beams or pieces of timber *R R R R*, for the purpose of supporting the cylinder *D*, and answering as ways for the rollers *n n*, by which means the cylinder is shifted or moved from vat and tub to the caldron or cruset. The cylinders *D*, Figs. 1 and 5, are made of suitable wire-cloth or reticulated metal and formed with rods or bolts with two sets of screw-taps *v v v v* on each end, by which the end plates or disks *x x* are kept in place. The cylinders *D* and Fig. 6 have doors, which are kept closed, when required, by one of the rods being detachable and acting as a fastening-bar. Through these cylinders runs an axis *r r r*, having formed at each end crank-handles, as shown in the diagrams, and which are required for the convenience in the use and handling thereof.

Tanks *B B* and *C C* are made of durable stout wood lined with any suitable non-corrosive material, perfectly water-tight, and may be mounted on trundles or casters for convenience in use, these tanks having detachable diaphragms or draw-divisions *h h*, which are used to form the vats, tubs, and baths. The sides and ends of said tanks have rest-places or axle-bearings *q q q q* formed in their top edges for the purpose of holding the axles of the preparing and coating cylinders *D* and Fig. 6 and to aid in the revolving of said cylinders in coating.

Having completed the apparatus, the process or operation of preparing and coating proceeds as follows: The furnace *A A* being fired and attaining the required degree of heat merely sufficiently to melt the zinc, which

is kept in a proper state of fusion (care being observed that the melted mass is not permitted to scorch or burn, which care and a little experience and use of a pyrometer or thermometer will establish) while the zinc is being fused the articles to be coated or zincked are placed in the preparing-cylinder D, and being suspended by the block-and-tackle fixtures, as shown in Fig. 1, are lowered and deposited in the vat No. 1 or the decapage bath, in which is a solution of sulphuric acid and water sufficiently strong merely to detach the oxidation or other superfluous matter. While in this bath the cylinder is revolved by manual power, by which revolution or motion the articles are cleaned of all extraneous particles; but in order to render the decapage more complete the cylinder D is shifted along on the railway-beams R R R R and deposited in the scouring-vat No. 2, containing sand and water, and agitated therein a few minutes also, this finally completing the decapage. After this the cylinder D is removed to the rinsing-tub No. 3, containing simply pure water, in which the cylinder is revolved repeatedly for a few minutes. Then the articles are taken out of cylinder D and deposited in a similar one, called the "coating-cylinder," which is suspended by the tackle apparatus and deposited in the dipping-bath No. 4, containing water and copper and lead clippings or particles, covering the bottom of the bath 4. While in this bath the cylinder is agitated or revolved repeatedly for several minutes, (say five or ten,) which dipping, owing to the galvanic action produced by the copper, lead, and water, acts as an auxiliary by opening the pores of the metal, after which the cylinder is withdrawn and removed and suspended over the drying oven or chamber No. 5, and after remaining about two or three minutes, and being revolved also, is then changed or shifted and deposited in the cruset or melting-caldron No. 6, containing the fused zinc, in which must be thrown a handful of pulverized sal-ammoniac. The articles are suffered to remain quiescent for about a minute. Then the cylinder is revolved for about one minute more, observing that during the time of coating the cruset must be covered with the top or cap, Fig. 6. The required time being given for coating, the cylinder is slowly withdrawn, revolving it at the same time, and after being withdrawn the articles coated are thrown into warm or tepid water and permitted to cool gradually.

In the preparation and coating of large massive articles or long sheets of metal large and long cylinders, like Fig. 5, are to be used, and the diaphragm-divisions *h h* are to be detached, forming the long vats and tubs, having a sufficient number of them, as required; also, long or parallel ogrammic crusetts or melting-caldrons and covers, Figs. 3 and 4, are used, and in the drying operation the long cylinders are swung on cranes or beams

or their equivalents and subjected to the drying agency of the furnace by opening the hot-air vent or escape *g*, Fig. 1, instead of suspending the cylinders immediately over the furnace.

By my improved process or system many great advantages are attained: first, cheapness and dispatch; secondly, great economy of labor and a saving in the amount of zinc used; thirdly, less danger and injurious effects to the health of the persons employed; fourthly, great durability of coating and uniformity or equality of coating, the metal absorbing in its pores the coating, forming a solid combination, not being merely a superficial film or temporary covering, as is the result of the modes heretofore resorted to in galvanizing metals; fifthly, the detaching or separating of the several pieces is readily accomplished, and entirely dispensing with manipulation or hand-separating, the pieces not sticking or running together; sixthly, by the use of the rotary cylindrical preparing and coating devices a pure deposit of zinc is produced, for the cylinders act as strainers and purifiers, owing to their reticulated principle of construction, and thus is dispensed with the injurious operation of hand dipping or skimming, this cylinder acting as a mechanical rotary skimmer, by which the fused metal is freed of the impurities or dross, which cannot be accomplished by hand-skimming; seventhly, it has been practically demonstrated that by my process two persons can do more in a given time than six persons can possibly accomplish by any other mode heretofore known. Again, too, less than one-half the cost is required that is attendant upon any other method.

My process is also admirably adapted to the effectual, durable, and cheap coating of cannon and balls, shells, anchors, and chain cables, and sheathing and other metallic articles used in naval architecture and for maritime purposes, wherein the articles are liable to atmospheric oxidation or aqueous salinous corrosive action.

Having given a plain and comprehensible description and explanation of my improved process of galvanization or coating of metals, the same process or method being applicable to the coating with tin, lead, and copper, now what I claim as new and original with myself, and desire to secure by Letters Patent of the United States, is as follows, viz:

The construction and application of the rotary reticulated immersing cylinders or receptacles D and Fig. 5 and the use thereof in combination with the melting and drying apparatus A A A and diaphragm-tanks B B C C, for the purpose of rotary dipping, substantially as described, and operated as set forth, for the galvanizing of metals.

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Witnesses:

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