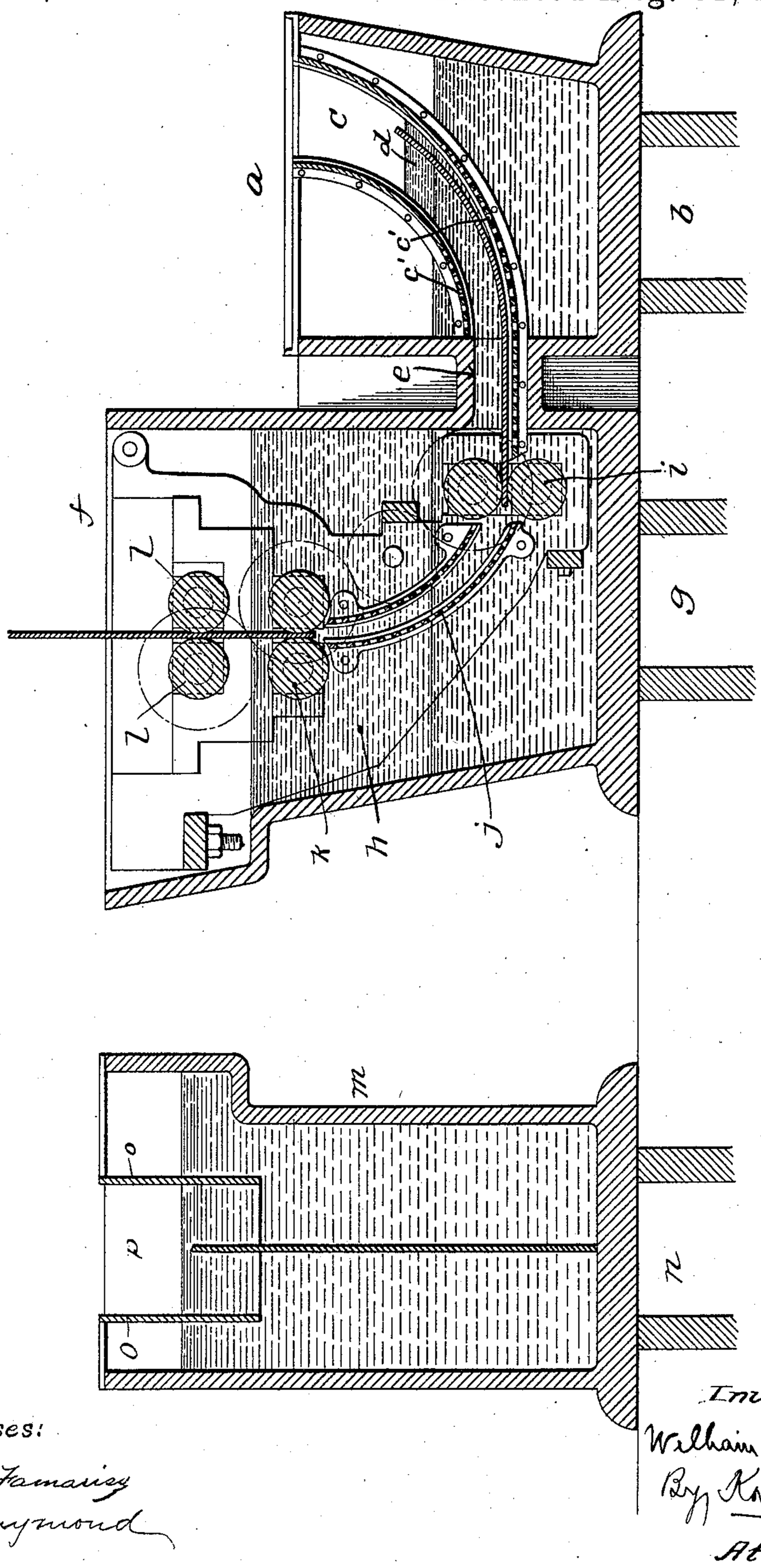
(No Model.)

W. BANFIELD.

METHOD OF COATING METALS.

No. 589,381. Patented Aug. 31, 1897.



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METHOD OF COATING METALS.

SPECIFICATION forming part of Letters Patent No. 589,381, dated August 31, 1897.

Application filed July 23, 1896. Serial No. 600,204. (No specimens.)

To all whom it may concern:

Be it known that I, WILLIAM BANFIELD, a resident of Irondale, in the county of Jefferson and State of Ohio, have invented a new and useful Improvement in Methods of Coating Metals; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the coating of metals, and more particularly to the coating of iron or steel plates with lead.

There is now manufactured and has been for many years a plate, commonly called a "terne" plate, which consists of an iron or steel plate coated with an alloy of tin and lead. This plate is the nearest approach to a lead-coated plate which has ever been successfully manufactured. It is well known that for certain purposes—such, for instance, as roofing-plates—ordinary tin-plate cannot be employed, as the tin is attacked and eaten by the acid which is due to rain-water, soot, and other elements which fall upon said plates. Accordingly the terne-plate was manufactured for such purposes as roofing, for being composed largely of lead it was not so liable to be affected by the action of the acid. Then, again, for such purposes as roofing where it was desired to employ a cheap plate this terne-plate was particularly applicable, as it could be made at considerably less expense than a tin-plate, the usual proportions in terne plates being about one-fourth tin and three-fourths lead.

The difficulty heretofore of manufacturing a pure lead-coated plate was due to the fact that in the manufacture of both tin and terne plates it was necessary to have a thick layer of grease or oil upon the top of the pot containing the melted tin or the alloy of lead and tin in order to prevent the oxidation of the metal. It was possible to coat plates with the pure tin from the fact that tin melted at about 400° Fahrenheit, so that the heat necessary to melt the tin was not of such high temperature as to burn the oil or grease resting upon the body of molten tin into which the plates were dipped. It was also possible to maintain a body of oil or grease upon a pot of molten lead and tin provided the quantity of lead was not in too great proportion to the amount of tin. While such an alloy would have to be heated to a point above the melting-point of tin, yet it could be held down to such a point as to prevent the burning of the oil or grease resting thereon. When, however, it was attempted to coat the plates with pure lead, it was found impossible to maintain a body of oil or grease upon the molten lead, owing to the fact that lead melts at a little over 600° Fahrenheit, and such a degree of heat would burn the oil, and it was thus impossible to prevent the oxidation of the metal, or if the oil or grease was not completely burned away the intense heat would thicken and blacken it, so that it would adhere to the sheets and spoil the same.

The object of my invention is to provide a method for giving a plate a coating of pure lead and at the same time preventing the oxidation of the metal.

My invention comprises, generally stated, the taking of a plate which has been properly treated and coating the same with a suitable alloy of lead and tin and then dipping said plate with the preliminary coating thereon into a bath of molten lead and creating a non-oxidizing vapor or fumes at the surface of the molten lead, whereby the oxidation of the metal is prevented.

In the accompanying drawing I have illustrated a common form of apparatus which may be employed in carrying out my invenvention, although I do not limit myself in any sense to any particular form of apparatus.

In said drawing the letter *a* designates a suitable pot containing an alloy of lead and tin, said alloy consisting of about three-fourths lead and one-fourth tin, although the exact proportions are of no importance. A little antimony is sometimes added to give color to the metal. Accordingly when I state in the claims that the preliminary coating consists of an alloy of lead and tin I do not wish to be understood as confining myself absolutely to these two metals, but intend to include within the scope of my invention the introduction of antimony or such other metals as may be found to be used to advantage in connection with the lead and tin. Beneath said pot is the fire-chamber *b*. Within the pot *a* is the passage *c*, having the perfo-

rations c', beginning at a suitable point below the upper end of said passage. The upper end of the passage c contains a suitable flux d, such as a solution of muriate of zinc. The molten metal in the pot a enters the perforations c' in said passage and fills said passage to the same height as the height of the metal in the pot a, while the flux d rests upon the molten metal in said passage. The passage e connects the passage c with the pot f, said pot having also a fire-chamber g beneath it. This pot f also contains the molten alloy, and resting upon said alloy is the oil or grease h. Adjacent to the inlet of the pot f are the rollers i, and extending up from said rollers within the pot f are the guides j. At the upper end of the guides j are the rollers k, situated within the oil, while just about at the top of the oil are the rollers l. Suitable mechanism is employed for operating said rollers, which it is not deemed necessary to illustrate or describe.

Adjacent to the above-described apparatus is the lead-pot m, which has the fire-chamber n below the same. At the upper end of the lead-pot m are the bars o, which extend down into the lead and make a contracted dipping-opening p. As the plates are drawn up through this dipping-opening p by having it contracted the operator can more readily keep the surface free from impurities on the surface of the metal. The lead-pot m contains pure lead, which is melted by the fire in the fire-chamber n.

Having described the form of apparatus suitable for carrying out my invention, I will now describe the process.

Iron or steel plates, commonly termed "black plates," having been properly treated in the manner ordinarily employed preparatory to the coating of such plates, the plates are passed down through the molten metal in the passage c, thence through the passage e to the pot f, whence they pass through the rollers i up through the rollers k and l. Just before the plates enter the rollers l the operator throws a little clean oil in the space between the rollers l, so that when the plates emerge from said rollers l they have a light coating or film of oil on them. The plates are then immersed in the lead-pot m, and having been properly coated with the lead are withdrawn. The film of oil which was on the plates when they were introduced into the lead-pot generates a vapor or fumes, which arise from the pot and which prevent the oxidation of the molten lead in the pot.

The above-described preliminary coating of the alloy of lead and tin is given to the plate to prepare the same to receive more readily the coating of pure lead which follows. It being well understood that to obtain a union between two metallic surfaces said union may be more readily accomplished by using an alloy or metal which melts at a lower temperature than the more fusible of the metals sought to be joined.

I do not wish to limit myself in any way to the manner of obtaining the vapor or fumes to prevent the oxidation of the metal at the top of the lead-pot. Furthermore, within the terms "vapor" and "fumes" I mean to include any suitable non-oxidizing gas. Palm-oil or other suitable oil might be sprayed over the top of the lead-pot in such a manner as to create fumes through which the plates pass as they emerge from the lead-pot.

By the above-described process I am enabled to keep the lead at the proper melting-point and yet prevent the oxidation of the metal. It would be impossible to maintain a body of oil on the surface of the molten lead and keep the lead at the proper temperature. Even if the oil or grease did not burn away, yet it would become so black and viscous that it would adhere to the plate when drawn through it, thereby marring the appearance of the plate. I obtain a plate coated with a pure coating of lead and one upon which ordinary acid has no effect.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The process of coating metal plates with lead, consisting in giving the plates a preliminary coating of an alloy of lead and tin, immersing the plates thus coated in a bath of molten lead, and creating non-oxidizing fumes at the exposed surface of the molten lead, substantially as set forth.

2. The process of coating metal plates with lead, consisting in giving the plates a preliminary coating of an alloy of lead and tin, immersing the plates thus coated in a bath of molten lead, and generating oil fumes at the surface of the molten lead, substantially as set forth.

3. The process of coating metal plates with lead, consisting in giving the plates a preliminary coating of an alloy of lead and tin, applying oil to the coated surface of said plates, and immersing the plates in a bath of molten lead and withdrawing same, substantially as set forth.

In testimony whereof I, the said WILLIAM BANFIELD, have hereunto set my hand.

WILLIAM BANFIELD.

Witnesses:
ROBT. D. TOTTEN,
ROBERT C. TOTTEN.