(No Model.) 2 Sheets—Sheet 1.

G. RETTERER.

APPARATUS FOR GALVANIZING IRON.

No. 491,720. Patented Feb. 14, 1893.

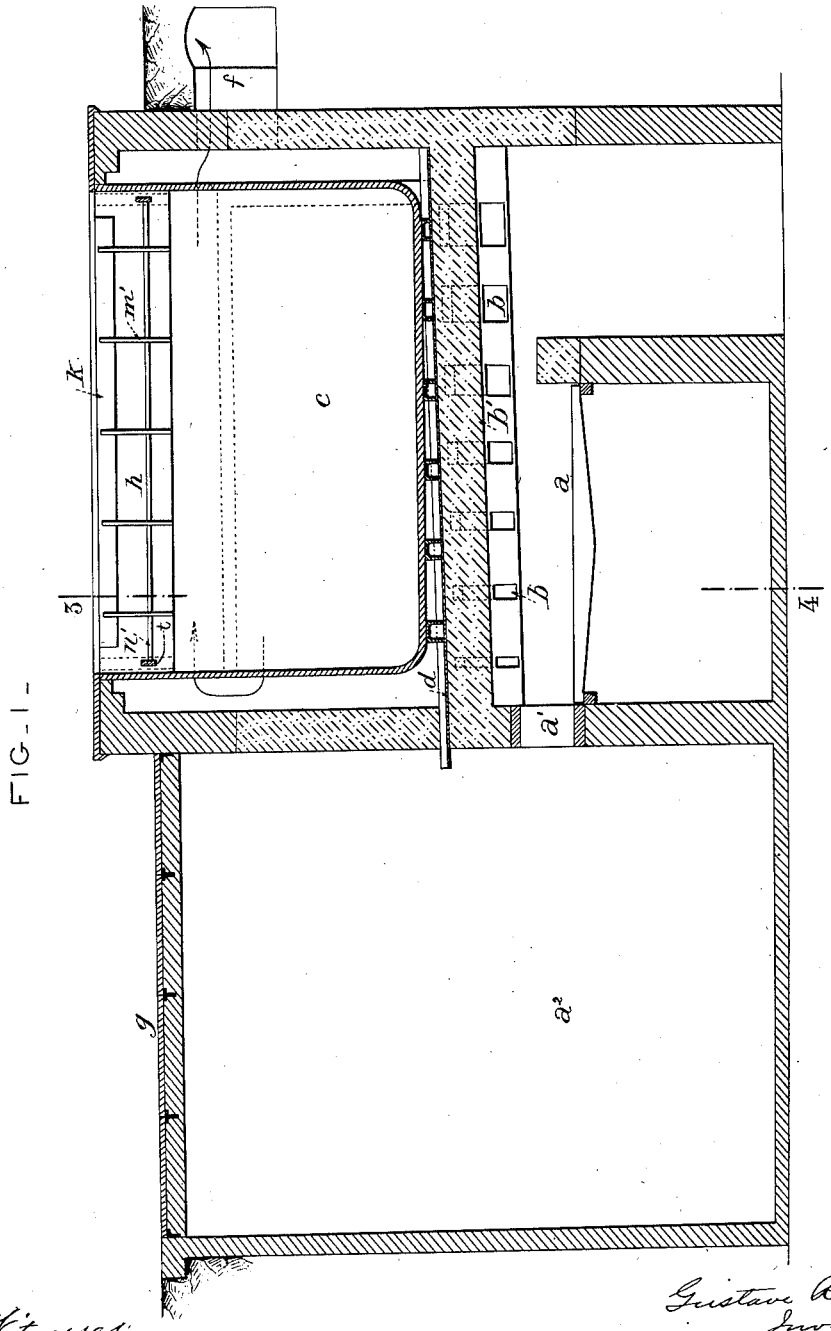

FIG. 1.

Witnesses:
M. L. Pinckney
Jos. A. Shea.

Gustave Retterer.
Inventor.
per Bowen & Behrens,
attys

(No Model.) 2 Sheets—Sheet 2.

G. RETTERER.

APPARATUS FOR GALVANIZING IRON.

No. 491,720. Patented Feb. 14, 1893.

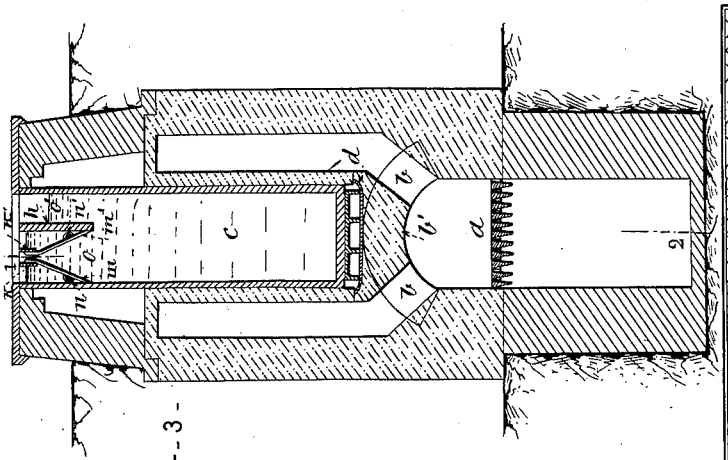

FIG-3-

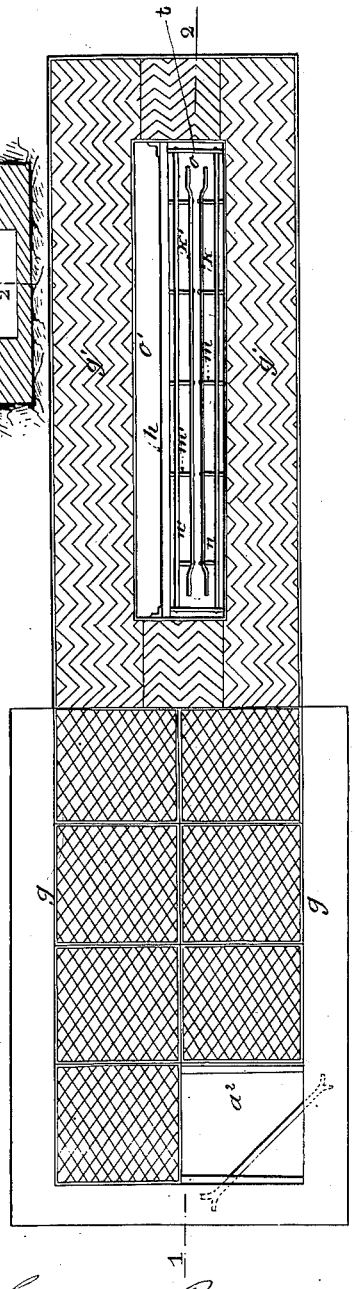

FIG-2-

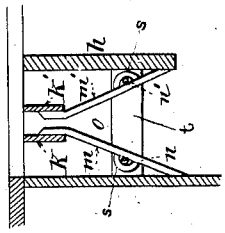

FIG-4-

Witnesses:
W. C. Pinckney
Jos. A. Shea

Gustave Retterer,
Inventor,
per Bowen & Behnen,
attys.

UNITED STATES PATENT OFFICE.

GUSTAVE RETTERER, OF PARIS, FRANCE.

APPARATUS FOR GALVANIZING IRON.

SPECIFICATION forming part of Letters Patent No. 491,720, dated February 14, 1893.

Application filed May 23, 1892. Serial No. 433,936. (No model.) Patented in France April 14, 1892, No. 220,948, and in England April 16, 1892, No. 7,332.

To all whom it may concern:

Be it known that I, GUSTAVE RETTERER, engineer, of 31 Rue du Commerce, Paris, in the Republic of France, have invented a new Improvement in Galvanizing Iron and Apparatus Therefor, (for which I have obtained Letters Patent of France, No. 220,948, for fifteen years, dated April 14, 1892, and of Great Britain, No. 7,332, dated April 16, 1892;) and I do hereby declare that the following is a full and exact description thereof, reference being made to the accompanying drawings.

This invention relates to an improved galvanizing bath and its method of employment for galvanizing iron whereby the formation of hard spelter, so prejudicial with the processes heretofore employed is in a great measure prevented.

At present sheet iron is generally galvanized by immersing the sheets, previously pickled and scoured by an acid bath, in a bath of melted spelter covered with sal-ammoniac where they become covered with a superficial coating of spelter. This operation requires two workmen to operate the sheets and a third to spread (spatuler) the surface of the bath when the sheets are withdrawn. By this process hard spelter is largely produced and an excessive evaporation results from the frequent and considerable oxidation of the surface of the spelter from contact with the atmosphere for, it will be understood, that for each sheet the upper surface of the spelter has to be spread whereby it is uncovered more than is expedient and is put directly and for a certain length of time in contact with the atmosphere. This method of galvanizing possesses the further disadvantage of charging the immersed sheets with spelter to too great an extent, doubtless owing to the length of time occupied in immersing them in and removing them from the bath. By another method, also well known, the sheets are first dipped in a bath of melted lead and are afterward immediately immersed in another bath of melted spelter. This method only possesses the advantage of better preparing the sheet to receive the covering of spelter the process otherwise having the same defects as exist with the single bath process.

According to my invention the galvanizing bath at its upper part is divided by means of a longitudinal partition into two compartments which communicate with each other below the partition; one of these compartments which forms the continuation of the lower part of the galvanizing bath is filled, as well as such lower part, with melted lead and the other compartment with melted spelter which floats on the lead which has free access through the bottom of this second compartment. The sheets to be galvanized are first immersed in the lead bath sufficiently deep to allow of the upper longitudinal side to descend somewhat below the dividing partition and in any suitable manner caused to pass to the other side of the thickness of the said partition when by reason of the difference of the densities of the lead and the sheet the latter will be automatically projected through the spelter bath until it arrives within reach of the workmen who grasp it with their lifting tongs and withdraw it perfectly galvanized. Oscillating guides are provided in the spelter baths arranged on two bars which float on the surface of the spelter, which guides direct the automatic upward movement of the sheet and the bars spread the insulating layer which re-covers the surface of the spelter in the necessary manner and at the moment required.

By my invention the oxidation of the spelter takes place only on the withdrawal of each of the sheets and not during the whole of the operation as with the processes hitherto employed, the formation of hard spelter and evaporation are reduced to a minimum; the charge of spelter is as small as possible and is uniformly applied and finally the spreading being effected automatically the workman charged with this duty in the well known processes can be dispensed with whereby an economy of labor is effected.

Still other advantages are possessed by the mode of operating which I have just described and by the new arrangements that I have de-

signed for putting my method into actual manufacturing practice, arrangements which I will describe hereinafter with reference to the accompanying drawings.

Figure 1 shows a vertical section on the longitudinal axis of the galvanizing bath, that is to say, on the line 1—2 of Figs. 2 and 3. Fig. 2 is a plan. Fig. 3 represents a vertical cross-section on the line 3—4 of Fig. 1.

The stonework of the galvanizing bath is of well known construction; the grate *a* is preceded by the opening *a'*, which opens into the engine room *a²*; the combustion gases issue through the flues *b*, in an arch *b'*, on which the galvanizing bath *c* rests. Cast iron lugs of progressively increasing heights keep the bottom of the galvanizing bath in a horizontal position, in spite of the back of the arch, which I have caused to be inclined for the sole purpose of directing to a main gutter *d* the molten metal which may escape, and which flows of itself into a reservoir placed for that purpose in the engine room. The combustion gases, after having passed through the flues *b* at the front and at the back of the upper part of the furnace, mount up to about one half the height of the sides of the galvanizing bath, are then led to near the end at the back of the furnace, are brought back afterward to heat the upper part of the sides of the galvanizing bath, and finally escape through the chimney, which forms a continuation of the flue *f*.

As shown by the drawings, the workmen are placed at *g*, on a level with the ground, or at *g'*, on a level with the upper edges of of the galvanizing bath.

At its upper part the galvanizing bath, is longitudinally divided by an iron partition *h*, forming a metal-tight joint at its two ends, so as to make, with the sides of the galvanizing bath, two bottomless compartments *o o'*, either of the same or of different size. Two bars *k k'*, placed in the middle of the compartment *o*, are carried respectively by two series of supports *m m'*, mounted by means of staples or eyes *s* respectively on two horizontal pivoted rods *n n'*, the former being near the partition *h*, and the latter near the side of the galvanizing bath. The rods *n n'* are pivoted at their ends to the two cross supports *t*. This arrangement allows the bars *k k'*, to come together as near as possible when in the normal position, and also to open out in turning on their pivotal supports. Fig. 4 is a detail view of this arrangement.

In the galvanizing bath *c*, and the compartment *o'* is found pure molten lead, and in the compartment *o*, melted spelter. By reason of the difference of the densities of the lead and the spelter, the levels of the lead in *o'* and *o* will be nearly as shown in Fig. 3. On the level of the lead in *o'*, sal-ammoniac, or muriate of ammoniac, or a zinc salt such as chloride of zinc has been spread. On the surface of the spelter floats a layer of fine powder, such as powdered coke.

The operation is as follows: The iron to be galvanized, taken hold of by two workmen, is immersed in the compartment *o'* until its upper edge has gone a little below the partition *h;* then the workmen incline the sheet in pushing such upper edge toward the compartment *o*, and afterward leave hold of it. By reason of the difference of the densities of the lead and the sheet, this latter rises in the compartment *o* until it comes and separates the bars *k*, *k'*, at which point it is again taken hold of by the workmen and carried to the storeroom. By this new process, the sheets are then passed to the lead baths, and afterward, and without any handling whatever, to the spelter baths. In this last period of the process, the bars *k k'* have acted just as spreaders do for, in being opened out by the pressure of the rising sheet, they have just sufficiently uncovered the surface of the spelter to let the sheets come out of the bath. The sheets thus treated are more brilliant, finer, more malleable, more salable in fact than those galvanized as heretofore, and, besides, there is very much less hard spelter and less evaporation by reason of the automatical spreading of the layer of fine powder on the spelter. Oxidation takes place in a lesser degree, and the spelter is laid on in the lowest quantity. Finally, there is economy of labor, by reason of the automatical spreading. The stock of zinc also need not be so large, on account of the quantity used at a time in the bath being as small as possible.

In conclusion, I may again remark that the destroying action of the spelter is only felt on the upper parts of the galvanizing bath; that such action can be looked after; and that if necessary it can be attenuated in a great measure in this sense that if the compartment *o* has got out of order after a certain time, the spelter bath and its self-working system, which is movable, can be placed in the compartment *o'*. In this way, the galvanizing bath lasts very much longer.

What I claim is:

1. A galvanizing bath provided with a substantially vertical partition in the upper part dividing said upper part into two spaces or compartments, one of said compartments being provided with movable guide bars or spreaders arranged normally near each other and constructed to be separated by the upward movement between the same of the material operated upon, substantially as described.

2. A galvanizing bath provided with a substantially vertical partition in its upper part dividing said upper part into two spaces or compartments one of said compartments being provided with two pivoted bars or spreaders arranged normally near each other, and to be separated by the upward movement

between the same of the material operated upon, substantially as described.

3. A galvanizing bath provided with a substantially vertical partition in its upper part dividing said upper part into two spaces or compartments one of said compartments being provided with two movable bars or spreaders secured to downwardly extending pivoted arms or supports, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

GUSTAVE RETTERER.

Witnesses:
PAUL RUBY,
ALEXANDRE HUBAUT.