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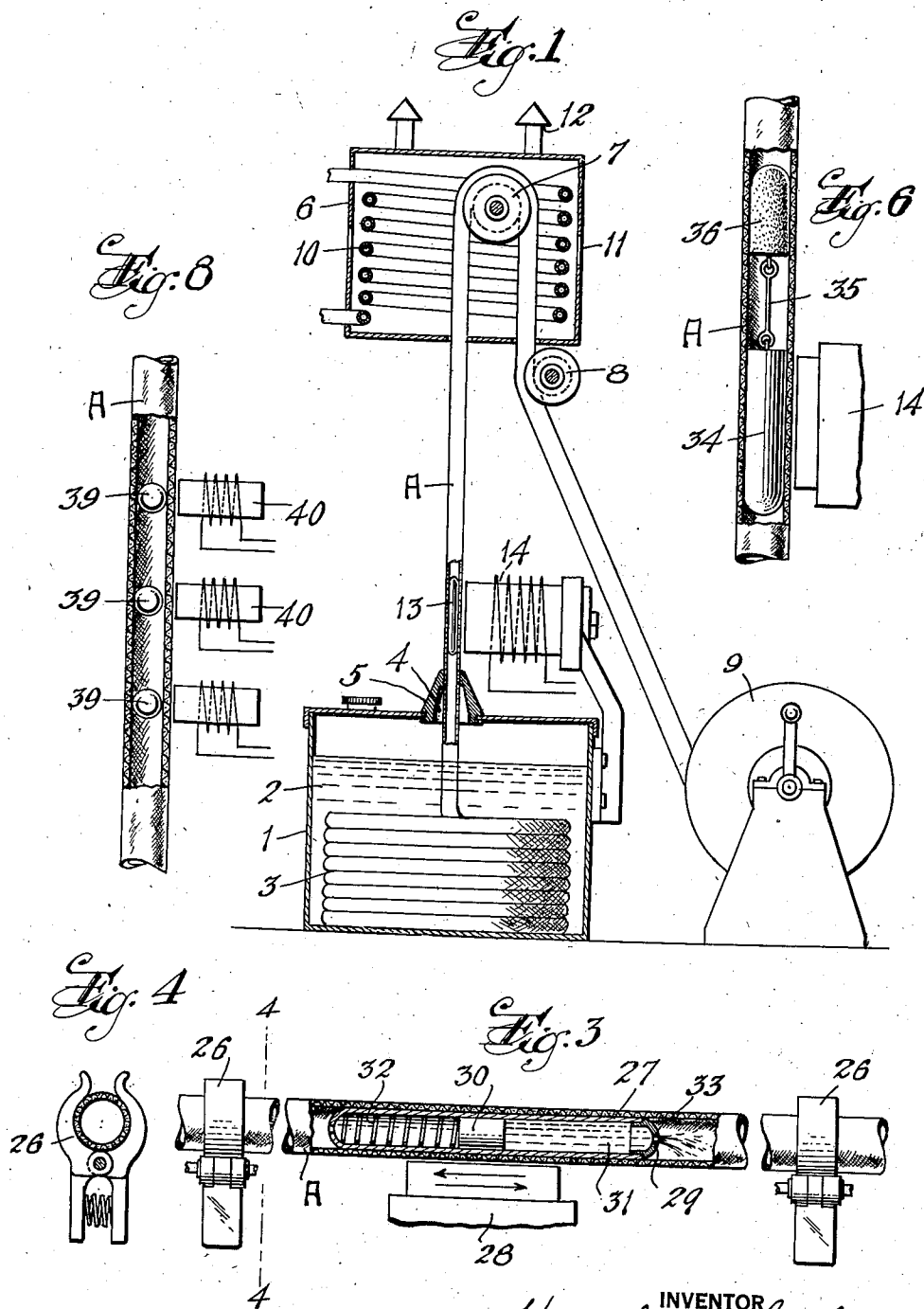
K. M. CHALKER

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APPARATUS FOR COATING THE INTERIOR OF TUBING AND THE LIKE

Filed July 6, 1936

2 Sheets-Sheet 1



INVENTOR
Kenneth M. Chalker,
BY
Harry S. Look,
ATTORNEY

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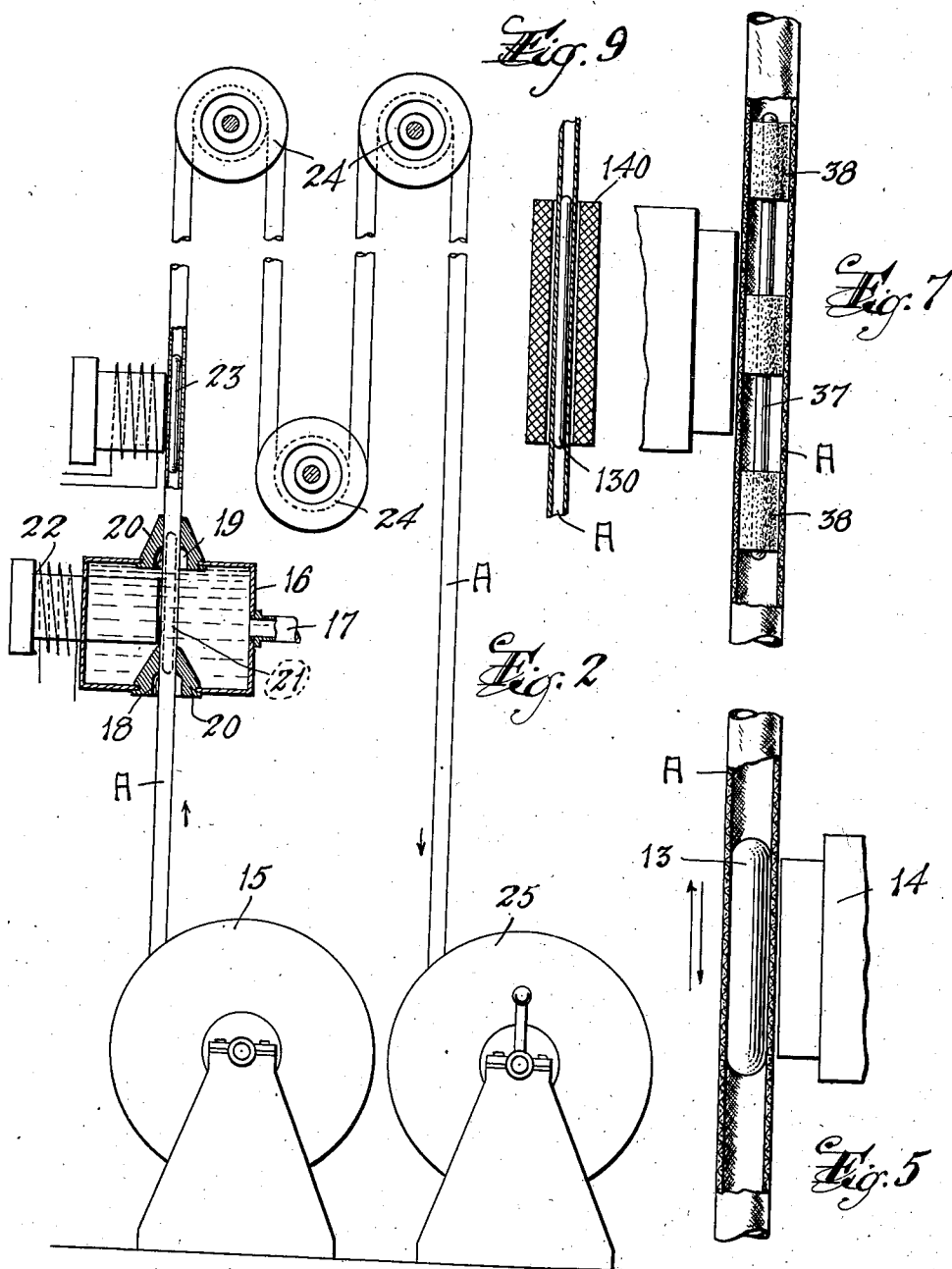
K. M. CHALKER

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INVENTOR
Kenneth M. Chalker,
BY
Harry S. Cook,
ATTORNEY

UNITED STATES PATENT OFFICE

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APPARATUS FOR COATING THE INTERIOR
OF TUBING AND THE LIKE

Kenneth M. Chalker, Woodbridge, N. J.

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4 Claims. (Cl. 91—32)

This invention relates in general to the coating, cleaning or wiping of interior walls of tubes, tubing, pipes, sleeves and the like, and more particularly to the application of a coating material to the interior walls of the tubing in continuous lengths.

The invention is especially directed to the coating of tubing for electrical insulation, although the invention is equally adaptable to applying water proof or water resistant coatings, or fire proof or heat resistant coatings to tubes and tubing.

One form of electrical insulation tubing comprises a tube formed of cotton of more or less porous nature and having its walls saturated with an electrical insulating composition. Generally such tubing has been coated only on the outside, although obviously tubing coated on both the inside and outside would be more satisfactory. However, it has been difficult if not impossible practically to coat the inside of such tubing, especially tubing formed in continuous lengths, due to the problem of wiping the surplus coating material from the interior walls of the tubing. Obviously manufacture of the tubing in continuous lengths is desirable from the standpoint of economical production.

Therefore, one object of my invention is to provide a novel and improved apparatus for cleaning, coating or wiping the interior of tubes, tubing, sleeving and the like, whereby long continuous lengths of tubing or the like may be cleaned, coated or wiped easily, thoroughly and quickly in a continuous operation.

Other objects are to provide an apparatus wherein a cleaning or wiping or other operating element shall be held stationary in the tubing or the like with the tubing movable thereover, or the cleaning or wiping element shall be movable within the tubing with the tubing held stationary, the cleaning or wiping element to be held and actuated by means exterior of the tubing, and more particularly to utilize magnetic force for holding and manipulating a cleaning or wiping element within tubing to be cleaned or coated; and to obtain other advantages and results as will be brought out by the following description.

For the purpose of illustrating the principles of the invention, I have schematically illustrated several forms of apparatus for carrying out the invention, although it should be understood that other forms of apparatus may be used without departing from the spirit or scope of the invention. Referring to said drawings in which corresponding and like parts are designated through-

out the several views by the same reference characters

Figure 1 is a schematic illustration of one form of apparatus embodying the invention.

Figure 2 is a similar view of another form of apparatus.

Figure 3 is another view partially in section and partially in side elevation showing another form of apparatus.

Figure 4 is a transverse sectional view on the line 4—4 of Figure 3.

Figure 5 is an enlarged fragmentary longitudinal sectional view through tubing showing a wiping element embodying the invention.

Figures 6, 7, and 8 are similar views showing other forms of wiping elements, and

Figure 9 is a similar view showing another form of magnet and relationship of the magnet and wiping element.

Specifically describing the embodiment of the invention illustrated in Figure 1, the apparatus here shown is particularly designed for use in coating tubing which is of such nature that the coating composition will permeate the material of the tubing by simple immersion or soaking of the tubing in the coating composition. The reference character 1 designates a container or tank for the coating composition 2 in which the tubing A to be coated is immersed in coiled form as at 3. The top of the container has an opening 4 through which the tubing is pulled from the container, and preferably the opening has a wiper 5 for removing the surplus coating material from the exterior of the tubing. The tubing may be led upwardly into a drying chamber 6 and over pulleys 7 and 8 to a winding reel 9 for the finished tubing. The drying chamber may be heated as by a steam coil 10 and has suitable air inlets 11 and vents 12.

For wiping or removing the surplus coating from the interior walls of the tubing, I may utilize a wiping rod 13 some part of which is formed of magnetic material and which is of a size and construction most suitable for the particular type of tubing and the operation to be performed on the inner walls of the tubing. As shown in Figure 1, the wiping element is a rod of magnetic material of approximately the same diameter as the interior of the tubing, and the rod is held stationary within the tubing by magnetic force which may be applied to the rod from the exterior of the tubing by a suitable magnet such as an electro-magnet 14 at one side of the tubing. With such a construction, after the tubing has become sufficiently permeated with the

coating composition, it may be drawn in a continuous operation out of the container and over the wiping element 13, as by winding the tubing upon the reel 8, and the wiping element 13 will smooth the coating material on the inner walls of the tubing and remove excess coating material from the walls by the wiping action incident to pulling of the tubing over the wiping element.

In many instances it may be desirable to pass the tubing through a solenoid 140 and mount the wiping element 130 in the tubing and within the solenoid whereby the wiping element will be held stationary in the tubing as the core of the solenoid, as shown in Figure 9.

In Figure 2 of the drawings I have shown an apparatus for use where pressure is necessary to force the coating composition through the material of the tubing. Here the uncoated tubing is shown as wound on a reel 15 and drawn through a container 16 to which the coating material is supplied under pressure as through a pipe 17. The tubing enters the container through an opening 18 in the bottom and leaves through an opening 19 in the top, and the openings are provided with suitable packing and wiping elements 20.

If desired the wiping element 21 for the interior of the tubing may be arranged within the container 16 so as to restrict the flow of the coating composition into the tube and prevent clogging of the tube, the wiping element being held in position by an electro-magnet 22 a portion of which projects into the container so as to exert the required magnetic force on or be magnetically coupled with the wiping element 21 to hold the latter stationary. Also, if desired a second wiping element 23 may be located outside the outlet opening 19 of the container for further smoothing and wiping the interior of the walls of the tubing. The tubing may then be passed over suitable drying supports 24 and wound on a reel 25.

Instead of holding the wiping element stationary and moving the tubing thereover, the tubing may be held stationary and the wiping element may be moved within the tubing, for example as shown in Figure 3. Here the tubing may be releasably gripped at spaced points by suitable grippers 26 and held stationary for a predetermined time, and the wiping element 27 may be moved back and forth within the tubing by movement of the electro-magnet 28 which may be actuated by any suitable means.

Also if desired the wiping element may be so formed as to itself supply the coating material to the interior of the tubing. For example, the element may comprise a hollow casing having a removable nozzle cap 29 at one end and a follower 30 within the casing. The coating material 31 may be inserted into the casing between the follower 30 and the nozzle cap 29 and the follower 30 may be influenced in any suitable manner as by a spring 32 to exert pressure on the material and force it from the casing through a discharge opening 33 in the nozzle cap. In this way, the coating material may be applied to the interior of the tubing simultaneously with reciprocation of the wiping element and the wiping element will smooth the material on the interior walls of the tubing.

Similarly the wiping element might be held stationary and the tubing reciprocated back and forth over the wiping element as shown in Figure 5 instead of being continuously moved in one direction.

The construction of the wiping element may be varied according to the nature of the operation to be performed. In Figure 6 I have shown the wiping element as including a magnetic rod section 34 flexibly connected by a link 35 to a brush or rubber section 36.

In Figure 7 I have shown the wiping element as including a rod 37 formed of magnetic material and having spaced longitudinally thereof a plurality of brush or rubber wiper sections 38.

Figure 8 shows the utilization of a series of balls 39 as the wipers, the balls being held within the tubing by electro-magnets 40.

It will be understood by those skilled in the art that any number of wiping elements may be used at any desired points in the length of the tubing. Also the tubing and wiping elements may be so arranged as to permit the tubing to be moved horizontally or vertically or diagonally, and the relative speed of movement of the tubing and wiping elements may be varied as required.

Also any suitable coating compositions may be utilized depending upon the purpose for which the tubing is intended; for example paints, varnishes, lacquers, and synthetic resins may be utilized for the coating material, and the coated tubing may be subjected to any suitable drying or baking process depending upon the nature of the coating and the purpose for which the tubing is intended.

Other modifications in the apparatus will occur to those skilled in the art as falling within the scope of the invention, the main feature of the invention being the supporting or holding of the wiping or operating element within the tubing by exterior holding means, particularly by utilization of magnetic force or a magnetic coupling between the holding means and the wiping or operating element.

The term "wiping element" as used in the specification and appended claims, is intended to include any element or device which it may be necessary to retain, hold or actuate within the tubing or the like in cleaning, wiping, scraping and coating or similar operations.

Having thus described my invention, what I claim is:

1. Apparatus for coating the interior walls of tubing and the like comprising means for applying a coating material to the interior of the tubing, a wiping element to be arranged within the tubing being coated, a holding means for said wiping element to be located outside said tubing and magnetically coupled to said wiping element, and means for causing relative movement of the tubing and said wiping element to smooth and wipe said coating material over the interior walls of the tubing.

2. Apparatus for coating the interior walls of tubing and the like comprising means for applying a coating material to the interior of the tubing, a wiping element to be arranged within the tubing being coated and formed in part of magnetic material, an electro-magnet to be located outside said tubing to hold the wiping element in the tubing, and means for causing relative movement of the wiping element and said tubing while the wiping element is held by said electro-magnet to smooth and wipe said coating material over the interior walls of the tubing.

3. Apparatus for coating the interior walls of tubing and the like comprising means for applying a coating material to the interior of the tubing, a wiping element to be arranged within the tubing being coated, means located outside said tubing and magnetically coupled to said wiping element

to hold the wiping element stationary, and means for drawing said tubing over said wiping element while the latter is so held to smooth and wipe said coating material over the interior walls of the tubing.

5 4. Apparatus for wiping the interior of tubing and the like comprising a wiping element having

a portion formed of magnetic material to be arranged within the tubing, a magnet outside said tubing for holding said wiping element within the tubing, and means for causing relative movement of said magnet and the tubing while the wiping element is held by said magnet.

KENNETH M. CHALKER.