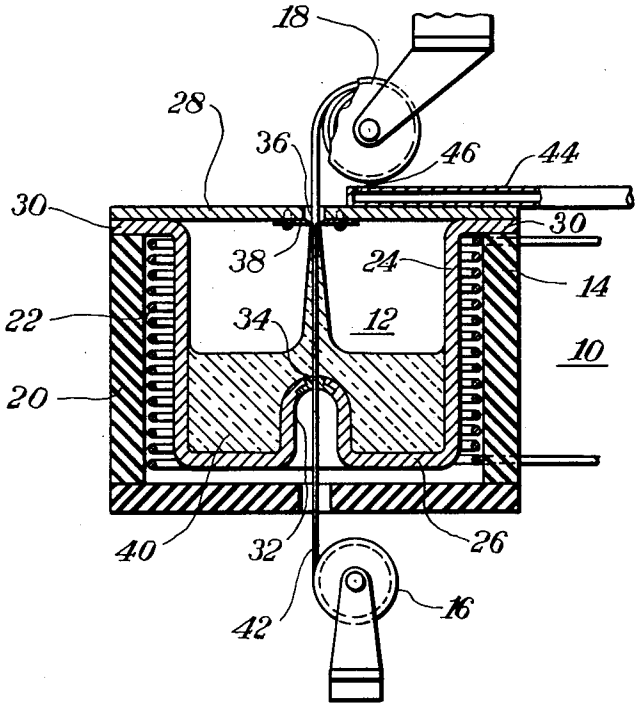
July 4, 1939. P. H. BRACE 2,165,031

APPARATUS FOR THE MANUFACTURE OF ELECTRICAL APPARATUS

Filed April 6, 1938



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Patented July 4, 1939

2,165,031

UNITED STATES PATENT OFFICE

2,165,031

APPARATUS FOR THE MANUFACTURE OF ELECTRICAL APPARATUS

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Application April 6, 1938, Serial No. 200,502

2 Claims. (Cl. 91—32)

This invention relates to apparatus for the insulating of conductors in the manufacture of coils for electrical apparatus.

An object of this invention is the provision of apparatus for facilitating the manufacture of coils of electrical apparatus, in which vitreous material is employed as the insulating medium.

Other objects of this invention will become apparent from the following description when taken in conjunction with the accompanying drawing, the single figure of which is an elevational view, partly in section, of apparatus embodying teachings of this invention.

Referring to the drawing, the apparatus 10 comprises a receptacle 12 removably disposed in a heating unit 14 and a reel 16 and mandrel 18 associated therewith. The heating unit illustrated comprises the supporting insulated walls 20 and a heating element 22 carried about its inner surface in any suitable manner. The heating element is connected to any suitable source of supply (not shown).

As illustrated, the receptacle 12 is provided with side walls 24, a bottom 26 and a removably disposed cover 28. In order that the receptacle may be supportedly disposed in the heating unit, the upper edges of the side walls 24 are flared outwardly to form the flanges 30 for seating on the upper edge of the supporting insulated walls 20 of the heating unit. In this position, the flange 30 makes a substantial air-tight joint with the walls of the heating unit, thereby preventing the loss of heat at the top of the unit when the element 22 is connected to a source of supply.

As illustrated, the bottom 26 of the receptacle carries an upwardly projecting inverted cup projection 32 having an opening disposed in the top thereof. This opening is adapted to receive dies 34 having different sized openings therein in order to control the size of the opening through the bottom into the receptacle, as will be explained more fully hereinafter. The cover 28 is also provided with an opening 36 disposed opposite the opening in the bottom of the receptacle and has an adjustable gauge or stripper 38 associated therewith to adjustably control the size of the opening.

The receptacle 12 is adapted to hold a supply of vitreous insulating material 40 which is to be picked up by a conductor, such as a wire 42, as the wire is drawn from the reel 16 through the receptacle and wound on the mandrel 18, as will be explained more fully hereinafter. In order to aid in the forming of the coil comprising the turns and layers of the conductor on the mandrel 18, a pipe 44, or any other suitable means, is associated adjacent the mandrel 18 and is provided with an opening 46 to direct an air blast from the pipe 44 onto the turns and layers of the conductor wound on the mandrel 18. In practice, a hot air blast is passed through the pipe 44 and directed onto the conductor wound on the mandrel, as will be explained more fully hereinafter. This hot blast of air may be heated by any suitable means, such as by passing air over heating elements (not shown).

The supply of vitreous material contained in the receptacle 12 may be of any mineral body which is rendered viscous when heated. In practice, any suitable glass having the required insulating and heat resisting properties necessary for the insulation of the coils may be employed, or a mixture of glass and finely divided solid material, or crystalline substances may be used instead of pure glass.

In operation, a die 34 having an opening therein which will permit the passing of the conductor 42 therethrough, while preventing leakage of the vitreous material from within the receptacle, is positioned in the opening in the top of the cup projection 32. With the conductor 42 in this position passing through the receptacle 12, a supply of the vitreous insulating material is placed within the receptacle. In order to render the vitreous material so viscous that it will be picked up by the conductor 42, as it passes therethrough, the heating element 22 is connected to its source of supply, and sufficient heat is applied to melt the vitreous material. As a general rule, the vitreous material within the receptacle will be heated to a temperature of above 500° C. and in some cases, such as where Pyrex glass is employed it is subjected to a temperature of 1400° C.

With the vitreous material in the receptacle in this condition and with the stripper 38 adjusted to remove recess material from the conductor as it is drawn from the receptacle, the wire is wound upon the mandrel 18. In practice, a cooled mandrel is employed in order to freeze the contacting surface layer of the vitreous material carried by the conductor as it is wound thereon. In winding the first layer on the mandrel, the turns of the coated conductor are so wound adjacent each other that the vitreous material carried thereby adheres to the coating of the adjacent turn before the cooling effect of the mandrel renders the insulating material solid.

In order to secure a close bond of the second and succeeding layers of the conductor to the

preceding layer of the coated conductor as it is wound upon the mandrel, the hot air blast is directed onto the preceding layer of the coated conductor to render its exposed surface layer of vitreous material so plastic that the layers will adhere to each other. In practice, the temperature of the hot air blast will be above 300° C. depending upon the characteristics of the vitreous material, a higher melting material, such as Pyrex glass, requiring temperatures up to 600° C. to render it plastic.

By practicing this invention, an insulated coil suitable for use in electrical apparatus is secured having high insulation. The resulting coil is a solid, integral and rigid unit capable of withstanding high temperatures and of withstanding the chemical effects of insulating liquids with which it is sometimes employed. Further, the insulation of the coils produced in accordance with this invention avoids catalytic effects or other interaction between the metal conductor and the insulating liquids in which it is to be employed, thereby avoiding deterioration of the liquid or of the conductor.

Although this invention has been described with reference to a particular embodiment, it is, of course, not to be limited thereto, except insofar as is necessitated by the prior art and the scope of the appended claims.

I claim as my invention:

1. Apparatus for the manufacture of coils of electrical apparatus comprising, in combination, a reel for carrying a supply of wire, a receptacle containing a supply of viscous vitreous insulating material, means for admitting wire from the reel to the receptacle to pass through the vitreous material to coat the wire, a mandrel disposed adjacent the receptacle for receiving the coated wire as it leaves the receptacle and for winding the wire into a coil, and means associated with the mandrel for controlling the viscosity of the exposed surface of the vitreous material of the wound wire for causing it to adhere to the vitreous coating of additional turns of the wire.

2. Apparatus for the manufacture of coils of electrical apparatus comprising, in combination, a reel for carrying a supply of wire, a receptacle containing a supply of viscous vitreous insulating material; means for admitting wire from the reel to the receptacle to pass through the vitreous material to coat the wire, a mandrel disposed adjacent the receptacle for receiving the coated wire as it leaves the receptacle and for winding the wire into a coil, means disposed between the supply of vitreous material and the mandrel for removing excess vitreous material from the wire and providing a coating thereon of predetermined thickness, and means associated with the mandrel for controlling the viscosity of the exposed surface of the vitreous material of the wound wire for causing it to adhere to the vitreous coating of additional turns of the wire.

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