March 14, 1961 F. A. PARODI 2,974,456

STOPPERING MACHINE

Filed May 2, 1958

2 Sheets-Sheet 1

FIG. 1

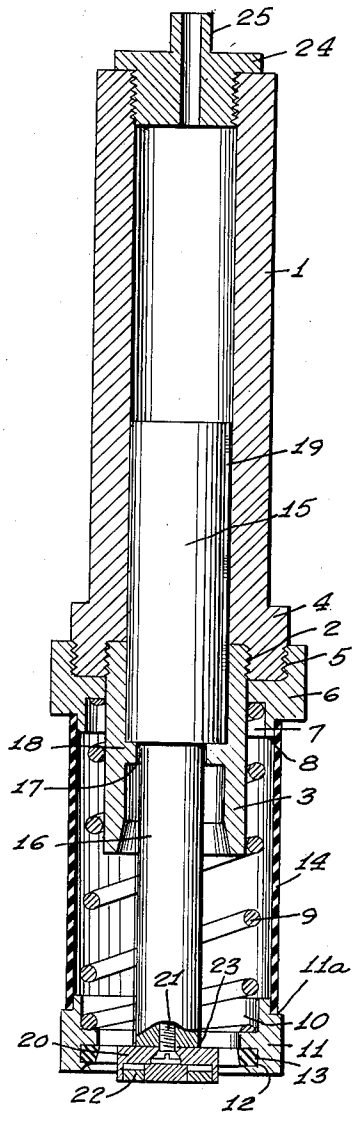
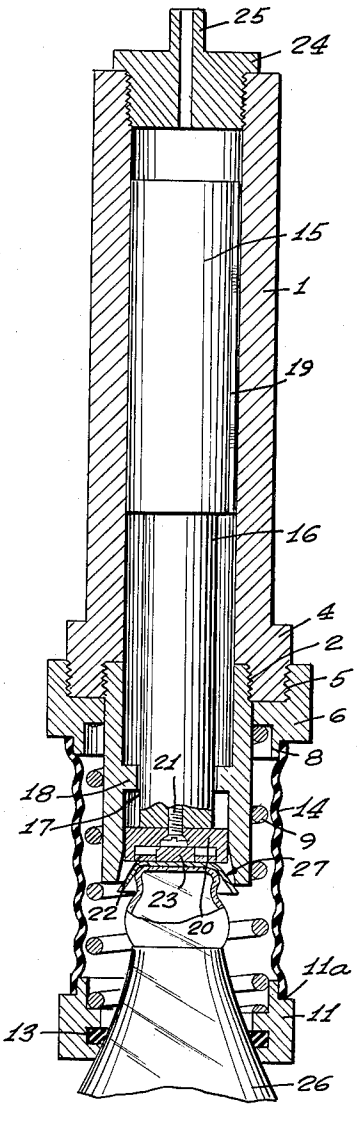


FIG. 2



INVENTOR,
FEDERICO A. PARODI

BY

ATTORNEY

March 14, 1961 F. A. PARODI 2,974,456

STOPPERING MACHINE

Filed May 2, 1958

2 Sheets-Sheet 2

FIG. 3

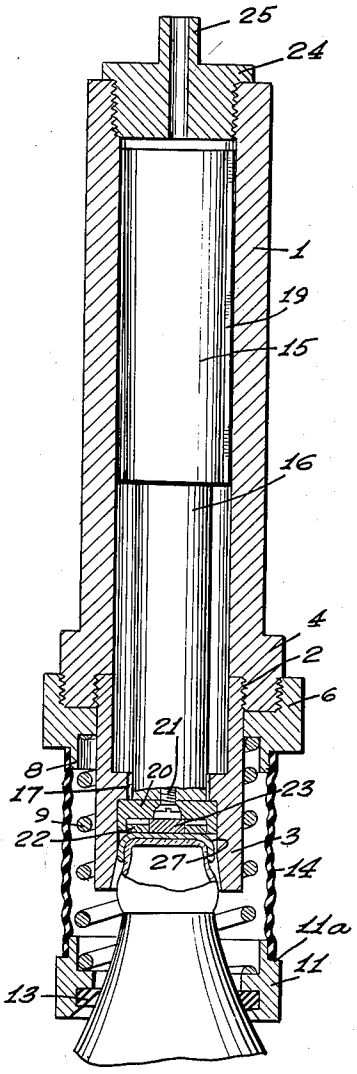
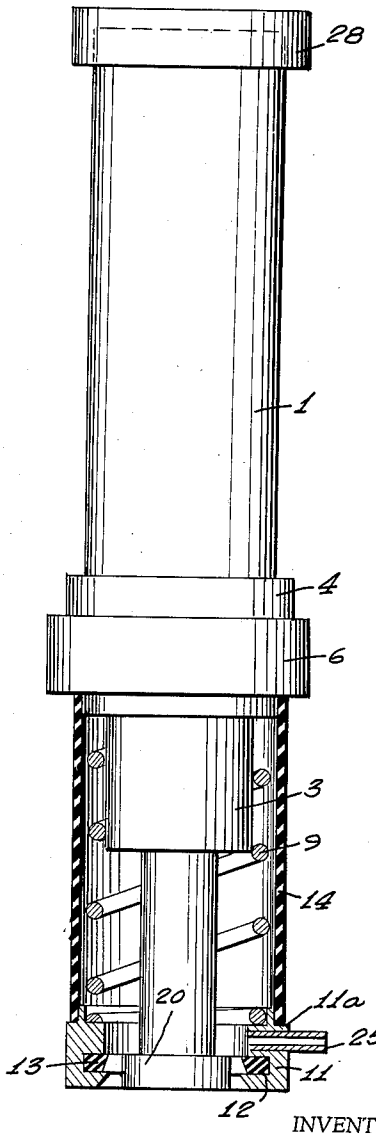


FIG. 4



INVENTOR

FEDERICO A. PARODI

BY Irvin P. Lashof,

ATTORNEY

United States Patent Office 2,974,456 Patented Mar. 14, 1961

2,974,456

STOPPERING MACHINE

Federico A. Parodi, Montevideo, Uruguay, assignor to Stabil Internacional S.A., Montevideo, Uruguay, a corporation of Uruguay

Filed May 2, 1958, Ser. No. 732,579

11 Claims. (Cl. 53—88)

The present invention refers to a device for stoppering bottles with the so-called crown caps. More specifically the invention refers to a device which prior to the application of the crown cap is adapted to remove the air present above the liquid contained in the bottle.

In order to achieve this result the device is provided with a die of known type able to effect the sealing of the crown cap on the mouth of the bottle, and is further provided with a hollow cylinder adapted to form a sealed chamber above the neck of the bottle when the bottle is pressed to abut against the lower end of said cylinder.

One characterizing feature of the present invention resides in the fact that said cylinder which is adapted to form the sealed chamber is constituted by such means that the resulting chamber is retractable and yieldable, so that the chamber is adapted to permit small side displacement in those cases in which the position of the bottle makes such displacement necessary when the bottle is pressed against the sealing die of the crown cap. The invention will be more clearly described through the following specification and with reference to the accompanying drawings in which:

Fig. 1 is a sectional view in elevation of a preferred embodiment of the device of this invention, which is shown in inoperating condition.

Fig. 2 is a sectional view in elevation of the same device of Fig. 1, illustrating the arrangement in the moment in which the bottle which is to be stoppered is pressurized against the lower edge of the retractable hollow cylinder and the vacuum pump is started.

Fig. 3 shows the same device in sectional view in elevation, illustrating the moment in which the sealing die for the crown cap is operating.

Fig. 4 illustrates an alternative embodiment in which the channel of the vacuum pump is located at a different place in the device.

With reference to Fig. 1, the device of the present invention comprises a hollow cylinder or supporting member 1, made of a suitable metal such as bronze or steel, having in its lower inner portion a screwthread 2 to which is fixed the sealing die for the crown cap 3. This sealing die is formed in hard steel. In its lower outer portion cylinder 1 has an enlargment 4 which terminates with a screw thread 5 to which is adjusted a ring member 6 having an inner recess 7 and an outer shoulder 8. To said recess 7 is fixed the upper end of a helical spring 9 made of hard steel, and which extends downwards surrounding the sealing die 3. The lower end of said helical spring 9 is fixed within the recess 10 formed on the annular member 11. Said member is provided with an annular groove 12 where is fitted a ring 13 constituted of elastic rubber, the object thereof being discussed hereinafter. A tube of elastic rubber 14 surrounds the helical spring 9 and the ends thereof are adjusted to the outer shoulder 8 of the annular member 6 and to the shoulder 11*a* provided in the annular member 11.

The above described arrangement provides a retractable hollow cylinder adapted to permit lateral displacements of the annular member 11.

Within the hollow cylinder 1 is located a solid cylinder 15 made of bronze or steel which terminates in a portion 16 having a reduced diameter. This diameter is such that this portion 16 can freely move through a bore 17 provided in the wall 18 which limits the upper portion of the sealing die 3; the bore 17 has a diameter 2 mm. greater than that of the cylinder 16 in order to assure a free passage of air between both members. The upper cylinder 15 has a longitudinal recess 19 in order to assure a free passage of air. The lower cylinder 16 terminates in its lower portion, in an inverted cap 20 which is fixed to cylinder 16 by means of a screw 21. On the inner wall of this inverted cap 20 is provided a screw thread for adjusting the screwed cap 22 having a central bore through which extends the lower face of a permanent magnet 23, the object of which will be discussed hereinafter. The whole arrangement is capable of moving upward when it is pushed from its lower portion. The movement downward of this assembly is limited by the projection of the annular wall 18 of the sealing die, and the size of the assembly is such that when the same is in the lower portion of its travel, the lower face of the permanent magnet 23 is located at a level which is placed slightly below the plane determined by the annular member 11. The cylinder 1 terminates in its upper portion with a screwed member 24 having a central channel and provided with a projecting tube 25 adapted to be connected to the duct of a vacuum pump.

In practice the operation of this device is as follows:

The assembly is fixed in place by clamping it to a supporting column (not illustrated herein) and it is mounted so that the device be disposed in vertical position, and aligned with a raising platform (not illustrated) upon which the bottle already filled with the liquid is placed. The crown cap can be provided by merely applying it upon the edge of the mouth of the bottle or alternatively by placing said crown cap at the protruding lower end of the central cylinder 16, wherein is retained due to the effect of the permanent magnet 23. If, under these conditions the bottle is raised, the neck thereof will enter the retractable cylinder, and if the upward travel is further continued, a portion of the neck of the bottle will abut against the rubber gasket 13. If the upward movement is still continued, the pressure will cause the reaction of the helical spring 9 whereby the gasket 13 will be tightly pressed against the neck of the bottle, as illustrated in Figure 2.

As can be seen in Figure 2, the upper portion of the bottle 26 is located within a chamber tightly closed while the crown cap 27 is simply resting upon the edge of the mouth of the bottle. The inner cylinder 15 and its extension 16 are resting upon the cap 27 and exert on said cap a given pressure due to the combined weight of portions 15 and 16. This pressure is of a great inmportance since when a vacuum is formed within the chamber, said vacuum also acts within the bottle, and causes the liquid contents to boil. The boiling of liquid could result in an overflow of the liquid contents, but this overflow is prevented by the pressure exerted upon the crown cap which acts as a valve which impedes the liquid to pass. The vacuum is generated by a vacuum pump which is connected to the chamber by means of the tube 25. The vacuum duct of the vacuum pump is provided with means for controlling the connection of tube 25 with the vacuum pump and for controlling also the inlet of air within the chamber in order to permit the withdrawl of the bottle when the operation is finished. It was practically found that the necessary pressure to avoid overflow of the liquid is in the range of about 1 kg. This pressure can be regulated by varying the length of cylinder 15 and/or

by providing a spring disposed between the upper end of cylinder **15** and the screwed member **24** of cylinder **1**. Once the necessary vacuum is attained within the bottle, the platform upon which the bottle rests is further raised thus attaining the position shown in Figure 3. In this figure it is illustrated that the raising was sufficient to cause the sealing of the crown cap by means of the sealing die. Under these conditions, the bottle was tightly sealed thus preventing the atmospheric air to enter therein. Once the bottle is stoppered, the vacuum duct is closed and the inlet of air is open in order to restore the atmospheric pressure within the chamber. Then the platform is lowered and the stoppered bottle is withdrawn from the stoppering machine.

In considering the present invention it is to be noted that it is practically impossible to manufacture bottles which are absolutely identical since during the molding operation of the bottles contractions and other effects take place which cause the longitudinal axis of the container to be not strictly perpendicular to the plane determined by the base of the bottle. In the prior art of sealing crown caps, the sealing pressure is exerted between the upper end of the bottle and the base thereof without any side pressure which could tend to deviate the mouth of the bottle in the moment in which the same enters the sealing die. If the cylinder wherein the neck of the bottle is located were rigid, the bottle would be subject to side pressures which could cause difficulties in the sealing operations. On the contrary the device of the present invention shows the great advantages of relieving said side pressure and this is due to the fact that the cylinder which constitutes the vacuum chamber is yieldable. Fig. 4 illustrates a device having the same features to those of the embodiment shown in the preceding drawings with the exception that the tube **25'** adapted to be connected to the vacuum pump is located in the annular member **11** forming part of the vacuum chamber. In this case, the upper portion of cylinder **1** is tightly closed by means of a screwed member **28**.

The device of the present invention has been described hereinbefore as a single unit. However, it will be readily understood by those skilled in the art, that a given number of units can be combined and mounted on a rotatable path provided with a plurality of raisable platforms so that each stoppering device be aligned with the corresponding raisable platform. To this end, it is possible to employ the known machines for sealing bottles, wherein each nozzle can be replaced by the stoppering device in accordance with the present invention. In this manner, it is possible to form rotatable machines with automatic inlet and discharge of bottles. Moreover, the provision of the crown caps can be effected automatically in such a way that the permanent magnet present in each of the stoppering device can take the respective cap and keep it until the bottle is in condition to be pressurized against the sealing die. This embodiment is not specifically illustrated since it is understood that those skilled in the art can design a rotatable machine without departing from the essence of the present invention.

This invention is not limited by the preceding description, and the scope thereof is defined in the appended claims.

I claim:

1. A device for stoppering containers with crown caps under vacuum, which comprises a hollow rigid cylinder vertically mounted, closed in its upper portion and which terminates in its lower portion in a die for sealing a crown cap on the mouth of a container, a retractable, yieldable, hollow cylinder, the upper edge thereof being fixed to the rigid cylinder by means of a vacuum tight connection, the lower edge of said second cylinder being normally disposed below the plane determined by the lower face of the crown cap-cylinder die, an elastic rubber gasket provided in the inner lower end portion of the retractable cylinder, adapted to form a vacuum tight chamber when said gasket is pressurized against the outer part of the neck of the container to be stoppered, a slidably mounted bar provided within the rigid cylinder, for exerting pressure upon the crown cap when the crown cap rests on the edge of the mouth of the container, means for limiting the longitudinal movement of said bar and a duct for connecting the inner cavity of the retractable cylinder with a vacuum pump.

2. A device for stoppering bottles with crown caps under vacuum, which comprises a vertically disposed rigid hollow cylinder, closed in its upper portion and which terminates in its lower end in a die for sealing a crown cap on the mouth of a bottle, an helical spring fixed to the outer lower portion of the cylinder, said spring extending downward and surrounding the die, and which terminates below the plane determined by the lower face of the die in an annular member provided with an elastic gasket adapted to form a vacuum tight seal when said gasket is pressurized upon the neck of the bottle which is to be stoppered, said spring being enclosed with a tube of elastic rubber to constitute a flexible retractable hollow cylinder, a slidably disposed bar within the rigid cylinder, and adapted to exert pressure upon the crown cap, means for limiting the longitudinal movement of said bar, and an outlet tube adapted to connect the cavity of the retractable cylinder with a vacuum pump.

3. A device for stoppering bottles with crown caps under vacuum according to claim 1, in which said bar for exerting pressure on the crown cap terminates in a permanent magnet which is disposed at a level below the plane determined by the lower face of the retractable cylinder.

4. A device for stoppering bottles with crown caps under vacuum according to claim 2, in which said bar for exerting pressure on the crown cap terminates in a permanent magnet which is disposed at a level below the plane determined by the lower face of the retractable cylinder.

5. In a device for stoppering containers with crown caps under vacuum, a retractable yieldable hollow cylinder, the lower end having sealing means for engaging in a fluid-tight manner the outer part of the neck of the container to be stoppered, means for fixedly supporting the upper end of said cylinder, a die in said cylinder for sealing a crown cap on the mouth of said container, the lower edge of said cylinder being normally disposed below the plane determined by the lower face of said die, means within said cylinder for exerting pressure upon the crown cap when the crown cap rests on the edge of the mouth of the container, and a duct for connecting the inner cavity of said cylinder to a source of vacuum.

6. A stoppering device as recited in claim 5 wherein said means for exerting pressure is a slidably mounted bar coaxial with said die.

7. In a device for stoppering containers with crown caps under vacuum, a supporting member terminating in its lower portion in a die for sealing a crown cap on the mouth of the container, an axially retractable and laterally displaceable hollow cylinder mounted on said supporting member and surrounding said die, the lower end of said cylinder having sealing means for engaging in a fluid-tight manner the outer part of the neck of said container, the lower edge of said cylinder being normally disposed below the plane determined by the lower face of said die, and a duct for connecting the inner cavity of said cylinder to a source of vacuum.

8. A stoppering device as recited in claim 7 including means within said cylinder for exerting pressure upon the crown cap when the crown cap rests on the edge of the mouth of the container.

9. A stoppering device as recited in claim 7 including a bar sidably mounted in said supporting member for exerting pressure upon the crown cap when the crown

cap rests on the edge of the mouth of said container and means for limiting the longitudinal movement of said bar.

10. A stoppering device as recited in claim 7 wherein said cylinder comprises a tube of flexible material and wherein there is provided spring means for maintaining said flexible tube in its normally extended condition.

11. In a device for stoppering containers with crown caps under vacuum, a supporting member terminating in its lower portion in a die for sealing a crown cap on the mouth of the container, an axially retractable and lateraly displaceable hollow cylinder mounted on said supporting member and surrounding said die, said cylinder comprising a tube of flexible material, spring means for maintaining said flexible tube in its normally extended condition, the lower end of said cylinder having

sealing means for engaging in a fluid-tight manner the outer part of the neck of said container, the lower edge of said cylinder being normally disposed below the plane determined by the lower face of said die, a bar slidably mounted in said supporting member for exerting pressure upon the crown cap when the crown cap rests on the edge of the mouth of said container, means for limiting the longitudinal movement of said bar, and a duct for connecting the inner cavity of said cylinder to a source of vacuum.

References Cited in the file of this patent

UNITED STATES PATENTS

2,339,791	Muhlke	Jan. 25, 1944
2,614,739	Posotti	Oct. 21, 1952