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METHOD OF APPLYING A MOLTEN ZINC COATING TO A FERROUS ARTICLE

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1 Claim. (Cl. 117—131)

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This invention relates to metallic coatings and particularly to the metallic coating of nails, tacks, spikes, fittings and the like by galvanizing operations, although not limited thereto.

Commercial galvanizing operations of work-objects of the type mentioned may be carried on in a tumbler (i. e. "drum galvanizing") or by hot-dipping.

When zinc is flaked, slabs of zinc are melted down and the molten zinc poured into water to cause the formation of flakes which are then used in tumbler galvanizing. Tumbler galvanizing consists of charging a definite amount of flake zinc together with a known weight of articles to be coated into a heated tumbler. The tumbler is heated well above the melting point of the zinc and the contents consisting of zinc, tin dross or tin skimmings, flux and articles to be coated are tumbled therein for a known length of time to cause the thorough coating of the said articles. In hot-dip galvanizing, the charge (such as a quantity of nails, etc.) is placed in a perforated pot-like container and immersed in the molten zinc for a certain period of time after which the pot-like container is removed therefrom and transferred to a centrifugal machine where the perforated container and coated nails are revolved at a high rate of speed to drive off, by centrifugal force, the excess zinc remaining on the nails.

In either the tumbler, or hot-dip galvanizing operation the objective is to produce a coating characterized by a smooth finish, bright appearance and adherence. Heretofore, it has been the general practice in drum zinc-coating processes to make additions of metallic tin to the slab zinc in the flaking of the zinc to enhance the fluidity of the zinc and to obtain an evenly distributed tin-zinc coating on the work-object. Without tin additions, the zinc coating is unevenly distributed which results in lack of smoothness, finish, and brightness. But tin is, on the whole, quite expensive.

It is among the objects of the present invention to provide a substitute for tin which may be added to slab zinc in the flaking pot, or preferably, added directly to the drum charge composed of the work-objects, flaked zinc, and a fluxing agent.

As before stated, considerable difficulty is encountered in making smooth and bright finish nails, tacks, spikes, and the like unless there is sufficient metallic tin. This necessitates an increase in zinc used for same quantities of tumbler and hot-dip galvanized products, and results in

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a rough galvanized coating on tumbler-galvanized nails and the like.

Without sufficient tin it was found difficult to produce smooth and evenly distributed zinc coatings on certain special types of nails such as tacks, Fetter Ring nails, screw shank nails, fine nails, brads, finishing and box nails, etc. It was frequently found necessary to mix various sizes of nails, brads and finishing nails with coarser sized nails. This involves increased cost due to necessity of sorting, and results in the waste of fuel, man-hours and material.

Applicants have discovered that tin skimmings and tin dross may be used in lieu of pure, or substantially pure tin. The tin skimmings or tin dross may be flaked with slab zinc, and/or tin skimmings or tin dross may be added in small definite amounts with varying amounts each of flaked zinc, flux, and the articles to be coated. These additions can be made directly to hot-dip or tumbler galvanizing units; and in case of flaking pots tin skimmings and/or tin dross can be added directly to the slab zinc.

Also, by the use of tin skimmings in accordance with the teachings of the invention, a cost savings can be effected due to the reduction in the amount of flaked zinc to be added to the tumbler.

When practicing the invention in connection with the tumbler galvanizing of nails, conventional practice is followed except that certain weights of tin skimmings, having a metallic tin content of between 60 percent and 70 percent, are added to the charge of nails and flake zinc in place of pure metallic tin. To the charge of nails, zinc and tin skimmings is added a sufficient amount of ammonium chloride to act as a fluxing agent to reduce, to metallic tin, the tin contained in the skimmings and to also act as a fluxing agent to the nails in order to make their surfaces receptive to the coating composition.

When galvanizing a charge of 100 lbs. of tacks, small nails or brads 11 to 17 lbs. of flake zinc together with 2 to 4 oz. of tin skimmings and ½ lb. of ammonium chloride flux may be used. A 200 lb. charge of nails of the box nail size requires 12 to 23 lbs. of flaked zinc, 2.5 to 4.5 oz. of tin skimmings and 1 lb. of ammonium chloride. A 300 lb. charge of large size common nails necessitates the use of between 21 and 36 lbs. of flaked zinc, 3.75 to 6.0 oz. of tin skimmings and 1½ lbs. of ammonium chloride.

Different sizes of nails, but of the same weight, require different weights of charging material because of the varying amount of surface to be

coated. In other words, a 100 lb. charge of small nails requires more coating material than a 100 lb. charge of large size nails because of the additional exposed surface to be coated in the case of the smaller nails.

The tin skimmings or tin dross which is in accordance with the present invention used in lieu of pure tin, may be obtained directly from the conventional hot-dip tinning pans which periodically have the skimmings and dross removed therefrom. Prior to our discovery, the tin skimmings and tin dross from hot-dip tinning pans were returned to the refineries in order to reclaim the tin contained therein.

While we have shown and described certain specific embodiments of the present invention, it will be readily understood by those skilled in the art that we do not wish to be limited exactly thereto, since various modifications may be made without departing from the scope of the invention as defined in the appended claim.

We claim:

The method of applying a molten zinc coating to a ferrous article which comprises applying to the article a molten liquid consisting of zinc, ammonium chloride and tin skimmings, the amount of tin skimmings being between 0.6 and 2.3% of the weight of the zinc, and the amount of ammonium chloride being between 2 and 6.4 times the weight of the tin skimmings, and thereafter cooling the coated article to solidify the metal coating thereon.

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