W. GETHING, D. JENKINS & S. GARDNER.

Apparatus for Pickling Metal Plates.

No. 160,178. Patented Feb. 23, 1875.

FIG. 3.

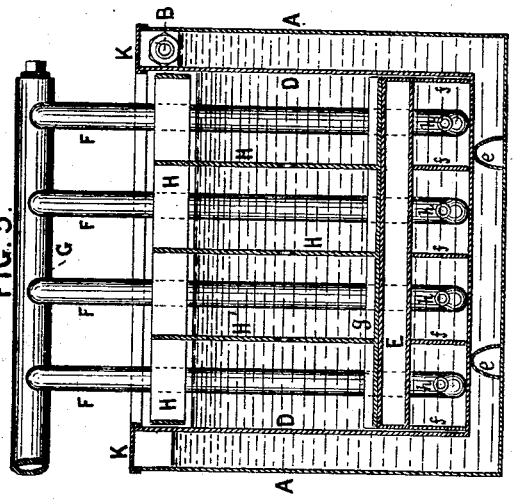


FIG. 4.

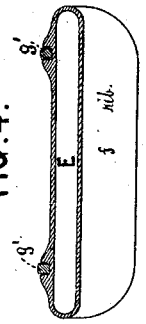


FIG. 2.

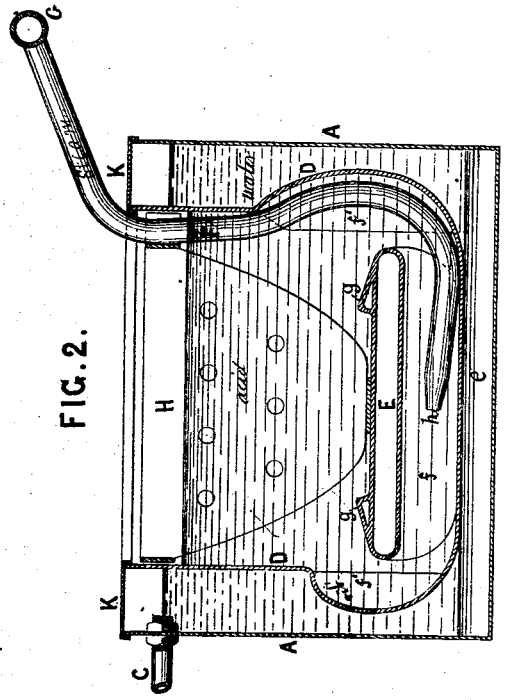
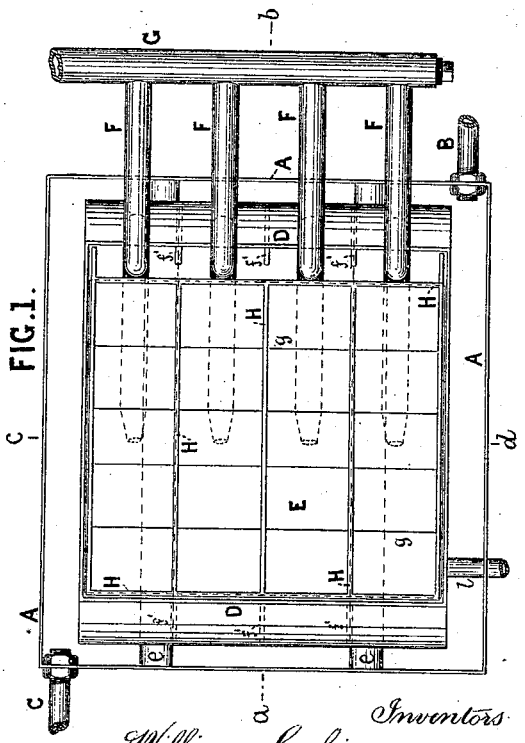


FIG. 1.



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM GETHING, DAVID JENKINS, AND SANKEY GARDNER, OF NEATH, SOUTH WALES.

IMPROVEMENT IN APPARATUS FOR PICKLING METAL PLATES.

Specification forming part of Letters Patent No. **160,178**, dated February 23, 1875; application filed September 22, 1874.

To all whom it may concern:

Be it known that we, WILLIAM GETHING, DAVID JENKINS, and SANKEY GARDNER, all of Neath, South Wales, have invented certain new or improved modes or means and machinery or apparatus for the pickling of metal plates to be coated with tin, terne, or other metal, of which the following is a specification:

According to our invention we employ a vessel or receptacle, made of cast iron or other metal or material, sufficiently large to receive one, two, or more, if necessary, of the acid-vessels. The outer vessel contains water, which is admitted by an inlet-pipe and escapes by an outlet-pipe, so that there may be a free current of water through the vessel, when required. There are ribs, projections, or stands in the bottom of the outer vessel, in which the vessel containing the acid rests; or the acid-vessel may be provided with legs or supports, the object being to prevent the bottom of one vessel touching the bottom of the other, and thereby impeding the free circulation of the water. At or near the bottom of the acid or pickle containing vessel there is a compartment or shelf, under or beneath which two or more steam-pipes, in proportion to the size of the vessel, are led from a main pipe, and in such manner that the steam can be cut off and regulated as desired. The steam-pipes are open at their ends, so that there may be a free admission of steam into and at or near the lower part of the acid-containing vessel. In the acid-vessel we place a frame with perforated plates, forming compartments at convenient distances apart, for the reception of the metal plates to be pickled.

The accompanying drawings illustrate the manner in which we propose to carry our invention into effect.

Figure 1 is a top plan of apparatus constructed according to our invention, with the cover between the acid-vessel and water-bath removed. Fig. 2 is a vertical section through line *a b*, and Fig. 3 is a similar section through line *c d*, both of Fig. 1.

Similar letters of reference refer to like parts in all the figures.

A is the outer vessel, containing water, which may be of any convenient size, although in the drawing we show it suitable only for one pickle-bath; B, inlet-pipe, and C outlet-pipe, to same. D is the acid-vessel, made of lead. *e e* are ribs on which the acid-vessel D rests; or the ribs or legs may be on the acid-vessel itself. The acid-vessel D is made larger at bottom than top, having sweep or bulging-out ends, as shown in drawings at Fig. 2, in such manner that the acid or pickle may be conveniently agitated by the action of the steam on it, as more fully hereafter described. E is the compartment or shelf at bottom of acid-vessel D. *ffff* are the ribs on the under side of shelf E. *f' f'* are corresponding divisions or ribs on the bulging portions of the vessel D. *g g* are projections on the top, on which the metal plates to be pickled rest when placed in the bath. These projections may be made with a groove in them to receive iron bars, vitrified, glazed, or tinned, or copper or yellow-metal bars, tinned or glazed, or without such coating. Fig. 4 shows a view of shelf E with these bars applied. *g' g'* are the bars placed in recesses on the shelf. F F F F are steam-pipes leading from the main steam-pipe G to the under side of the shelf E, for conveying steam thereto, which may be cut off or turned on, as desired, for which purpose the main pipe G is fitted with a suitable tap or taps. The pipes F are opened at the ends *h*, and their nozzles have a slightly-upward direction, as shown at Fig. 2, in order to direct the steam issuing from them in an upward direction, as well as for forcing the pickle all round the bath. H is the frame with the perforated plates or compartments, between which the metal plates to be pickled are placed. The frame may have four or a greater or less number of divisions, in proportion to the size of the bath. K is cover between acid-vessel and water-bath.

The operation is as follows: Water is first put in the acid-vessel D, and then the acid is added to it to form the pickle. The plates to be pickled are then placed in the compartments in the frame H, the number of compartments varying according to the size of apparatus. Water is caused to fill the outer vessel A and to circulate through same cold, and steam is admitted into the pipes G and F, which thereby entering the vessel D, containing the

acid-pickle, at once in the direction of the bulging curves, the acid-pickle is thereby kept in continual agitation or motion, and is caused to circulate through the perforated divisions of the frame H, and to act on, round, and through every part of the pickle-chamber, and on every part of the metal plates placed therein, the pickle alone reaching the plates, the steam in its passage being partly condensed, the degree of temperature of the acid-pickle bath being regulated by the outer vessel and the water circulating through it, as well as by the steam admitted into pickle or acid bath. A pipe, *l*, with tap or plug, is fitted in bottom of the acid-pickle bath D, in order to run off the old or waste pickle when required.

When the plates are sufficiently pickled they are removed and subsequently washed and treated in the ordinary way, and the bath is ready to receive a fresh supply of plates.

By our invention the use of sawdust, sand, or other material for separating the plates when in the pickle is rendered unnecessary, and should not be used when employing our invention. A considerable saving in time, labor, and of acid is effected, while at the same time the pickling is better and more expeditiously done than heretofore.

It is to be distinctly understood that one of the essential features in this our invention is the mode and means described for the employment and introduction of steam into the acid-bath D, for the purpose of pickling metal plates to be coated with tin, terne, or other metal; but at the same time we are aware, and wish it to be clearly understood, that simply the introduction of steam into the pickle-bath is not new. Neither is it sufficient for the purposes of our invention unless means are adopted whereby the temperature of the acid-bath can be judiciously regulated during the pickling process, as, for example, in and by the employment of the vessel A, containing water, as before described, as well as by our steam appliances for forcing the pickle through every part of the lead chamber, for we have found that the introduction of steam alone into the said bath D during the pickling process, without the water-vessel and our other appliances before described, has not the desired result of pickling the plates efficiently or properly, because when steam is introduced into the acid-bath direct, without the acid-vessel being placed in the water-bath, and without our appliances, as aforesaid, the plates are liable to become blistered, their surface discolored, and consequently they will be unsuitable or defective for the tinning process, whereas by our invention the pickling is most effectively accomplished.

We claim as our invention—

1. The acid-bath for pickling metal plates, consisting of an inner vessel with supports for the plates, an outer vessel containing water for regulating the temperature of the bath, and pipes for introducing steam into the acid, substantially as set forth.

2. The shelf E and frames H, between which the plates to be pickled are placed, in combination with the steam-pipes F, with their open ends beneath the shelf E, and arranged as specified, to produce a circulation of the acid in the bath, as set forth.

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