July 3, 1934. H. F. KNIESCHE 1,965,550

MACHINE FOR APPLYING PRESSURE AND HEAT TO BOTTLE CAP FLANGES

Filed Feb. 13, 1931

Fig. 1.

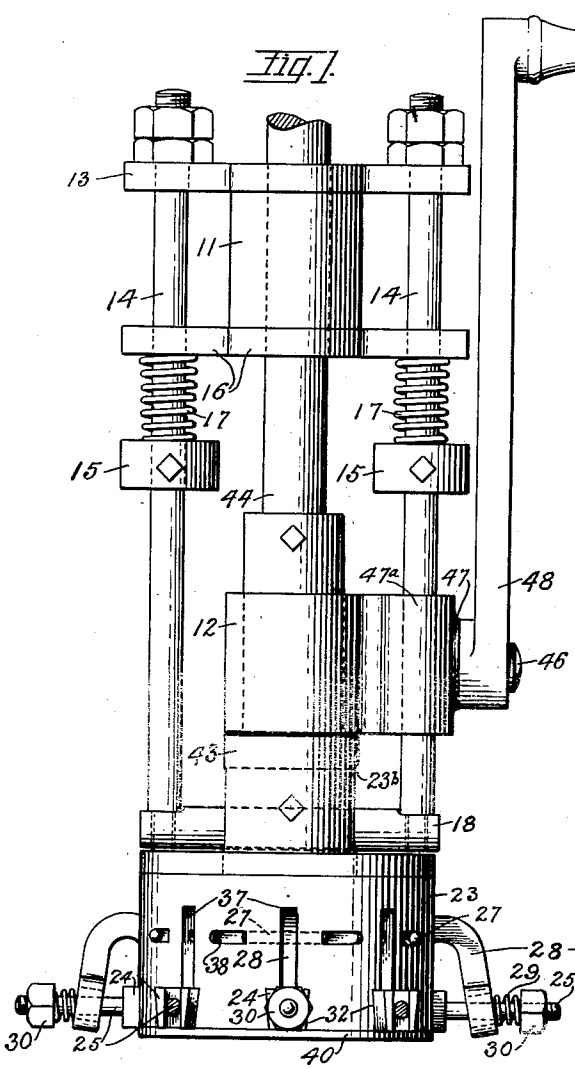


Fig. 2.

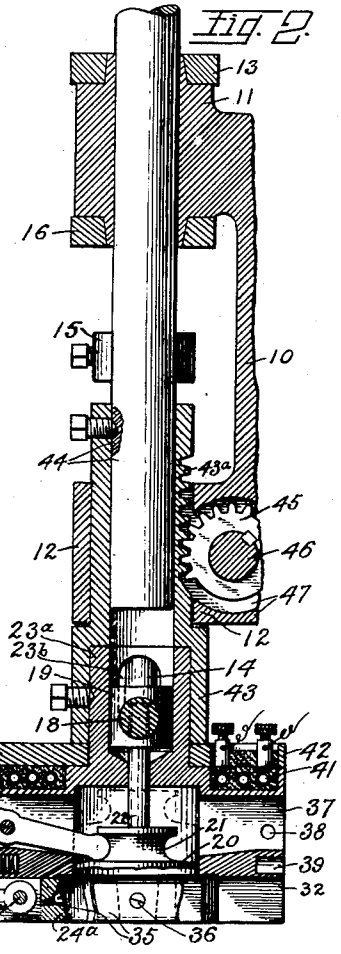


Fig. 3.

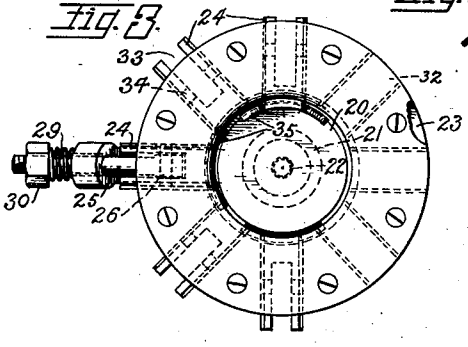


Fig. 4.

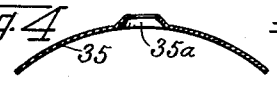


Fig. 5.

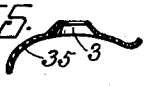
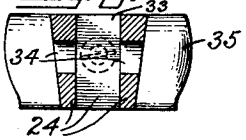


Fig. 6.



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MACHINE FOR APPLYING PRESSURE AND HEAT TO BOTTLE CAP FLANGES

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Application February 13, 1931, Serial No. 515,631

3 Claims. (Cl. 226—86)

This invention relates to a machine for contracting flanges of milk-bottle caps or the like, and especially to a machine for applying pressure and heat to bottle cap flanges.

One object of this invention is to provide a machine or mechanism that is effective to contract, compress and heat the flanges of bottle caps composed of card-board or other fibrous material which will be given permanent set when heated while under pressure.

Another object is to provide a flange-pressing means having a substantially continuous unbroken annular pressing surface which is expansible and contractible for very evenly contracting and compressing the flanges around the bottle-necks and eliminating hollow protrusions or corrugations such as formed by certain other known cap-flange pressers and which permit entrance of extraneous matter that may contain germs.

Another object is to provide a very practical and effective means for contracting and pressing and setting the flanges around bottle-necks so as to avoid successful tampering without easy detection; and therefore, if the bottle cap is removed from the bottle neck, the consequent disfiguration or distortion of the cap will be clearly discernible at a glance.

Another object is to provide means for securing the bottle caps in permanent set by their own inherent properties in combination with the application of pressure and heat around their flanges while on the bottle-necks.

Another object is to provide a cap-flange contractor that is mounted for reciprocating movement of the body that carries the pressing members, so the latter are moved to and from their operating position around the bottle-necks, so the bottles need not be raised and lowered but moved to and from cap-pressing position in a horizontal plane by a conveyer or other appropriate means.

Another object is to provide a mechanism of this character with operating connections for either manual actuation or mechanical power, and which can be operated singly or in sets of any appropriate number of the mechanisms combined in a step-by-step machine which brings the individual cap-pressing mechanisms into operating position over and down around the bottle-necks.

Another object is to provide automatic means for retracting the pressers and returning the actuating means to normal, and a simple and effective cushioning means to minimize the shock upon return to normal.

Other objects and important features are pointed out or implied in the following details of description, in connection with the accompanying drawing in which:

Fig. 1 is a side elevation of one of the bottle cap pressing mechanisms complete with the exception of two of the transmission levers and their adjuncts being omitted, their connecting links being shown in cross section. Fig. 2 is a central vertical sectional view, the section being at right angles to the plane of Fig. 1, some parts being omitted and others broken away for the sake of showing other parts clearly.

Fig. 3 is a bottom plan view of the hollow supporting and guiding body that is mounted for vertical reciprocating movement; only one of the pressing devices being shown complete, at the left side; only one of the radially slidable pressing units being shown at its innermost position, at the top; and three of the eight pressing devices being omitted, at the right side, the guiding channels thereof being shown in sets of parallel dotted lines.

Fig. 4 is an enlarged horizontal sectional view of one of the springy concavo-convex pressing plates that form parts of the respective pressing units above referred to, the thickness of this plate being exaggerated for the sake of showing it in section.

Fig. 5 is a central vertical sectional view of the enlarged plate shown in Fig. 4.

Fig. 6 is an enlarged cross sectional detail view of one of the pressing units, showing the ends of the pressing plate (Figs. 4 and 5) protruding at opposite sides of the bar to which it is secured.

Referring to this drawing in detail, in which similar reference numerals refer to similar parts throughout the several views, the invention is described in detail as follows:

A part of a support is shown at 10, and this may be fixed, or adjustable, or mounted for step-by-step revolving movement in a horizontal path in a series of others of its kind. This support includes upper and lower bearings 11 and 12, also an apertured horizontal beam 13 resting on or united with the bearing 11. Vertical supporting rods 14 extend through the apertures in the beam 13 and are provided with adjusting nuts on their threaded upper ends, and with adjustable collars 15. An apertured beam 16 is seated against the lower side of the bearing 11, and the rods 14 extend through its ends which

serve as seats for the upper ends of compressed springs 17 that rest upon the collars 15, and serve to assist the springs 31 and to act as the cushioning means previously mentioned. A horizontal rod or beam 18 has its apertured and internally threaded ends secured to the lower ends of the rods 14 by means of screw threads on the latter. The combination thus far described may be known as the cushioned supporting structure.

An actuating connector is composed of a horizontally bored or apertured upper part 19, a cylindrical lower part 20 having an annular groove 21 which is semi-circular in cross section, and an intermediate part 22 that is united with the parts 19 and 20 by screw-threads or other proper means. The central part of the beam 18 is fitted in the bore of the part 19, so the beam 18 supports the actuating connector and normally holds it in a fixed position.

A hollow or axially bored body 23 incloses the actuating connector and is slidable vertically thereon so as to combine therewith as an actuating means for moving the devices which press the flanges of the bottle caps inward on the bottle necks. The pressing devices may constitute any appropriate number of sets, or combinations of parts, eight in the present embodiment of the invention, and each set comprises a slide or beam 24, a link 25, pivots 26 and 27, a lever 28 on the pivot 27, a tensioning spring 29, an adjusting nut 30 on the link 25 for pressing the spring 29 against the lever 28, and a spring 31 for pressing the outer arm of the lever 28 outward and thereby pressing its inner arm downward while holding the link 25 and slide or beam 24 at their outer position. Each beam 24 is slidingly fitted in a channel 32, the walls of which constitute guiding elements, and is preferably of the form shown, being longitudinally slotted at 33, and laterally bored at 34 to receive the pivot 26, and is formed with downwardly tapering sides and a protruding lower part 24*a* at its inner end which is concaved. Each alternate beam 24 is centrally apertured, internally screw-threaded, and countersunk for conforming to a concavo-convex springy plate 35 (shown separately in Figs. 4 and 5) which has a counter-sunk frusto-conical apertured boss 35*a* fitted in the countersunk aperture of the beam 24 and secured by a screw 36 whose head is flush with the concave pressing face of the plate 35. By this fastening means, not only is the maximum security obtained, but also the breaking tendency is opposed to the maximum extent. The ends of each plate 35 project laterally with respect to the beam 24 which carries it, and these projecting ends bridge the gaps between this beam and the next adjacent beams and overlap the pressing faces of these latter beams which do not carry such plates 35. These plates 35 are dished as a segment of a hollow globe, and are very thin (about 5 to 10 thousandths of an inch) and when at their innermost position, the flange-pressing position, their ends nearly meet one another, and they combine with the pressing faces of the beams 24 to form a substantially unbroken and smooth annular surface which conforms to the shape of a milk bottle neck and mouth of standard or usual shape and size, so as to contract the flange of the bottle-cap and to firmly and smoothly press it against the mouth and neck of the bottle.

The hollow body 23 is slotted at 37 for receiving the levers 28, and the walls of the slots 37 are bored at 38 to receive the pivots 27. Cavities 39 are provided for the springs 31. The central part of the body 23 is axially bored for receiving the plates 35 and the actuating connector 19—20—22, and the upper part of the shank 23*a* is vertically slotted at 23*b* for receiving the beam 18 and permitting relative vertical movement of the supporting structure and the hollow body and its adjuncts. The said adjuncts of the hollow body 23 include a retaining and guiding disc 40 which constitutes a part of the guiding means for the slides or beams 24, this disc being secured by screws, as shown in Fig. 3, or by other appropriate means; an electric heater 41, of any appropriate kind, seated in an annular substantially air-tight channel in the upper part of the body 23 and insulated therefrom and provided with binding posts by which it may be connected to any appropriate source of electric energy; a retaining disc 42 which is centrally apertured and fitted around the shank 23*a* and over the heater 41; a tubular rack-member 43 removably secured around the shank 23*a* and on the disc 42 so as to hold the latter in place while supporting the body 23; and an actuating and guiding rod 44 adjustably secured in the upper part of the tubular member 43 and slidable in the upper bearing 11 while the member 43 is slidable in the lower bearing 12.

The tubular member 43 is formed with a rack 43*a* which engages with a spur-gear segment 45 which is mounted on a stub-axle 46, the latter being journaled in a housing 47 which forms a lateral extension of the bearing 12, said lateral extension also including a vertically bored part or bearing 47*a* which is slidable on one of the rods 14. An actuating arm 48 is screw-threaded or otherwise secured on the stub-axle 46, and may be provided with a handle 49. The member 48—49 can be operated for turning the segment 45 so as to cooperate with the rack 43*a* for moving the body 23 and its adjuncts downward, and thus to move the pressing faces of the members 24 and 35 down around the mouth and neck of a bottle which has a partly finished cap thereon, and for finishing the cap by contracting and pressing and heating its flange. Instead of the actuating member 48—49, which may be removed at will, the rod 44 may be employed as the actuating member or means, by applying pressure downward thereon by any appropriate means, for instance, by a cam, a lever or other mechanical means (not shown).

The inner ends of the levers 28 are arcuate or semi-circular, and are fitted in the annular groove 21, so that these levers are actuated or swung on their pivots 27 by the relative vertical movement of the member 20 and the body 23. It will be seen therefore, that the operation of this machine or mechanism is as follows:

As the body 23 is moved downward by its actuating means 44 or 48, the actuating connector 19—20—22 is held stationary by the supporting structure 18—14—13—11—10; and this relative movement causes the levers 28 to swing their outer arms against the respective pressing units 24—35. The continuation of such movement causes the pressers or pressing units to move inward to the position shown at the upper part of Figure 3, and in thus moving, they contract and press and heat the flange of the bottle cap around which they have moved, the heat being transmitted to the pressing faces, from the heater 41, by conduction through the metal of the body 23. Upon reversing movement of the actuating means 44 or 48, the springs 17

and 31 combine with the actuating means for returning the levers 28 to the normal position shown in the drawing; and in thus returning, they cooperate with the links 25 and springs 29 for returning the pressers to their normal position, so the bottle can be removed with its cap permanently set thereon, and other bottles and caps can be similarly placed and operated upon.

Although I have described this embodiment of my invention specifically, it is not my intention to limit my patent protection to these exact details of description, for numerous changes may be made within the scope of the inventive ideas as implied and claimed.

What I claim as my invention is:

1. In a machine for contracting a flange of a cap around the neck of a bottle or the like, the combination of a set of pressing units, means to guide and force the pressing units toward a common point at which the flange can be placed, thin concave plates, and means securing each of said plates to the pressing face of a corresponding one of said pressing units in position to overlap a part of the pressing face of an adjacent pressing unit, for the purpose specified.

2. In a machine for contracting a flange of a cap around the neck of a bottle or the like, the combination of a set of pressing units, means to guide and force the pressing units towards a point at which the said flange can be placed, thin concave plates, and means on alternate pressing units to hold the respective concave plates on their respective pressing faces in such relation that the ends of each concave plate overlap a part of each adjacent pressing face.

3. In a device for combining with similar devices in contracting a cap-flange under the head of a bottle-neck, a unitary member including a presser having a concave pressing face which includes a protruding lower edge, said pressing face being tapered from its upper edge to its protruding lower edge, and a thin concavo-convex plate united with said pressing face and conforming thereto and having an edge protruding laterally therefrom with respect to the direction of pressing movement of said pressing face, for the purpose specified.

HARRY F. KNIESCHE.