July 24, 1923. 1,462,608

N. MARSHALL

METHOD OF AND APPARATUS FOR ENAMELING TUBES

Filed May 6, 1921

Fig. 1.

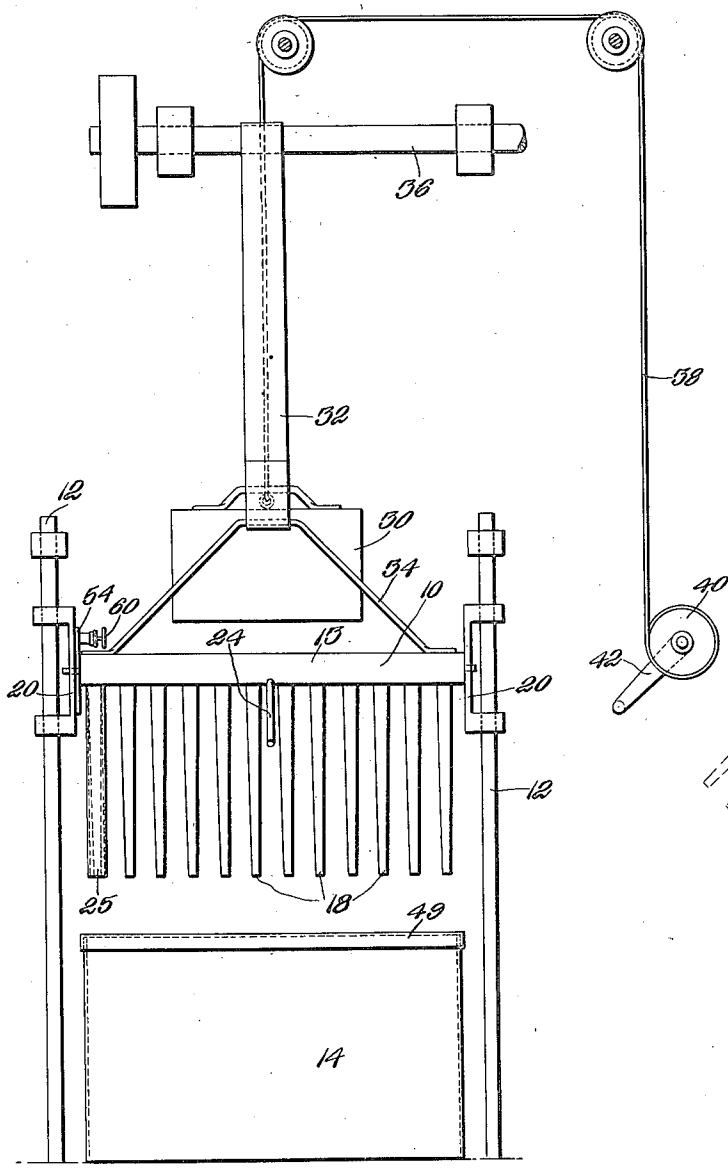


Fig. 2.

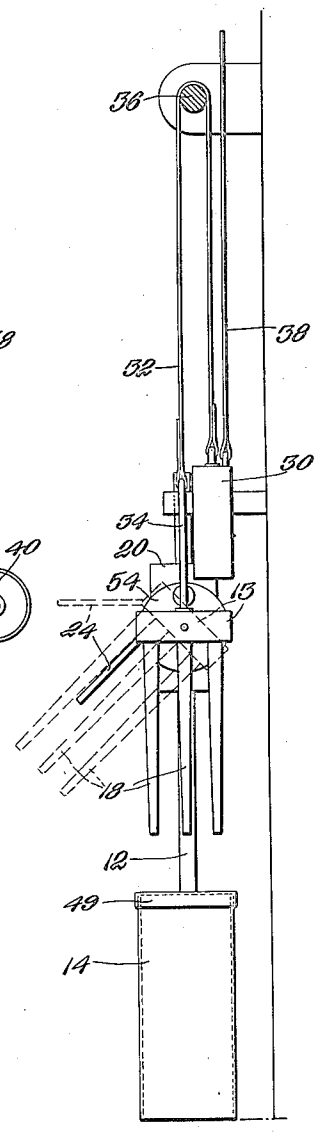
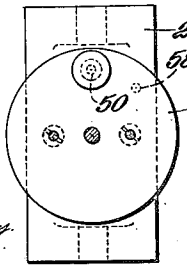
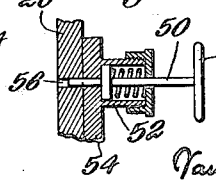


Fig. 3.



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Fig. 4.



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Patented July 24, 1923. 1,462,608

UNITED STATES PATENT OFFICE.

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METHOD OF AND APPARATUS FOR ENAMELING TUBES.

Application filed May 6, 1921. Serial No. 467,244.

To all whom it may concern:

Be it known that I, NORMAN MARSHALL, a citizen of the United States, residing at Waltham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Methods of and Apparatus for Enameling Tubes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a method of and apparatus for enameling tubes.

The object of the invention is to provide both a novel and improved method and apparatus by which tubes may be enamelled advantageously and economically to produce a superior enamelled article.

The invention consists in the method and apparatus hereinafter described and particularly pointed out in the claims.

In the drawings illustrating the preferred form of the apparatus Fig. 1 is a side elevation; Fig. 2 is an end elevation; and Figs. 3 and 4 are details to be referred to.

The method and apparatus embodying the present invention finds particular application in the production of white enamelled fibrous tubes used as candle tubes in the manufacture of electrical fixtures. In such manufacture it is desirable that the coating of enamel should be confined to the exterior of the tube and further that the coating should be as uniform in thickness as possible and free from streaks. When any considerable number of tubes are dipped in a bath of enamel and withdrawn, the manner in which the tubes are withdrawn from the bath and subsequently handled during the period in which the enamel is drying, controls in a large measure the quality and uniformity of the finished enamel coating.

I have discovered that a desirable and superior coating of enamel may be produced upon tubes by supporting the tubes in a vertical position in a manner such as to close the open upper ends of the tubes, then dipping the tubes in a bath of enamel and subsequently withdrawing them from the bath at a slow and uniform rate of speed such as to permit the enamel to set or partially set as fast as the tubes emerge from the bath. As the tubes are supported in a drying position there is no flow of enamel from one part of the tube to the other, thus producing a uniform and desirable enamel coating. By dipping the tubes vertically with their upper ends closed an effective air pocket or seal is produced within the tubes which effectively prevents the enamel from entering the interior of the tubes to any appreciable extent.

Referring to the drawings, the apparatus for dip enameling tubes in accordance with the present invention comprises in general a tube supporting rack 10 slidably mounted upon vertical standards 12 and capable of movement downwardly toward an enameling tank 14 located between the standards 12 below the supporting rack 10. The tube supporting rack 10 comprises an elongated block 13 from which a plurality of tapered pins 18 depend, as shown in Fig. 1. The block 13 is rotatably mounted at its ends in brackets 20 arranged to slide upon the vertical standards 12 so that when the block 13 is in a raised position in which the pins 18 are completely removed from the tank 14 the pins and block may be swung outwardly as a unit by means of a handle 24 into the inclined position indicated in dotted lines in Fig. 2. In such position the tubes 25 to be enamelled may be conveniently slipped over the ends of the tapered pins 18 and pushed upwardly thereon until the upper ends thereof are completely closed. The tubes are frictionally held in place upon the pins 18 so that after a plurality of tubes have been placed in position upon the pins, the latter are ready to be dipped into the enameling bath. Provision is made for locking the tube supporting rack 10 in both its vertical and inclined positions and for this purpose a spring pressed plunger 50 is secured within a hub 52 carried by a plate 54 bolted to one end of the block 16. The spring pressed plunger is adapted to cooperate with holes 56, 58, in the bracket 20 to lock the tube supporting rack in either a vertical position or in an inclined position. A handle 60 is provided on the end of the spring pressed plunger to facilitate in withdrawing the same from the holes when it is desired to change the position of the tube supporting rack. The construction of the spring pressed plunger and associated parts is illustrated in detail in Figs. 3 and 4.

Movements of the tube supporting rack 10 downwardly to cause the tubes to be dipped into the enameling tank 14 are produced by raising a counter-weight 30 se-

cured by a belt 32 to a strap 34 bolted to the top of the tube supporting rack 10. The belt 32 is extended over a counter-shaft 36, as shown in Fig. 1. For this purpose the counter-weight is connected by a connector 38 to a rotatable drum 40 provided with a handle 42 so that upon rotation of the drum the counter-weight is gradually lifted and the tubes and tube supporting rack permitted to fall under the influence of their weight.

After the tubes have been completely immersed in the bath of enamel, provision is made for withdrawing them at a very slow and uniform rate of speed in order that the enamel may have a chance to set or partially set as the tubes are withdrawn from the bath. For this purpose the counter shaft 36 over which the belt 32 extends is rotated slowly, preferably at a rate such as to produce a vertical movement of the tubes of about three inches per minute. After the tubes have emerged from the bath a cover 49 is placed upon the enameling tank 14 and the tubes are permitted to remain in their raised position, as shown in Fig. 1, until the enamel has dried sufficiently to permit the tubes to be removed. In removing the tubes the tube supporting rack 10 is swung outwardly into the dotted line position in Fig. 2 in which the tubes may be conveniently removed from the depending tapered pins 18.

In some instances in which it is desired to enamel both the exterior and interior of tubes the pins 18 will be relatively short and only of sufficient length to constitute a support for the upper end of the tubes. The pins will be provided with a vent hole to permit the escape of the air as the tubes are dipped vertically into the enameling tank. In this manner both the exterior and interior of the tubes may be enameled. In some instances it may be desirable in enameling the exterior of tubes of certain character that the pins 18 should be straight instead of tapered and of substantially the length of the tube, so that when the tubes are slipped thereover the pins will substantially fill the interior of the tubes and constitute a support therefor during the enameling operation.

While the preferred form of the apparatus has been illustrated and described it will be understood that the same may, if desired, be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:—

1. The method of dip enameling the exterior of tubes which consists in closing the upper end of a tube, dipping it vertically in a bath of enamel, and subsequently removing it at a slow and uniform rate.

2. The method of dip enameling the exterior of tubes which consists in closing the upper ends of a plurality of tubes, dipping the tubes vertically in a bath of enamel, and subsequently removing the tubes at a slow and uniform rate.

3. The method of dip enameling the exterior of tubes which consists in supporting a plurality of tubes in a manner such as to close the upper ends thereof, dipping the tubes vertically while thus supported in a bath of enamel, and subsequently removing the tubes at a slow and uniform rate.

4. The method of dip enameling the exterior of tubes which consists in supporting a plurality of tubes upon tapered pins in a manner such as to close the upper ends thereof, dipping the tubes while thus supported vertically in a bath of enamel, and subsequently withdrawing the tubes at a rate of substantially three inches per minute.

5. An apparatus for dip enameling tubes having, in combination, means for closing the upper ends of the tubes, an enameling tank, means for dipping the tubes vertically in the tank, and means for withdrawing the tubes at a slow and uniform rate of speed.

6. An apparatus for dip enameling tubes having, in combination, a tube supporting rack provided with a plurality of tapered pins of a diameter sufficient to close the upper ends of tubes positioned thereon, a tank below said tube supporting rack for containing enamel, means for lowering the tube supporting rack to cause immersion of the tubes in the enamel, and means for subsequently withdrawing the tubes and rack from the enamel at a slow and uniform rate of speed.

7. An apparatus for dip enameling the exterior of tubes having, in combination, a tube supporting rack comprising a block provided with a plurality of depending tapered pins, standards upon which the block is slidably mounted, means for supporting the block and pins including a shaft, a counter-weight, and a belt connecting the counterweight and block and extended over the shaft, a tank containing a bath of enamel located between the standards beneath said rack, means for lifting the counter-weight to permit the rack and pins to move downwardly to immerse a plurality of tubes supported by the pins in the bath of enamel, and means for rotating the shaft at a slow and uniform speed to cause withdrawal of the pins and tubes from the bath.

8. An apparatus for dip enameling tubes having, in combination, a pair of vertical standards, brackets slidably mounted upon the standards, and a tube supporting rack rotatably mounted in the brackets and arranged to slide therewith upon the standards, means for locking the tube supporting rack in a vertical and an inclined position, an enameling tank, means for moving the tube supporting rack toward the enamel-

ing tank, and means for withdrawing the same from the enameling tank at a slow and uniform rate of speed.

9. An apparatus for dip enameling tubes having, in combination, a tube supporting rack provided with a plurality of pins of a diameter sufficient to close the upper ends of tubes positioned thereon, a tank below said rack containing a bath of enamel, means for lowering the tube supporting rack to cause immersion of the tubes in the enamel, and means for subsequently withdrawing the tubes and rack.

10. An apparatus for dip enameling tubes having, in combination, means for supporting the tubes from their upper ends and arranged to close the upper ends of the tubes, an enameling tank, means for dipping the tubes vertically in the tank, and means for withdrawing the tubes vertically from the tank.

11. An apparatus for dip enameling tubes having, in combination, a tube supporting rack, standards upon which the rack is slidably mounted, means for supporting the rack including a counter-weight, and means for moving the rack to cause immersion of the tubes in the enamel and for subsequently withdrawing the tubes from the enamel.

12. An apparatus for dip enameling tubes having, in combination, tube supporting means, means for moving the tube supporting means vertically to dip the tubes into a bath of enamel, and means for withdrawing the tubes vertically from the bath of enamel.

13. An apparatus for dip enameling tubes having, in combination, tube supporting means, means for moving the tube supporting means vertically to dip the tubes vertically in a bath of enamel, and means for withdrawing the tubes vertically from the bath of enamel at a slow and uniform rate.

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