Aug. 17, 1954 A. PODESTA 2,686,624

APPARATUS FOR APPLYING CLOSURE CAPS TO CONTAINERS BY CURLING THEIR EDGES

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Fig. 1

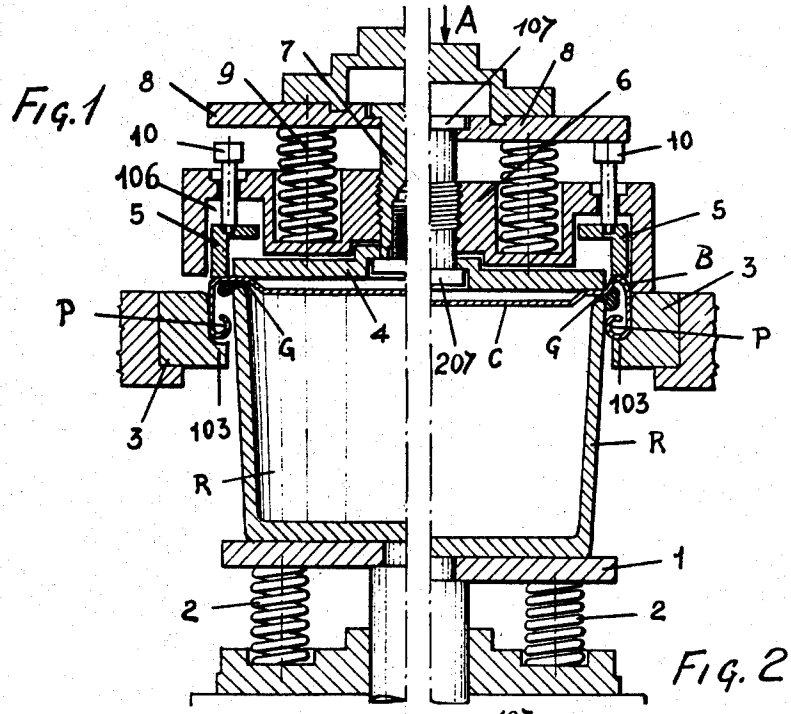


Fig. 2

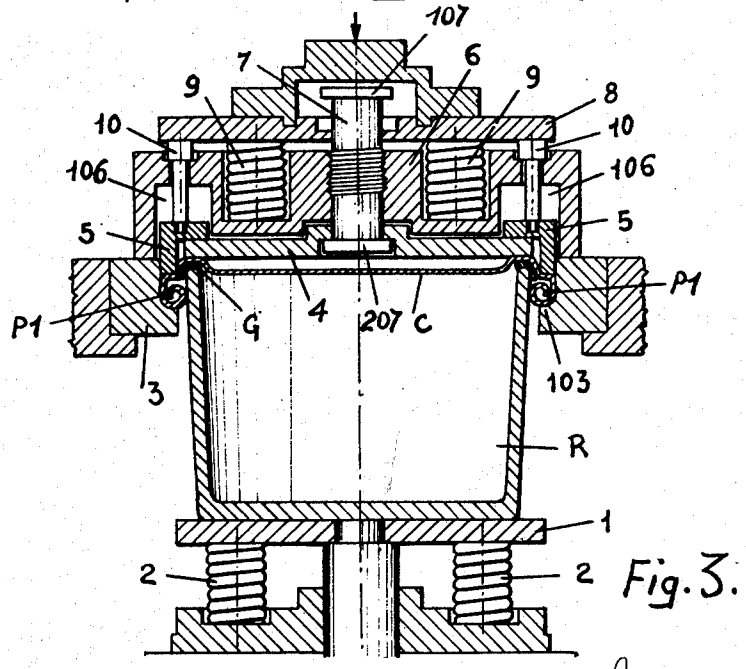


Fig. 3.

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Fig. 4.

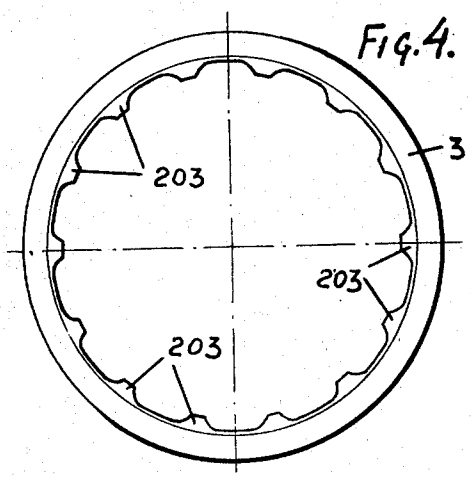


Fig. 5.

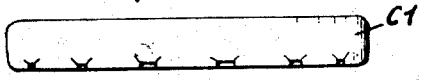


Fig. 6.

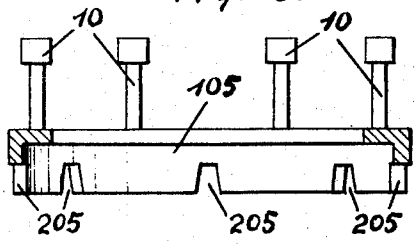


Fig. 8.

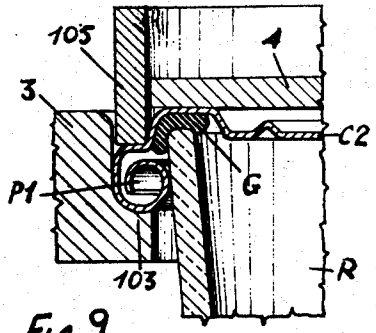


Fig. 9

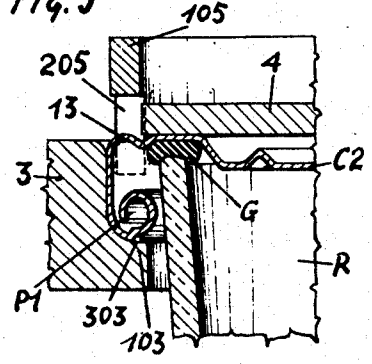
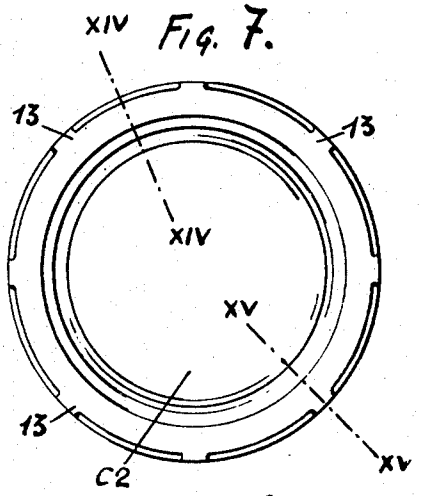


Fig. 7.



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APPARATUS FOR APPLYING CLOSURE CAPS TO CONTAINERS BY CURLING THEIR EDGES

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Application June 12, 1952, Serial No. 293,072

7 Claims. (Cl. 226—84)

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This invention relates to an apparatus for applying closure caps to containers by curling their edges into engagement with the external wall of said container.

Many devices of this kind have been designed, all of which usually comprise a presser tool adapted to hold the cap bottom pressed against the container mouth and an annular curling die made in one or more sections, provided with a curling groove against which the cap edge is forced so as to follow the curve of the groove and be curled under a bead or against the container walls.

The known devices however presented the drawback that, at least under certain practical conditions and especially by the use of certain metallic materials, the skirt of the cap was deformed laterally or pressed upwardly between the cap presser and the walls of the curling die.

According to the invention these drawbacks are overcome by employing, preferably together with the usual cap bottom presser an annular pressing tool (which will be referred to as annular jaw) so arranged as to avoid that the cap skirt, during the curling of its edge, be driven upwardly or laterally and that the periphery of the bottom of the cap and the adjacent part of the cap skirt snugly and tightly contactually engage the container mouth.

In accomplishing this operation, the pressing annulus is depressed under the level of the cap bottom and generally also under the level of the container mouth.

The invention will be better understood by the following description made by reference to the attached drawings in which:

Figures 1 and 2 show in axial section two complementary halves of a device for sealing containers by means of caps by inside curling of the edges thereof during the first two curling steps and Figure 3 shows a section of the same device after the curling is completed.

Figures 4 and 5 show a plan view of a particular form of annular curling die and a side view of a cap curled thereby.

Figure 6 is a diametral section through an embodiment of a pressing jaw, while Figure 7 is a plan view of a cap curled in a machine using said jaw, and

Figures 8 and 9 are sections taken on lines XIV—XIV and XV—XV of the cap shown in Figure 7, showing the final curling steps.

In the embodiment shown in Figures 1 through 3 the device comprises an axially movable platform 1 supported by springs 2 and on which the

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container R is placed. All around the container, just under its mouth, a curling die 3 is fastened whose cylindrical walls have substantially the same diameter as the skirt of cap C which is preferably pre-curled as shown at P, Fig. 1, this pre-curling fitting snugly on groove 103 of said die.

Above the container a cap-pressing unit is fitted which comprises a cylindrical block 6 provided at its lower side with a deep annular groove 106 and at its upper side with a number of cylindrical holes for holding helical compression springs 9 bearing against a press plate 8 adapted to be pressed in the direction of arrow A by suitable means (not shown). Groove 106 presents a number of perforations through which are slidably mounted the stems of studs 10 to which an annular pressing jaw 5 is fastened, guided at the outside by the vertical walls of die 3 and whose inner diameter is slightly greater than the diameter of the container mouth.

Block 6 is fastened to a central bolt 7 suspended by its head 107 to press plate 8. To the projecting lower end of said bolt, under block 6, a cap presser 4 is fastened as by screw 207, threaded under bolt 7. The fastening of the cap presser presents a certain amount of lost motion.

The operation is as follows:

Having placed the container R with its pre-curled cap C on platform 1, pressing jaw 5 is allowed to freely bear on cap bottom border. Then by depressing plate 8, the springs 9 are compressed and causes block 6 and underlying cap presser 4 to hold the cap firmly pressed against the container mouth, while the container with its supporting platform 1 are pushed down by compressing springs 2. By this movement the cap edge by bearing against the curling die 103, besides being further curled, drives the outer cap bottom border upwardly, as shown at B in Figure 2. By further depressing plate 8, this acts against the heads of studs 10 and presses down the pressing jaw with its border under the level of the container mouth, thus forcing down the outer part of the cap bottom downwardly, as shown in Figure 3 and completing the curling and the fastening of the cap to the container mouth.

Fig. 4 shows a curling die particularly adapted for curling caps made of hard material, such as tinned sheet iron. Instead of having a continuous curling-groove as in the preceding figures, this annulus shows a crown of curved inwardly projecting members or claws 203 which, by impressing the edge of the skirt of the cap confer to this latter the form shown in Fig. 5.

Figures 6 through 9 show the preferred modifications of the device for the case in which the closed container must be subjected to sterilization by means of heat and therefore a one-way vent is necessary in order to permit the escape of air and vapor from the tightly closed container.

In this embodiment the pressing jaw 105 (Fig. 6) show a number of notches 205, while the curling die 103 shows at intervals a number of projecting points or grains 303, generally facing the notches 205. By this arrangement, the parts of the cap which come to be in correspondence of the notches 205 are permitted to come up as shown at 13 in Fig. 9, while the remaining parts of the cap bottom are regularly pressed down as shown in Figure 8. Furthermore, in correspondence of the notches 205 the grains 303 of the curling die (Fig. 9) slightly notch at intervals the cap curl just where the packing G is less compressed, viz. in correspondence of notches 205 of the pressing jaw. Thus any fluid pressure built up in the container due to heating or other causes is allowed to escape all around the uncompressed gasket parts and is allowed to freely escape to the exterior through the notches made in the cap curl by the grains 303.

From the foregoing it is apparent that a substantial improvement has been devised by providing a substantially annular pressing jaw, together or instead of the usual cap presser plate, in order to press or to keep pressed under the level of the cap bottom and preferably also at a lower level than the container mouth, the marginal part of the bottom of closure caps to be fitted to containers by curling of the border of their skirts.

Of course the invention may underly numerous changes, though remaining within the limits of its basic idea.

Among the variations of this invention, the following may be mentioned:

(*a*) In some cases, and particularly in the cases of containers, such as glass bottles, provided with a bead under their mouth, the cap presser 4 could be omitted and replaced by a suitable annular pressing jaw 5, which holds the cap bottom compressed against the container mouth bead, whereby said rim is depressed below the level of the next lying central part of the cap bottom.

(*b*) In some instances, and particularly for conical containers, like that shown in Figures 1 through 3, the pressing jaw might be pressed down first and the cap presser 4 could be pressed down afterwards, thus forcing the cap bottom with its packing and the container downwardly, while the cap curl, being kept fast by the pressing jaw, slides slightly towards the container mouth and thus adheres very firmly against parts of the container having larger diameters.

(*c*) It is possible to regulate the precise moment in which the pressing annulus comes into action after the pressure plate 4, by varying the play or lost motion between the heads of the studs 10 and the corresponding parts of block 6, e. g. by shortening the stud stems or fitting washers thereon.

(*d*) The container-supporting platform 1 might be rendered universally adjustable by known means, for example by making its underside convex and by mounting same on a complementary concave platform.

As regards the gasket, it may be flat or annular. In this latter case, especially when the caps should be applied on beaded containers, such as bottles, a packing ring encircling the container

neck could be adopted, which by being pressed between the container neck and the cap skirt above the curl provides a very efficient seal of liquids containing gas (CO_2) under pressure.

It is further to be noted that the terms "pressing jaw" and "curling die" employed in the foregoing specification and the following claims shall include not only complete annular bodies in one piece, but also annular bodies made of a plurality of sections, with the working edge or the working groove made up of sections or parts separated by intervals or notches.

I claim:

1. A device for sealing containers by curling against the walls of the container, under its mouth, the brim of the skirt of metallic caps provided with gasket means, and comprising a supporting platform for the container on whose mouth an uncurled or partially curled cap has been applied, a continuous annular curling die provided with an opening for receiving the mouth of said container and having a cylindrical inner wall of enlarged diameter terminating at the lower portion in a curling groove, a substantially annular pressing jaw slidably mounted coaxially of the cylindrical inner wall of said curling die and whose edge bears against the brim part of the cap bottom, in a position outside of the confines of the container mouth, and means for pressing said pressing jaw towards the groove of said curling die to force the marginal edge of said cap downwardly below the upper edge of the container mouth and curl the lower edge of said cap into sealing engagement with said container.

2. A device for sealing containers according to claim 1, comprising further a cap presser fitted concentrically of said pressing jaw, means for axially and resiliently pressing said cap presser against the cap bottom and means for rigidly pressing said pressing jaw against the cap bottom rim, after the said cap presser has been resiliently pressed against a central section of the cap bottom.

3. A device for sealing containers according to claim 1, comprising further a cap presser fitted concentrically of said pressing jaw, means for axially and resiliently pressing said cap presser against the cap bottom and means for rigidly pressing said pressing jaw against the cap bottom rim, after said cap presser has been resiliently pressed against the cap bottom, and spring means for supporting the said container-supporting platform.

4. A machine for sealing containers by means of metallic caps by curling the skirt of the caps against the container walls, said machine comprising a container-supporting platform mounted on springs, an annular curling die comprising cylindrical walls terminated at its lower end by a grooved portion projecting inside of said walls, said curling die being fastened to a fixed part of the machine, and a pressing device comprising a press plate fitted above said curling die, means for driving said plate towards or away from said curling die, a bolt projecting downwardly from said press plate and connecting said plate with some lost motion to a substantially cylindrical block, springs inserted between said press plate and said block, a plurality of holes drilled along a circumference near the periphery of said cylindrical block, inside of the outline of the said upstanding press plate, a beaded stud passed through each of said holes with the heads facing the said press plate, an annular pressing jaw attached to the lower end of the stems of said

studs, so as to permit some lost motion of said jaw in axial direction and a cap bottom presser attached to the lower end, projecting out of said cylindrical block, of said connecting bolt, whereby the diameter of said pressing jaw is such as to permit its axial sliding within the cylindrical walls of said curling die.

5. A machine according to claim 4 in which the pressing jaw has its pressing edge provided with a plurality of deep notches.

6. A machine according to claim 4 in which the pressing jaw has its pressing edge provided with a plurality of deep notches and the groove of the said curling die has slightly projecting points facing the notches of the pressing jaw.

7. A machine for sealing containers by curling the edges of metallic caps provided with sealing gaskets, against the container walls under the container mouth, and comprising a spring-supported container-supporting platform, a fixed and rigid curling die having a cylindrical wall ending at its lower end with a curling groove projecting inside of the ring and having its concavity directed upwardly, a pressing jaw slidably

mounted above said curling die and adapted to slide within the cylindrical wall of said curling die to engage the marginal edge of said cap and force said edge downwardly, a cap presser plate slidably arranged within said pressing jaw and arranged to yieldingly hold said cap in position during downward movement of said pressing jaw, means for driving said pressing jaw and pressing plate independently from each other towards the said curling die, whereby the pressing annulus is finally driven with its working edge at a lower level than the said cap presser plate encircled thereby, and spring means interposed between said cap presser plate and the means for driving same towards the said curling die.

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