

- [54] **APPARATUS FOR HERMETIC CLOSURE OF FILLED CONTAINERS** 3,020,686 2/1962 Rueckert et al. 53/112 A X
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[51] Int. Cl.² **B65B 31/02**

[58] Field of Search..... 53/22 R, 86, 112 R, 112 A,
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[57] **ABSTRACT**

The present invention relates to a method of and an apparatus for hermetic closure of filled containers of the kind made of foil or sheet material and having an opening surrounded by a marginal flange, with a cover made of foil or sheet material for closing the opening by getting sealed on the container along its flange.

4 Claims, 2 Drawing Figures

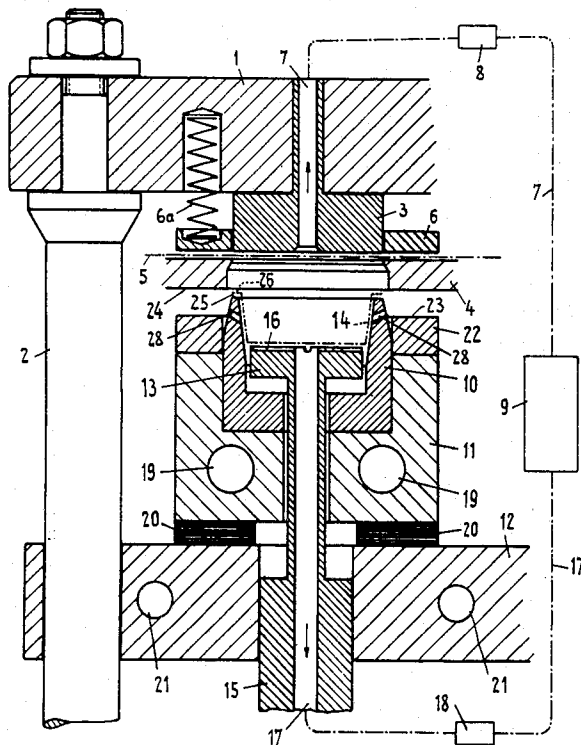


FIG. 1.

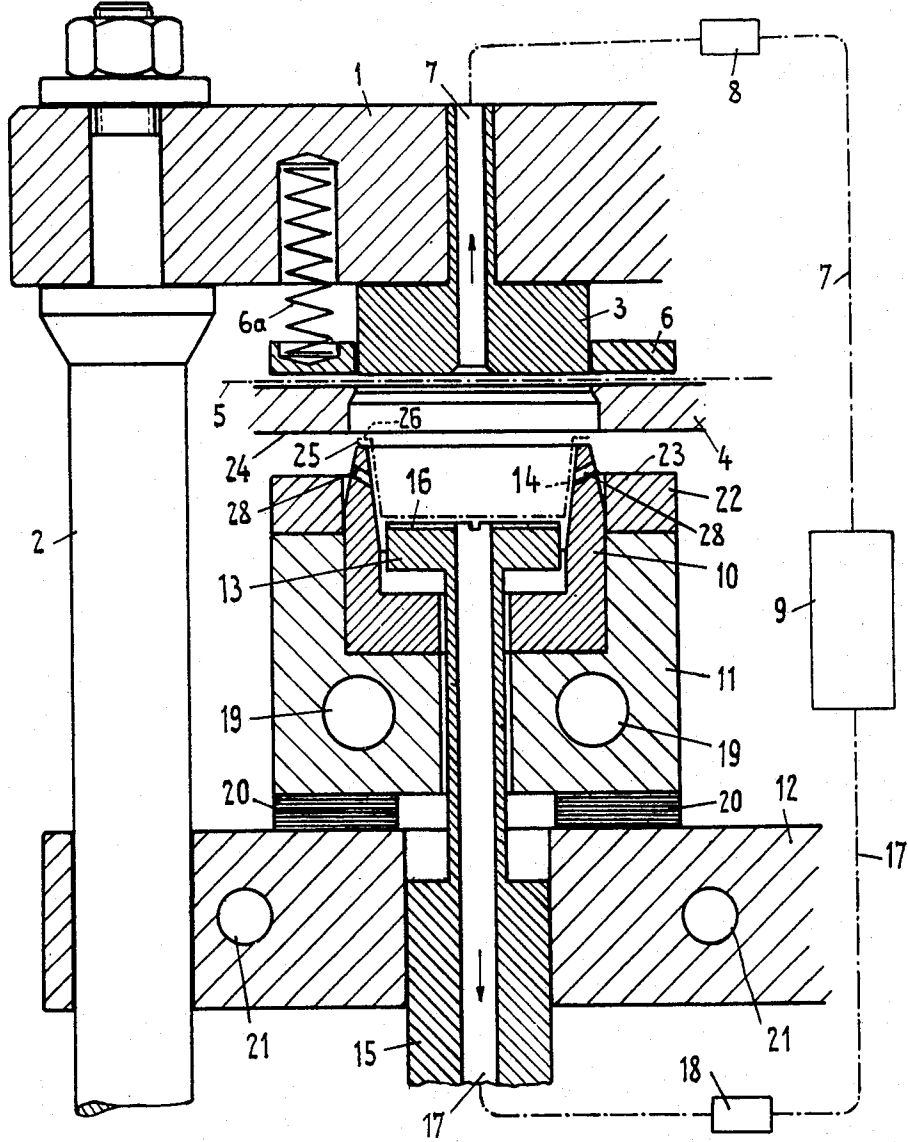


FIG. 2



APPARATUS FOR HERMETIC CLOSURE OF FILLED CONTAINERS

Particularly for containing and for the purpose of selling single consumer rations of liquid food, milk, cream, jam, etc., preferably one way containers are used, being made of foil or sheet material and closed with a tear-off cover. However, often when tearing-off the cover a portion of liquid content is spouted out of such containers. It has been found that this disadvantage can be avoided if the closed container has a reduced inside pressure.

It is an object of the present invention to reduce the inside pressure in such containers before they are hermetically sealed.

The method according to this invention achieves such object in that tools for punching out the cover and for sealing it on the container are used to enclose the open container in a hollow space which will be hermetically closed from outside air at the latest after the cover is punched out and disposed in the hollow space, and in that pressure will be reduced in the closed hollow space below the outside atmospheric pressure while the cover is placed upon and sealed to the container flange in order to hermetically close the container opening.

The apparatus according to the invention for carrying out this method comprises upper and lower tools for punching out the cover and for placing and maintaining the container and cover in registering position for the purpose of and during the sealing operation. This apparatus is characterised in that a lower tool is surrounded at its circumference by a pushing element determined for effecting the punching stroke of the female collar of the punching tools, whereby this pushing element and this female collar have each an annular surface for mutual tight contact and hermetically enclose together with the other tools during the punching stroke a hollow space wherein the container and cover are located, which space is connected to an air suction duct traversing the lower tool and is closed from outside air at the latest after the cover is punched out and until the container is sealed.

The container which has been sealed by following the method according to the present invention has a cover which is inwardly cambered due to reduced inside pressure.

The invention will now be described, by way of example, with reference to the accompanying drawing, in which:

FIG. 1 shows a schematic vertical section through that part of the apparatus which comprises the tools for punching out the cover and for sealing the same on the container, and

FIG. 2 shows the hermetically closed container in vertical section.

Referring to FIG. 1, on a traverse 1 of the frame 2 of the apparatus is rigidly mounted an upper punching tool 3 having a plan face corresponds to the shape of the cover to be punched out. A female punching tool 4 is arranged below the tool 3 for cooperating therewith in punching out the cover from a sheet or strip 5 of foil material which gets stepwise conveyed between the punching tools 3 and 4. By not illustrated operating means the tool 4 can be lifted and lowered with respect to the tool 3 and traverse 1 for executing the punching stroke, whereby an axially displaceable ring-plate 6 surrounding the tool 3 is pressed from above upon the strip 5 and the female tool 4 by pressure springs 6a

which are disposed between the traverse 1 and the ring-plate 6. An air suction duct 7 traverses vertically the upper tool 3 and leads via a control valve 8 into a vacuum supply tank 9.

The apparatus comprises in its lower portion a lower two-part tool consisting of a cup-like sealing tool 10 located in a heating body 11 which tightly contacts the tool 10 laterally and from below. The heating body is mounted on a traverse 12 that is vertically movable in the frame 2 of the apparatus by the operation of not illustrated driving means. The other part of the lower tool is a bearing plate 13 for carrying the container 14 to be sealed. This plate is located in the cup of the sealing tool 10 and has on the bottom side a rod with cylinder 15 by which it is vertically guided in the traverse 12 for relative movement with respect to the sealing tool 10. The bearing plate 13 has radial grooves 16 in its top side and is vertically penetrated by an air suction duct 17 leading through the rod and cylinder 15 over a control valve 18 into the above cited vacuum supply tank 9.

The heating body 11 is provided with bore holes 19 for the installation of heating elements, i.e., of electric resistance heaters. A thermally insulating ring 20 is interposed between the heating body and the traverse 12, while the latter can be cooled by water or another cooling agent flowing through the holes 21 provided in the traverse 12. On the top side of the heating body 11 is mounted a push ring-plate 22 surrounding the sealing tool 10 on its circumference. This push ring plate 22 has a plane top surface 23 determined to abut against the plain bottom surface 24 of the female punching tool 4 for effecting the punching stroke when the lower tool 10, 11 is lifted. Thereby the two plane surfaces are adapted to achieve a tight annular contact.

The operation of the described apparatus and the method of sealing the filled container are as follows:

At the beginning of the working cycle, the bearing plate 13 is about in a lift position as shown in FIG. 1, while the lower tool 10, 11 has been lowered with its upper sealing edge 25 located closely below the top surface of the plate 13 in order to permit that a filled container 14 can be pushed upon this plate. Thereafter, the lower tool 10, 11 is lifted, abuts with its sealing edge 25 against the marginal flange 26 of the container 14 and raises the same from the plate 13. The lift of the tool 10, 11 continues, whereby it reaches with the push ring 22 the female punching tool 4 and raises the same, so that the strip 5 will be clamped between the tool 4 and the ring-plate 6. Then the punching out of the cover 27 from the strip 5 takes place.

The container 14 and the cover 27 are now in a hollow space which has been tightly closed from the outside air since immediately before the beginning of the punching operation, under cooperation of the strip 5 and thereafter solely by means of the parts 11 and 22 of the lower tool, the female tool 4 and the upper tool 3.

By opening the control valve 8 shortly before the end of the punching operation the cover 27 gets locked to the tool 3 by pressure reduction in the suction duct 7. Then, by opening the control valve 18, the pressure gets also reduced in the hollow space through the suction duct 17 and the bores 28 in the sealing tool 10. Meanwhile, the heating sealing tool 10 has raised the container 14 with its marginal flange 26 against the locked cover 27 and effects the sealing operation

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whereby the container is closed hermetically along the flange. The valves 8 and 18 will be closed and the tool 10, 11 and the female tool 4 together with the ring-plate 6 will be lowered into their initial position, whereupon the plate 13 projects slightly above the sealing edge 25 and the closed container 14, 27 can be removed from the plate, while the strip 5 is advanced by one step.

Since within the closed container is there is subatmospheric pressure, the cover 27 is inwardly cambered, as is shown in FIG. 2. The air suction duct 7 through the upper tool 3 is not imperatively needed. Immediately before punching out the cover, the hollow space including the container will be hermetically closed and gets then evacuated by the suction duct 17. Also at the end of the punching operation the reduced pressure in the hollow space will be maintained, since the punching tools immediately reach their overlapping positions.

What I claim is:

1. An apparatus for sealing an opening of a filled sheet-material container in a manner to prevent spurt- ing of the container contents during the later breaking of the seal, comprising a lower punching tool for punching a closure from a sheet of closure material; an upwardly open cupped receiver for accommodating a filled sheet-material container having an upwardly fac- ing opening; cooperating juxtaposed sealing surfaces on said lower punching tool and said receiver which en-

gage one another when said receiver is moved up- wardly against said lower punching tool so that the lat- ter forms with said receiver an enclosed chamber in which the container is located; pressure-reducing means for producing in said chamber and said con- tainer a sub-atmospheric pressure; an upper punching tool above and cooperating with said lower punching tool to punch said closure when said chamber and con- tainer are at said sub-atmospheric pressure; and sealing means for sealing the punched closure to said container over said opening thereof.

2. An apparatus as defined in claim 1, wherein said pressure-reducing means comprises a suction duct pen- etrating said receiver and communicating with the interior thereof.

3. An apparatus as defined in claim 2, and further comprising means for holding the punched closure on one of said punching tools by suction until said cham- ber is at said sub-atmospheric pressure.

4. An apparatus as defined in claim 2, said container having a flange which surrounds said opening and to which said closure is to be sealed; and wherein said re- ceiver has a sealing edge projecting upwardly for en- gagement with said flange; said sealing means compris- ing heating means for heating said sealing edge to effect a heat-seal between said closure and said flange.

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