March 22, 1938. C. A. FOURNESS ET AL 2,111,853

CORD COATING MACHINE

Original Filed Oct. 16, 1935

Fig. 1.

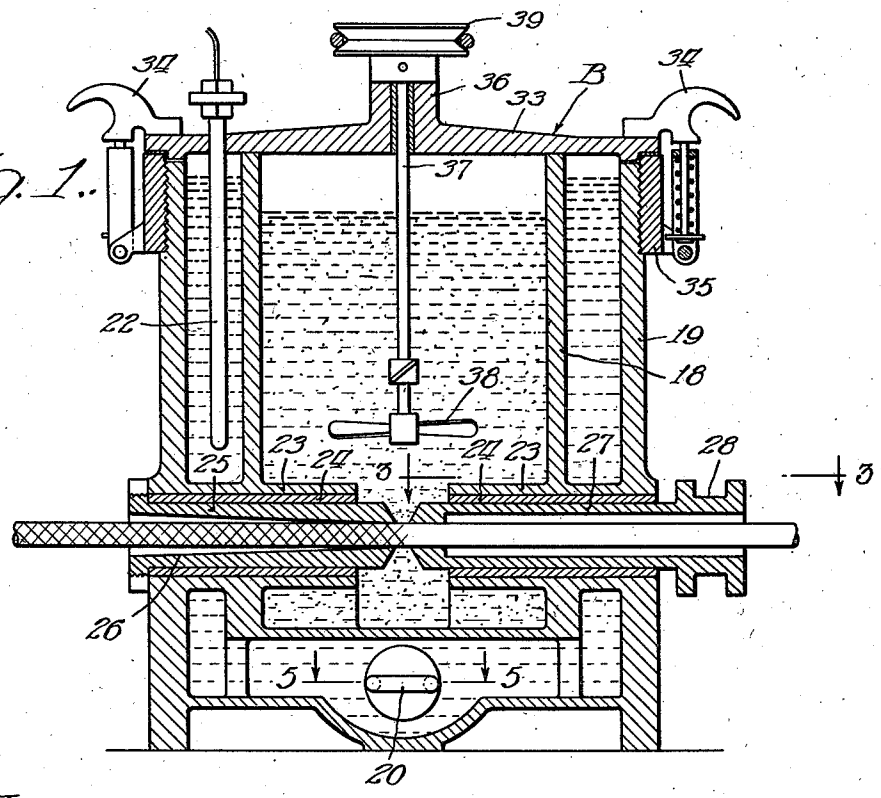


Fig. 2

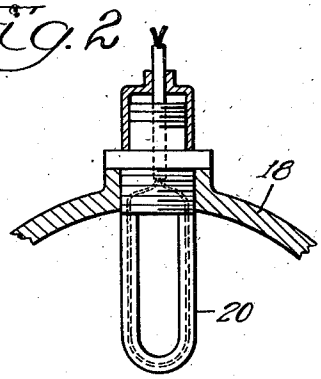
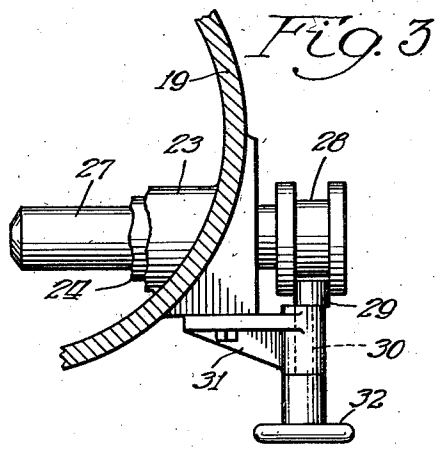


Fig. 3



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2,111,853

CORD COATING MACHINE

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Original application October 16, 1935, Serial No. 45,364. Divided and this application July 24, 1936, Serial No. 92,308

5 Claims. (Cl. 91—32)

This invention relates to cord coating machines, and pertains more especially to a machine for wrapping and coating cords used in the manufacture of tampons.

In a method of manufacturing such tampons which we have designed and successfully put in practice, a sheet of sixteen-ply creped absorbent wadding is first repeatedly folded or crimped on itself into substantially round or cylindrical form, and then run through a wide mesh braiding machine which compacts and holds together the numerous folds and produces a substantially round uniform article of about five-eighths inch diameter known as the tampon "cord". This cord is then run through a cord coating machine which first applies a concentrated starch solution to the surface of the cord, then wraps a thin sheet or strip of cotton wadding on this cord, then applies a diluted starch solution as an impregnation and thin second coating to the covering sheet or strip, and finally compacts and reduces the cord and winds it on a polygonal reel. The reel with the cord thereon is next placed in a drying oven in which it is subjected to a flow of heated air sufficiently long to thoroughly dry the cord. The cord is then cut into tampon lengths, and, by means of a stitching machine, the closed end of a cord loop is drawn through and then looped around the tampon about one-half inch from the outer or rear end thereof and the two free ends of the loop are knotted together. Finally, the inner or forward end of the tampon is moistened to render it pliable and then compressed in a die and dried to give it a comparatively rigid blunt pointed conical end form.

Our present invention relates to an apparatus for performing the cord coating operation, and a practical form of such apparatus is illustrated in the accompanying drawing, in which—

Fig. 1 is an enlarged vertical section through one of the duplicate starch solution containers.

Fig. 2 is a fragmentary horizontal section through a heating device for the water jacket of the solution container.

Fig. 3 is an enlarged detail of an adjusting device for one member of the valve controlling the amount of starch solution applied to the cord, taken on the line 3—3 of Fig. 1.

In the drawing 18 designates a vessel for containing the concentrated starch solution, this vessel being surrounded at its sides and bottom by a water jacket 19. In the bottom of the water jacket is an electric heater of a known type designated as an entirety by 20, by which the jacket water is maintained at a suitable temperature to maintain a freely flowing condition of the starch solution. The bulb 22 of an electrically controlled thermostat is immersed in the jacket water, this thermostat maintaining the solution at a uniform temperature.

Within the container 18 and its jacket 19 and extending a substantial distance into the container are a pair of opposed tubular bosses 23 lined with bushing sleeves 24. A valve tube 25 is fitted tight within one bushing 24 and is formed with a tapered duct 26 to facilitate the passage of the cord therethrough, and a valve tube 27 has a sliding fit within the other bushing 24 so that its inner end can be adjusted toward and from the cooperating valve tube 25. The opposing faces of these valve tubes 25 and 27 are beveled so as to form between them an annular V-shaped orifice for the flow of the solution onto the cord. The reason for beveling the inner end faces of the valve tubes is because the opening between the faces at the cord is only about $\frac{1}{32}$ to $\frac{1}{8}$ of an inch, and the starch solution does not circulate well enough in the opening unless it is V-shaped. We ascertained by practical tests that the starch has a tendency to thicken in the opening when the faces are square or parallel. It is obvious that the temperature of the solution would tend to be lowered in a narrow space, with consequent thickening of the starch. It is, therefore, necessary to have good circulation in this annular channel.

It will also be observed from Fig. 1 that the bore of valve tube 27 is substantially larger than the diameter of the cord except at its inner end portion, and both valve members have sliding contact with the cord only at their inner end portions. The reason for this is that on the entering side it is very important not to apply the pressure of the valve tube to the irregular surface of the cord too suddenly,—otherwise the cotton will tend to be stripped off. The surface of the cord is quite irregular and would tend to catch in the tube unless the constriction is very gradual, as shown. On the exit side it is equally important not to have more friction than is necessary,—otherwise too much of the starch would be scraped off. Furthermore, since the cord is somewhat damp at this stage, it has a tendency to be stretched too much if there is excessive friction in this tube 27. In early trials with this equipment we experienced the difficulties above enumerated, and the tubular valve members were accordingly re-designed as shown in Fig. 1 to overcome these difficulties. On the outer end of

valve tube 27 is a grooved collar 28 engaged by an eccentric 29 on the inner end of a short shaft 30 that is journaled in a bracket 31 attached to a member of the main frame and equipped with a hand wheel 32. By turning the wheel 32 in one direction or the other, the valve tube 27 is moved longitudinally, and the width of the annular orifice between the two valve tubes is regulated. The solution container 18 and its water jacket 19 are normally closed by a cover plate 33 and secured in place by a group of hinged spring-actuated clamps 34 that, in turn, are mounted on a ring 35 screwed onto the upper end of the water jacket 19. The cover 33 is formed with a central upstanding boss 36 forming a bearing for an agitator shaft 37, on the lower end of which shaft is a horizontal stirrer or agitator 38 driven by a pulley 39 on the upper end of the shaft 37 and serving to maintain the consistency of the starch solution substantially constant. By means of this device, as the cord travels through the tubular valve members 25 and 27, it receives a coating of the starch solution, the thickness of which of course depends on the adjustment of the valve.

This application is a division of an application filed by us on the 16th day of October, 1935, Serial No. 45,364, which has matured into Letters Patent No. 2,074,580, granted March 23, 1937, to which patent reference may be had for a full illustration and description of a complete tampon cord-coating machine of which the subject matter of this application forms part.

Manifestly changes in structural details of the machine may be resorted to without departing from the essence of the invention or sacrificing any of the advantages thereof; and hence we reserve such variations, modifications and mechanical equivalents as fall within the spirit and purview of the claims.

We claim:

1. In a cord coating apparatus of the character described, means for applying a coating solution to the surface of the cord, comprising a vessel to contain the solution, a valve controlling the amount of solution admitted to the surface of the cord comprising two endwise opposed tubular valve members mounted in the side walls of said vessel through which the cord is drawn, said valve members extending approximately to the transverse center of the vessel and having their inner ends narrowly spaced to admit the solution between them, and means for adjusting the distance between said inner ends.

2. In a cord coating apparatus of the character described, means for applying a coating solution to the surface of the cord, comprising a vessel to contain the solution, and a valve controlling the amount of solution admitted to the surface of the cord comprising two endwise opposed tubular valve members mounted in the side walls of said vessel through which the cord is drawn, said valve members having their inner ends spaced to admit the solution between them, and one of said valve members being fixed and the other adjustable endwise.

3. In a cord coating apparatus of the character described, means for applying a heated coating solution to the surface of the cord, comprising a vessel to contain the solution, a water jacket surrounding the sides and bottom of said vessel, an electric heater in the bottom of said jacket for heating the water in the latter, an electrically controlled thermostat having its bulb located in the jacket for maintaining the solution at a uniform temperature, and a valve controlling the amount of solution admitted to the surface of the cord comprising two endwise opposed tubular valve members mounted in the side walls of said vessel and its jacket through which the cord is drawn, said valve members having their inner ends spaced to admit the solution between them, and means for adjusting the distance between said inner ends.

4. In a cord coating apparatus of the character described, means for applying a coating solution to the surface of the cord, comprising a vessel to contain the solution having in its lower portion two endwise opposed tubular bosses each extending a substantial distance into said vessel, and a valve controlling the amount of solution admitted to the surface of the cord comprising two endwise opposed tubular valve members mounted in said bosses with their inner end portions projecting beyond the inner ends of said bosses but narrowly spaced apart to admit the solution between them, said valve members being relatively adjustable endwise to vary the space between their inner ends.

5. In a cord coating apparatus of the character described, means for applying a coating solution to the surface of the cord, comprising a vessel to contain the solution having in its lower portion two endwise opposed tubular bosses each extending a substantial distance into said vessel, and a valve controlling the amount of solution admitted to the surface of the cord comprising two endwise opposed tubular valve members mounted in said bosses with their inner end portions projecting beyond the inner ends of said bosses but narrowly spaced apart to admit the solution between them, and means for adjusting the distance between the inner ends of said valve members, comprising a grooved collar fast with the outer end of one of said members, a shaft journaled radially of said collar, an eccentric on the inner end of said shaft lying in the groove of said collar, and a hand wheel on the outer end of said shaft.

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