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METHOD AND APPARATUS FOR MAKING COMPOSITE STRIP STOCK

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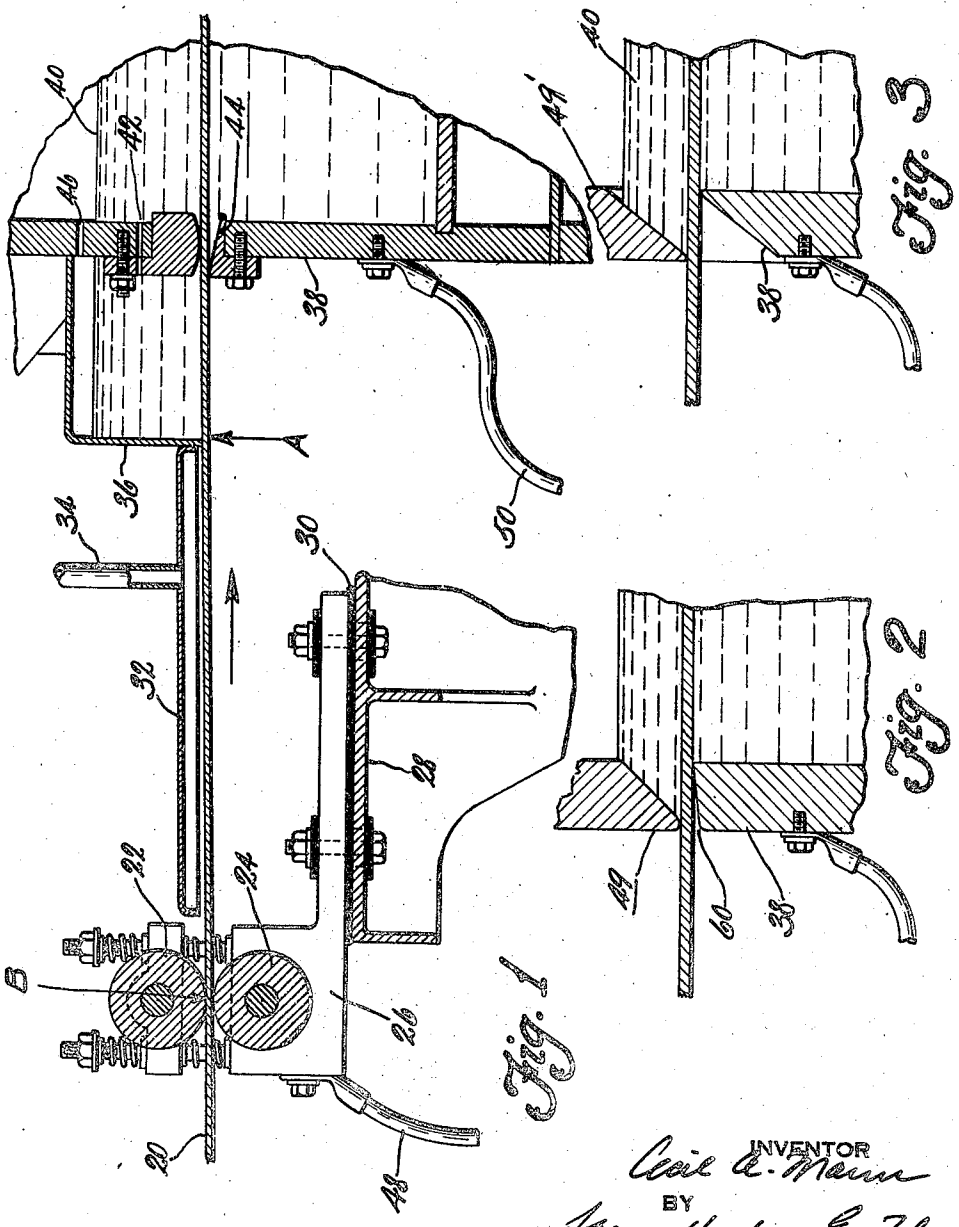


Fig. 1

Fig. 2

Fig. 3

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METHOD AND APPARATUS FOR MAKING COMPOSITE STRIP STOCK

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3 Claims. (Cl. 117—93)

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This invention relates to fluxing equipment for metal strips and is particularly concerned with fluxing equipment used in connection with electrical heating of the strips and to the method of fluxing said strips.

This application is a continuation in part of my copending application, Serial No. 376,512. In said copending application, a method and apparatus for electrically heating a metal strip is shown wherein the surface of the strip is conditioned for subsequent babbitting operations thereon.

This invention is particularly directed to the resistance heating of the electrical strip wherein the molten babbitt to be placed on the surface of the strip is used as one electrode for the current which passes through the strip during the resistance heating thereof. In the apparatus shown in my copending application, it has been found that under certain conditions, difficulty is experienced in that the backside of the strip, although not conditioned for babbitting, will sometimes pick up babbitt when heated by resistance. This phenomena while only occasional, necessitates removal of the babbitt from the backside of the strip and therefore is objectionable when it occurs. The explanation for the phenomena is one which is difficult to expound but is probably due to the fact that the current passes through the babbitt and into the strip in sufficient quantity to overheat the strip on the backside thereof at the instant it enters the babbitt chamber or stated differently, there is a potential difference at the opposite sides of the strip.

It is, therefore, the prime object of this invention to provide an apparatus and a method for passing current into the strip from the babbitt so that the strip is heated uniformly and so that the conditioning thereof is apparent only on one side thereof.

In carrying out the above object it is a further object to provide an apparatus wherein molten babbitt is present on the top side of the strip prior to the time the bottom side of the strip contacts the molten babbitt.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing, wherein preferred embodiments of the present invention are clearly shown.

In the drawing:

Fig. 1 shows a partial fragmentary view of an apparatus wherein the resistance heating is used to preheat the strip;

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Fig. 2 is a modification of the throat design shown in Fig. 1; and

Fig. 3 is still another modification of the throat design as shown in Fig. 1.

Referring particularly to Fig. 1, a steel strip 20 is shown which is to be conditioned so that it may be babbitted with a predetermined thickness of babbitt on the top side only thereof. The strip 20 passes through a pair of spring pressed pinch rolls 22 and 24 which are mounted on a fixture 26, which is insulated from a support 28 by insulation 30. The strip then passes beneath a hood 32 supplied with reducing gas through tube 34 and next passes under an extension 36 of a babbitt tank 38 which contains molten babbitt 40 therein. The babbitt 40 flows into the extension 36 through one or more orifices 42 in the wall of tank 38. The strip 20 then passes into the babbitt tank 38 through a throat portion 44. Preferably a reducing atmosphere is maintained over the babbitt 40 to prevent oxidation thereof and this atmosphere may be bled into the extension 36 through an orifice 46. Electrical current is supplied to the hook-up by means of connections 48 and 50. Connection 48 is bolted to fixture 26 whereby current passes through the pinch rolls 22 and 24. Connection 50 is bolted to babbitt tank 38 wherein the current flows through the babbitt and into the strip 20 to complete the circuit. It is apparent from this setup that the current will heat the strip in accordance with the resistance of the strip between the points noted by arrows A and B since the current passes through the molten babbitt 40 contained in the extension 36. In this manner the current enters or leaves the top side of the strip so that the strip between the pinch rolls and the extension only is heated due to the resistance thereof. This heated portion of the strip being beneath said hood 32 is suitably fluxed by the gas as described in my copending application.

It will be apparent that as the strip 20 moves, it is progressively heated, fluxed and passed into the babbitt tank whereupon the babbitt wets the upper surface of the strip which has been cleaned after which the strip passes out of the tank through a suitable casting head, not shown, and is cast on to the surface of the strip in a layer of any desired thickness. The backside of the strip does not pick up any babbitt since it is oxidized by the atmosphere during the heating thereof.

Fig. 2 shows a modification of the design shown in Fig. 1 wherein a babbitt tank throat 49 is

chamfered as at 60 to form a very thin edge on the bottom side of the throat. In this manner the resistance of the throat at the bottom side thereof is sufficiently great to provide for current flow through the top side of the strip as it passes into the babbitt. This modification provides satisfactory results in most cases and eliminates the past difficulties wherein the backside of the strip at times became wetted with the babbitt.

Fig. 3 shows still another modification which has proved to be highly satisfactory both from an operation and a design angle. In this instance the throat 49' is chamfered from opposite sides thereof whereby the bottom portion of the throat does not contact the strip until after it has passed through the babbitt 40 held in the top portion of the throat. It will be further noted that the outer wall of tank 38 on the upper half of the throat extends slightly past the outer portion of the wall at the lower end of the throat and therefore babbitt is actually in contact with the top surface of the strip prior to any contact of the strip with the bottom portion of the throat. In this manner the modification shown in Fig. 3 is in many respects quite similar to the design shown in Fig. 1 but more compactly designed, thereby making for greater simplicity and eliminating difficulties when it is desired to change the throats 44, such as is necessary when varying widths of the strips are desired to be run through the machine.

In all of the embodiments of invention the prime purpose in mind is to cause the current to flow entirely through the babbitt into the strip whereby uniform heating of the strip is accomplished. In all of the embodiments a body of the molten babbitt is maintained over the strip prior to any contact of the bottom of the strip with the babbitt or the throat. This is to assure that the current will first pass through the babbitt into the strip at the top side thereof, thereby eliminating any chance of babbitting of the strip on the bottom side thereof.

It is apparent that other designs may be utilized but in all cases the same general characteristics must be maintained in order to accomplish the desired results.

From the foregoing it is manifest that I have provided a new throat design which eliminates the possibility of babbitting the backside of the strip when heating the strip by resistance heating. It is also to be understood that while babbiting operations have been referred to herein that any other metal may be cast on the surface of a strip of any suitable material by the same procedure. For example, steel strip may be tinned or overlaid with bronze, aluminum or brass, or nickel, copper, bronze, aluminum strip, etc., may have any suitable lower melting point alloy or metal cast thereon, in all cases the procedure being similar to the procedure referred to herein.

While the embodiments of the present invention as herein disclosed, constitute preferred forms, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. In a method of continuously and progressively electrically heating and simultaneously fluxing the surface of a strip of metal for subsequent babbitting operations, the steps comprising: continuously passing strip material into a tank of molten babbitt, progressively heating a portion of said strip material by passing current through said strip material, from a point sufficiently remote from said tank to yield the desired resistance figure, into the babbitt in said tank whereby the strip is heated by the resistance thereof while simultaneously providing a reducing gas adjacent the upper surface of said heated strip, and continuously maintaining a relatively small body of the babbitt of sufficient volume and of sufficiently low resistance in contact with the top side only of the strip to assure passage of current through the babbitt into the strip prior to the entry of the strip into the main portion of the babbitt in said tank.

2. In an apparatus for continuously conditioning the surface of metallic strip material for subsequent application of another metal thereon comprising in combination; a tank for containing molten metal to be applied, means for acting as one electrode of an electrical circuit in contact with the strip at a point remote from said tank, and a container for molten metal connected to said tank so that molten metal in said container will be in contact with one surface only of said strip prior to the entry of the strip into the tank containing molten metal, said container being connected to the other side of said electrical circuit whereby current passing through the strip from said means to said molten metal in said container, heats the strip to the desired temperature.

3. In a method for continuously and progressively electrically heating and simultaneously conditioning the surface of a strip of metal for subsequent casting thereon of another metal the steps comprising: continuously passing strip material into a tank containing said other metal in the molten state, progressively heating a portion of said strip material prior to its entry into the molten metal by passing an electric current through the said strip material at a point sufficiently remote from said tank to yield the desired resistance figure, into said molten metal, simultaneously providing a reducing atmosphere adjacent one surface only of the heated portion of said strip, and continuously maintaining a body of molten metal of sufficient volume to permit passage of the desired current therethrough in contact with said one surface only of the strip and in a position ahead of the molten metal contained in said tank whereby the molten metal contacts the strip on one surface only thereof to form an electrical circuit therethrough prior to the contacting of the other surface of the strip with the molten metal.

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