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FLUID APPLICATOR FOR CAP MAKING MACHINES

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2 Sheets-Sheet 1

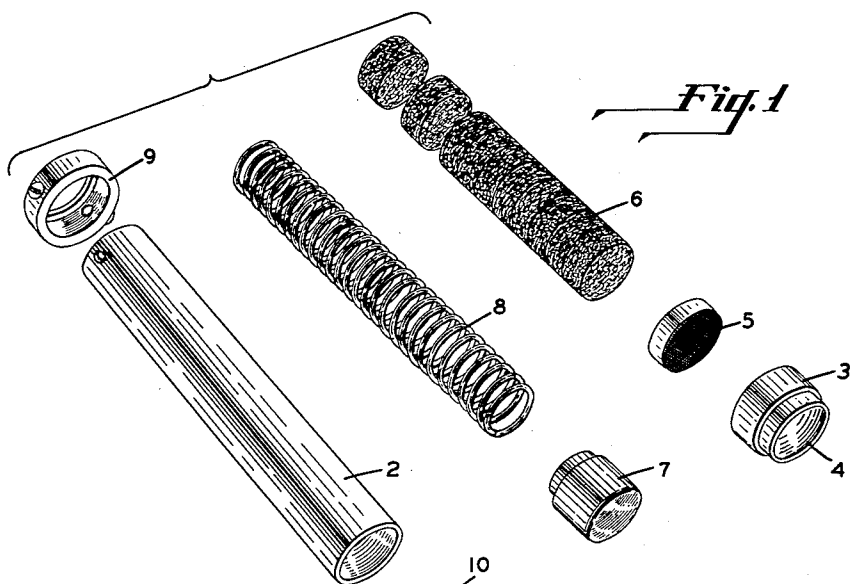
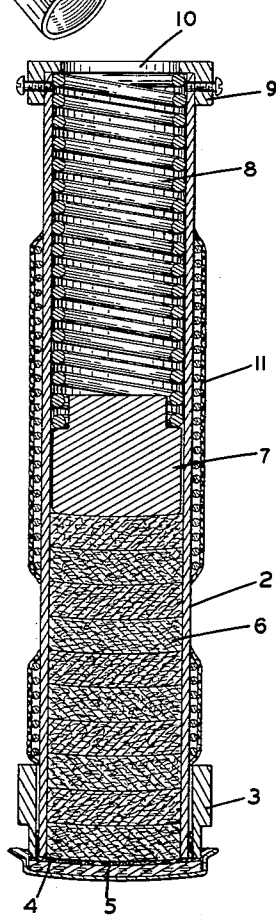


Fig. 2



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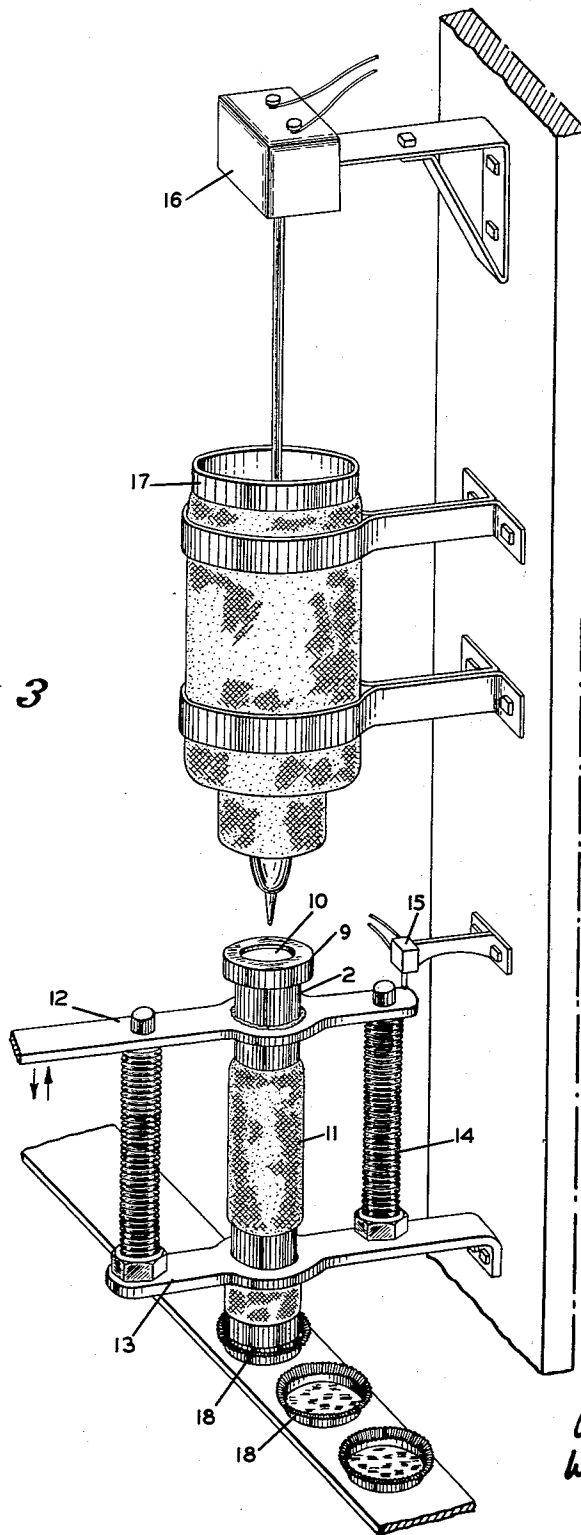
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Fig. 3



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FLUID APPLICATOR FOR CAP MAKING MACHINES

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3 Claims. (Cl. 118—241)

This invention relates to a fluid applicator, and more particularly to an applicator for applying a film of coating material to the surface of articles during high-speed production operations.

In the manufacture of crown closures having a sealing liner of cork composition or the like, it is necessary to protect the liner from the contents of the bottle. If this is not done, the contents of the bottle penetrate the cork composition liner, swelling the same so that voids are present therein through which leakage occurs. In order to prevent the contents of the container from coming in contact with the surface of the liner, two systems have been used. One of the most common is to secure a spot of sheet material, such as varnished paper, metal foil, etc., to the center of the crown liner so that the entire area of the liner exposed to the neck opening of the bottle is covered by this spotting material.

Another system which is used extensively for the sealing of beverages, for example, where the period of time during which the bottle is sealed is relatively short, has been to coat the liner with a fluid coating material which renders the liner relatively impervious to the contents of the bottle. One of the most common coating materials used for this purpose is paraffin wax.

This coating operation is difficult, inasmuch as it is essential that the coating composition be printed intermittently to a continuous line of crowns passing along on a conveyor at a relatively high rate of speed. It is essential that a controlled amount of coating composition be applied to properly coat the liner but at the same time avoid an excess use of the material. This is particularly difficult when using coating compositions in which the fluidity changes with changes in temperature, making it necessary to maintain the fluid within a limited temperature range for proper application.

One of the prior art systems which has been widely used is carried out by placing a quantity of cork liners in a tumbling device together with solid pieces of paraffin wax. The device is tumbled for a period of time sufficiently long to allow the liners to come in contact with the paraffin wax to coat all the liners. One of the chief disadvantages of this system is that both sides of the liner are coated, when coating on one side only is desirable. In addition to this unnecessary use of wax, it is also difficult to properly adhere the waxed liners to crown closure shells because the adhesive does not have an affinity for the waxed surface of the liner.

In another system currently used by the industry, the paraffin coating operation is performed by a rotary applicator having a plurality of applying pads positioned on the extremity of rods radiating from a central hub. This rotary device is located in the path of travel of the lined crowns in such manner that one of the pads contacts the liner of a crown as the crown passes thereunder. The pad then passes over a roller which rotates in the fluid reservoir and picks up sufficient coating material for the next application. This is not a completely satisfactory

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device for performing the coating operation, inasmuch as there is a tendency for the coating material to splash onto the working parts of the assembly machine as well as onto the skirt of the crowns being manufactured. This not only has a deleterious effect on the articles being produced, but also results in a considerable waste of coating material. Here, too, there is a problem of applying an excess of paraffin which flakes off and contaminates the contents of the bottle. The problem of temperature control to keep the paraffin at the proper consistency is present in this system.

In order to overcome the disadvantages of the prior art devices described above, I have developed a capillary type coating device which will apply a controlled amount of fluid to the exact area of the liner to be coated, with no waste of material and no deleterious effect resulting to the article being produced or to the equipment utilized in producing the article.

An object of this invention is to provide a coating device which will supply a controlled amount of fluid to a limited area of the article to be coated.

Another object of this invention is to provide a coating device which will apply the desired amount of material to the article without wasting any of the relatively expensive coating material.

Other objects and advantages of this device will be apparent from an observation of the attached drawings in which:

Figure 1 shows the component parts of the device;

Figure 2 is a cross-sectional view of the applicator; and

Figure 3 shows the device in position to apply the coating.

Referring to Figure 2, there is shown a hollow sleeve or cylinder 2 which is placed on the machine for reciprocatory motion in a vertical direction. This cylinder 2 serves as a reservoir for the fluid coating material. An adapter ring 3 fits over the lower extremity of the cylinder 2 and is formed to fit the interior of a crown closure or other article to which the coating material is to be applied. The adapter 3 has an opening 4 which is provided with a convex diaphragm 5 having openings therein. The size of the openings in the diaphragm 5 is selected in accordance with the fluidity of the fluid coating composition. Above the diaphragm 5 is a plurality of felt pads 6. These pads 6 may be of any composition capable of absorbing and holding a supply of the fluid material to be fed to the diaphragm. The pads 6 are shown in small increments for convenience of assembling. If desired, this absorptive element may be in one piece. Above the absorptive element 6 is a back-up plug 7, which keeps the absorptive element under a certain amount of compression to keep supplying the fluid to the screen 5. Pressure is applied to the back-up plug 7 by means of a coil spring 8, which is compressed between the top ring 9 fitted over the top of the cylinder and the back-up plug 7. The top of the cylinder is open as shown at 10 for the purpose of supplying the liquid coating composition to the cylinder. In order to maintain the coating composition at the proper temperature for application, the cylinder may be heated by means of a resistance heating element 11 wrapped around the outer circumference of the cylinder.

In applying a coating composition to the article to be coated, the device is lowered into the article as the article passes therebeneath on a suitable conveyor as shown in Figure 3. This arrangement is satisfactory for relatively low-speed production; however, in high-speed production, such as that currently existing in the closure industry, it has been found desirable to lower the applicator into engagement with the crown on the conveyor and have the applicator travel with the crown on the conveyor while the coating operation is being performed. There

are several possibilities for carrying out this idea, and one which has been found particularly suitable involves the utilization of a rotary carrier placed immediately above the rotary conveyor carrying the lined crowns away from the lining machine. The coating applicators are arranged on the carrier so that they are disposed in alignment with the crowns carried on the conveyor. During a certain portion of the rotary cycle of the applicator carrier, each applicator is lowered into the crown moving directly therebeneath so that the applicator is in engagement with the crown liner during a portion of its path of travel on the conveyor.

In the embodiment shown in Figure 3, downward motion is imparted to the device through the crosshead 12 from a suitable source, not shown. This crosshead 12 is secured to the cylinder 2 by welding or other suitable means. The crosshead 13 at the lower portion of the cylinder 2 serves only as a guide for the cylinder 2 as the cylinder moves through an opening therein. The upward motion to the cylinder 2 into crosshead 12 is effected by the coil springs 14 which are under compression between the two crossheads 12 and 13.

Each time the crosshead 12 is raised, it contacts micro-switch 15, closing the electric circuit to the valve arrangement 16, opening the valve and permitting a metered quantity of the coating material to flow from the source of supply 17 into the open end of the cylinder 2.

In the operation of the device, the crown 18 or other object to be coated is placed in position beneath the cylinder 2 and the cylinder is lowered so that the adapter 3 fits into the inner area of the crown. The central portion of the diaphragm 5 contacts the liner of the closure, flexing the diaphragm and causing the fluid composition to pass through the screen onto the closure liner. A slight continued downward movement of the plunger will flatten the diaphragm against the surface of the liner and apply a uniform layer of the coating composition to the liner. The assembly is then withdrawn from the crown and lowered into another crown, where the operation is repeated.

The relationship between the size of the holes in the diaphragm and the viscosity of the coating composition should be such that the fluid will not pass through the holes in the diaphragm when the same is not in contact with an article to be coated. When the diaphragm is brought into engagement with the article to be coated, the center of the convex diaphragm contacts first in the center of the disc to be coated. Continued downward movement of the assembly causes the diaphragm to flex upwardly, compressing the felt pads to a limited extent. This compression of the felt pads is sufficient to force a limited amount of the fluid coating material through the diaphragm onto the surface of the disc. Because the center of the convex diaphragm touches first in the center of the disc liner, the fluid passes through the diaphragm in this center area first and flows evenly in a radial direction from the center over the area to be coated, forming a uniform coating of the desired thickness.

It will be understood that in utilizing this invention the flowability of the coating composition determines the size of the holes in the diaphragm. Thus for the more viscous fluids larger holes will be necessary than for the more fluid materials. After the diaphragm with holes of the

proper size has been selected for a fluid of a given fluidity it is essential that the device be maintained at a relatively uniform temperature to insure proper application of the coating composition to the lining material.

I claim:

1. In a device for applying a relatively viscous coating composition to a surface to be coated, the elements comprising a reservoir, a core of absorbent material disposed in said reservoir, a flexible diaphragm disposed across one end of said reservoir and in engagement with said core of absorbent material, a resilient member in engagement with the other end of said core of absorbent material to urge said core firmly into engagement with said flexible diaphragm, said flexible diaphragm being provided with openings through which the liquid passes when the diaphragm is flexed to further compress the core material, the openings in said diaphragm being of a size that the fluid will not pass therethrough normally but will pass through when the diaphragm is flexed, and means for bringing said flexible diaphragm into engagement with the article to be coated with sufficient force to flex said diaphragm and for elevating said diaphragm away from said article.

2. In a device for applying a relatively viscous coating composition to a surface to be coated, the elements comprising a reservoir, a flexible diaphragm disposed across one end of said reservoir, means for holding a supply of the fluid coating composition in contact with said flexible diaphragm, said flexible diaphragm being provided with openings through which the liquid passes when the diaphragm is flexed, the openings in said diaphragm being of a size that the fluid will not pass therethrough normally but will pass through when the diaphragm is flexed, and means for bringing said flexible diaphragm into engagement with the article to be coated with sufficient force to flex said diaphragm and for elevating said diaphragm away from said article.

3. In a device for applying a relatively viscous coating composition to a surface to be coated, the elements comprising a reservoir, a core of absorbent material disposed in said reservoir, a flexible diaphragm disposed across one end of said reservoir and in engagement with said core of absorbent material, means for urging said core of absorbent material into firm engagement with said flexible diaphragm, said flexible diaphragm being provided with openings through which the liquid passes when the diaphragm is flexed to further compress the core material, the openings in said diaphragm being of a size that the fluid will not pass therethrough normally but will pass through when the diaphragm is flexed, and means for bringing said flexible diaphragm into engagement with the article to be coated with sufficient force to flex said diaphragm and for elevating said diaphragm away from said article.

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