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L. W. BECHTER

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FLUX DAM FOR GALVANIZING KETTLES

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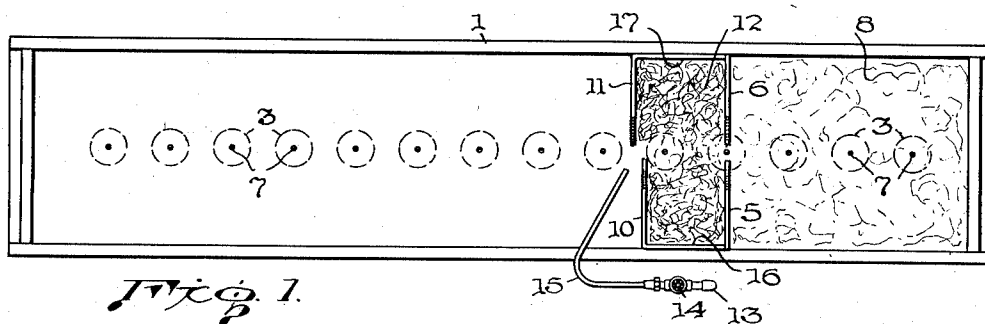


Fig. 1.

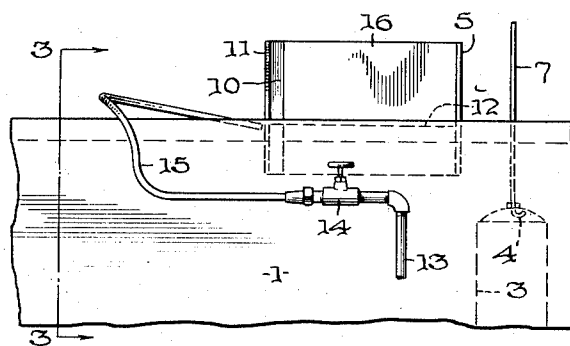


Fig. 2.

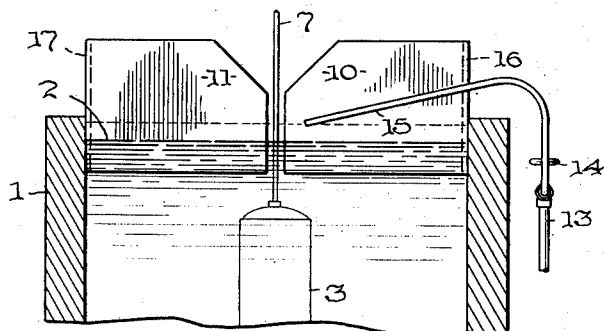


Fig. 3.

INVENTOR.
LYLE W. BECHTER
BY

Pennie, Edwards, Morton & Barrows
ATTORNEYS

UNITED STATES PATENT OFFICE

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FLUX DAM FOR GALVANIZING KETTLES

Lyle W. Bechter, South Gate, Calif., assignor to
Rheem Manufacturing Company, San Francisco,
Calif., a corporation of California

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3 Claims. (Cl. 91—12.5)

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This invention relates to apparatus for use in the plating or coating of articles by the submersion of the articles in a bath of plating or coating medium, and, while not necessarily limited thereto, is particularly adapted to apparatus for use in the galvanizing of ferrous articles.

In the galvanizing of ferrous articles, the articles, after preliminary treatment, are submerged in a bath of molten zinc for a length of time sufficient to allow a zinc coating of the desired thickness to form thereon. Ordinarily the portion of the bath of molten zinc into which the articles are submerged is covered with a supernatant flux layer, such as a layer of ammonium chloride or zinc ammonium chloride, which gradually will liberate chlorine and serve to provide the final cleaning of the surfaces of the articles as they are lowered therethrough into the molten zinc. However, the surface of that portion of the bath from which the articles are withdrawn should be maintained free from flux, for otherwise particles of the flux would adhere to the coated articles as they are withdrawn and leave them with an unsatisfactory and wholly undesirable surface finish.

Heretofore, a dam has been placed across the top portion of the zinc kettle to maintain the flux at that end of the bath of molten zinc where the articles are submerged, and the articles have been so manipulated by the operators as to cause them to pass beneath the dam and into the bright end of the kettle. The patent of Richard S. Rheem and Robert D. Patterson, No. 2,520,658, discloses a method and apparatus for galvanizing ferrous articles in which the articles to be galvanized are supported by hooks from a continuously-moving overhead conveyor which has a path of travel such that the suspended articles are automatically lowered through the flux layer into the molten zinc at the immersion end of the zinc kettle, carried, submerged, through the zinc kettle, and finally withdrawn at the bright end of the kettle. The apparatus shown therein for confining the flux to but one portion of the surface of the molten zinc bath comprises a pair of dams disposed transversely across the upper part of the kettle, each extending inwardly and oppositely from the opposite edges of the kettle and being of such length that their inner ends are closely adjacent, but so spaced that the shanks of the article-supporting hooks may pass therebetween. Such opening between the dams permits some of the flux to pass therethrough from the flux-covered portion of the surface of the molten zinc bath to the bright end of the kettle. Also, the shanks of the supporting hooks tend to drag some of the flux through such opening.

The present invention contemplates apparatus for confining a flux or similar layer to one portion of the surface of a body of liquid coating

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medium, while permitting supporting means for the articles to be coated to pass therethrough; and particularly a flux dam for use in a galvanizing kettle which may form part of an automatic galvanizing system of the general nature of that disclosed in the above-mentioned application.

More specifically, the present invention contemplates a flux dam or similar restrictive and confining apparatus comprising a pair of dams which extend only slightly below the surface of the liquid coating material and which extend inwardly from the opposite sides of the kettle in such a relation to one another that their inner ends are closely adjacent but are spaced transversely of the kettle a distance sufficient to permit the supporting means for the articles to be coated to pass between them, and a conduit for compressed air having an outlet so positioned and directed that a blast of air therefrom will blow the flux back and away from the space through which the supporting members pass and thereby prevent the flux from passing through such space into the bright end of the kettle. The dams are so positioned relative to one another that their inner ends not only are spaced transversely of the kettle a distance sufficient to permit passage of the article-supporting means, but also are spaced longitudinally of the kettle, and the outlet for the compressed air conduit is directed generally transversely of the kettle and into the space between the inner ends of the dams.

The invention will be further described in connection with the accompanying drawings which show embodiments of the invention particularly adapted for confining a layer of flux to the immersion end of a galvanizing kettle. However, it is to be understood that such further and detailed description is merely by way of exemplification and the invention is not limited thereby, except to the extent set forth in the appended claims.

In the drawings:

Fig. 1 is a plan view of a galvanizing kettle embodying the present invention,

Fig. 2 is a partial side elevational view on an enlarged scale, and

Fig. 3 is a transverse sectional view, on an enlarged scale, taken along line 3—3 of Fig. 2.

In the drawings 1 designates any suitable kettle for holding a bath of molten zinc 2 through which ferrous articles 3 are to be passed for galvanizing. The articles are carried by hooks 4 suspended from any satisfactory continuously-moving overhead conveying means (not shown).

A pair of dams 5 and 6 is transversely disposed across the kettle adjacent the immersion end. The dams are positioned opposite one another and extend inwardly from the opposite sides of the kettle and have their inner ends lying adjacent the longitudinal center thereof and so spaced with respect to one another that the shank 7 of a supporting hook can pass therethrough with a

minimum of clearance. The lower edges of the dams extend slightly below the surface of the molten zinc but not a sufficient distance therebelow to interfere with the free passage of the articles thereunder. The upper edges of the dams extend above the surface of the molten zinc a distance sufficient to maintain a layer of flux 8 on the molten zinc between the dams and the adjacent end of the kettle.

A second pair of dams 10 and 11 is spaced slightly forward of the dams 5 and 6 in the direction of the travel of the articles through the tank. These dams, like the dams 5 and 6, have their lower edges extending slightly below the surface of the molten zinc, but not a sufficient distance therebelow to interfere with the free passage of the articles thereunder, and have their upper edges extending above the surface of the molten zinc a distance sufficient to maintain a layer 12 of flux on the molten zinc between the pairs of dams. However, the dams 10 and 11, in addition to having their inner ends so spaced with respect to one another transversely of the kettle that the shank of a supporting hook may pass between them, are so positioned that the dam 11 lies slightly forward of dam 10 in the direction of the travel of the articles through the kettle.

The layer 12 of flux lying between the pairs of dams is of substantially greater density and viscosity than the flux layer 8. As the shanks of successive hooks pass through dams 5 and 6, some of the flux behind these dams is dragged or carried into the portion of the bath between the pairs of dams. This transfer of flux from one portion of the bath to another is opposed by the denser, more viscous flux layer 12. However, even though the layer 12 of flux between the pairs of dams is of greater density and viscosity than the flux of the preceding layer which covers the immersion end of the bath, some of it too will tend to be carried by the supporting hook shanks through the opening between dams 10 and 11. Such passage of flux into the bright end of the bath is prevented by a jet of compressed air which is directed toward the space between the inner ends of the dams 10 and 11 in a direction generally transversely of the kettle. The compressed air is furnished from a compressed air supply pipe 13, through a valve 14 and a conduit 15 so supported that a compressed air blast or jet emitted therefrom will be directed into the space between the dams.

The air blast or jet continually impinges against the flux just back of the opening between dams 10 and 11, as well as against the shanks of the supporting hooks passing therethrough and prevents any flux, including that on the hook shanks, from passing through such space into the bright end of the bath where it could adhere to the freshly coated articles as they are being withdrawn from the bath.

By directing the air blast or jet transversely of the kettle into the opening between the dams 10 and 11 and against the supernatant layer of flux behind the dam 11, a clockwise swirling motion is imparted to the flux which tends to sweep it past the opening and thereby further facilitates the retention of the flux behind the dam.

Preferably, the pressure of the compressed air issuing from the conduit is so controlled by air valve 14 that it never substantially exceeds that required to prevent the flux from passing through the space between the dams into the bright end of the kettle. Excessive pressure in the conduit

may cause an undesirable mixing of the flux with the molten zinc, resulting in particles of flux adhering to the surfaces of the articles being coated and causing the coating to be imperfect. Also, an excessively high-pressure blast or jet of compressed air may cause such agitation of the bath that dross, which normally sinks to the bottom of the bath, will be disseminated throughout the molten zinc and, consequently, be apt to adhere to the surfaces of the articles being coated, also causing an imperfect coating thereon.

Wings 16 and 17 are provided for dams 10 and 11 to prevent flux that may accumulate behind the dams from piling up therebehind and escaping over the adjacent edges of the kettle. The wings extend rearwardly from dams 10 and 11 to dams 5 and 6, thus setting up a barrier to the passage of any flux over the edges of the kettle between the dams.

While the invention has been described in connection with a galvanizing kettle having two pairs of dams maintaining a dense and more viscous flux layer between them, it is to be understood that the air blast or jet may be used with but a single pair of dams. Also, it is to be understood that various changes may be made in the details of the apparatus without departing from the invention or sacrificing the advantages thereof.

I claim:

1. In metal-coating apparatus including an elongated container for a bath of coating metal adapted to have a layer of supernatant flux thereon, said container having a feed end and a discharge end, means for confining a layer of flux to one portion of a bath of molten metal in the container which comprises dams extending inwardly from opposite longitudinal sides of the container and upwardly from the normal level of the upper surface of the molten metal, at least portions of the lower edges of said dams being spaced from the bottom of the container a distance sufficient to permit articles being coated to pass thereunder, said dams having their adjacent ends spaced apart a distance sufficient to provide a space above the molten metal through which article-carrying members may pass when traveling horizontally, the adjacent ends of said dams being offset from one another longitudinally of the container, and a gas conducting conduit positioned to direct a blast of gas transversely of said container into the space between the adjacent ends of the dams and against supernatant flux on molten metal behind the dam closest the discharge end of the container to prevent the flux from passing through said space.

2. Metal coating apparatus as defined in claim 1 in which the adjacent ends of the dams are spaced apart transversely of the container.

3. Metal coating apparatus as defined in claim 1 which includes valve means for regulating the pressure with which the compressed gas issues from said conduit.

LYLE W. BECHTER.

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