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APPLICATOR DRIPPAGE CONTROL DEVICE

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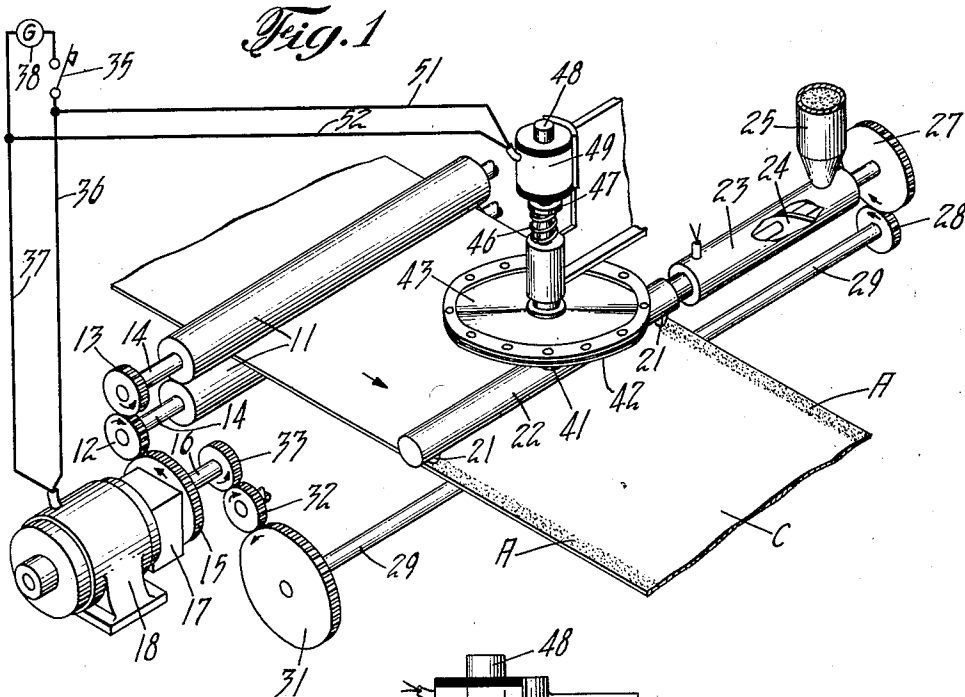
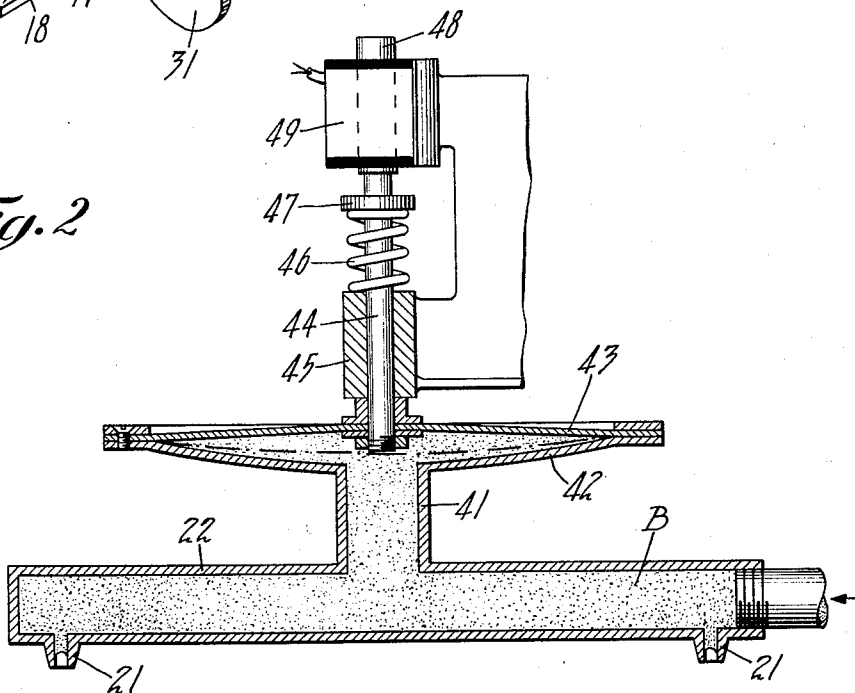


Fig. 2



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1

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APPLICATOR DRIPPAGE CONTROL DEVICE

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4 Claims. (Cl. 118—24)

The present invention relates generally to machines for applying fluid substances to material and articles by way of nozzle applicators and has particular reference to devices for controlling drippage of the fluid substances from the applicators.

In the manufacture of containers, either fibre or metal, fluid adhesives, cements, compounds, plastics or the like substances, are often applied to container parts or sheet or web material from which containers are made, by way of nozzle applicators. In certain types of machines using nozzle applicators, considerable difficulty has been experienced in dripping of the substance from the applicator when the machine stops, and slow starting of the flow of substance when the machine starts. This is particularly true of machines which apply the substance to substantially continuous webs upon which other operations are performed simultaneously with the applying operation and wherein stoppage of the travel of the web through the machines occasionally occurs. Such a stoppage of the web causes the substance to drip upon it and thereby causes damage to the web. Also when the web starts travelling after a stop, a skip in the application of the substance occurs and again spoils the web for use where such portions cannot be cut out.

An object of the instant invention is to prevent drippage of fluid substances from nozzle applicators when the flow of the substance is cut off.

Another object is to provide for immediate flow of fluid substances from a nozzle applicator when the latter is set in operation.

Another object is to provide a diaphragm control device which is simple in construction and efficient in operation for controlling the drippage and the fast starting of fluid substance nozzle applicators.

Another object is to provide such control device which is synchronized with the operation of the nozzle applicators so as to be effective in controlling the application of fluid substances in substantially continuous operations which are subject to occasional uncontrolled stoppage.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a perspective view of principal parts of a fluid applying apparatus embodying the instant invention, and

Fig. 2 is an enlarged sectional view of a diaphragm control device used in the apparatus shown in Fig. 1.

As a preferred and exemplary embodiment of the instant invention the drawing discloses an apparatus for applying bands or ribbons A of fluid plastic substance B, to the marginal edge portions of a substantially continuous web C of fibre material, fed through the apparatus continuously as an incident to preparing the web for the manufacture of containers therefrom.

The web C preferably is advanced by a pair of feed

2

rollers 11 between which the web passes. The rollers 11 are rotated continuously in unison through a pair of meshing spur gears 12, 13 mounted on trunnions 14 projecting from the ends of the rollers. One of the gears, preferably gear 12, is a driving gear and is in mesh with a gear 15 mounted on a shaft 16 of a speed reduction unit 17 driven by an electric motor 18.

The fluid plastic substance or material B applied to the web C as the bands A, is ejected or extruded from a pair of open orifice nozzles 21 which depend from a manifold 22 disposed above and transversely of the path of travel of the web C as shown in Fig. 1. The manifold 22 is connected to and receives the fluid plastic substance B from a heated feed housing 23 containing a helical feed screw 24. The screw 24 preferably receives granulated plastic substance from a hopper 25 and advances it through the housing 23 for reduction to a melted fluid condition and then feeds it into the manifold 22 for discharge through the nozzles 21. Heating of the housing 23 preferably is effected electrically through coils embodied in the housing and connected to a suitable source of electric current.

The feed screw 24 is continuously rotated in a slow manner in time with the advancement of the web C. For this purpose the screw 24 carries a spur gear 27 which meshes with and is driven by a pinion 28 mounted on and rotating with a cross-shaft 29. The shaft 29 is rotated through a gear 31 which is carried thereon and which meshes with an idler gear 32 which in turn meshes with a driving pinion 33 mounted on the gear reduction unit shaft 16. Through this connection, the feed screw 24 and the web feed rollers 11 are rotated in unison and from the same source of power, i.e. the electric motor 18.

Starting and stopping of the motor 18 preferably is effected through an electric switch 35 embodied in a circuit comprising lead wires 36, 37 which connect the motor 18 with a suitable source of electric current such as a generator 38.

In order to control drippage and fast flow starting of the fluid plastic substance at the nozzles 21, the manifold 22 is equipped with a diaphragm control device which is electrically connected to the motor circuit hereinbefore described. For this purpose, the manifold 22 is formed with a short standpipe 41 which at its lower end communicates with the interior of the manifold. At its upper end, the standpipe 41 is connected to and communicates with a shallow dish shaped diaphragm casing wall 42 having its outer marginal edge portion secured to the outer marginal edge portion of a flexible diaphragm 43, preferably made of bronze or stainless steel.

The diaphragm 43 at its free mid-section is connected to the lower end of a vertically disposed rod 44 slidably carried in a vertical stationary bearing 45. A compression spring 46 around the rod 44 and interposed between the top of the bearing 45 and a collar 47 on the rod, flexes the diaphragm 43 upwardly, as shown in Fig. 2. The upper end of the rod 44 is formed with a core 48 which is surrounded by stationary normally deenergized electric solenoid 49 connected by wires 51, 52 to the motor circuit wires 36, 37 respectively. Hence when the motor switch 35 is opened the solenoid 49 is deenergized and vice versa.

In operation, as when the switch 35 is closed, the solenoid 49 is energized and the core 48 is forced out of the solenoid, thus moving the rod 44 downwardly to flex the diaphragm 43 toward its casing wall 42 as shown in dot and dash lines in Fig. 2. This is the normal position of the diaphragm 43 during the normal discharge of the fluid plastic substance from the nozzles 21 to produce the bands A on the moving web C.

When the electric motor 18 stops for any reason, through opening of the switch 35, either manually or

3

automatically, the feed screw 24 stops so as to stop feeding the plastic substance to the nozzles 21 and the solenoid 49 is deenergized to release its core 48. This action causes the spring 46 to flex the diaphragm 45 upwardly into the full line position shown in Fig. 2 and this causes a sufficient amount of the plastic substance B in the manifold 22 and standpipe 41 to be drawn up into the space created by the flexing of the diaphragm. This has the effect of drawing the residual substance in the nozzles 21, upwardly above the discharge orifices of the nozzles as shown in Fig. 2 and holding it in this position while the machine is stopped, thereby preventing drippage of the substance from the nozzles.

When the machine is again started through closing of the switch 35, the feed screw 24, as well as the motor 18, immediately begin to rotate and the solenoid 49 is simultaneously energized, thereby causing the flexing of the diaphragm 43 downwardly against the drawn-up substance B with the result that the substance is forced down through the nozzles 21 to immediately start flowing of the substance to continue formation of the bands A on the web C without a break.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In an applicator apparatus, the combination of a manifold for holding a fluid substance, a plurality of nozzles on said manifold, each of said nozzles having a discharge orifice for delivering said substance from said manifold, means for feeding said substance to said manifold, means for stopping said feeding means to terminate delivery of said substance from said nozzle, a movable flexible diaphragm in communication with said manifold for drawing residual substance from said nozzles into said manifold upon the stoppage of said feeding means to hold said residual substance against drippage from said nozzles, and spring means for moving said diaphragm for the purpose specified.

2. An apparatus of the character defined in claim 4, wherein said movable flexible diaphragm for drawing residual substance inwardly away from said nozzles is disposed adjacent a standpipe communicating with said manifold, a wall enclosing said diaphragm and connected to said standpipe, and means responsive to the stopping of said actuating means for flexing said diaphragm in one direction relative to said enclosing wall to draw said substance inwardly from said nozzles into said manifold and standpipe to prevent dripping of the substance from said nozzles, said diaphragm being movable in the oppo-

4

site direction upon starting of said actuating means to force the substance from said standpipe and manifold into said nozzles for delivery therefrom to effect fast starting of the substance flow.

3. In an apparatus for applying a band of fluid substance to a substantially continuous web of material, the combination of means for advancing said web along a predetermined path of travel, a nozzle disposed adjacent the path of travel of said web, said nozzle having a discharge orifice for delivering said fluid substance to said web, means for feeding said substance to said nozzle for delivery therefrom in a continuous stream to produce a continuous band on said web, means for actuating said web advancing means and said substance feeding means in synchronism, means for starting and stopping said actuating means, and a movable flexible diaphragm disposed in contact with said substance adjacent said nozzle, said diaphragm having means controlled by an electric solenoid for moving the diaphragm towards and away from said nozzle, the latter for drawing residual substance inwardly away from said nozzle orifice upon the stoppage of said feeding means, to hold said substance retracted in said nozzle against dripping therefrom.

4. In an apparatus for applying a fluid substance to a substantially continuous web of material, the combination of means for advancing said web along a predetermined path of travel, a manifold extending across the path of travel of said web for holding said fluid substance, a plurality of nozzles on said manifold, each of said nozzles having a discharge orifice for delivering said substance from said manifold to said web, means for feeding said substance to said manifold, electrically controlled means for actuating said web advancing means and said substance feeding means in synchronism, means for starting and stopping said actuating means, and a movable flexible diaphragm disposed in contact with said substance adjacent said nozzles, said diaphragm having means controlled by an electric solenoid for moving the same in opposite directions, respectively for urging said substance through said nozzle orifices onto said web and for drawing residual substance inwardly away from said orifices upon stoppage of said feeding means, to hold said substance retracted in said nozzles against dripping therefrom.

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