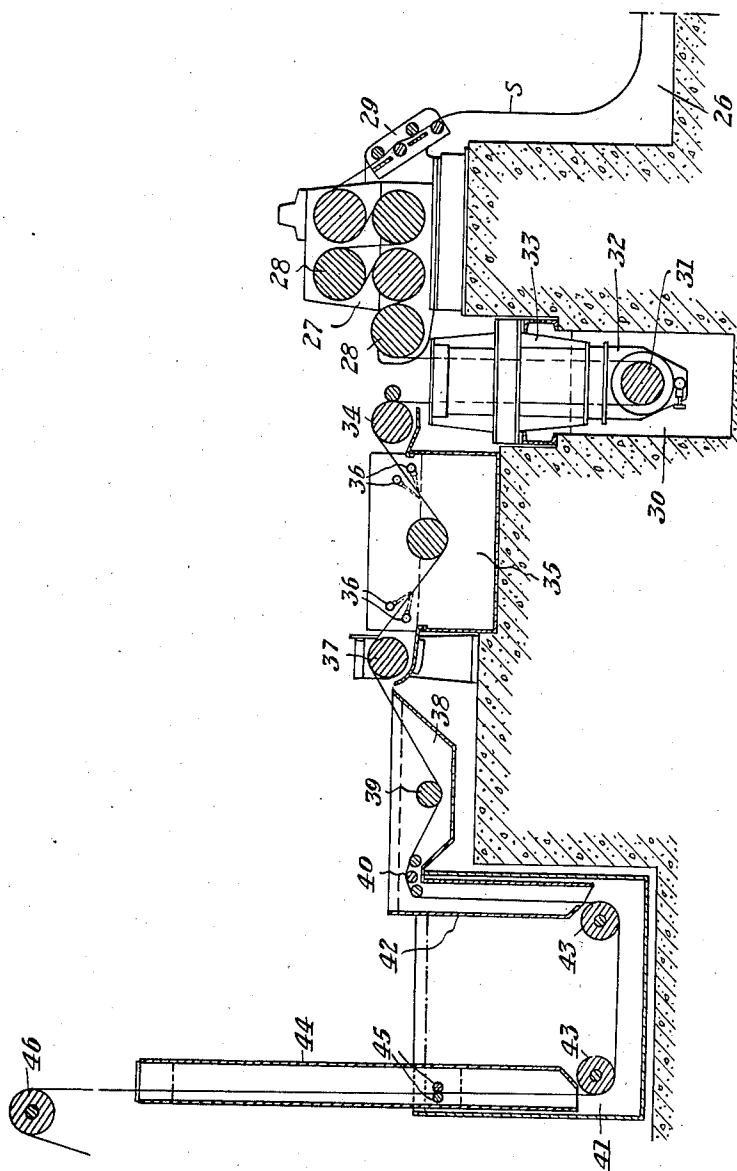


Dec. 3, 1940.

B. W. GONSER ET AL
APPARATUS FOR COATING STRIP
Filed Nov. 9, 1938

2,223,355



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UNITED STATES PATENT OFFICE

2,223,355

APPARATUS FOR COATING STRIP

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Application November 9, 1938, Serial No. 239,614

3 Claims. (Cl. 91—12.5)

This invention relates to the art of coating and, in particular, to an apparatus for applying a protective coating to metallic strip. The specific application in connection with which the invention will be completely disclosed is the tinning of steel strip although the invention may be applied to other uses as well.

The tinning of strip has long been a desideratum in the steel industry and while certain special classes of strip have been tinned in continuous process, the great mass of tin plate now being manufactured is coated by tinning in sheet form. We are aware that tinning of strip by electrolytic process has been accomplished. It is an object of our invention, however, to provide a method and apparatus whereby strip may be coated continuously by the hot dip method.

The chief difficulty experienced in previous attempts to tin strip by hot dip methods has been the development of dry streaks or scruff streaks after a relatively short length of prime material is produced. In a co-pending application of Gonser and Seybolt, Ser. No. 233,603, a method and apparatus for tinning are disclosed whereby these objectionable results are avoided. The present invention concerns an apparatus for making tin plate from strip in coils, utilizing the invention of said aforementioned application.

In a preferred embodiment, our invention includes means for unwinding coiled strip and feeding it through apparatus for effecting thereon, successively, the operations necessary to the production of commercially saleable tin plate. The invention consists more particularly in the construction, arrangement and functioning of a continuous coating apparatus, a preferred form of which is illustrated in the accompanying drawing:

The single figure of the drawing is a view, partly in side elevation and partly in longitudinal section, showing the apparatus for effecting the desired preliminary operations such as pickling, washing, and fluxing as well as the actual coating by immersion.

It will be understood that the drawing illustrates only a few of the various portions of a continuous train of apparatus known as a strip-tinning line, adapted to work successively on each portion of a strip advanced therethrough.

Referring now in detail to the drawing, coiled strip is unwound, passed through strip-shearing and welding devices of known construction, and delivered to a looping pit 26.

The looping pit 26 is of sufficient size to accommodate enough strip to permit continuous

operation of the apparatus to be described shortly while the shearing and welding operations above mentioned are being carried out.

Strip is pulled continuously from the pit 26 by a drag bridle 27. This comprises a plurality of rolls 28 provided with any suitable driving means, the strip S being trained around the rolls as illustrated. Before reaching the bridle, the strip passes through a set of rolls 29 which have the effect of removing therefrom any bends which may have been introduced in the looping of the strip in the pit 26.

From the bridle 27, the strip passes into a pickling tank 30 and around a guide roll 31 submerged therein and journaled in suitable bearings 32 carried in a supporting structure 33. The roll 31 cooperates with the last roll 28 of the drag bridle and a guide roll 34 journaled in suitable bearings (not shown) adjacent the exit side of the tank 30, in guiding the strip through the latter.

After leaving the pickling tank, the strip passes through a water spray tank 35 provided with sprays 36. The effect of the sprays is to wash from the strip any pickling solution carried over thereon from the tank 30.

After passing through the water spray tank, the strip passes over a guide roll 37 journaled in suitable bearings and into a flux tank 38 provided with guide rolls 39 and 40. The flux tank 38 overhangs a tank or pot 41 adapted to contain coating material such as molten tin, and has a neck 42 depending into the tin bath. The length of this neck is considerable, as shown, and prevents flux being dragged into the main body of tin in the tank 41. Guide rolls 43 in the tank 41 serve to guide the entering strip downwardly through the neck 42 and across the tank 41. A stand pipe 44 projects downwardly into the tank 41 on the exit side thereof and is filled with oil such as palm oil. Wiping rolls 45 are mounted in the stand pipe for squeezing excess molten tin from the strip as it passes therebetween. These rolls are composed of non-tinning material, and any convenient means may be provided for adjusting the rolls vertically as well as toward and from each other to control the thickness of the tin layer formed on the strip. A plurality of pairs of non-tinning wiping rolls may be used if desired. The tin coating cools and solidifies as the strip passes upwardly through the stand pipe 44 and has solidified before it reaches a guide roll 46 journaled thereabove. The considerable depth of the stand pipe below the tin level permits wide variation in the latter without

danger of the high head of palm oil exceeding the lead pressure at the bottom of the stand pipe.

From the coating bath and the oil column the strip passes downwardly into various finishing machines such as a washer, polisher, etc.

An exit drag bridle not shown is disposed beyond the finishing machines above-mentioned and serves to cooperate with the bridle 28 in forwarding the strip through the several stages of treatment.

It will be apparent from the foregoing description that the invention provides an apparatus for conveniently and expeditiously handling strip through a continuous coating apparatus at relatively low cost. Continuous operation of the coating mechanism proper is permitted without interruptions for the attachment of a succeeding length to the end of the preceding coil.

A further advantage of the invention is the relatively high speed, viz., about 100' per minute, at which the apparatus may be operated. It is found that tin plate produced by the invention may be made with a lighter coating of tin and therefore at lower cost, than has been necessary heretofore in order to avoid objectionable porosity. Tinning strip in continuous lengths also overcomes certain well-known objections to the tinning of steel sheets, viz., the inaccuracies in size resulting from tinning after shearing, and the increased consumption of tin which results from the heavy tinning of the leading and trailing edges of the sheets if sheared before tinning. Further advantages of the invention are the economy possible in stamping strip as compared to sheets, a more uniform coating and the ease with which thin coatings may be applied.

Although we have illustrated and described herein but a preferred embodiment and practice, changes therein may be made without departing from the spirit of the invention or the scope of the appended claims.

We claim:

1. Strip coating apparatus comprising a pot which is quite deep relative to its length and containing molten coating metal, strip-forwarding means, a flux tank elongated in the general direction of strip travel, said tank overhanging said pot and having a neck depending into said pot, said neck being long enough to prevent flux from being drawn through the neck and into the main body of coating metal by strip traveling at normal speed, and a stand-pipe of oil extending down into said pot and being of a height sufficient to permit solidification of the coating on strip traveling at normal speed, before emerging therefrom.

2. Apparatus as defined in claim 1 characterized by strip-wiping rolls in said stand-pipe, composed of non-tinning material.

3. Strip coating apparatus comprising a pot which is quite deep relative to its length and containing molten coating metal, strip-forwarding means, a flux tank elongated in the general direction of strip travel, said tank overhanging said pot and having a neck depending into said pot, said neck being long enough to prevent flux from being drawn through the neck and into the main body of coating metal by strip traveling at normal speed.

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