Dec. 26, 1939. G. T. CHURCH 2,184,610

COATING APPARATUS

Filed March 29, 1937 2 Sheets-Sheet 1

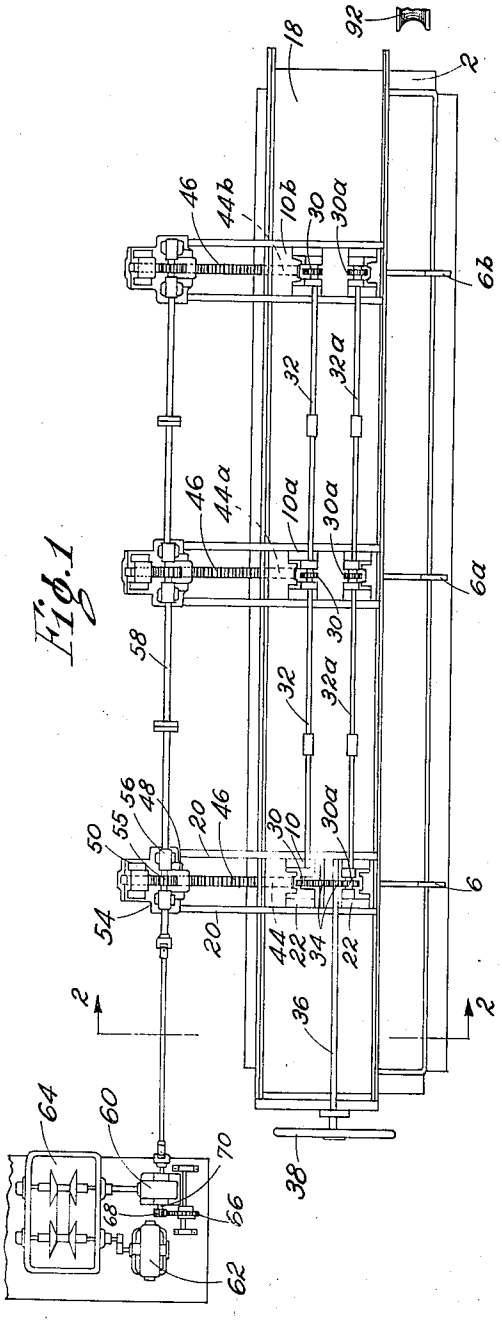


Fig. 1

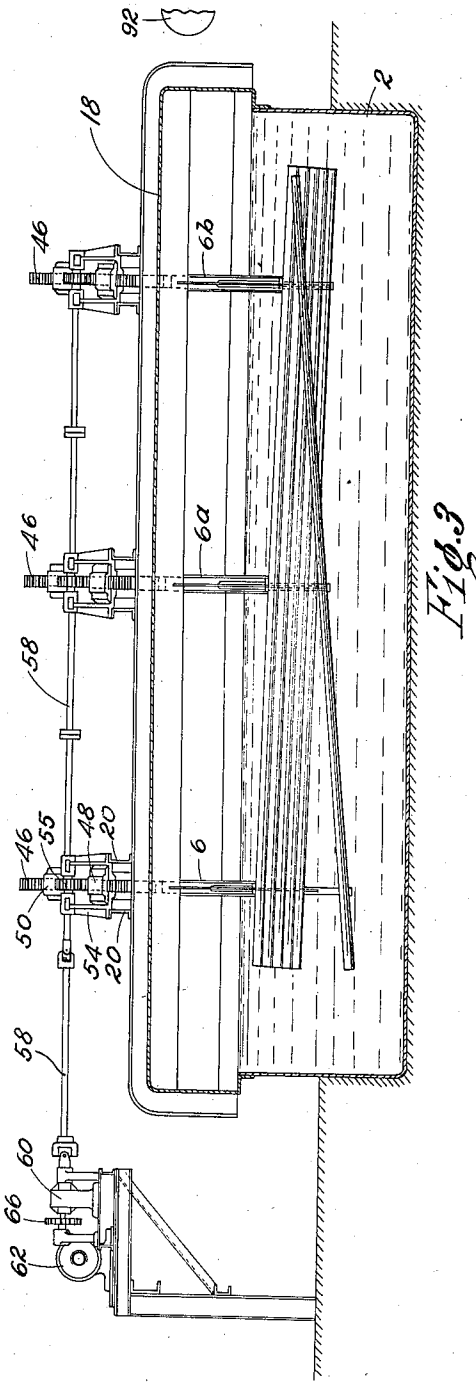


Fig. 3

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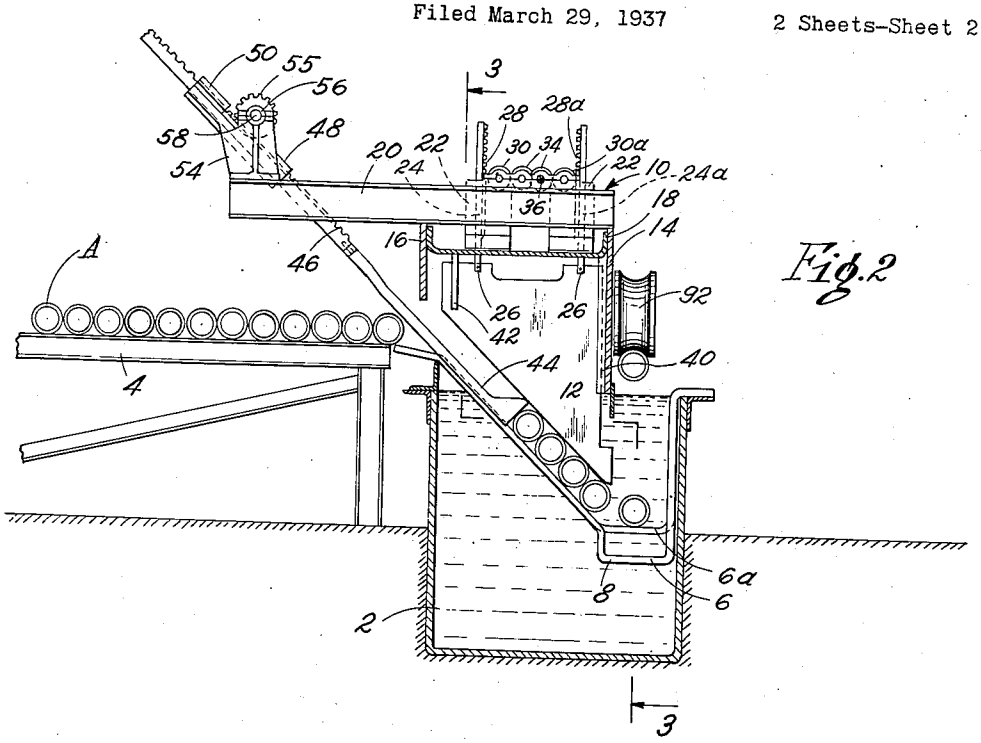


Fig. 2

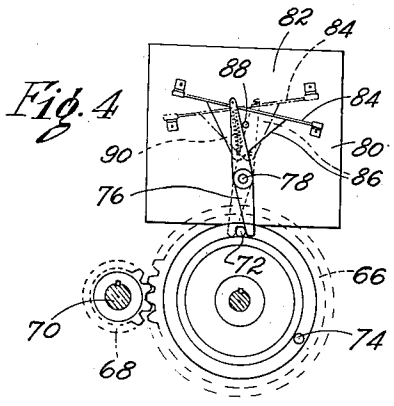


Fig. 4

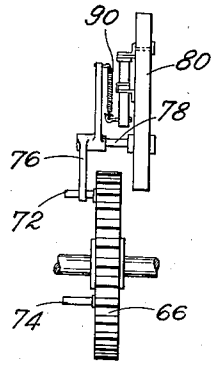


Fig. 5

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COATING APPARATUS

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Application March 29, 1937, Serial No. 133,518

2 Claims. (Cl. 91—12.6)

This invention relates to the art of applying coating material to pipes, bars and the like and more particularly to new and improved apparatus for handling articles during the coating operation.

This invention is particularly adapted to a process of coating pipes and the like wherein the pipes are coated by immersion in a bath of molten metal, for example, galvanizing material. In such a process, it is highly desirable that each length of pipe should remain in the bath of coating material for a period of time, determined by the thickness of the coating desired and the type of material used, and that each length of pipe be subjected to the coating bath for the same length of time. Where such practice is not followed the coated articles may have non-uniform coatings, or brittle coatings which readily flake or peel off, or the articles may become warped or distorted due to being subjected to the coating bath for too great a length of time.

Where apparatus made in accordance with the present invention is employed in coating pipe with molten metal a pipe having a uniform, closely adherent coating is produced. Brittle coatings which do not adhere to, or are not alloyed with, the surface of the pipe are avoided, and furthermore the pipes are substantially straight when discharged from the coating bath.

In the drawings accompanying and forming a part of this specification:

Figure 1 is a top plan view of apparatus constructed in accordance with the present invention,

Figure 2 is an enlarged transverse sectional view taken on the line 2—2 of Figure 1,

Figure 3 is a sectional view taken on the line 3—3 of Figure 2,

Figure 4 is an enlarged front view illustrating the timing mechanism for operating the switch of the reversible motor circuit, and

Figure 5 is a side elevational view of the apparatus shown in Figure 4.

In the drawings, Figures 1 to 3, inclusive, there is illustrated apparatus made in accordance with the present invention including an elongated tank or pot 2 of sufficient size capable of holding a plurality of pipes "A" and containing the molten metal for coating the pipes. The pipes are introduced laterally into the tank 2 from a suitable table 4 positioned along one side of the tank. In moving through the tank 2 the pipes are supported on a plurality of spaced substantially straight supporting members 6, 6a and 6b which slope downwardly from the entry side of the tank to a point below the discharge side of the tank. Each of the supporting members 6, 6a and 6b is formed with a substantially horizontal portion 8 upon which the pipes rest prior to their removal from the tank. The horizontal portion 8 of the supporting member 6 is preferably disposed at a lower level than the horizontal portions of the supporting members 6a and 6b to facilitate the up ending of the pipes as they are being withdrawn from the tank. Vertically disposed above each of the supporting members 6, 6a and 6b is arranged a guiding device 10, 10a and 10b, respectively, which cooperates with the inclined surface of the supporting members to form a passageway along which the pipes may travel in the tank. This passageway assures that the pipes will move in the proper sequence in the tank, and further, that the pipes will be maintained completely submerged below the surface of the molten metal while so disposed in the tank.

The guiding devices 10, 10a and 10b include a plate 12 having a lower edge surface inclined at an angle complemental with the upper inclined surface of its associated supporting member. To make the device adaptable for coating pipes of different diameters the plate 12 is preferably mounted for vertical movement so that the passageway may be changed accordingly.

The guiding devices are supported above the tank 2 on a super-structure, at spaced points therealong. This super-structure consists of spaced longitudinally extending vertically disposed plates 14 and 16, which are preferably connected together at their upper ends by a U-shaped beam 18. The guiding devices are mounted on the upper edge surface of the plates 14 and 16 and each device includes a pair of transversely extending spaced I-beams 20 which support therebetween a pair of spaced bearing or guiding blocks 22. The bearing blocks 22 are adapted to slidably receive the upper ends of hangers 24, and 24a which are secured to the guide plate 12 as at 26. For raising and lowering the plate 12 the hangers 24 and 24a have formed thereon racks 28 and 28a, respectively, which engage with pinions 30 and 30a mounted on the blocks 22. The pinions 30 of the spaced guiding devices 10, 10a and 10b are operatively connected together by shafts 32, and the pinions 30a are connected by the shafts 32a. Intermediate the pinions 30 and 30a of the guiding device 10 are a pair of spur gears 34, one of which is mounted on one end of the shaft 36. The other end of the shaft 36 is provided with a hand

wheel 38. Rotation of the hand wheel 38 mounted on the end of the shaft 36 rotates the spur gears 34 which in turn rotate pinions 30 and 30a, whereby raising or lowering of all the plates 12 may be accomplished, resulting in the passageways between each of the supporting members 6, 6a and 6b and their complemental guide plates 12 being substantially equal. The plate 12 is guided in its vertical movement between spaced guides 40 secured to one surface of the plate 14 and between spaced guides 42 depending from the lower surface of beam 18.

In the coating of pipes where it is desired to obtain a uniform product having a closely adherent coating it is highly important that the pipes be subjected to the coating material for a predetermined length of time. To obtain these desired results the pieces of pipe should be introduced into the tank of molten metal one at a time, should remain immersed in the coating material a predetermined period of time and should be withdrawn from the tank in the same manner in which they were introduced. For this purpose, as well as to obtain maximum production from the device, a plurality of reciprocating pusher rods 44, 44a and 44b are employed to introduce into and move the pipes through the molten metal in the tank.

The pusher rods 44, 44a and 44b are preferably flanged on their lower surface and when operatively positioned, straddle and ride upon the supporting members 6, 6a and 6b, respectively. The pusher rods are made of different lengths, for example the rod 44a is longer than the rod 44 and rod 44b longer than rod 44a so that the pipes will be moved along the passageway in an angular position. This permits the molten metal to run freely upwardly through the pipes causing their inner surfaces to be thoroughly coated.

For reciprocating the pusher rods there is secured to the end of each rod a rack 46 which slidably engages in spaced guiding or supporting blocks 48 and 50 integrally formed with a bearing bracket 54 which is mounted on the outwardly extending end of the transverse beams 20. A pinion 55 mounted in bearings 56 and splined to the longitudinally extending shaft 58 is positioned between each set of guide blocks 48 and 50 in engagement with the racks 46. The end of the driving shaft 58 is connected to a speed reducing unit 60 which is operatively connected to a reversible motor 62 through a variable speed changing device 64 which controls the rate of speed of the pusher rods.

The length of the stroke of the pusher arms is controlled by the mechanism illustrated in Figures 4 and 5 of the drawings. This mechanism comprises a gear wheel 66 driven by means of a pinion 68 carried on an extension of the shaft 70 of the speed reducing unit 60. On one face of the gear wheel 66 are positioned outwardly extending pins 72 and 74 engageable with the end of a rocker arm 76 pivotally mounted on a shaft 78 extending outwardly from the panel 80 which carries the reversing switch 82 controlling the circuit to the motor 62. The pins 72 and 74 may be positioned at various positions on the face of wheel 66 whereby the length of travel of the pusher arms may be varied. An elongated contactor arm 84 mounted on an angulated plate 86 which is pivotally mounted as at 88 on the face of the panel 80 serves to open and close the contacts of the switch 82. A spring 90 connects the upper end of the rocker arm 76 with the apex of the angulated plate 86.

Through the variable speed changing device 64 which controls the rate of travel of the pusher rods and the mechanism which determines the length of stroke of the rods, it is possible to fix a definite time period during which each pipe is disposed within the tank. This period can be readily adjusted to suit the particular size and type of pipe being coated.

In the operation of the device a plurality of pipes are positioned on the table 4 and an operator rolls them one at a time onto the supporting members 6, 6a and 6b between each stroke of the pusher rods 44, 44a and 44b, the pusher rods being at the end of its return stroke as each pipe is placed on the ends of the supporting members. When the pipe is positioned on the upper end of the supporting members it is engaged by the end of the pusher rods 44, 44a and 44b and forced under the surface of the molten metal in the tank 2. In view of the fact that the pusher rods are of different lengths the pipe is forced into the bath on an angle which permits the molten metal to flow upwardly through the pipe thereby completely coating the inner surface thereof.

The pipes are moved along the passageway formed between the supporting members and the plates 12 by the pusher rods and come to rest on the horizontal portions 8 of the supporting members. By the time the pipes have reached this position the inner and outer surfaces thereof have been completely coated, they are then picked up by an operator and one end brought into engagement with the magnetic roller 92 which draws the pipe from the tank and passes it on to subsequent manufacturing operations.

Having thus described the invention what is desired to obtain by Letters Patent is defined in the appended claims.

I claim:

1. Apparatus for coating pipes comprising a tank for molten metal, means defining a passage-way along which pipes may travel broadside in sequence into the tank, means including reciprocating pusher rods for moving pipes along said passageway, means for positively reciprocating said pusher rods at the same speed in opposite directions, and means for varying the length of travel of said rods.

2. Apparatus for coating pipes comprising a tank for molten metal, means defining a passage-way along which pipes may travel broadside in sequence into the tank, means including reciprocating pusher rods for moving pipes along said passageway, means for positively reciprocating said pusher rods at the same speed in opposite directions, and separate means for varying the speed and length of travel of said rods.

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