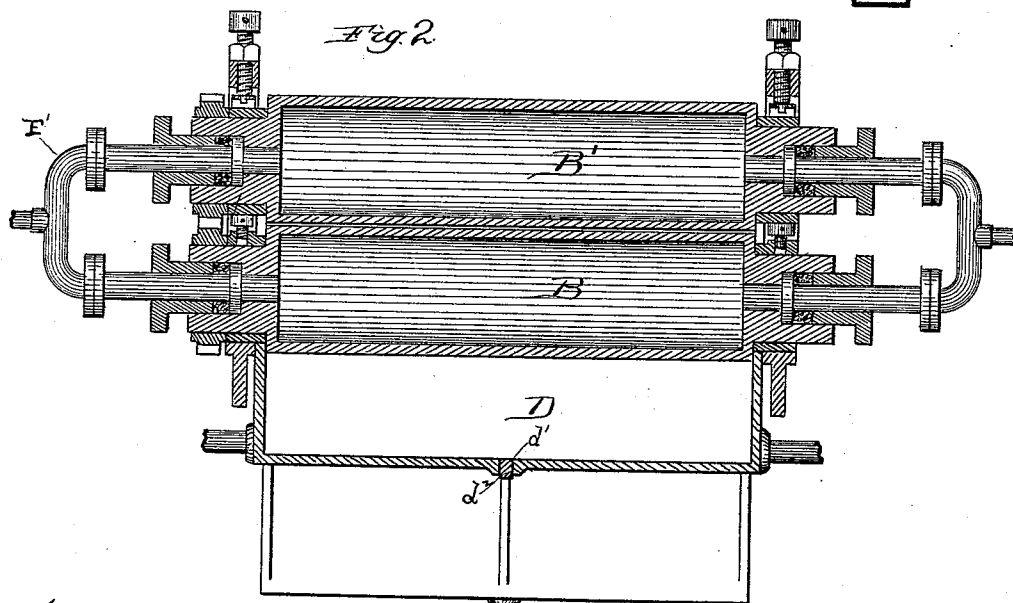
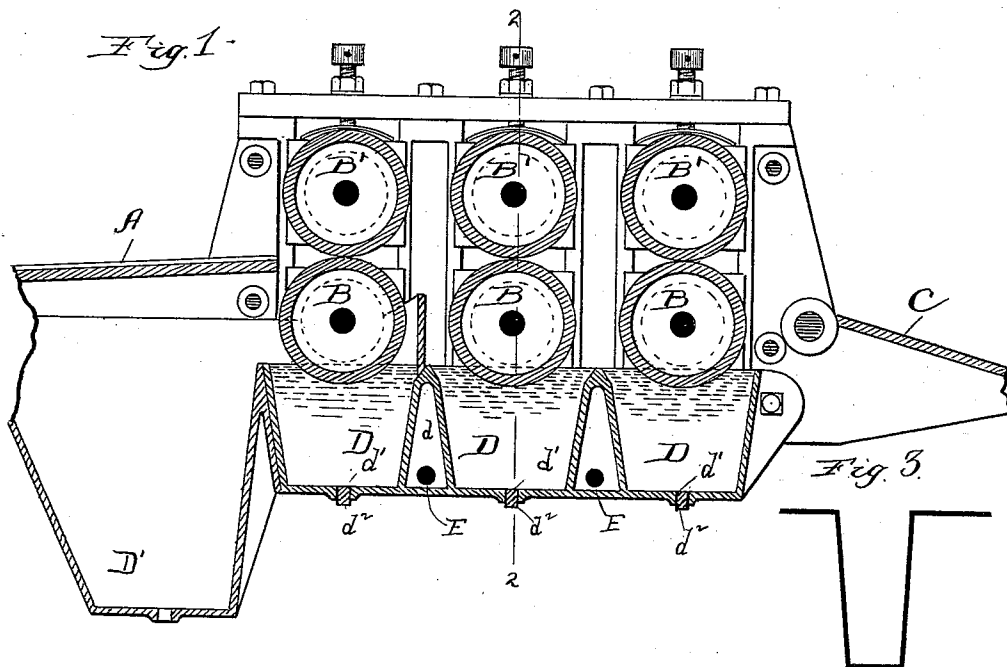


(No Model.)

E. NORTON.  
PROCESS OF COATING SHEET METAL.

No. 488,527.

Patented Dec. 20, 1892.



Witnesses:

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*His Attorneys.*

# UNITED STATES PATENT OFFICE.

EDWIN NORTON, OF MAYWOOD, ASSIGNOR TO HIMSELF, AND OLIVER W. NORTON, OF CHICAGO, ILLINOIS.

## PROCESS OF COATING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 488,527, dated December 20, 1892.

Application filed November 16, 1891. Renewed November 25, 1892. Serial No. 453,107. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN NORTON, a citizen of the United States, residing in Maywood, in the county of Cook and State of Illinois, have invented a new and useful improvement in Process of Coating Sheet Metal, of which the following is a specification.

This invention relates to an improved process of coating sheets of steel or iron with tin, lead or zinc. In the coating of black steel or iron sheets with these other metals as heretofore practiced, one commonly employed process has been the following:—The sheets are first prepared for taking the coating of metal by removing the scale oxidation and foreign matter from the surface by immersing the sheets in a bath of diluted sulphuric acid, commonly called a pickling bath. Upon removal from this bath the acid is carefully washed off from the sheets and they are at once completely immersed in pure, clean water to protect them from fresh oxidation which would ensue if they were exposed to the atmosphere. The plates are next taken from the water and while still wet are immersed one by one in a bath of palm oil which is maintained in a heated state at a temperature just sufficient to evaporate the water and at the same time heat the plate and prepare it for the next step in the process. From this oil bath the plates are taken to and immersed in a bath of molten tin covered with a body of palm oil, the plates being passed first through this body of oil before coming in contact with the molten tin beneath. A dozen or more sheets are commonly immersed in this bath at a time and are then taken out and laid in a pile. The operator next takes each sheet singly and brushes the surplus tin off from it with a hempen brush and then dips the sheet into another bath of molten tin, and finally into the grease pot where, by means of a lifting device, the sheet is passed up slowly between polishing rolls running in the heated oil and given its final polish and finish. This constitutes what is known to the trade as the palm oil process of tinning sheets. The several pots in this process require to be kept at different temperatures. Thus the pot in which the sheets are first plunged into the oil cannot be so highly heated as the pot containing the metal and oil, because if it were heated to the

temperature of the latter, the contact of the oil with the wet sheets would cause the oil to foam and sputter and boil over. This foaming of the oil is a great annoyance and can only be avoided where the sheets are immersed in a large body of oil by keeping the oil at a comparatively low temperature. The sheets are left in this pot until the moisture has been evaporated from them, so that when they are put into the pot containing the oil and molten tin, there will be no longer any traces of moisture upon them which can produce steam or excite the highly heated oil in the pot with the metal. This process also requires several handlings of the sheets, and there is a very considerable loss of metal through oxidation especially while it is being brushed. For these and other reasons great skill and long practice are required in the practice of this process and the workmen who understand it are scarce and hard to obtain. The consumption of tin plate has also grown so rapidly in recent years that it was impossible to supply the demand by this old process which is slow, and hence manufacturers have been in many instances led to adopt the quicker process described in the next paragraph.

Another process of coating tin andterne plates by which it has been sought to obviate some of the difficulties encountered in the palm oil process has come into extensive use and is as follows:—In this process the plates are first pickled and washed in clean water as in the other process, and then instead of inserting them in a palm oil bath, they are immersed at once in a pot containing molten coating metal and a flux floating and resting upon the metal composed of muriate of zinc or "acid" and lime. This flux does not become agitated and overflow as does the palm oil when heated to the extent necessary to keep the metal in proper fluid condition. After passing through this flux and metal, the plates are transferred into the grease pot and polished by rolls as in the other process. In this acid process a very considerable economy in labor, fuel and waste from oxidation of the tin is obtained. But the use of this new flux is attended with great injury to the quality of the plates as the acid attacks the steel body beneath the coating, and causes pin holes to appear in the plates after manufacture and

they are much less durable than the plates produced by the palm-oil process for the same reason. The fumes arising from the flux are also very injurious and unpleasant to the workmen.

In the present invention, which is in reality an improvement upon the palm oil process, because I employ the oil as a flux instead of the acid, I aim to overcome the difficulties heretofore encountered in the practice of such process and to obtain the economy of labor, fuel &c. which attends the practice of the acid process. The principal objection other than the expense of attending the oil process has been the tendency of the oil to foam and boil over when the wet sheets are inserted in it and this difficulty I have fully removed.

In carrying out my invention I pass the iron or steel sheet as it comes from the bath of water through one or more pairs of heated rolls, the surface of which are continuously supplied with a covering of heated oil or other suitable flux so that the rolls will impart such covering of flux to the sheets as they pass between them. The rolls should be heated to a sufficient degree to evaporate the moisture from the surface of the plates and if necessary to accomplish this thoroughly I employ two or more pairs of the rolls. In this manner the moisture is evaporated simultaneously with the application of the flux coating so that there is no time for oxidation to take place upon the surface of the plate. At the same time, the heat of the rolls is imparted to the plates themselves so that they are brought to a temperature suitable to produce the best results when they are placed in the molten metal. The sheets thus prepared having the water evaporated and both sides covered thoroughly with the oil or flux are ready to be immersed in the bath of oil flux and molten coating metal without causing any agitation of the flux in the pot with the metal. The remaining treatment is the same as previously practiced in the acid or single pot process.

By this improved process I obviate the objections to the oil process as heretofore practiced and obtain the economy in labor and fuel attending the acid process without employing and encountering the objections attending the use of acid.

In the accompanying drawings, forming a part of this specification I have, to enable my invention to be more readily understood by those skilled in the art, shown an apparatus or means suitable for carrying out the same, and that which I believe to be the best means now known to me for practicing the same.

In said drawings Figure 1 is a longitudinal vertical sectional view of a machine which may be used for drying, heating and fluxing the wet pickled sheets; Fig. 2 is a vertical section on line 2—2 of Fig. 1, and Fig. 3 is a sectional view on a smaller scale of the tinning or metal coating pot or bath into which

the sheets are immersed after being dried, heated and fluxed by passing through the machine, shown in Figs. 1 and 2.

In practicing the process the wet pickled sheets are taken one by one from the clean water bath and fed directly into the drying, heating and fluxing machine shown in Figs. 1 and 2, and as the sheets are delivered from this machine they are passed directly into tinning pot, shown in Fig. 3. The sheets pass from the feed table A of the machine between the three pairs of steam-heated revolving rolls or surfaces B B' and are delivered onto the delivery table C. The lower rolls B of each pair revolve in the fluxing troughs D which are likewise heated by steam as well as by contact of the oil with the hot rolls D. An overflow trough D' is provided under the table A to receive the palm oil or flux that may boil or foam up over the edge of the first trough D. Between the troughs D are hollow partitions d into which steam is admitted from the steam pipe E to heat the troughs or the oil therein. The hollow rollers B B' are heated by steam from the steam pipes E' which connect with the rollers through suitable stuffing boxes. The troughs D are provided with openings d' in their bottom closed by plugs d<sup>2</sup>, through which openings the palm oil or flux may be drawn off from the troughs D when desired for repairing the apparatus, or for other purposes.

The machine indicated in the drawings is one specially designed for practicing my improved process and is the joint invention of John G. Hodgson and myself and forms the subject of our joint application now pending as Serial No. 427,983 filed April 26 1892. Any other suitable apparatus may however be employed for practicing the process, though that herein shown and briefly described is that which I deem to be the best means now known to me for practicing my process.

I claim:—

1. The improvement in the old palm oil process of tinning or coating iron or steel sheets with tin or other metal herein described, and consisting in first taking the wet sheets from their water bath and simultaneously drying off the moisture, heating the sheets and fluxing or coating them with palm oil by passing the sheets between heated metallic rolls supplied with oil, and then immersing the sheets thus heated, dried and fluxed in a bath of molten tin or other metal, substantially as specified.

2. The process of coating metal plates with molten metal which consists in first pickling the plates, then passing the plates while still wet between hot rolls supplied with an oil flux whereby the sheets are simultaneously dried and fluxed then passing the sheets into the molten metal, substantially as specified.

EDWIN NORTON.

Witnesses:

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