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METHOD OF COATING IRON OR STEEL.

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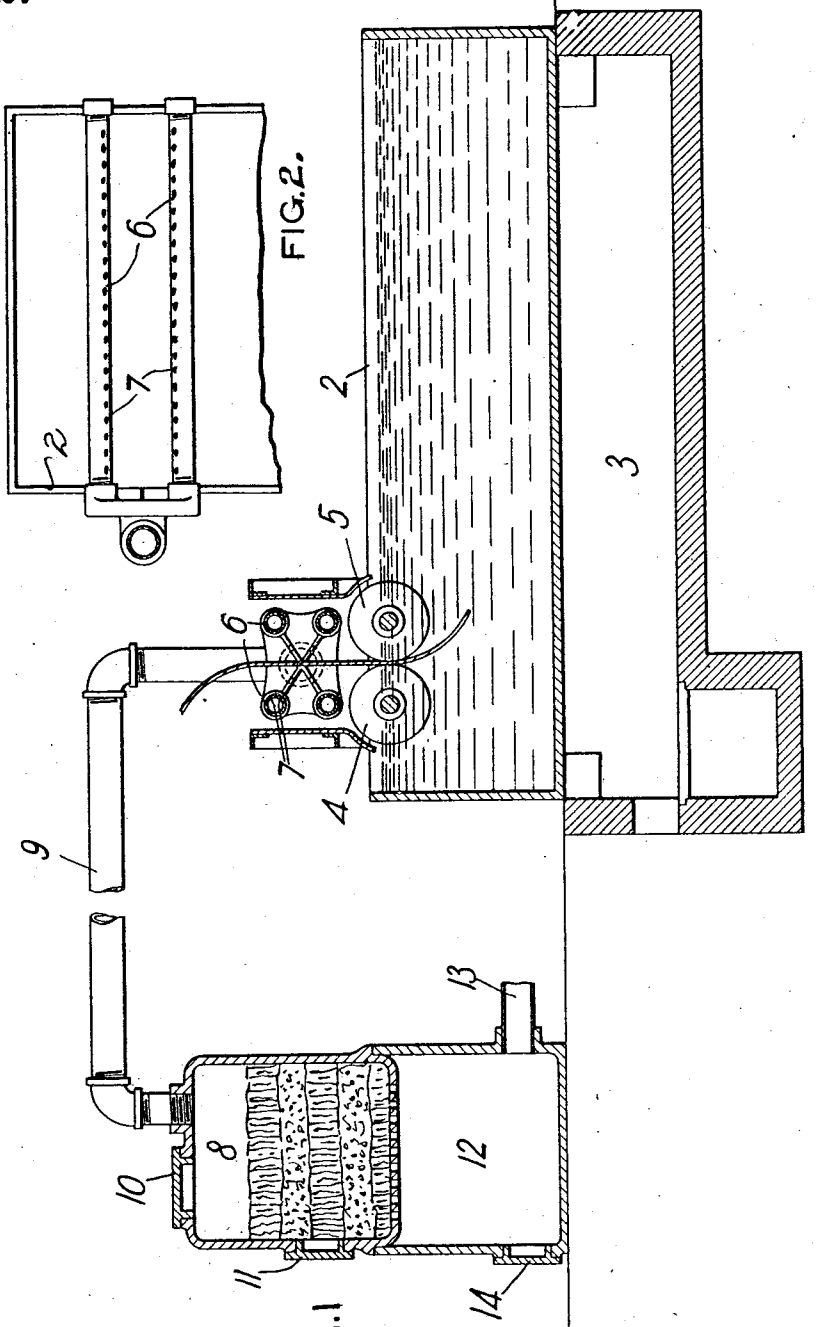


FIG. 1

FIG. 2.

WITNESSES

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ROBERT SKEMP, OF SCOTTDALE, AND WILLIAM GIBSON, SR., OF VANDERGRIFT, PENNSYLVANIA, ASSIGNORS TO AMERICAN SHEET & TIN PLATE COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

METHOD OF COATING IRON OR STEEL.

1,143,922. Specification of Letters Patent. Patented June 22, 1915.

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To all whom it may concern:

Be it known that we, ROBERT SKEMP, of Scottdale, in the county of Westmoreland, State of Pennsylvania, and WILLIAM GIBSON, Sr., of Vandergrift, in the county and State aforesaid, have invented a new and useful Method of Coating Iron or Steel, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

Our invention relates to the coating of iron or steel with another metal and to the means employed in coating the iron or steel and more particularly relates to the coating of iron or steel sheets.

In existing methods used heretofore in coating iron or steel with another metal it has been found difficult and practically impossible to obtain a bright, smooth coating, particularly in galvanizing or coating iron or steel with zinc by reason of the tendency of molten spelter or similar coating metals to oxidize particularly in a humid atmosphere or in the presence of moisture.

One object of our invention is to provide novel means for coating metal articles with another metal whereby the coating metal is excluded from contact with air after leaving the bath of coating material while the metal coating upon the articles remains in a molten state.

Another object of the invention is to provide improved means for coating metal articles in which the articles being coated emerge from the molten bath of coating material into a non-oxidizing atmosphere or atmosphere of dry gases.

A further object of this invention is to provide novel means for maintaining the coating materials within a non-oxidizing atmosphere while the molten coating is solidifying upon the surface of the iron or steel being treated.

Referring to the drawings Figure 1 is a sectional elevation showing the arrangement of one form of apparatus adapted for use in carrying out our invention. Fig. 2 is a detail plan showing the construction of the discharge pipes by which the non-oxidizing gases are directed on the opposite sides of the coated metal and the non-oxidizing atmosphere is maintained in proximity to the discharge end of the coating tank in accordance with our invention.

In the drawings 2 designates an open top galvanizing tank of the usual known construction having a fire place 3 by which the spelter is maintained in a molten condition. The tank 2 is provided with suitable means for passing the materials to be coated into and through the bath of molten spelter (not shown).

At the exit end of the galvanizing tank are the feed out rollers 4 and 5 by which the materials being coated are withdrawn from the spelter.

On the discharge side of the exit rollers 4 and 5 are the conduits 6 of which there are four shown arranged in two parallel rows, one above the other, and between the rows of which the coated materials pass. The conduits 6 extend for the full length of the discharge or exit rollers 5 which are of a length slightly less than the width of the tank 2 and of a length greater than the width of the widest plate passed between the rollers and at suitable intervals in their length are perforations 7 through which the carbon dioxid or other non-oxidizing gas generated in the retort or gas generator 8 is conducted to the place of use at the exit end of the coating tank. The ends of the conduits are connected into a supply pipe 9, which leads to the upper end of the retort or gas producer 8, which as shown in the drawings comprises a rectangular cast iron box or shell having an opening or door 10 in its top surface through which the coke or other fuel and the limestone is inserted.

Adjacent to the bottom of the fuel chamber is a cleaning door 11, which as shown is located on one side of the retort.

The bottom of the retort is provided with a series of perforations or when found desirable grate bars may be employed which extend over the entire bottom surface of the fuel chamber, and which form one side of a wind and ash box 12. The pipe 13 is provided to connect the interior of the wind box with a source of air under pressure. A door 14 is also provided on the wind box which permits of the ready removal of ashes dropping through the perforations in the bottom of the fuel chamber into the wind box.

In the operation of coating materials in accordance with our improved method, a fire is started in the interior of the retort. Coke, charcoal or other carbonaceous materials and limestone are then put into the fuel chamber, preferably in alternate layers of limestone and fuel, air being supplied under pressure through the pipe 13 and the wind box 12 by a blower, compressor or other source of air supply. The carbon dioxid gas given off from the combustion within the fuel chamber is led by the conduit 9 to the perforated tubes 6 located above the exit rolls 4 and 5 at the discharge end of the galvanizing pot 2. Carbonic acid gas (CO_2) by reason of its comparative harmlessness in a well ventilated shop being preferably the gas used in forming the desired dry, non-oxidizing atmosphere. The fuel chamber or retort is preferably formed of cast iron and is located at a suitable point relative to the galvanizing pot. The so formed gas flowing from the perforations 7 in the conduits 6 is caused to impinge on the surfaces of the coating metal on the coated articles. This gas being dry maintains an atmosphere of non-oxidizing gases in proximity to the top of the bath of molten materials and about the feed out rollers 4 and 5 by which the coated materials are withdrawn from the coating tank. The coated metal plates or other articles which articles have been pickled or otherwise cleaned prior to the coating operation, to expose the metallic surfaces thereof in the usual known manner, in emerging above the surface of the coating metal or flux floating upon the top of the coating metal are maintained in this dry non-oxidizing atmosphere for a sufficient length of time to permit the molten or practically fluid coating material covering the materials to solidify upon the surface of the coated materials, and in this way a smooth, bright surface, free from oxidation, is provided upon the coated materials.

The advantages of our invention will be apparent to those skilled in the art. By carrying out the steps comprising our improved method, the coating on the surfaces of coated materials is excluded from contact with air or moisture and is maintained in a non-oxidizing atmosphere for sufficient length of time to permit the coating to set or solidify.

The apparatus employed in carrying out our improved method of coating is simple and easily kept in repair, and can be cheaply operated. The means employed in generating the dry gases can be easily and quickly installed and put into operation.

Modifications in the construction and arrangement of the apparatus may be made without departing from our invention. The steps comprising our method may be carried out in apparatus other than that shown. Means other than the retort shown and described may be used in generating a non-oxidizing gas without departing from our invention as defined in the appended claims.

We claim:

1. The method of coating metal articles with metal, which consists in maintaining an open bath of molten metal; introducing metal articles into the bath, withdrawing the articles through the surface of the bath, maintaining a dry non-oxidizing gas heavier than atmosphere on the surface of the bath at the exit of the articles to displace atmospheric air therefrom, and maintaining the articles in said gas to prevent oxidation of the coating while solidifying upon the articles.

2. The method of coating metal articles with metal, which consists in maintaining an open bath of molten metal, introducing the articles to be coated into the bath, withdrawing the articles through the surface of the bath, maintaining carbon dioxid gas on the surface of the bath at the exit of the articles to displace atmospheric air therefrom, and maintaining the articles in said gas to prevent oxidation of the coating while solidifying upon the articles.

3. The method of coating metal articles with metal, which consists in maintaining an open bath of molten metal, introducing metal articles into the bath, withdrawing the articles through the surface of the bath, impinging a stream of dry non-oxidizing gas heavier than atmospheric air upon the coated surfaces of the articles as they emerge from the bath, and thereby maintaining a gaseous atmosphere on the surface of the bath at the exit of the articles to displace atmospheric air thereform, and maintaining the articles in said gaseous atmosphere to prevent oxidation of the coating while solidifying upon the articles.

In testimony whereof, we have hereunto set our hands.

ROBT. SKEMP.
WILLIAM GIBSON, Sr.

Witnesses to the signature of Robert Skemp:
H. M. Davis,
R. P. Perry.

Witnesses to the signature of William Gibson, Sr.:
E. M. Porter,
M. S. Johnston.