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METHOD OF COATING SHEET METAL

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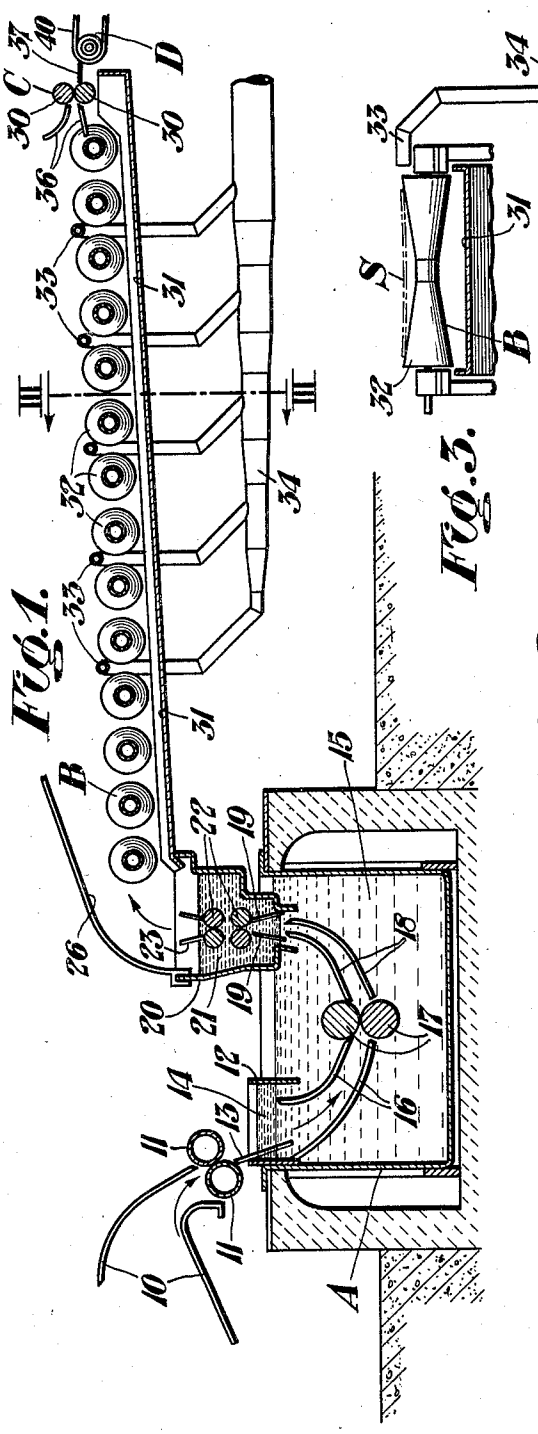


Fig. 1.

Fig. 3.

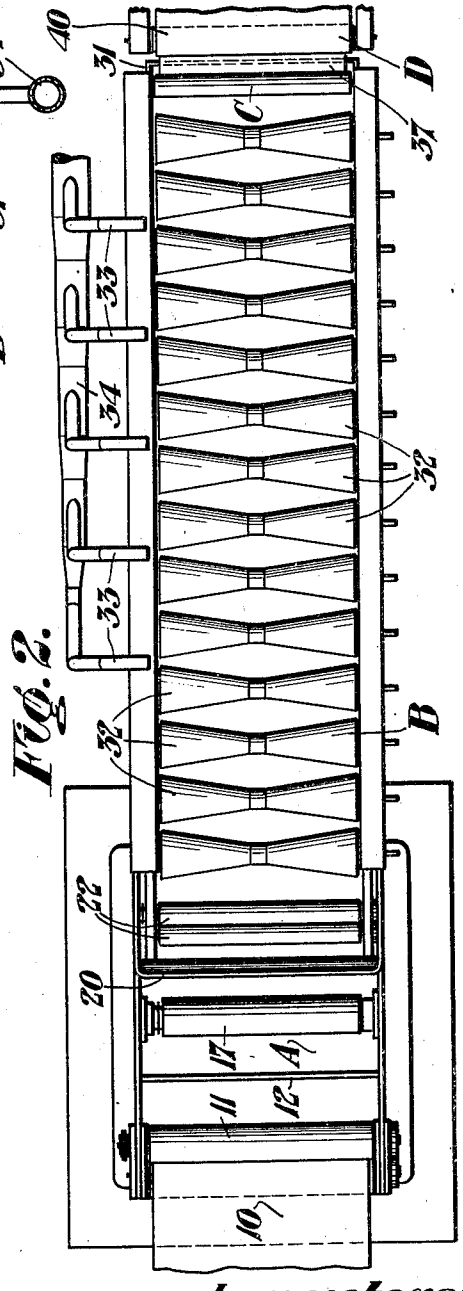


Fig. 2.

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METHOD OF COATING SHEET METAL

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2 Claims. (Cl. 91—70.2)

This invention relates to a method of coating sheet metal, and more particularly to coating such metal with tin or terne (lead and tin), although not limited thereto, the present application being a division of our application Serial No. 731,984, filed June 22, 1934.

It is one of the objects of the present invention to smoothly and evenly coat sheet metal, as distinguished from the uneven coatings heretofore obtained, and includes the elimination of the corrugating of the metallic coating which, in mill parlance, is known as "strippers".

The foregoing and other objects will be apparent after referring to the following specification, and the appended drawing which discloses one form of apparatus that may be utilized to practice the method of the invention.

Figure 1 is a sectional elevation of the apparatus of our copending application referred to, and which may, as before stated, be utilized to practice the method of the present invention.

Figure 2 is a plan of the apparatus of Figure 1.

Figure 3 is a sectional view on the line III—III of Figure 1.

Referring more particularly to the drawing, the letter A designates a pot which is adapted to contain metallic coating compositions in a molten state.

A pair of guides 10 are disposed on one side of the pot A and have associated therewith a pair of driven guide rolls 11, which are adapted to feed a sheet to be coated into a flux-box 12 which is provided with a guide plate 13 and contains the usual fluxing agents 14; such as a zinc chloride solution having an excess of hydrochloric acid. As is well known in conventional tin pot practice, this fluxing agent effects a final cleansing of the surface of the sheet prior to its immersion in the molten tin or terne 15 in the pot.

A pair of feed-in guides 16 are disposed in the pot A immediately below the flux-box 12, and extend downwardly to a pair of immersed feed rollers 17 which are driven in such manner as to feed the sheet between a pair of feed-out guides 18 which terminate shortly below the surface of the molten tin or terne 15 on the other side of the pot A. These feed-out guides 18 are augmented by a pair of secondary guides 19 which are disposed immediately thereabove.

An oil-box 20 is disposed immediately above the upper extremities of the guides 18 and contains a suitable oil 21. A plurality of pairs of driven guide rolls 22 are entirely immersed in the oil 21 immediately above the guides 19.

In conventional practice, the upper pair of these rolls 22 would only be immersed in the oil in the oil-box to a point where their "nips" would be exposed to the atmosphere. This is for the reason that it is desired to squeeze the excess oil from both sides of the sheets and permit it to remain in the oil-box.

In tin plate practice the oil is so low in viscosity that it "breaks" or "runs" as the sheets emerge, and but little oil adheres thereto.

In terne practice, while the oil is heavy enough to cover a major portion of the surfaces of the sheets, no attempt is made to prevent the breaking of the oil film, which is due to the low viscosity of the oil. In addition, no effort is made, in terne practice, to insure the complete solidification of the metallic coating before the oil is squeezed from the sheets.

The present invention overcomes these difficulties by feeding the sheet out of the oil-box with a smooth, continuous and unbroken oil coating thereon and maintaining the protective oil coating in such manner as to permit the metallic coating to solidify while thus protected. This distinguishes from the prior art, wherein the majority of the oil is immediately squeezed from the sheet and it is fed to a branner, or other cleaning device. This causes the uneven metallic coating of sheet metal and the production of "strippers".

In order to cool the oil coated sheets, they are fed out of the oil-box 20 by the guide rolls 22, and deflected by a guide plate 26 onto an elongated cooling table B. At the remote end of this elongated cooling table B there is disposed an oil removing means C, which is made up of a pair of squeeze rolls 30. A foam guard 23 is disposed immediately above the upper pair of guide rolls 22 to prevent foam and bubbles from breaking the film of oil on the sheets as they emerge from the oil-box 20.

The elongated cooling table B is composed of an extended collector tray 31 over which there is mounted a plurality of driven spool-shaped conveyer rolls 32, each of which is made up of a pair of truncated cones with their apexes adjoining. Due to the shape of the conveyer rolls 32 the coated sheets, which are indicated at S in Figure 3, are supported on their edges only; thus preventing the breaking or roughening of the oil film by contact.

As the oil coated sheets S are moved along the cooling table B they are gradually and uniformly cooled by radiation. This permits the metallic coating to solidify in a smooth and continuous state. The cooling is preferably accelerated by air under pressure from nozzles 33, which are dis-

posed along the ends of the conveyer rolls **32**, air being supplied from a main **34**. The disposition of these nozzles **33** is such that the air jets will be directed along the surfaces of the coated sheets S, rather than impinging thereon, which would have an agitating effect.

After the sheets S have reached the remote end of the cooling table B they are assisted between the squeeze rolls **30** by a pair of guide plates **36**. As the squeezed sheets S emerge from the oil removing means C they are assisted by a guide plate **37** onto a transfer means D, which is composed of a driven endless belt **40** at the other end of which is disposed the usual branner or other cleaning device.

As shown in Figure 1, the collector tray **31**, which is disposed beneath the conveyer rolls **32**, slopes toward the oil-box **20** so as to return thereto the oil removed from the metal-and-oil coated sheets S by the squeeze rolls **30**. If, however, the usual palm oil were employed in the oil-box **20**, it would become "cracked" from long contact with the highly heated sheets and, if returned to the oil-box, would render the aggregate too viscous for use.

This condition is more noticeably evident when sheets of U. S. S. gage No. 26 and heavier are processed, as they hold greater quantities of heat.

In order to obviate this difficulty, a proper viscosity of oil is maintained in the oil-box **20** despite the excess hot "cracked" oil which is returned by the collector tray **31** from the squeeze rolls **30**. This is done by making additions to the oil-box to compensate for permanent losses resulting from the inability of the squeeze rolls **30** to entirely remove the oil adhering to the sheets. If palm oil alone were added to compensate for such losses, the oil in the oil-box would gradually become so thick as to become unworkable. If a single oil is used alone as an addition it must be of a viscosity less than palm oil, or if palm oil is used there must be added to it a non-mineral oil of less viscosity.

We have found that a mixture of approximately 70 to 85 per cent. palm oil and 15 to 30 per cent. non-mineral oil (such as hydrogenated fish oil, cotton-seed oil or any non-mineral oil having a less natural viscosity than palm oil) works very satisfactorily. The Saybolt viscosity of our oil in the oil-box **20** is preferably maintained approximately about 300 to 500. If these limits of percentage of mixture and viscosity are maintained the oil will be of such consistency as to provide the proper and uniform unbroken film desired. In the terne coating of said metal by our method, a mixture of 78 per cent. palm oil and 22 per cent. non-mineral oil gives very satisfactory results.

The composition of our oil mixture as added for make-up purposes to the oil-box **20** is such that if some of the oil of the oil-box has been permanently lost (having been guided through the squeeze rolls **30**) and some of it returned by the collector tray **31** after having been "cracked" or otherwise altered by heat, the resultant oil in the oil-box is maintained at a satisfactory consistency with other desirable characteristics. That is to say, the consistency and the desirable characteristics of the oil are such as to maintain upon the metallic coating of the sheets a continuous and unbroken protective oil film.

We have also found that the addition of an oil lower in viscosity than palm oil, either alone or in combination therewith, results in less "cracking" or thickening than would be the case if only palm oil were used.

By the practice of the method of the present invention the superior results mentioned are obtained.

While we have shown and described one specific embodiment of our invention, it is to be understood that we do not wish to be limited exactly thereto, since various modifications may be made without departing from the scope of our invention, as defined in the following claims.

We claim:

1. The method of coating sheet metal which includes imposing thereon a coating of molten metal, superimposing on the coated or molten metal an unbroken protective oil coating consisting of approximately 70 to 85 per cent. palm oil and 15 to 30 per cent. of an oil selected from the group consisting of hydrogenated fish oil and cotton seed oil, said oil having a Saybolt viscosity range between 300 and 500, permitting the sheet to cool while thus protected, and finally removing the unbroken oil coating.

2. The method of coating sheet metal which includes immersing the same in a bath of molten metal, directing the sheet through a pool of oil prior to its exposure to the atmosphere to provide an unbroken protective oil film thereon, said oil consisting of approximately 70 to 85 per cent. palm oil and 15 to 30 per cent. of an oil selected from the group consisting of hydrogenated fish oil and cotton seed oil and having a Saybolt viscosity range between 300 and 500, removing the sheet from the pool of oil without disturbing the unbroken oil coating thereon, permitting the metallic coating to solidify while thus protected, removing the unbroken oil coating, and returning the removed oil to the pool.

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