Dec. 14, 1937. W. H. CONVERS 2,102,059

DEVICE FOR APPLYING COATINGS TO WIRES

Filed Dec. 31, 1930 2 Sheets-Sheet 1

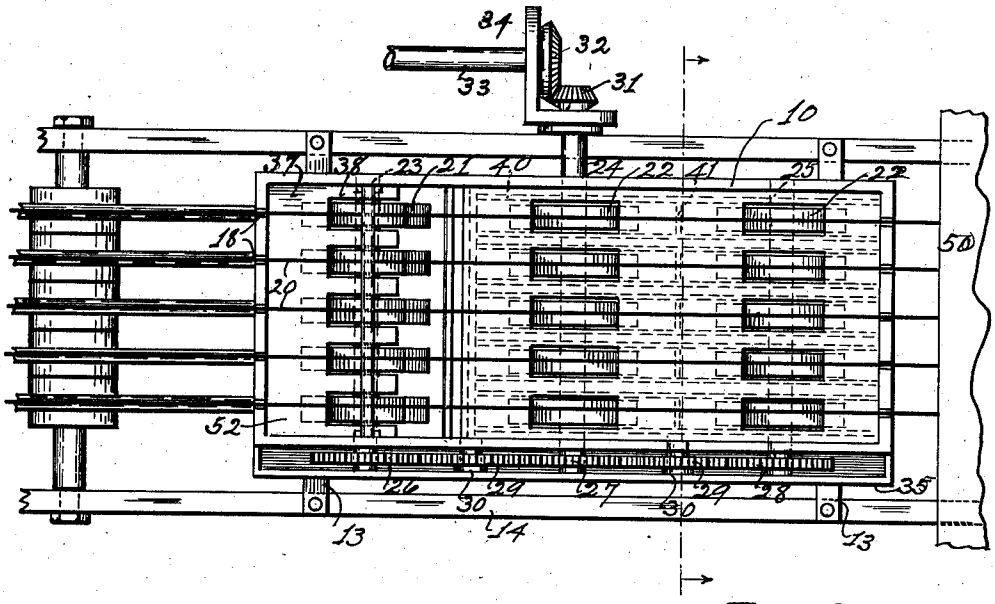


Fig 1

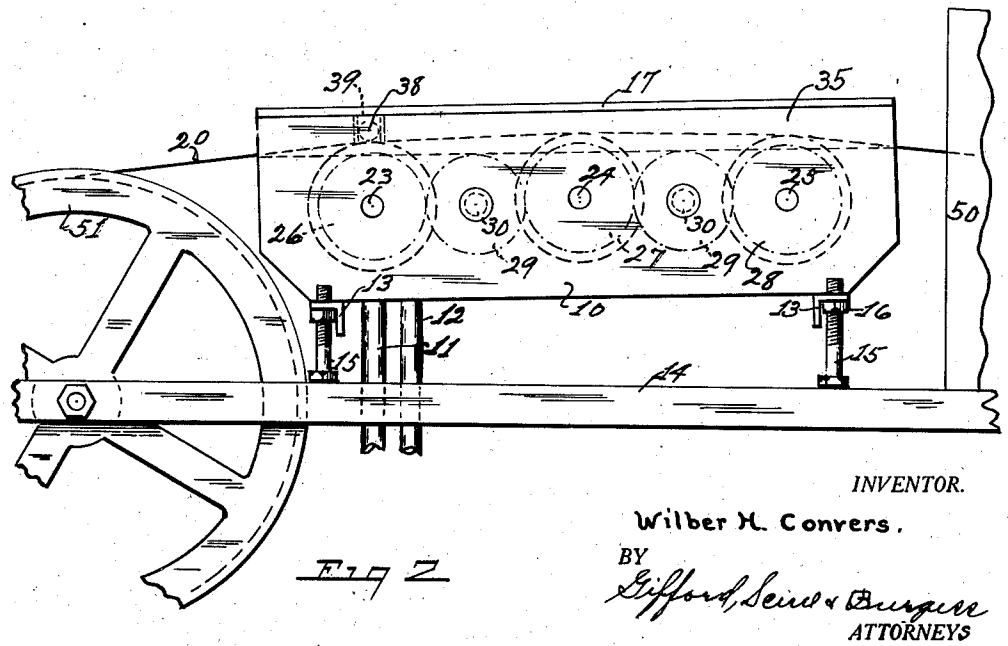


Fig 2

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DEVICE FOR APPLYING COATINGS TO WIRES

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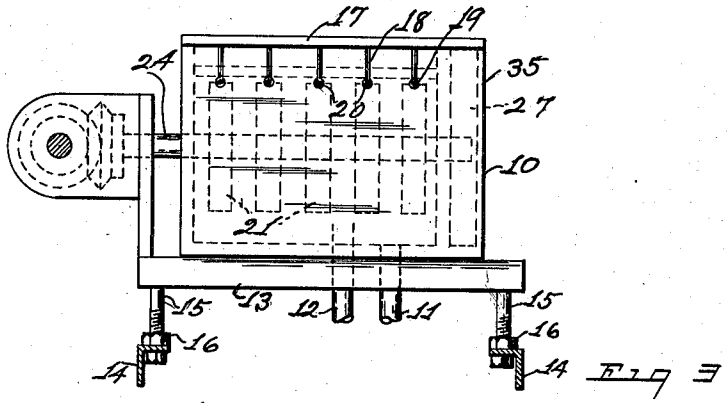


Fig 3

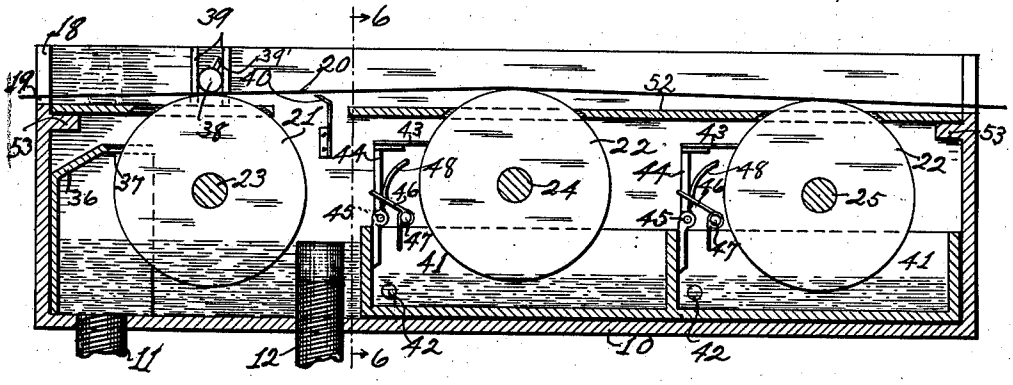


Fig 4

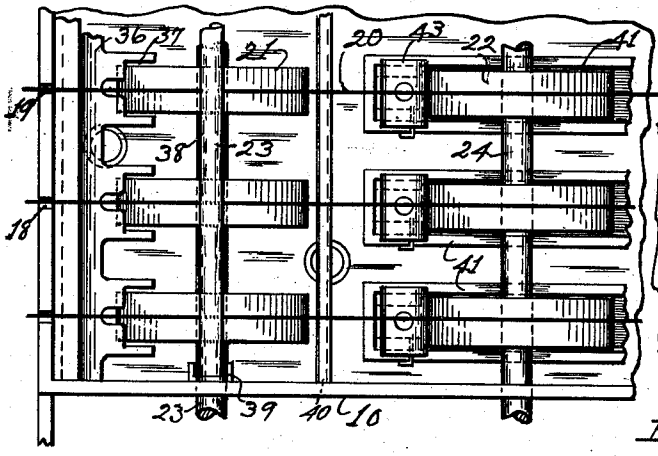


Fig 5

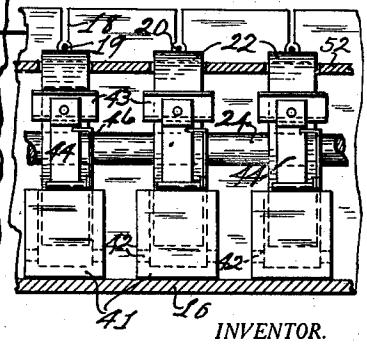


Fig 6

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UNITED STATES PATENT OFFICE

2,102,059

DEVICE FOR APPLYING COATINGS TO WIRES

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Application December 31, 1930, Serial No. 505,705

6 Claims. (Cl. 91—51)

This invention relates to a coating appliance of that class employed in applying a coating of insulating material or a solution of the same to a wire or the like, and is an improvement over the invention shown and described in my application, Serial No. 486,313, filed October 4, 1930.

In the coating of wire at high speeds in devices of this character it has been found that the excess coating material must not only be removed from the wire before drying, but that when the coating device is thus operated the coating material is apt to be thrown from the transfer drums by centrifugal force. One of the objects of the present invention is to prevent this from taking place. The coating drums may be divided into a series of narrow faced rollers, one for each wire, whereby the friction is reduced.

Also by this invention excessive evaporation of the solution is prevented and the excess coating material that is applied to the wires is carried back to the stock tank or sump.

Also by this invention separate compartments may be provided for rollers for removing excess coating material and a low level of coating material is maintained in these compartments while the level in the tank or sump is somewhat higher.

The invention will be understood from the description in connection with the accompanying drawings in which Fig. 1 is a top plan view of the device with the cover plate and shield removed.

Fig. 2 is a side elevation of the same.

Fig. 3 is an end elevation of the same.

Fig. 4 is an enlarged vertical longitudinal section.

Fig. 5 is an enlarged plan view of the same, partly broken away.

Fig. 6 is an enlarged cross sectional view, partly broken away, taken along the line 6—6 of Fig. 4.

In the drawings, reference character 10 indicates a box shaped tank that is provided with an inlet feed pipe 11 from a suitable supply of coating material or a solution of it. The tank 10 is also provided with an overflow pipe 12 and is mounted upon a support 13 which in turn is adjustably mounted on a main support 14 by the threaded supports 15 and nuts 16 in such a manner that the tank 10 may be given a slight incline so that the solution will drain to one end. The tank 10 is also provided with a cover plate 17, while the ends are formed with a series of slots 18 and holes 19 through which the wires 20 may pass.

One set of solution applying rollers 21 and two sets of excess material removing rollers 22 are shown, but it is to be understood that as many sets of the removing rollers may be used as are desired.

These rollers 21 and 22 are narrow cylinders and are secured in sets side by side spaced apart on the three transverse shafts 23, 24 and 25 which are rotatably mounted in the side walls of the tank 10 with their ends extending through one side thereof. The gears 26, 27 and 28 on the shafts 23, 24 and 25 are in mesh with the idler gears 29 mounted on stud shafts 30, so that the shafts 23, 24 and 25 rotate in the same direction. The shaft 24 is extended beyond the side of the tank 10 opposite the gear 27 and has secured thereon a bevel gear 31 in mesh with and driven by a bevel gear 32 secured on a shaft 33 mounted in the bracket 34 secured to the tank 10 and driven in any convenient way. The trains of gears may be covered by a casing 35 secured to the side of the tank 10.

The rollers 21 on the shaft 23 are spaced apart distances equal to the center to center distances of the holes 19 in the end of the tank 10. These rollers 21 rotate directly in the solution contained in the tank 10. The level of solution in the tank 10 is governed by the height of the outlet or overflow pipe 12. The amount of solution carried up to the wires 20 by these rollers 21 is regulated by a series of shields 36 mounted at the end of the tank 10 adjacent the rollers 21 and formed with notches 37 which allow a certain amount of the solution to be carried up by each roller 21 to envelop the wires 20.

A transverse rod 38 rests upon the wires 20 to cause a large amount of coating material to be kept at this point through which the wires are drawn, thus procuring full immersion of the wires in the coating liquid. The rollers 21 are driven fast enough to bring up enough coating material to flood the wires 20. The ends of the rod 38 are in the guides 39 and this rod is prevented from turning by a pin 39'.

An excess coating remover 40 formed of a piece of metal is placed transversely across the container. It has its upper edge slightly curved against the direction of wire travel and is placed just below the wires 20, but not in contact with them. The wires traveling at high speed carry such an amount of coating material that unless the remover 40 is used more rollers 22 for removing excess material would be required to prevent the wires from being overloaded and an irregular coating on the wires from resulting.

This scraper 40 traps the excess and removes a large percentage of the surplus.

The series of rollers 22 on the shafts 24 and 25 are also spaced apart to conform to the lines of travel of the wires 20. Each of these excess removing rollers dips into a separate chamber or container 41 in the tank 10, one for each roller 22. Each of these chambers 41 is formed with an inlet hole 42 communicating with the main tank 10.

Each one of the rollers 22 is provided with a separate brush or scraper 43 mounted on the upper end of an arm or scraper holder 44 which is hinged to a chamber 41 as at 45 and held in contact with the face of the rollers 22 by a spring 46. These scrapers may be of any suitable material. The springs 46 are held in place by screws 47.

These scrapers 43 are wider than the faces of the rollers 22 and as the rollers 22 rotate and carry up the solution from the chambers 41 these scrapers 43 remove the excess material.

Curved plates 48, each as wide as the scrapers 43, are attached to the holders 44 to provide pockets just below the points of contact of the brushes 43 with the wires 20 and to the left of the plates 48 as seen in Fig. 4. The most of the coating material that is removed from the rollers 22 by the brushes 43 passes over the plates 48 back into the tank 10. This prevents the coating material from accumulating below the scrapers 43 in such a manner that it might accumulate on the sides of the rollers 22 and interfere with removal of material from the wires by these rollers.

As the rollers 22 dip only slightly into the solution and remove it from the chambers 41 and the amount of solution admitted to these chambers is governed by the sizes of the inlet holes 42 in the sides thereof the level of solution in these chambers will remain at a lower level than the level of the solution in the main tank 10. The rollers 22 will be kept moistened with only a very small amount of the solution and as they contact with the wires 20 they remove the excess that may remain after having been coated by the rollers 21 and the main portion of the excess removed by the remover 40, so that an even thickness of coating remains on the wires 20.

The tank 10 is mounted between the oven 50 and a series of guide wheels 51 over which the wires 20 are carried in any convenient way, as, for example, by being wound upon reels (not shown). In coating devices of this type the supply spools from which the wire is drawn for coating is, in larger size of wire sometimes rotated in the plane of its axis to give the wire a twisting motion as it receives the several coats as it goes through the coating device several times. The wire has different surfaces on the bottom side during successive coatings, thus making for even coating around the outside of the wire. This can easily be done by rotating the holders of the spools slowly as the wire is taken off.

For preventing evaporation of the solution a shield 52 is provided which rests on the lugs 53 formed in the walls of the tank 10. This shield is formed with an opening for each of the rollers through which only its upper part projects to contact with the wire.

By this invention a variety of different sorts of coatings can be applied to wires in a very rapid and satisfactory manner. The wires may be heated in the oven 50 to the proper temperature to bake the coating composition on the wire or cause resinification of the ingredients in situ when the ingredients of the coating composition are of the sort that will permit this. After the heating operation, the wires may be passed through again to receive an additional coating in the same way and so on for as many times as may be desired, thus applying a plurality of even smooth coatings of uniform thicknesses.

The speed of application is very rapid as the wires may be passed through at a rate of 500 feet per minute or more.

The rollers 22 are driven at such a speed that their peripheries have a speed slightly different from the speed of the wires 20 and they dip only slightly into the coating material or solution in the chambers 41. As the pumping action of the rollers 22 and the cleaning action of the brushes 43 remove the liquid faster than the openings 42 can replenish it, the levels in these chambers 41, where the device is running, is automatically held at such a point that just enough solution is left to mix with the coating taken from the wires and returned to the sump by the scraper brushes 43, where it is mixed with the main body of the solution by the action of the applying rollers 21, thus insuring constant viscosity. Also the continuous flow of fresh solution into the chambers 41 is promoted by the pumping out action, so that no settling or jellying action can take place which would cause trouble in producing an even coating.

Instead of having a separate chamber 41 for each roller 22, a single chamber may be provided for these rollers, or a chamber may be provided for each set or groups of such rollers. The supply and return pipes 11 and 12 may also be so located that a continuous mixing action is provided by circulation of the liquid through these pipes.

I claim:

1. In a coating device, a reel for wire, a chamber for the wire through which the wire is moved longitudinally, said chamber comprising a container and means for supplying coating material thereto, a coating applying roller in said container in contact with said wire, a roller for removing excess coating from said wire having a greater peripheral speed than the speed of said wire, and means comprising a restricted inlet for causing said last-named roller to dip into said coating material to a less depth than said first-named roller.

2. In a coating device, a reel for wire, a chamber for the wire through which the wire is moved longitudinally, said chamber comprising a container and means for supplying coating material thereto, a coating applying roller in said container in contact with said wire and a non-rotatable member above said roller contacting with said wire.

3. A coating device for wire through which the wire is moved longitudinally, comprising a container and means for supplying coating material thereto, a coating applying roller in said container in contact with said wire, a roller for removing excess coating from said wire having a greater peripheral speed than the speed of said wire, and means for maintaining a lower level of said material at said second-named roller than at said first-named roller.

4. In a coating device, a reel for wire, a chamber for the wire through which the wire is moved longitudinally, said chamber comprising a container and means for supplying coating material

thereto, means for applying said coating material to said wire at one point, a roller in said container in contact with said wire for removing excess coating material from said wire, said roller having coating material applied to its face at one point, and means for removing the major portion of said material from the face of said roller before it contacts with said wire, said means comprising a scraper and a plate spaced from said roller and said scraper.

5. In a device for coating wire, a container for coating material, a roller dipping into the coating material in said container, means for passing said wire into contact with said roller, and means for removing excess coating material from said wire, said last named means comprising a roller, a scraper and a plate wider than the length of said roller.

6. In a device for coating wire, a container for coating material, a roller dipping into the coating material in said container, means for passing said wire into contact with the upper side of said roller, and means for removing excess coating material from the lower side of said wire, said last named means comprising a roller, a scraper and a plate wider than the length of said roller.

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