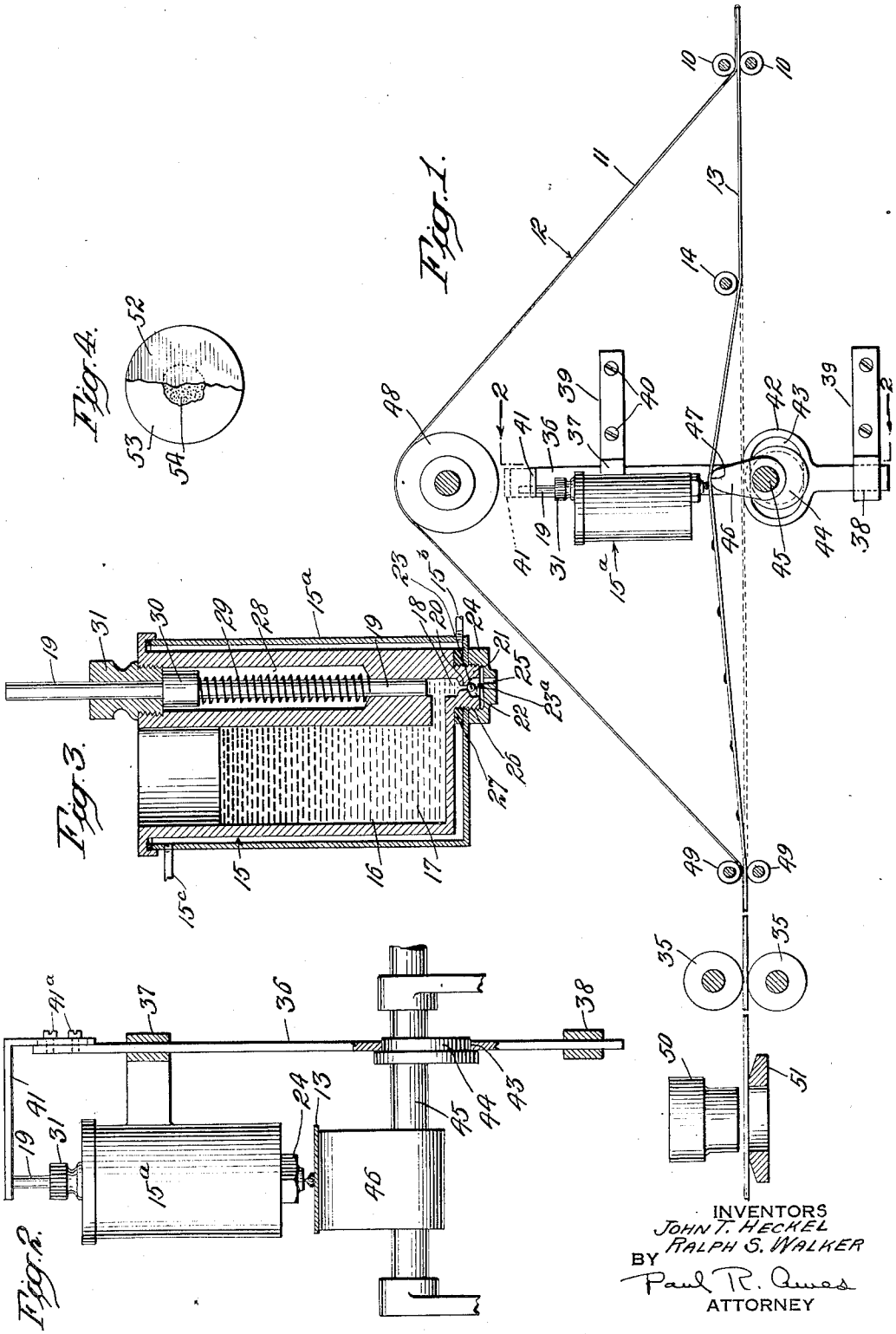
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LINER

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LINER

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This invention relates to the manufacture of liners and the like, especially for bottle or jar caps, and more particularly to improvements in the production of liners made up of a plurality of layers of material, one of which is preferably impervious and resistant to the contents of the bottle or jar, while the other is generally formed of comparatively thick compressible material, the layers being secured together by adhesive.

Liners of this general character have been employed within bottle caps, such as those made of metal and adapted to be screwed on the bottle or jar, and are preferably of such diameter that their edges rest upon the rim of the bottle. Certain disadvantages have occurred in the manufacture and use of such liners as made in the past. In the production of such liners the practice has been to apply a coating of adhesive to the surface of the compressible layer and apply the impervious layer and cut the liners from the sheet after the adhesive is dried. However, when adhesive is applied to such liners over the surface of a compressible material such as cardboard which is generally quite porous, the liner, upon the drying of the adhesive, becomes so stiff that the liner will not conform to the irregularities in the surface of the rim of the jar or bottle.

Furthermore, when a bottle cap is employed which has a ring extending downwardly from the inside of the top, and adapted to lie closely within and around the perimeter of the rim of the bottle, either for the purpose of indenting the liner to form a tight seal between the liner and the top of the bottle, or for the purpose of stiffening the top of the cap to prevent it from doming, the stiffness of such liner is apt to result in the bending or doming of the cap thereby causing the portion of the top of the cap which overlies the mouth of the jar to cease to lie in a line approximately parallel to the surface of the rim of the jar, resulting in a loss of a substantial amount of the effectiveness of the seal.

In the manufacture of bottle cap liners from webs of material in accordance with previous practice, certain additional disadvantages are noted. For one thing, when the glue is applied over the surface of a web of material, even though another web is superposed thereon, the individual liners cannot be cut from the web until the adhesive dries because the adhesive would be extruded from between the sheets and would gum up the machine employed for cutting out the liners. In order to permit the adhesive to dry, without requiring undue space, the webs of material between which the adhesive resides, have been rolled up. When the web is unrolled the impervious material is found to be longer than the compressible material and tends to stand up in waves upon the compressible material. When these waves are passed between rollers for feeding the webs to the blanking mechanism, wrinkles or folds are formed, these wrinkles or folds thus impairing the sealing qualities of the liner. Through the present invention, these disadvantages may be avoided and at the same time a liner produced in which the layers adhere sufficiently for practical purposes.

An object of this invention is, accordingly, to produce an improved liner for the purpose indicated and adapted not only to effect a superior seal between the cap and jar but also to be simple and inexpensive to manufacture.

Other objects and advantages of our invention will become apparent in connection with the following detailed description of one form of the invention, reference being had to the accompanying drawing, wherein:

Fig. 1 is a front elevation, somewhat diagrammatic, of one form of machine adapted to produce a liner in accordance with the present invention.

Fig. 2 is an enlarged side elevation, partly in section, taken on the line 2—2 of Fig. 1.

Fig. 3 is a vertical section taken through the means for applying adhesive.

Fig. 4 is a plan view of a liner made in accordance with the invention, portions of said liner being broken away.

In the drawing, there is shown in Fig. 1 a machine including rollers 10 for guiding a web of paper 11, preferably water-proofed as by paraffining on its side 12, and a web 13 of material which is relatively thick and stiff as compared with the material 11. The web 13 may advantageously consist of a suitable thickness of cushioning material such as news board, cardboard, or the like, having the desired flexibility and compressibility for present purposes. The web 13 is shown passing below a guide roller 14 and thence to means for applying adhesive at spaced intervals to the web.

Such adhesive applying mechanism may advantageously consist of a device 15 including a well 16 for receiving liquid adhesive 17. At one side of the well 16 a sump 18 is shown adapted to cooperate with a plunger 19, actuated as hereinafter described. Below the sump there is preferably formed a restricted passage 20 through which portions of adhesive may be dispensed.

The passage 20 may be formed in a downward extension 21 on the device 15 and an enlarged hollow portion 22 be provided in the extension 21, below the passage 20, for receiving a ball valve 23, preferably supported upon some suitable resilient device such as the helical or coil spring 23a. For forming the bottom of the chamber 22, a cap 24 may be provided having an outlet passage 25 communicating with the chamber 22 out of line with passage 20 and adapted to convey adhesive from the chamber to a point adjacent the web 13. This cap 24 may be secured to the extension 21 in any convenient manner, as for instance, by threads 26. A steam jacket 15a, having inlet 15b and outlet 15c for a heating medium, is preferably provided surrounding the adhesive container for maintaining the adhesive in a fluid state. The bottom of the jacket may have an aperture through which extension 21 projects, the bottom of the jacket being spaced from the device 15 as by means of a nut 27, and being secured between the nut 27 and cap 24. If desired, however, other heating means such as a burner or electric heating device may be employed.

The piston or plunger 19 is mounted so that when depressed its lower end enters the sump 18 to segregate a portion of adhesive and dispense it through the passages 20 and 25. A cavity 28 may be provided in the member 15 for receiving a spring 29 adapted to retract the plunger to the position shown in Fig. 3 through cooperation with a sleeve 30 or other suitable device which may be shrunk onto the piston or plunger, or otherwise suitably secured thereto. The upper end of the plunger is shown extending through a head 31 threaded into the upper end of the wall surrounding the cavity 28 to close the same and limit the upward extent of travel of the plunger by contact between said head and the sleeve 30.

In operation, the chamber 22 and passage 25 will ordinarily be filled with adhesive, and as the plunger descends upon each stroke the ball valve 23 will be forced downwardly to permit the passage of a given quantity of adhesive. When the downward movement of the piston is stopped, the valve will serve to seal the passage 20, the size of the opening 25 being such that the viscous adhesive will not drain from the chamber 22. The ball valve 23 and chamber 22 thus aid in dispensing a uniform quantity of adhesive and locating it where desired without producing a stringy effect.

The dispenser may be used to advantage with continuous webs of material which may be drawn forward as by the driven press rollers 35, one of the webs being intermittently raised as successive points are directly beneath the adhesive dispensing device, while substantially at the same time a bit of glue is dispensed, the web thereupon moving or falling away rapidly. We have found that in this manner smearing or stringing of the adhesive along the moving web may be avoided. For accomplishing this, mechanism of the character which will now be described may advantageously be employed.

A member 36 may be mounted in guides 37, 38 for vertical sliding movement, these guides being suitably secured to an upright member (not shown) by arms 39 and screws 40 or other convenient fastening means. The arm 39 may also serve to support the glue dispensing member 15. Secured for vertical adjustment by means of any suitable device, such as screws 41a, to the upper end of the member 36 there is shown a generally horizontal arm 41 adapted to cooperate with the plunger 19 to depress the same periodically. The member 36 may also be formed with a portion 42 surrounding an opening 43 for cooperation with a cam 44 eccentrically mounted on shaft 45. This shaft 45 may be rotated from any suitable source of power (not shown). Secured to the shaft in any convenient manner is a cam 46 having an actuating face 47 so shaped that it is adapted to raise and drop the web 13 abruptly. The cam 46 may be adjusted so that it is synchronized with the arm 41 in order to effect the dispensing of the glue at the time when the web of material is raised as shown in Fig. 1, or possibly just prior to the time when the cam reaches dead center. As shown in this figure, the glue may be deposited on the web slightly in advance of the high point of the cam, with good results.

If it be desired to vary the amount of the glue deposited on the web at each stroke of the plunger 19 it is merely necessary to loosen screws 41a raise or lower the arm 41 and tighten the screws. In this way the movement of the plunger 19 and the depth to which the plunger enters the sump 18 will be increased or decreased and the amount of glue dispensed correspondingly varied.

In order that the rapid falling away of the web 13 from the cap 24 may be assured, the guide rollers 10 and 49 may grip the webs with sufficient force so that the web 13 is put under tension when displaced by the cam 46. Such a device is particularly useful with light materials. Other suitable means might be employed, if desired, for sharply jerking the web away from the glueing device, and in some cases, as where a heavy web is used, this may be unnecessary. While it is desirable that the portion of the traveling web to which adhesive is to be applied be brought closely adjacent the point at which the adhesive leaves the dispensing device, it will be understood that that web need not actually, and preferably should not, come in actual contact with said device.

As the adhesive is to be applied to but one of the webs, the web 11 is shown passing over a guide roller 48 clear of the glue or adhesive applying mechanism. The two webs 11 and 13 are superimposed, preferably just after the glue has been applied to one of them, as they pass between guide rollers 49. The drawing rollers 35, or other convenient device, may serve to press the two webs together to insure the proper action of the adhesive.

At 50 and 51 there are shown, somewhat diagrammatically, properly synchronized means for punching out of the superimposed webs bottle cap liners of the desired size. Various forms of such apparatus are well known and need not be further described herein, any suitable type being employable in connection with the apparatus.

Through the present invention, wherein the adhesive is applied to the center of the portions of the web adapted to form bottle cap liners, and not at the edges of such portions, the punching operation may advantageously be performed shortly or substantially immediately after the webs are pressed together, since there is no glue or other adhesive at the edges of the liners which would interfere with the punch or tend to gum it up. Moreover, the liners may be immediately placed in the bottle caps, as there is no glue oozing from the sides of the liner, and, if desired, the caps may thereupon be immediately placed on the bottles, the pressure of the caps aiding in holding the layers of material together while the adhesive dries. Moreover, possibility of the

adhesive crystallizing and the layers becoming separated before the liners are put in the caps is avoided. Also, the sheet material does not have to be rolled up, so that the disadvantage of irregularities between the layers and subsequent formation of wrinkles or folds, is avoided.

As is understood in the punching art the web may be fed forward intermittently or a rotary punch may be employed where desired.

Different sizes of liners or the like may be produced by changing the size of the punching die and controlling the speed of the web of material accordingly, the longitudinal distance between the glue dispensing device and punch being adjusted so that the latter is centered with respect to each deposit of glue. It is preferred to operate the glue dispensing device simultaneously with the punching die although it is obvious that this mode of operation may be altered. For example, to take care of a variation in the distance between centers, when liners for different sized caps are produced, without changing the longitudinal distance between the punching device and the glue dispensing device the punching device may be operated at the same rate as the glue dispensing device but at a slightly delayed period in order to accommodate such a variation in centers.

As shown in Fig. 4, the bottle cap liner may be composed of a portion **52** from the web **11** and a portion **53** from the web **13** with a bit of adhesive **54** between the two layers of material. The adhesive should be sufficient to spread over the surface of the material to the desired extent upon the pressing together of the layers, but it will be understood that its extent and configuration is not necessarily such as that shown. We prefer to have the adhesive occupy only the center portion of the liner, while a substantial perimetric portion of the layers **52** and **53** is not covered with adhesive. Accordingly, these edges are free for certain relative movement which has been found to be particularly advantageous in bottle cap liners of the character mentioned, where flexibility and an absence of wrinkles are important in obtaining adequate sealing. While the method and apparatus are simplified if but a single bit of adhesive is applied to each liner, it will be understood that a plurality of separate bits of adhesive might be applied to the surface of the material.

It may be noted that the side of the material **11** adjacent the adhesive is preferably of such character as to form a good bond with the adhesive, and that the material **13** is advantageously sufficiently yielding to provide a certain cushioning effect when employed between a bottle and rigid closure. While the material **11** may be of such character that is treated only on one side to make it impervious and highly resistant to the contents of the jar, as by being water-proofed or grease-proofed on the side opposite to the one to which the adhesive is applied, there is no reason, as far as the present invention is concerned, why the paper may not be resistant on both sides or composed of impervious materials, when a suitable adhesive such as that described in application Serial No. 525,341, filed March 25, 1931, by Louis G. Copes, is used.

No claim is made herein to the apparatus or method for producing cap liners described herein, since these are being claimed in our copending application Serial No. 708,438, filed January 26, 1934, now issued as Patent No. 2,029,922.

The terms and expressions which have been employed are used as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described, or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

We claim:

1. A cap liner comprising a plurality of layers of material, means for securing said layers together so as to provide for slippage between adjacent layers in a perimetral zone when said liner is subjected to sealing compression, said means comprising adhesive spaced inwardly from said zone.

2. A cap liner comprising a plurality of layers of material secured together with adhesive and provided with a zone, opposite the portion of the liner adapted to contact the container, which is free from adhesive between the layers, said layers being free to move relative to each other in said zone when the liner is subjected to sealing compression.

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