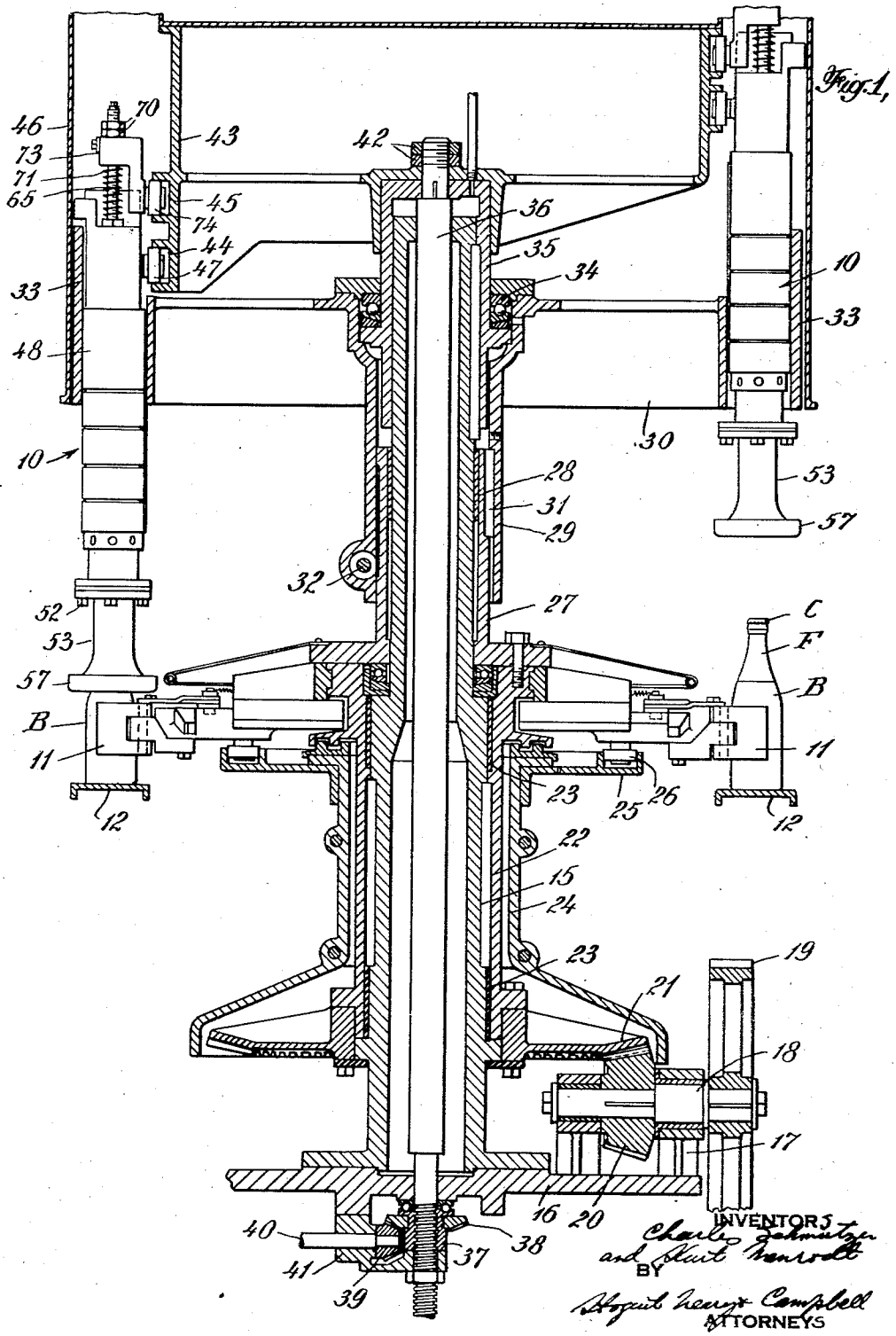
Oct. 6, 1942. C. SCHMUTZER ET AL 2,297,720

FOIL APPLYING APPARATUS FOR BOTTLES

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Fig. 1,



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FOIL APPLYING APPARATUS FOR BOTTLES

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Fig. 2,

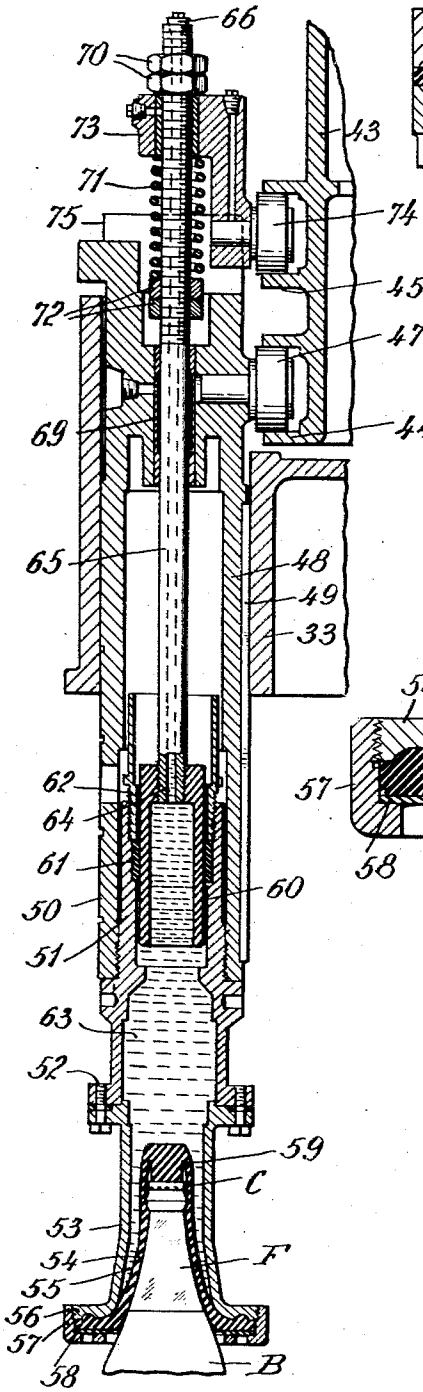
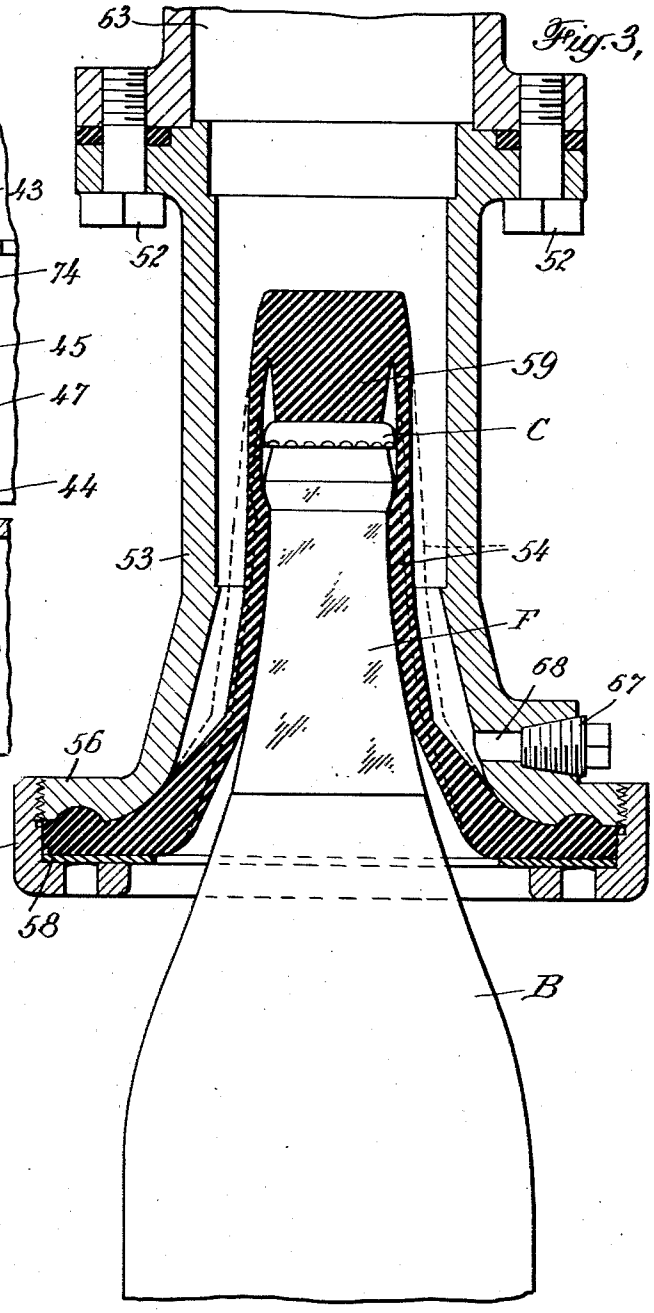


Fig. 3,



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Fig. 4,

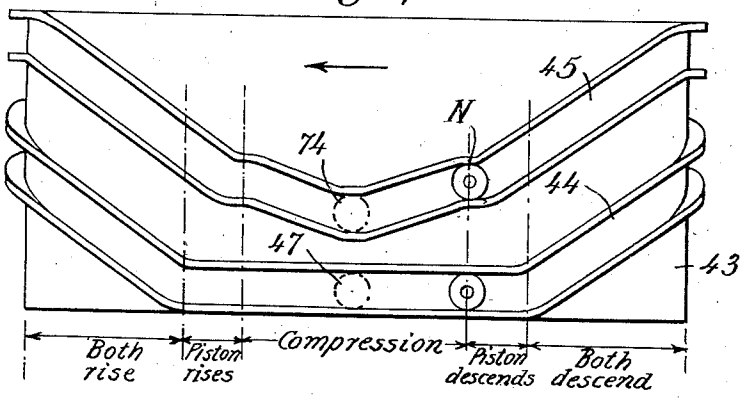


Fig. 5,

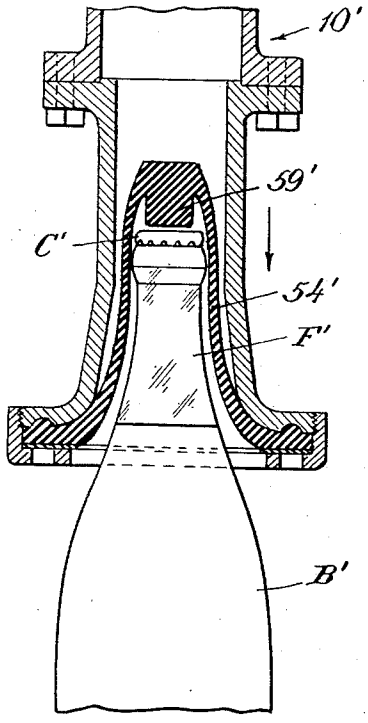
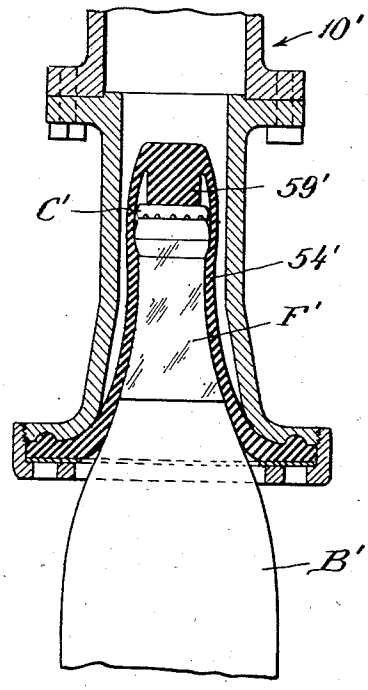


Fig. 6.



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UNITED STATES PATENT OFFICE

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FOIL APPLYING APPARATUS FOR BOTTLES

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Application February 11, 1939, Serial No. 255,798

3 Claims. (Cl. 226—85)

This invention relates to apparatus for applying foil to bottles and has particular reference to apparatus for applying uniformly to the necks of bottles the foil or equivalent material which is commonly applied when the bottles are used for beverage purposes and the like, although the invention is not limited to that use. This application is a continuation in part of application Serial No. 121,116, filed January 18, 1937.

Because the foil commonly employed for this purpose is non-elastic, being usually made of metal, it cannot be applied smoothly without crinkling and some folding as it accommodates itself to the varying diameter and shape of the tapering neck of the bottle. With foil-applying apparatus in common use, which usually consists of resilient rotating rollers or wipers, the crinkling and folding is considerable and the force of application frequently results in tearing and mutilation of the foil, due largely to creeping and bunching of the foil caused by the circumferentially non-uniform and localized rolling pressure of the rollers. Also with sleeve type squeezing devices the sleeve ripples when reduced in diameter during the squeezing operation with consequent disarrangement of the foil. Accordingly, the foil is not only non-uniformly applied to successive bottles but it is frequently unsightly and its decorative effect is impaired and often destroyed so that refoiling is necessary.

In accordance with the present invention, a foil-applying apparatus for bottles is provided in which the foil after being laid around the neck of the bottle is squeezed and pressed by means substantially exactly coextensive with the entire area of the foil so that it lies as smoothly and uniformly as the non-elastic nature of the foil will permit, the foil being applied without friction so that bunching, tearing and mutilation of the foil do not occur.

More particularly, the foil-applying apparatus of this invention comprises a multi-head rotary machine adapted to be driven in synchronism with the machine which lays the foil upon the gummed necks of the bottles. The bottles are transferred from the foil-laying machine to the foil-applying apparatus of this invention on which they are held individually by grip fingers in alignment with a corresponding head, which is recessed to receive it. As the foil-applying machine rotates, each successive recessed head descends over the upper end of a bottle so as to envelop the foiled portion of the neck thereof.

The recess in the head is fitted with a sheath of resilient material shaped to substantially conform to the contour of the neck of the bottle and having substantially the same normal dimensions. This sheath forms a chamber with the wall of the head and this chamber communicates with a liquid reservoir containing a piston actuated by a cam to first create a suction to expand the sheath to admit the bottle neck and then to apply pressure to the liquid so that the sheath is contracted hydraulically into coextensive contact with the neck of the bottle. Because the normal dimensions of the sheath are those of the bottle neck, the foil is accordingly squeezed and pressed uniformly over every unit of its area without rippling of the sheath, thus causing the foil to adhere firmly to the neck of the bottle and lie as smoothly thereon as the physical nature of the foil will permit. After this squeezing and pressing operation, the suction is again applied by the cam-actuated means, so that the resilient sheath expands to disengage the foil and enable the head to be retracted from the bottle, which is subsequently transferred by suitable means to additional processing machinery or the like, such as a labeling machine for applying the body and neck labels thereto. In a modified form of the invention, the rubber sheath is made initially or normally larger than the bottle neck, so as to admit the latter, and the top of the bottle engages the upper end of the sheath so as to elongate the latter axially with a consequent radial contraction, which effects the foil-squeezing operation without the use of auxiliary fluid means. Upon initial retracting movement of the head, the sheath immediately shortens with accompanying radial expansion to disengage the bottle and permit retraction thereof from the sheath.

It will be seen that the foil-applying apparatus of this invention provides a simple and effective means for uniformly applying the decorative foil to the bottles, such as beverage bottles and the like, with a facility which enables rapid operation and provides a trim and attractive package, all packages being alike in that the foil has the same appearance, as it is applied in precisely the same way to all packages.

For a more complete understanding of the invention, reference may be had to the accompanying drawings, in which:

Figure 1 is a vertical section through the foil-applying apparatus of this invention;

Fig. 2 is an axial section through one of the foil-applying heads, and illustrates the condi-

tion of the mechanism during the foil-squeezing operation;

Fig. 3 is an enlarged section through the head itself, illustrating the normal and distended conditions of the sheath in the head;

Fig. 4 illustrates the head-actuating and hydraulic piston operating cams; and

Figs. 5 and 6 illustrate a modified form of foil-applying device of this invention.

Referring to Fig. 1 of the drawings, the foil-applying apparatus of this invention is preferably a rotary machine provided with a plurality of peripheral foil-applying heads 10, of which eight are used in the particular machine illustrated, although any number may be provided. This machine is adapted to cooperate with a conventional machine (not shown) for laying the covering foil F loosely on the necks of the bottles B, which are then transferred individually in timed sequence to the foil-applying apparatus, where they are individually held by grip fingers 11 shown in Fig. 1. The finished foiled bottles B are transferred individually in timed relation by grip fingers 11 of the foil-applying apparatus to a conventional labeling machine (not shown). The foil-laying, the new foil-applying, and the labeling machines operate in synchronism and to that end are preferably driven from the same source of power in accordance with well-known standard practice.

As shown in Fig. 1, the foil-applying apparatus includes a central column 15 suitably mounted on a base plate 16 provided with bearing brackets 17 in which is journaled the drive shaft 18 driven by spur gear 19 from the aforementioned common source of power. Drive shaft 18 is fitted with a bevel pinion 20 meshing with a large bevel gear 21 bolted to the main sleeve 22 of the machine which is journaled on the central column 15 on bushings 23, so as to revolve thereon. The stationary housing 24 encloses the revolving main sleeve 22 and bevel gears 20 and 21.

Supported on this housing 24 is the cam 25 for operating the bottle grip fingers 11, the cam roller 26 following the cam 25 to open and close the grip fingers 11 at the proper time preparatory to transferring a bottle B from the foil-laying machine to the new foil-applying apparatus. These grip fingers 11 firmly grip the bottle in proper position during the foil-applying operation, sliding them over a table 12. After the foil is applied, the jaws 11 are opened by cam 25 to transfer the foiled bottle to the labeling machine. The particular form of the mechanism for operating the grip fingers 11 forms no part of the present invention and need not be described in detail.

Bolted to the upper end of sleeve 22 is an upper sleeve 27 journaled on bushing 28 on central column 15. The split hub 29 of a spider 30 is telescoped over upper sleeve 27 and is splined thereto by means of key 31 so that spider 30 rotates with sleeve 27. A clamp screw 32 contracts the hub 29 to lock it to upper sleeve 27. The spider 30 is provided with the circumferentially arranged guides 33 in which the foil-applying heads 10 are vertically slidable in alignment with the grip fingers 11 which hold the bottles B.

The spider 30 is supported on thrust bearing 34 carried by a sleeve 35 keyed non-rotatably on the upper end of a rod 36 extending downwardly through central column 15 and base plate 16. The lower end of the rod 36 is threaded and is fitted with a nut 37 to which is secured bevel gear 38 meshing with a bevel gear 39 on shaft 40 journaled in a bracket 41 secured to base plate 16 and supporting the weight of the nut 37, rod 36 and its appurtenant parts. By manually rotating shaft 40, nut 37 is caused to rotate so as to raise and lower rod 36, which results in raising and lowering of spider 30 supported by rod 36 on sleeve 35 so that the head 10 will accommodate bottles of different heights. When the adjustment has been made, spider 30 is locked in adjusted position by means of the clamp screw 32 as described.

Clamped against the upper end of sleeve 35 by nuts 42 on rod 36 is the stationary cam drum 43 having the separate circumferential cams 44 and 45 shown particularly in Fig. 4. Cam 44 is adapted for raising and lowering the respective foil-applying heads 10, and cam 45 is the hydraulic piston actuating cam. Cams 44 and 45 may be made separate, but they are preferably joined in one unit as shown. A hood 46 of sheet metal or the like is supported by drum 43 and encloses the upper portion of the machine.

The foil-applying heads 10 shown in enlarged detail in Fig. 2 are each supported on cam 44 by means of cam-following roller 47 carrying the cylindrical slide 48 splined in spider guided 33 by means of key 49 for non-rotative vertical movement therein. The slide 48 is provided with an integral tubular lower portion 50 and threaded on and extending partially into the interior of the tubular portion 50 is reservoir tube 51, to the lower end of which is secured by studs 52 the diverging funnel 53 forming the bottle receiving recess of the foil-applying head. This funnel 53 has the general contour of the upper end or neck of the bottle B but is considerably larger and its inner surfaces cooperate with the outer surface of the resilient sheath 54 within the funnel 53 to form the chamber 55.

The sheath 54 is preferably formed of soft rubber or other suitable resilient or flexible material, and, its internal dimensions and contour conform substantially to those of the bottle to be treated and, if desired, the dimensions of the sheath may be slightly smaller so as to closely engage the bottle surface when not distended or contracted by external means, as shown in Fig. 3. The flanged lower end of the sheath 54 is securely clamped pressure-tightly between the lip 56 of the funnel 53 by a clamp ring 57 threaded on the lip 56 of the funnel 53 over the gasket 58. The upper end of the sheath 54 is preferably molded with an internal, relatively solid, depending button 59 adapted to be engaged by the upper end or cap of the bottle B when the latter is inserted in the sheath 54, as shown in Figs. 2 and 3.

The upper end of reservoir tube 51 is closed by a piston 60 slidable in packing rings 61 clamped in place by packing gland 62 threaded in reservoir tube 51. Piston 60 is hollow and forms with the interior of reservoir tube 51 and sheath 54 the normally sealed reservoir 63 which is filled with water or other liquid through the bore 64 of the rod 65, which supports piston 60. The bore 64 in rod 65 is adapted to be sealed at its upper end by a plug 66 when the reservoir 63 and bore 64 are filled with the selected liquid. A plug 67 in the lower end of the funnel 53 seals a purge orifice 68 for the reservoir 63, as shown in Fig. 3. The interior of the reservoir 63 com-

municates with chamber 55 formed between the sheath 54 and funnel 53.

The piston rod 65 is slidable vertically in the bushing 69, mounted in the upper end of the slide 48. Slidable on the upper end of the piston rod 65 between nuts 70 and a coil spring 71 resting on fixed collars 72 is a block 73 supported by the cam-following roller 74 of cam 45. The block 73 is guided in its vertical movement in a fork formed by flanges 75 extending upwardly from slide 48. It will be observed that as cam 45 lowers roller 74 and block 73, the spring 71 will act as a buffer and transmit the downward movement to rod 65 and piston 60, which creates a pressure on the liquid in reservoir 63, thus contracting the resilient sheath 54. Conversely, when cam 45 raises block 73, it engages nuts 70, raising rod 65 and piston 60, so that a suction is created in reservoir 63, expanding the resilient sheath 54.

The relative contours of the actuating cam 44 for raising and lowering the foil-applying heads 10 and the hydraulic piston 60 actuating cam 45 are illustrated in Fig. 4, the follower 74 of the hydraulic piston-actuating cam 45 being shown in its lowest position, when the follower 47 of the head-actuating cam 44 is also in its lowest position. The relative angular positions of the active portions of the cams 44 and 45 are also illustrated on Fig. 1.

In preparing the foil-applying machine for operation, the reservoir 63 is first filled with liquid in a quantity such that the sheath 54 is neither distended nor contracted when the cam roller 74 is positioned at the point N indicated in Fig. 4. Then the plug 66 is screwed in place, sealing the liquid within the reservoir 63.

In operation, the bottles B are transferred from the foil-laying machine to the foil-applying apparatus by means of the grip fingers 11 of the latter, which are actuated at the proper time by cam 25 and which hold the bottles firmly in alignment with the corresponding foil-applying heads 10 in the manner illustrated in Fig. 1. As the machine rotates, cam 44 successively lowers each head 10 into position for cooperative relation with the upper end of each corresponding bottle B to the point indicated at the left of Fig. 1. The bottle is enabled to enter the sheath 54 because the latter has been previously expanded to the enlarged size shown by the dotted lines in Fig. 3. This was due to the aforementioned relative movement between the piston 60 and the slide 48 as effected by the respective cams 45 and 44.

Referring to Fig. 4, when the cam followers 47 and 74 are on the upper horizontal rows of respective cams 44 and 45, the sheath 54 is retracted to the dotted line position shown in Fig. 3 and neither the slide 48 nor the piston 60 have any vertical movement. As the head 10 rotates around the stationary drum 43, in the direction of the arrow on Fig. 4, both slide 48 and piston 60 simultaneously descend by reason of their cam followers 47 and 74 descending the identical pitch declines of their cams 44 and 45, as indicated in Fig. 4. When the follower 47 reaches the lower horizontal race of the cam 44, the upper end of the bottle is enveloped in the expanded sheath 54, with its cap C just engaging the button 59. Because the entire sheath 54 is resilient, the button 59 accommodates itself automatically to over- or under-height bottles.

The slide 48 then remains stationary, but the piston 60 continues to descend because of the shape of cam 45, as indicated in Fig. 4. This results in release of the suction at point N, where the sheath 54 assumes its normal size, and because its normal size is that of the bottle neck, closely engages the surface of the bottle B and effects a preliminary compression of the foil due to the inherent resiliency of the sheath 54.

As the machine continues to rotate, piston 60 is further lowered by its cam 45 to the point illustrated in Fig. 2, where it applies pressure to the liquid in reservoir 63, resulting in forced squeezing of the foil F during the compression period indicated in Fig. 4. Inasmuch as the sheath 54 has normally the same dimensions and shape as the bottle neck B, this additional compression by the liquid does not distort the sheath in any way, so that it cannot ripple or crease to mar the foil, as would be the case if a normally larger sheath were contracted to a smaller dimension by the fluid pressure.

As is indicated on Fig. 4, the piston 60 rises before the slide 48, thus creating a suction in the reservoir 63, which results in expansion of the sheath 54 from the solid line shape to the dotted line position shown in Fig. 3. Then with the sheath 54 expanded, so that it uniformly disengages the foil F over its entire area without rubbing, the head is raised from the upper end of the bottle B and piston 60 likewise continues to rise with the head by reason of the identical cams until their followers reach the upper horizontal races of the cams 44 and 45, and the process is repeated with the next successive head 10 and bottle. The bottle B with its foil F applied smoothly to the neck is released by grip fingers 11 for transfer to the next machine, such as a labeler.

Under some conditions of use, the additional forced compression step of the sheath may not be necessary, the inherent resiliency of the sheath 54 being relied on to perform the compression when the suction is released, by reason of its normal conformation to the contour of the bottle neck.

In the modification of the foil-squeezing apparatus of this invention illustrated by Figs. 5 and 6, the hydraulic sheath-actuating mechanism is omitted, and the sheath 54′ is made normally larger than the bottle neck, with the distance between button 59′ and the lower end of the head less than the distance that the bottle B′ is inserted into the sheath. Thus, when the head 10′ is lowered over the upper end of the bottle B′, the sheath 54′ does not engage the bottle or foil F′, and the cap C′ of the bottle B′ engages the button 59′ before the limit of insertion of the bottle into the sheath 54′. This causes an elongation of the sheath 54′, as indicated in Fig. 6, and because of the diametrical contraction of the sheath 54′ which necessarily accompanies its elongation, the sheath 54′ is drawn firmly against the foil F′, thereby forcing the foil flatwise against the bottle surface. As the head 10′ is raised by its cam, similar to cam 44, button 59′ becomes disengaged by the cap C′ and the sheath 54′ shortens, thus allowing it to again expand laterally to normal contour while disengaging the foil F′. This simple arrangement, while it dispenses with the hydraulic operating mechanism of Fig. 1, is not entirely as effective as the latter, for the expansion of the rubber sheath 54′ during retraction of the bottle therefrom is accompanied by some slight friction between the sheath and the foil, which might occasionally disarrange the foil slightly.

Although certain preferred embodiments of the

invention have been illustrated and described herein, it is to be understood that the invention is not limited thereby, but is susceptible of changes in form and detail within the scope of the appended claims. For example, the apparatus of this invention might be employed with equal facility without material change for applying wrapping or other sheet material to regularly- or irregularly-shaped objects of all kinds. The term "foil" as employed herein and in the appended claims comprehends non-metallic sheet material as well as the metallic sheet material more commonly employed for that purpose.

We claim:

1. In apparatus for applying foil to a bottle, the combination of a support for a bottle, a head having a recess therein extending upwardly from its lower end, an inverted resilient generally funnel-shaped sheath disposed within said head and having its larger end secured adjacent the lower end of said head and defining therewith a chamber, said sheath being normally shaped to substantially fit the neck of said bottle, means for creating a subatmospheric pressure within said chamber to cause external air pressure to stretch said sheath to larger than normal internal dimensions to permit said bottle and a piece of foil to be inserted into said sheath and means for increasing the pressure within said chamber to contract said sheath at least to its normal size to shape said foil about the neck of said bottle.

2. In apparatus for shaping foil to a bottle the combination of a tubular member, a resilient sheath of generally funnel shape having a narrow thickened closed end and a wider open end adapted to receive the top and neck of a bottle, said sheath being normally shaped to fit the neck of said bottle tightly, means securing the edge of said sheath at the larger open end to the end of said tubular member with the remainder of said sheath disposed within and otherwise unconnected with and spaced from said tubular member, means for creating a subatmospheric pressure within said tubular member to stretch said funnel-shaped member to greater than normal dimensions to permit insertion of the neck of said bottle and a piece of foil and means for increasing the pressure to permit said funnel-shaped member to contract to normal dimensions to shape said foil about the neck of said bottle.

3. In apparatus for applying sheet material to the neck of a bottle, the combination of a recessed member, a flexible sheath therein for receiving the neck of the bottle to be treated, and normally having internal dimensions and a shape substantially conforming to those of the neck of said bottle, said sheath being sealed to said member and forming a chamber therewith, a supply of fluid communicating with said chamber, and means for first creating a suction on said fluid to expand said sheath to larger than its normal size to admit the neck of the bottle and a piece of sheet material into said sheath and then reducing the suction on said fluid to contract said sheath upon the neck of said bottle to apply the sheet material thereto.

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