

Oct. 24, 1933.

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1,932,229

CONTINUOUS COATING WIPER APPARATUS

Filed March 22, 1933

3 Sheets-Sheet 1

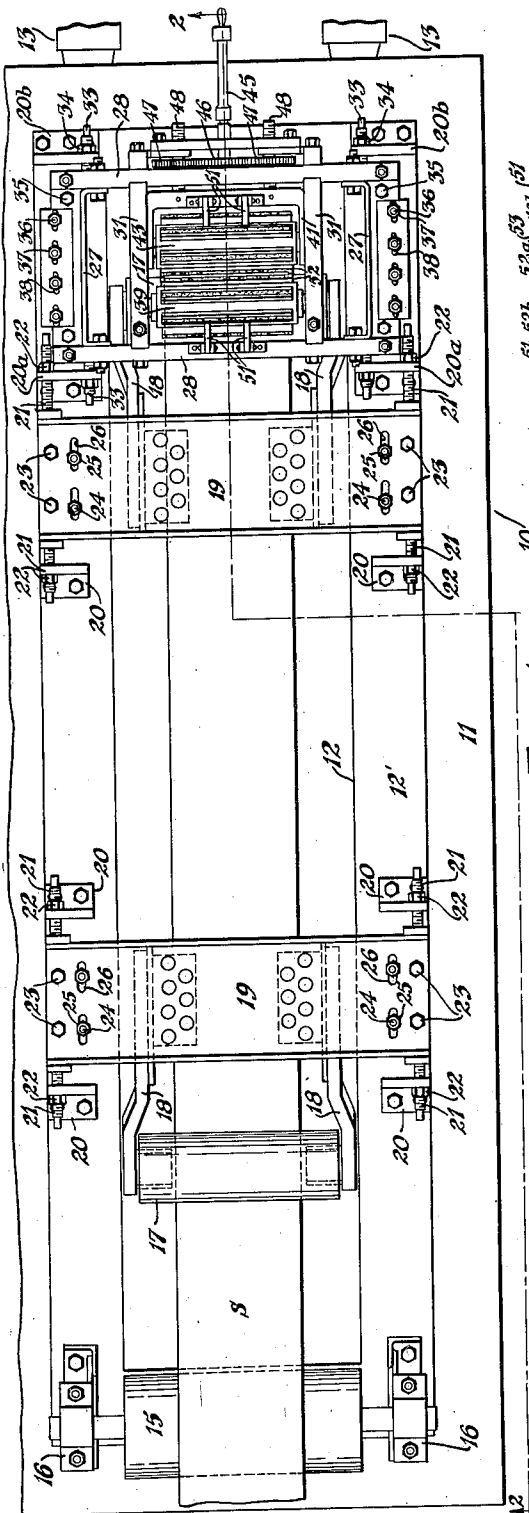


Fig. 1

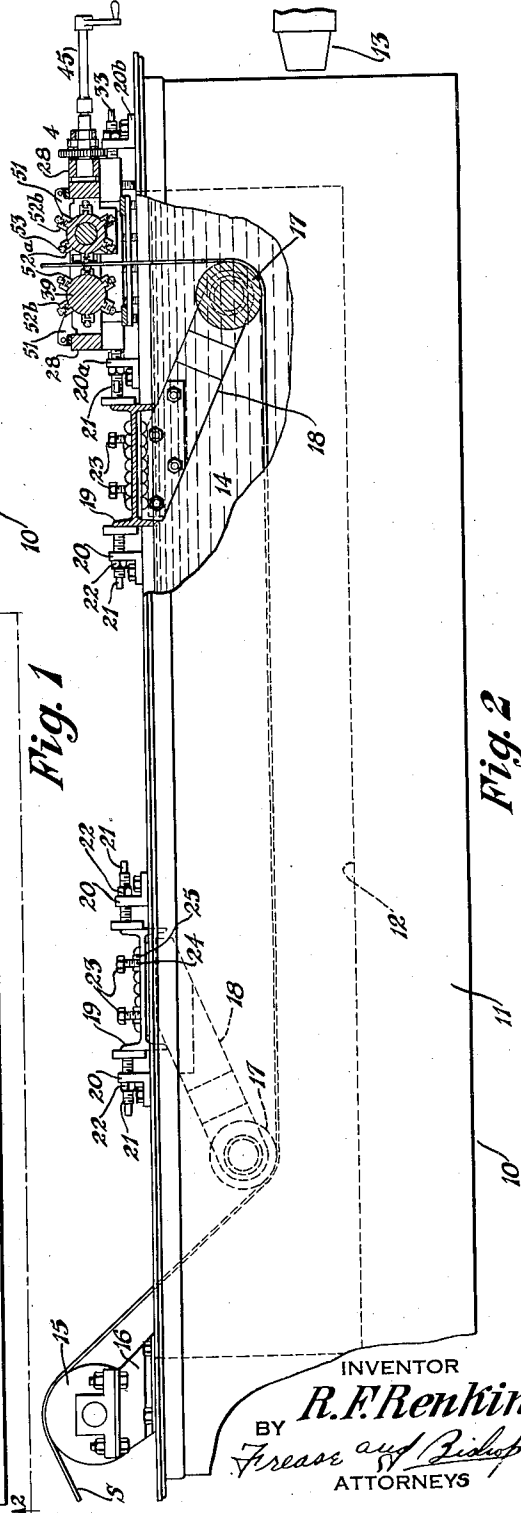


Fig. 2

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3 Sheets-Sheet 2

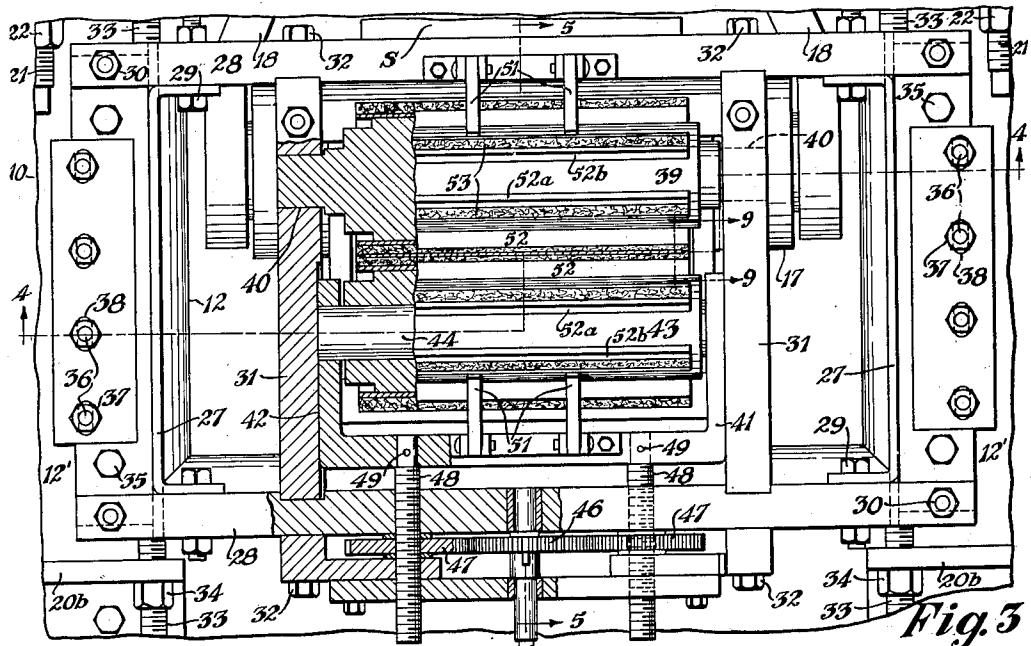


Fig. 3

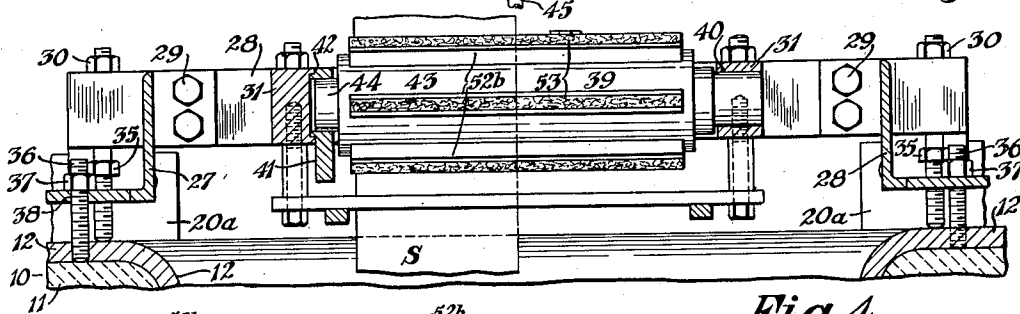


Fig. 4

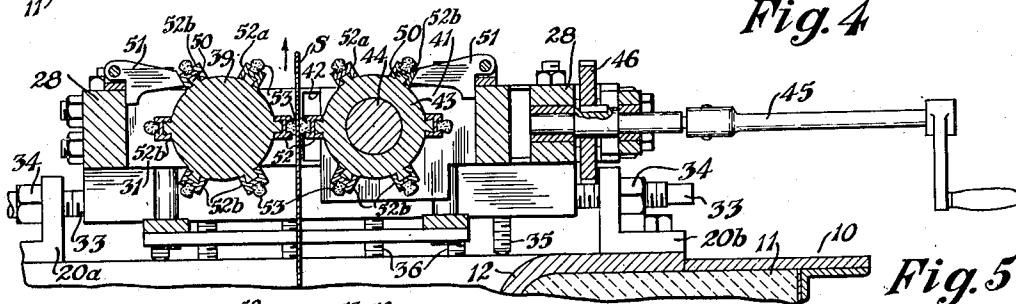


Fig. 5

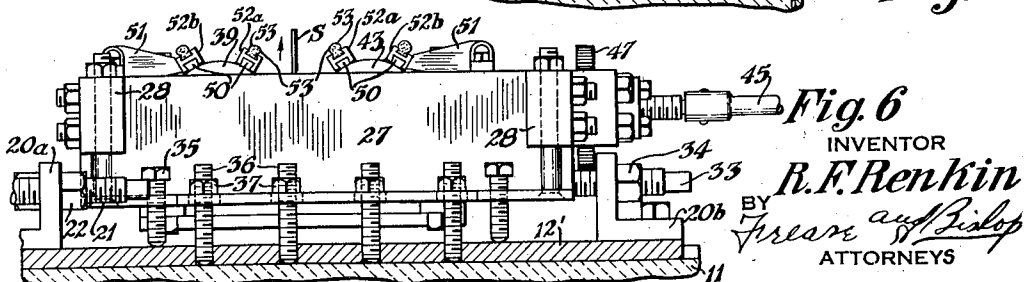


Fig. 6

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3 Sheets-Sheet 3

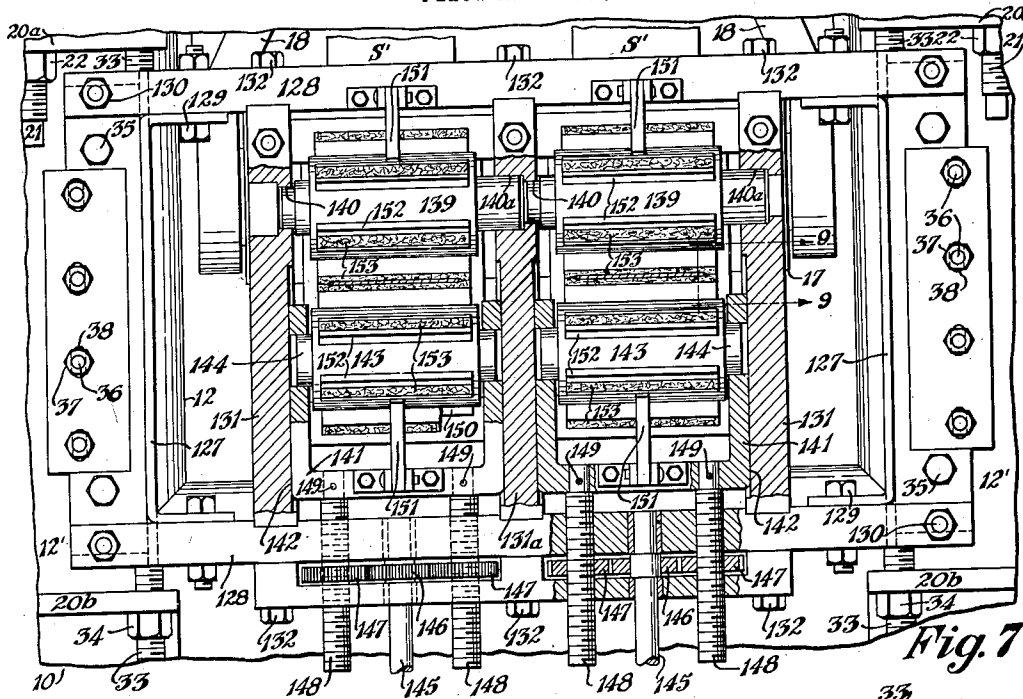


Fig. 7

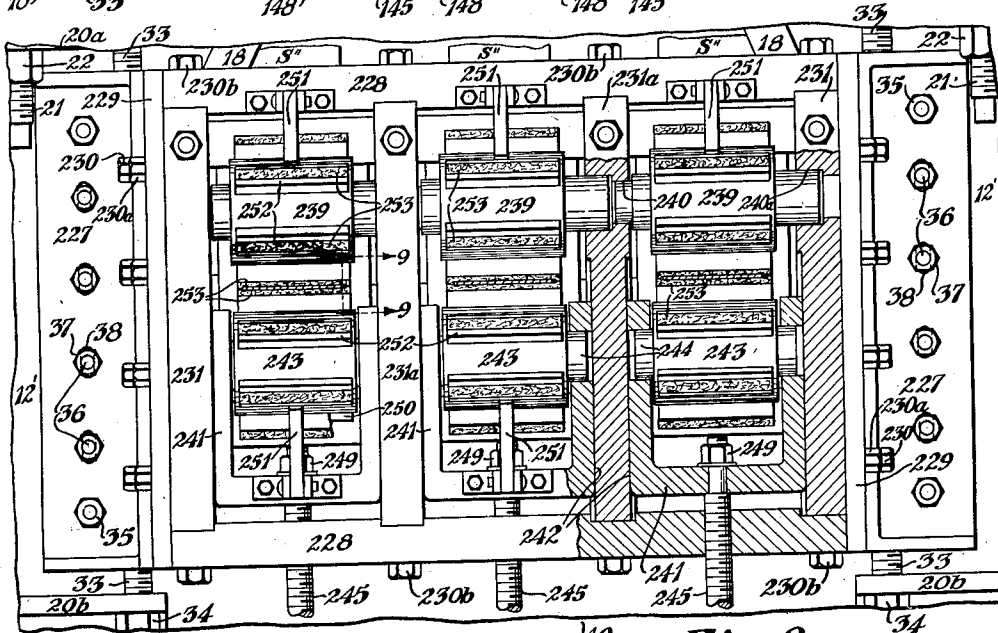


Fig. 8

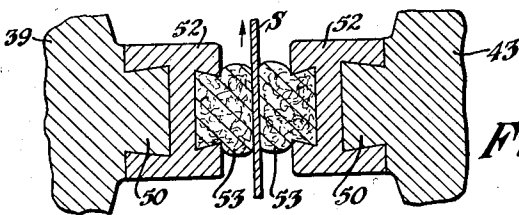


Fig. 9

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CONTINUOUS COATING WIPER APPARATUS

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Application March 22, 1933. Serial No. 662,055

17 Claims. (Cl. 91—59.4)

The invention relates to the continuous coating of metal strips and the like with a hot metallic protective coating; and more particularly to a wiper apparatus utilized for wiping off excess coating material which may adhere to the surfaces of a strip passing continuously through a molten bath in a coating pot, immediately after the strip issues from the molten bath, in order to provide a smooth, even and uniform coating on the surfaces of the strip.

The hot coating of metallic material as by galvanizing, tinning and the like, involves the passing of material to be coated through a molten bath of zinc, lead, tin, aluminum, or the like, or various combinations of the same, and usually, the immediate wiping of excess coating material from the surfaces of the material coated.

The molten bath is relatively hot, and consequently when a wiping operation is performed, the excess material being wiped from the surfaces of the coated material is hot; as is also the material being coated, due to its immersion in the molten bath. For these reasons it has been the practice to utilize asbestos, rubber and other types of wiper pads in performing the wiping operation.

However, wiper pads rapidly wear down and must be replaced frequently in order that a uniformly coated product may be obtained. The wiper pads may be replaced without difficulty when sheet material is being coated, because it is only necessary to delay the feed of sheets to the coating pot for a short time in order to accomplish a wiper pad change over.

On the other hand, difficulties are encountered in replacing the usual wiper pads of a coating wiper apparatus when strip material is being coated. The difficulties arise because strip material is always pulled in a continuous manner at a uniform speed through the molten bath; because the strip material in the bath will burn if the continuous, uniform movement of the same is delayed or stopped while the wiper pads are changed; and because a section of the strip will not be wiped, and therefore will not be uniform with the remainder of the strip, if the movement of the same is continued while wiper pads are removed and new ones placed in operative position.

It is therefore an object of the present invention to provide wiper apparatus for use in connection with the hot coating of continuous strip material, in which the wiper pads may be changed without delaying or stopping the continuous movement of material through the coating pot, and substantially without leaving a section of the strip unwiped.

Hot coating pots for coating continuous strips are provided with substantially horizontally located hold-down rolls under which the continuous strip passes in moving continuously through the

molten bath in the pot. These hold-down rolls are subject to corrosion, wear and the like, because of their immersion in the molten bath and must therefore be resurfaced or refinished from time to time. For these reasons, it is desirable, if not necessary, to provide for adjusting the location of the axes of the hold-down rolls both vertically and horizontally, in order to accommodate the rolls to the desired path of travel of the continuous strip moving through the coating pot.

These adjustments to the hold-down rolls require similar adjustments to be made for properly locating the wiper apparatus with respect to the hold-down rolls, so that it is also necessary to provide for vertical and horizontal adjustment of the wiper apparatus.

It is therefore a further object of the present invention to provide changeable hot coating wiper apparatus for continuously moving strip material with means for adjusting the wiper apparatus vertically and horizontally to accommodate the same to the desired path of travel of the strip and to compensate for hold-down roll wear.

The thickness and uniformity of the coating on hot coated material passed through a molten bath is controlled or determined in part by the amount of balanced pressure which is exerted by the wiper pads upon the surfaces of the material, during the wiping operation.

Accordingly, it is an object of the present invention to provide changeable hot coating wiper apparatus for continuously moving strip material with means for adjusting the balanced pressure exerted by the wiper pads upon the surfaces of hot coated material passing therebetween, to obtain a uniform coating having the desired thickness, and to compensate for wiper pad wear.

Strip material is rolled in many different widths and the hot coating of strip material may be most economically carried out if the coating and wiping apparatus is adapted for receiving different widths of strips as by providing a coating pot and removable wiper apparatus for hot coating and wiping a selected strip width, and by providing additional wiper apparatus which may be substituted for the wide strip wiper apparatus for wiping a plurality of narrower strips passed in parallel through the coating pot.

It is therefore a further object of the present invention to provide hot coating wiper apparatus for simultaneously wiping a plurality of strips passed in parallel through a coating pot, and to provide said apparatus with means for independently adjusting the location of and pressure of each individual strip wiper.

And finally, it is a further object of the present invention to provide a compact, simple, inexpensive and readily controlled and repaired

wiper apparatus having the aforesaid advantageous characteristics.

These and other objects may be obtained by the apparatus, combinations, parts, elements and devices, preferred embodiments of which are shown in the drawings and are hereinafter described in detail and claimed, which may be stated in general terms as including in continuous coating wiper apparatus for a hot coating pot, a frame, means for levelling and clamping the frame on the coating pot, means for horizontally adjusting and clamping the frame on the coating pot, a wiper roll member journaled in the frame, a movable carriage mounted in the frame, a second wiper roll member journaled on said carriage, each of said wiper roll members being provided with a plurality of rib members, wiper members for the rib members, said wiper and rib members being provided with interengaging means removably mounting the wiper members on the rib members, a removable wiper pad carried by each wiper member, means preventing rotation of each wiper roll in one direction, and means for adjusting said carriage to and away from the first mentioned wiper roll.

In the drawings:—

Figure 1 is a plan view of a continuous strip coating pot equipped with the improved continuous coating wiper apparatus;

Fig. 2 is a side elevation of the apparatus shown in Fig. 1, partly in section, as on the line 2—2, Fig. 1;

Fig. 3 is an enlarged fragmentary plan view, parts being broken away and in section, of the improved wiper apparatus shown in Figs. 1 and 2;

Fig. 4 is a transverse section of the parts shown in Fig. 3, taken on the line 4—4, Fig. 3;

Fig. 5 is a longitudinal section of the parts shown in Fig. 3, taken on the line 5—5, Fig. 3;

Fig. 6 is a side elevation of the improved coating wiper apparatus shown in Fig. 3;

Fig. 7 is a view, similar to Fig. 3, of a modified form of improved coating wiper apparatus for wiping two continuous strips passed in parallel through a coating pot;

Fig. 8 is a view, similar to Figs. 3 and 7, of a further modified form of improved coating wiper apparatus for wiping three continuous strips passed in parallel through a coating pot; and

Fig. 9 is a fragmentary sectional view through the improved wiper rolls, wiper members and wiper pads, taken on the line 9—9, Figs. 3, 7 and 8.

Similar numerals refer to similar parts throughout the drawings.

Any suitable form of coating pot or tank generally indicated at 10 may be utilized in carrying out the present invention, and the pot 10 may include a setting 11, a liner 12 and suitable heating means indicated generally at 13 for maintaining a molten bath 14 of suitable coating material at the proper temperature within the pot 10.

The coating apparatus illustrated is adapted for the coating of continuous strip material indicated at S, which may be pulled through the coating pot 10 from any suitable source, not shown. The strip S first passes over an entry roll 15 journaled in suitable bearing blocks 16 mounted on the pot 10. The strip S then passes into the molten bath 14, contained within the pot 10, under hold down rolls 17 journaled on hold down roll arms 18, which are carried by hold down roll supports 19 mounted on the coating pot 10.

A plurality of adjusting blocks 20 and 20a are mounted on the coating pot 10 adjacent to each hold down roll support 19, in which blocks 20 and 20a are threaded adjusting screws 21. The inner ends of the adjusting screws 21 engage the hold down roll supports 19 so that the position of the supports 19, and therefore of the hold down rolls 17 carried thereby, may be adjusted to accommodate the rolls to the desired path of travel of the continuous strip S moving through the bath 14 in the coating pot. When adjusted, the screws 21 may be clamped in adjusted position by the lock nuts 22.

Means is also provided for locating and adjusting the supports 19 in the desired vertical position with respect to the coating pot 10, preferably by providing levelling screws 23 which are threaded through the supports 19 and engage the upper flanged portion 12' of the liner 12; and by providing bolts 24 connected to the flange 12', and nuts 25 therefor, which bolts 24 extend through slots 26 provided in the supports 19. The slots 26 enable the supports 19 to be laterally adjusted by the adjusting means 21—22 and to then be clamped in levelled position by the nuts 25 after the levelling screws 23 have been set at the desired place.

Referring more particularly to Figs. 3, 4, 5 and 6, wherein a single strip wiper apparatus is shown, the wiper apparatus preferably includes a wiper frame composed of longitudinal end members 27 and lateral end members 28, preferably bolted together as at 29 and 30, and roll frame members 31 are connected to the frame members 28 preferably by bolts 32.

A plurality of adjusting blocks 20b are mounted on the coating pot 10 adjacent to the wiper frame, and adjusting screws 33 are threaded into the blocks 20a and 20b. The inner ends of the adjusting screws 33 engage the wiper frame members 28 so that the position of the frame may be adjusted to accommodate the wiper apparatus to the desired path of travel of the continuous strip S being wiped thereby. When adjusted, the screws 33 may be clamped in adjusted position by the lock nuts 34.

Means is also provided for locating and adjusting the wiper frame in the desired vertical position with respect to the coating pot 10, preferably by providing levelling screws 35 which are threaded through the wiper frame members 27 and engage the upper flanged portion 12' of the liner 12; and by providing bolts 36 connected to the flange 12', and nuts 37 therefor, which bolts 36 extend through slots 38 provided in the wiper frame members 27. The slots 38 enable the wiper frame to be laterally adjusted by the adjusting means 33—34 and to then be clamped in levelled position by the nuts 37 after the levelling screws 35 have been set at the desired place.

A wiper roll 39 is journaled at 40 in the frame members 31 and a carriage 41 is slidably mounted at 42 in the frame members 31. Another wiper roll 43 is journaled on a shaft 44 carried by the carriage 41, and the roll 43 may be moved toward and away from the roll 39 by the operating means 45, through the gear 46 and gears 47 threaded on the screws 48, which are connected at 49 to the carriage 41.

Each wiper roll 39 and 43 is provided with a plurality of longitudinally extending rib members 50, and as best shown in Figs. 3 and 5, rotation of the wiper rolls 39 and 43 in one direction is prevented by the pawl or catch members 51, which engage one of the wiper members 52b, 150

which are preferably provided with longitudinally extending grooves interengaging with the ribs 50, and are longitudinally slidably removably mounted on the ribs 50 of the wiper rolls 39 and 43.

5 The wiper members 52, 52a and 52b are provided with removable wiper pads 53, made preferably of asbestos.

10 In the operation of the improved apparatus, the strip S moves continuously through the pot 10, and the wiper apparatus therefor, in the direction shown by the arrows on the drawings, and passes between opposed wiper pads 53 carried by the wiper members 52 on each wiper roll 39 and 43. Rotation of the rolls 39 and 43 by 15 the passage of the strip between the same is prevented by the pawls 51; while the pressure of the wiper pads 53 upon the surfaces of the strip S is adjusted and maintained by operation of the adjusting means 45.

20 As the wiper pads 53 carried by the wiper members 52 wear down, the adjusting means 45 may be operated to maintain a uniform pressure on the surfaces of the strip S, to obtain a uniformly coated product. When it is necessary 25 to change wiper pads, the wiper rolls are rotated by the operator in a downward direction toward the strip (Fig. 5) so that the wiper pads 53 carried by the wiper members 52a contact with the surfaces of the strip S; and this contact 30 is established just after the contact of the wiper pads 53 carried by the opposed wiper members 52 with the surfaces of the strip is broken, so that substantially no portion of the strip will remain unwiped.

35 When this adjustment has been made, the worn wiper pads 53 carried by the wiper members 52b will be in the positions indicated by the wiper members 52b. Thus, in the drawings, the wiper members 52a carry new wiper pads 40 ready for use, the wiper members 52 carry wiper pads in use, and the wiper members 52b carry worn wiper pads 53, which must be changed.

45 The wiper members 52b carrying worn wiper pads 53 may then be removed when they reach the position shown at 52a and have their pads 53 turned or replaced, and may then be replaced on the rolls 39 and 43 at the positions indicated at 52a all during continuous movement of the strip S through the wiper apparatus.

50 Referring to Fig. 7, wherein a double strip wiper apparatus for strips S' is shown, the wiper apparatus preferably includes a wiper frame composed of longitudinal end members 127 and lateral end members 128, bolted together as at 129 55 and 130, and roll frame members 131 and 131a are connected to the frame members 128 preferably by bolts 132. Adjusting screws 33 threaded into the blocks 20a and 20b, together with the lock nuts 34, provide for the lateral adjustment and clamping of the wiper frame; while 60 the levelling screws 35, bolts 36 extending through the slots 38, and the nuts 37 therefor, provide for the vertical adjustment, levelling and clamping of the wiper frame.

65 Wiper rolls 139 are journaled at 140 and 140a in the frame members 131 and 131a, and carriages 141 are slidably mounted at 142 in the frame members 131 and 131a. Other wiper rolls 143 are journaled on shafts 144 carried by the 70 carriages 141, and the rolls 143 may be moved toward and away from the rolls 139 independently of each other by the operating means 145, through the gear 146, and gears 147 threaded on the screws 148, which are connected at 149 75 to the carriages 141.

Each wiper roll 139 and 143 is provided with a plurality of longitudinally extending rib members 150, and rotation of the rolls in one direction is prevented by the pawls 151, while wiper 80 members 152 carrying wiper pads 153 are longitudinally slidably removably mounted on the ribs 150. The wiper pads 153 are adapted for being replaced in the same manner as described in connection with Figs. 3, 4, 5 and 6.

85 Referring to Fig. 8, wherein a triple strip wiper apparatus for strips S'' is shown, the wiper apparatus preferably includes a wiper frame composed of longitudinal end members 227 and lateral end members 228, together with roll frame 90 members 231 and 231a. The members 227, 228, 231 and 231a are preferably bolted together as by the members 229 and the bolts 230, 230a and 230b. Adjusting screws 33 threaded into the blocks 20a and 20b, together with lock nuts 34 95 provide for the lateral adjustment and clamping of the wiper frame; while levelling screws 35, bolts 36 extending through slots 38, and the nuts 37 therefor, provide for the vertical adjustment, levelling and clamping of the wiper 100 frame.

105 Wiper rolls 239 are journaled at 240 and 240a in the frame members 231 and 231a, and carriages 241 are slidably mounted at 242 in the frame members 241 and 241a. Other wiper rolls 243 are journaled on shafts 244 carried by the 110 carriages 241, and the rolls 243 may be moved toward and away from the rolls 239, independently of each other, by the operating means 245 comprising screws threaded through one of the frame members 228 and connected to the car- 115 riages 241 and 249.

Each wiper roll 239 and 243 is provided with a plurality of longitudinally extending rib members 250, and rotation of the rolls in one direction 120 is prevented by the pawls 251, while wiper members 252 carrying wiper pads 253 are longitudinally slidably removably mounted on the ribs 250. The wiper pads 253 are adapted for being replaced in the same manner described in connection with Figs. 3, 4, 5 and 6.

125 Accordingly, the present invention provides wiper apparatus which may be utilized for wiping off excess coating material which may adhere to the surfaces of a strip or strips passing continuously through a molten bath in a coating 130 pot, immediately after the strip issues from the molten bath, to produce a smooth, even and uniform coating on the surfaces of the strip, in which the wiper pads may be changed without delaying or stopping the continuous movement 135 of the strip through the coating pot and substantially without leaving a section of the strip unwiped; in which the wiper apparatus may be adjusted both vertically and horizontally with respect to the coating pot; and in which the pressure exerted by the wiper pads upon the surfaces 140 of the strip passing therebetween may be controlled.

I claim:—

1. Continuous coating wiper apparatus for a 140 hot coating pot, including a frame, a plurality of wiper rolls rotatably mounted on the frame, a plurality of wiper pads removably mounted on each roll, and means preventing rotation of each roll in one direction. 145

2. Continuous coating wiper apparatus for a hot coating pot, including a frame, means for adjusting the location of the frame with respect to the pot, a plurality of wiper rolls rotatably mounted on the frame, a plurality of wiper pads 150

removably mounted on each roll, and means preventing rotation of each roll in one direction.

3. Continuous coating wiper apparatus for a hot coating pot, including a frame, means for levelling and clamping the frame on the coating pot, means for horizontally adjusting and clamping the frame on the coating pot, a plurality of wiper rolls rotatably mounted on the frame, a plurality of wiper pads removably mounted on each roll, and means preventing rotation of each roll in one direction.

4. Continuous coating wiper apparatus for a hot coating pot, including a frame, two wiper rolls rotatably mounted on the frame, a plurality of wiper pads removably mounted on each roll, means preventing rotation of each roll in one direction, and means for moving one of the rolls toward and away from the other roll.

5. Continuous coating wiper apparatus for a hot coating pot, including a frame, a wiper roll journaled in the frame, a carriage mounted in the frame, a second wiper roll journaled in said carriage, a plurality of wiper pads removably mounted on each roll, and means preventing rotation of each roll in one direction.

6. Continuous coating wiper apparatus for a hot coating pot, including a frame, a wiper roll journaled in the frame, a carriage mounted in the frame, a second wiper roll journaled in said carriage, a plurality of wiper pads removably mounted on each roll, means preventing rotation of each roll in one direction, and means for moving the carriage toward and away from the first mentioned roll.

7. Continuous coating wiper apparatus for a hot coating pot, including a frame, a plurality of wiper rolls rotatably mounted on the frame, a plurality of wiper members removably mounted on each roll, a wiper pad removably mounted on each wiper member, and means preventing rotation of each roll in one direction.

8. Continuous coating wiper apparatus for a hot coating pot, including a frame, a plurality of wiper rolls rotatably mounted on the frame, each of said wiper rolls being provided with a plurality of rib members, wiper members removably mounted on said rib members, a wiper pad mounted on each wiper member, and means preventing rotation of each roll in one direction.

9. Continuous coating wiper apparatus for a hot coating pot, including a frame, a plurality of wiper rolls rotatably mounted on the frame, each of said wiper rolls being provided with a plurality of rib members, wiper members for said rib members, said wiper and rib members being provided with interengaging means removably mounting the wiper members on the rib members, a removable wiper pad carried by each wiper member, and means preventing rotation of each roll in one direction.

10. Continuous coating wiper apparatus for a hot coating pot, including a frame, a plurality of wiper rolls rotatably mounted on the frame, each of said wiper rolls being provided with a plurality of longitudinally extending rib members, wiper members for said rib members, said wiper and rib members being provided with interengaging means longitudinally slidably removably mounting the wiper members on the rib members,

a wiper pad carried by each wiper member, and means preventing rotation of each roll in one direction.

11. Continuous coating wiper apparatus for a hot coating pot, including a frame, a plurality of wiper rolls rotatably mounted on the frame, a plurality of wiper members for each wiper roll, interengaging means removably mounted each wiper member on the wiper rolls, a removable wiper pad carried by each wiper member, and means preventing rotation of each roll in one direction.

12. Continuous coating wiper apparatus for a hot coating pot, including a frame, means for levelling and clamping the frame on the coating pot, means for horizontally adjusting and clamping the frame on the coating pot, a wiper roll journaled in the frame, a movable carriage mounted in the frame, a second wiper roll journaled in said carriage, each of said wiper rolls being provided with a plurality of rib members, wiper members for said rib members, said wiper and rib members being provided with interengaging means removably mounting the wiper members on the rib members, a removable wiper pad carried by each wiper member, means preventing rotation of each wiper roll in one direction, and means for adjusting said carriage toward and away from the first mentioned wiper roll.

13. Continuous coating wiper apparatus for a hot coating pot, including a frame, a plurality of sets of wiper rolls rotatably mounted on the frame, a plurality of wiper pads removably mounted on each roll, and means preventing rotation of each roll in one direction.

14. Continuous coating wiper apparatus for a hot coating pot, including a frame, means for adjusting the location of the frame with respect to the pot, a plurality of sets of wiper rolls rotatably mounted on the frame, a plurality of wiper pads removably mounted on each roll, and means preventing rotation of each roll in one direction.

15. Continuous coating wiper apparatus for a hot coating pot, including a frame, a plurality of sets of wiper rolls rotatably mounted on the frame, a plurality of wiper pads removably mounted on each roll, means preventing rotation of each roll in one direction, and means for independently adjusting one roll of each set toward and away from the other roll of each set.

16. Continuous coating wiper apparatus for a hot coating pot, including a frame, a plurality of wiper rolls journaled in the frame, a plurality of carriages mounted in the frame one adjacent to each roll, a wiper roll journaled in each carriage, a plurality of wiper pads removably mounted on each roll, and means preventing rotation of each roll in one direction.

17. Continuous coating wiper apparatus for a hot coating pot, including a frame, a plurality of wiper rolls journaled in the frame, a plurality of carriages mounted in the frame one for each wiper roll, a wiper roll journaled in each carriage, a plurality of wiper pads removably mounted on each roll, means preventing rotation of each roll in one direction, and means for independently adjusting each carriage toward and away from its adjacent wiper roll.

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