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D. RATHSPRECHER

2,700,484

CLOSURE FOR RECEPTACLES

Filed July 3, 1951

FIG. 1.

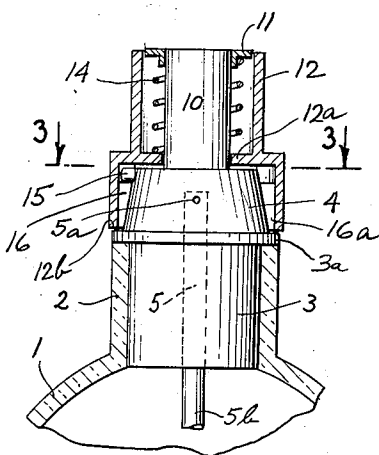


FIG. 2.

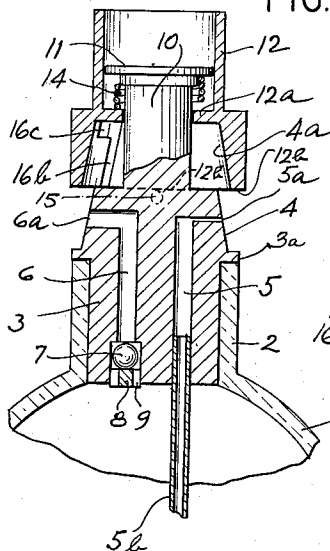


FIG. 3.

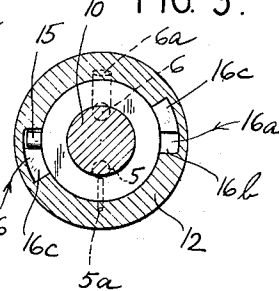


FIG. 5.

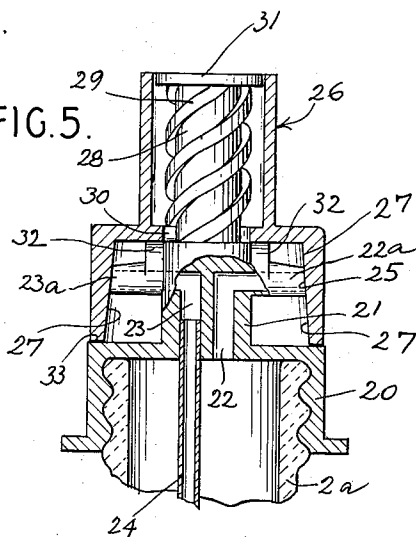


FIG. 6.

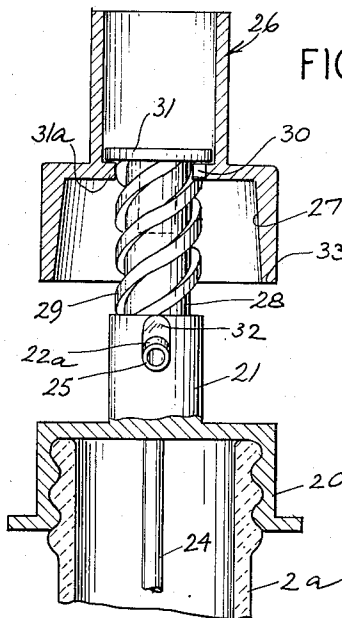
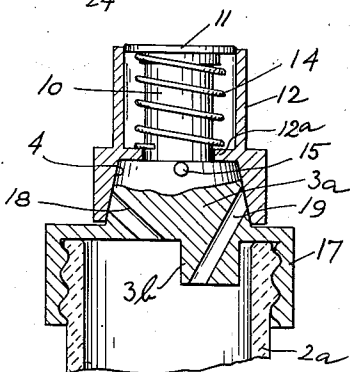


FIG. 4.



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ATTORNEYS

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CLOSURE FOR RECEPTACLES

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4 Claims. (Cl. 215—79)

My invention relates to new and improved closures for receptacles of all kinds, including rigid receptacles and resilient receptacles. These resilient receptacles may be made of polythene or other suitable resilient and easily bendable material which has sufficient resilience to keep it in normal shape. In one embodiment of the invention, I provide a closure which also functions as an atomizer or spray device.

In another embodiment of my invention, I provide a closure which can be opened so as to pour out the liquid in a continuous stream.

According to my invention, the aforesaid closures can be made and assembled at low cost and they are extremely reliable in use.

Other objects of my invention are set forth in the annexed description and drawings, which illustrate preferred embodiments.

Fig. 1 is a vertical sectional view partially in elevation, showing the first embodiment of my closure in closed position.

Fig. 2 is a vertical section which corresponds to Fig. 1, showing the closure in its open position. Fig. 2 is taken in a vertical plane which makes an angle of 90° with the vertical plane of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 1.

Fig. 4 is a vertical section, partially in elevation, which shows a second embodiment of my invention. The closure is shown in its closing position.

Fig. 5 is a vertical section, partially in elevation, showing a third embodiment of the improved closure in its closing position.

Fig. 6 is a vertical section, partially in vertical elevation, taken in the vertical plane of Fig. 5, showing the third embodiment of the closure in its open position.

First embodiment

This is shown in Figs. 1, 2 and 3. In this embodiment, the wall of the receptacle 1, including the wall of its neck 2, is made of any suitable resilient and flexible material which can be bent inwardly under light pressure, and which springs back to its normal shape when such pressure is released. Such bottles are well known articles of commerce and are made of vulcanized rubber or polythene, or other plastics or elastomers. The internal member of the closure is provided with an inner cylindrical body or sealing contact portion 3 which fits snugly and frictionally in the neck 2, so that said internal member remains fixed to bottle 1 when the closure is used in the ordinary manner. Said contact portion or body 3 has a stop flange 3a, which limits the insertion of the body 3 into the neck 2.

Above said stop flange 3, said body 3 has an intermediate portion or extension which has a frusto-conical closure-seat 4. The body 3 is provided with a passage 5 for the outflow of liquid. Said outlet passage 5 communicates at its lower or inner end with a tube 5b which extends into bottle 1 through any selected distance. The outlet passage 5 is provided at its top or outer end with an outlet port 5a in the frusto-conical closure seat 4. The body 3 is also provided with an air inlet passage 6, which has a top or outer inlet port 6a in the frusto-conical closure seat 4. At its inner end, the air passage 6 is provided with a conventional one-way valve which is automatically closed when outlet pressure is applied to the bottle 1 in order to force liquid out through tube 5b and the passage 5. When such outlet pressure is applied, the one-way valve is automatically moved by such pres-

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sure to close passage 6, in order to prevent the escape of either liquid or air from the interior of the bottle 1 through passage 6. When the pressure on the bottle 1 is released, the one-way valve is automatically opened, so that air can flow into the bottle 1 through the passage 6. This conventional one-way valve is illustrated by a ball valve 7 which is located in a recess of the body 3. A bottom insert 8 is provided in said recess of the body 3. Said insert 8 has an annular bottom row of passages 9 which communicate with passage 6 when ball valve 7 is in its open position. In this conventional illustration, the ball valve 7 is normally held by gravity in its open position shown in Fig. 2, in which the air inlet passage 6 is open at its lower end, so that there is communication between the air passage 6 and the openings 9. If the bottle 1 is squeezed, the resultant increased air pressure in the interior of bottle 1 automatically raises the ball valve 7 to seal the inner end of the air passage 6 so as to prevent escape of air or liquid through passage 6. If desired, a light spring of the conventional type may be used to bias the valve 7 to its open position shown in Fig. 2.

The cylindrical body 3 has a reduced outer or top cylindrical guide extension 10, which is located above said frusto-conical closure seat 4. An annular head 11 is fixed rigidly by a drive fit or in any other manner, to the top of guide extension 10. All the parts can be made of plastic or other suitable material. A cap 12 slidably fits upon the head 11 so that cap 12 can be moved longitudinally relative to bottle 1. Said cap 12 also has an internal flange 12a, which fits slidably upon the extension 10. A compression spring 14 holds the cap 12 normally in the closing position shown in Fig. 1. Said cap 12 has an internal frusto-conical sealing face 4a, which fits liquid-tight and gas-tight upon the frusto-conical closure seat 4, when the cap 12 is in its closing position shown in Fig. 1.

At its top, the frusto-conical closure seat 4 is provided with an integral and rigid lateral latching lug 15, which can extend into an annular or bayonet groove 16 of cap 12. There is a companion groove 16a in cap 12, which is identical with the groove 16. As illustrated in Fig. 2, the groove 16 has a vertical leg 16b and a lateral leg 16c. When the cap 12 is moved down from its open position of Fig. 2 to its closing position of Fig. 1, the latching lug 15 passes through the bottom end of the vertical or up-standing leg 16b. When the cap 12 is in its final bottom position of Fig. 1, said cap 12 can be turned so that the latching lug 15 is located in the lateral leg 16c, thus providing a bayonet closure. The additional groove 16a is provided for convenience in operation, because the operator may use either the groove 16 or the groove 16a to cooperate with the latching lug 15. It is thus unnecessary to turn the cap 12 through substantially 360°, in order to latch it to body 3. The upper end of spring 14 abuts head 11 and its lower end abuts flange 12a.

In order to operate the closure as an atomizer, the cap 12 is unlatched from the body 3, and said unlatched cap 12 is raised by the force of the helical compression spring 14, and said cap 12 is then turned until its bottom edge 12b, which is of annular shape, abuts the stop lug 15. The cap 12 is thus held releasably in opening position. Pressure is then applied intermittently to the resilient wall of the bottle 1, thus forcing liquid in successive atomized streams through the narrow outlet port 5a in a spray.

Second embodiment

This is shown in Fig. 4. This embodiment is adapted for pouring out the liquid in a continuous stream, instead of in the form of a spray. In this embodiment, the bottle is made of rigid material such as glass or the like. The neck 2a of this bottle has the usual outer thread, and the body 3a of the device is integral with a skirt 17 which is screwed rigidly to the neck 2a by means of a cooperating inner thread, so that body 3a is not turned relative to neck 2a when the closure is used. In this embodiment, the body 3a has the previously described frusto-conical seat 4, and said body 3a is provided with an outlet liquid passage 18 which may be made of any diameter. Said body 3a is also provided with an air inlet passage 19.

The body 3a is provided with the previously-described lateral lug 15, and the cap 12 is identical with cap 12 of

the first embodiment. Similar reference numerals indicate similar parts.

In this embodiment, when the cap 12 is raised to and held in the position shown in Fig. 2, liquid may be poured out in a continuous stream through the outlet passage 18, while air enters through the inlet passage 19.

For convenience, the inner end of the air inlet passage 19 is located in a downward cylindrical extension 3b of the cylindrical body 3a.

Third embodiment

This is shown in Figs. 5 and 6. This embodiment is also intended for pouring out the liquid in a continuous stream. The bottle is made of rigid material, with the outwardly threaded rigid neck 2a which has been previously described. The closure is provided with a body 20 which has an internal thread so that said body 20 can be fixed to the neck 2a, without turning relative to neck 2a when the closure is used. Said body 20 is provided with a top or outer extension 21, which has an outlet passage 22 for outflow of liquid and an air inlet passage 23. These passages are angular and they have outer horizontal or lateral legs 22a and 23a. An air inlet tube 24, of any selected length, is provided at the inner end of the air inlet passage 23. The walls of the outer ends of these legs 22a and 23a are of frusto-conical shape, in order to provide a tapered closure seat 25 at the end of each leg 22a and 23a. Said seat 25 has the shape of a part of a cone. The cap 26 of this embodiment is provided with an internal frusto-conical face 27, in order to seal the ends of the legs 22a and 23a, when the cap 26 is in the closing position of Fig. 5.

The extension 21 of the body 20 is provided with a top screw-threaded end portion 28, which is provided with a plurality of external threads 29, to form the usual multiple screw thread. The cap 26 is provided with a plurality of lateral follower lugs 30, one for each thread 29.

The end portion 28 has an enlarged stop head 31.

In order to open the closure, the head 26 is turned relative to the body 20, thus moving said cap 26 upwardly or outwardly by means of the cooperating screw thread 29 and the respective lugs 30.

The multiple thread 29 can be of suitable low pitch, so that the cap 26 is held releasably in its open position of Fig. 6, when said cap 26 is moved to said open position.

Liquid can then be poured freely out of the bottle through leg 22a while air enters through leg 23a.

The cap 26 is provided with an internal stop wall or flange 31a which abuts the head 31 when the head 26 is in its top opening position of Fig. 6.

The extension 21 is also provided with integral stop-lugs 32, against which the internal flange 31a abuts when the intermediate head 26 is in its closing position of Fig. 5. Also, the bottom annular face 33 of the cap 26 abuts the top face 20a of the body 20 when cap 26 is in its closing position.

I have disclosed preferred embodiments of my invention, but numerous changes and omissions and additions and substitutions can be made without departing from its scope.

In each embodiment, the closure has a longitudinal axis, which is vertical in the drawings. Each embodiment has means for holding the valve surface 4a against valve seat 4 in order to seal the outlet port of passage 5 and the inlet port of passage 6. In the first embodiment, said holding means comprise the helical compression spring 4. In the second embodiment, said holding means comprise the multiple thread 29 and the corresponding follower lugs 30.

I claim:

1. A closure for a neck of a receptacle, said closure having a body which has a longitudinal axis, said body having an attaching body-portion which is adapted to fix said body to said neck, said body also having an in-

intermediate body-portion which is external to said neck when said attaching portion is fixed to said neck, said body also having an outer guide body-portion, said intermediate body-portion being intermediate said attaching body-portion and said outer body-portion, said intermediate body-portion having a tapered closure-seat whose outer end is smaller than its inner end, said body having a liquid-outlet passage which had a liquid-inlet port and a liquid-outlet port, said body having an air-inlet passage which has an air-inlet port and an air-outlet port, said passages being separated from each other, said liquid-outlet port and said air-inlet port being separated from each other and being located in said closure-seat between the inner and outer ends of said closure seat and being wholly longitudinally spaced inwardly of said outer body-portion, a hollow cap associated with said body, said cap being movable longitudinally to-and-from relative to said body to an outer opening position and to an inner closing position, said cap having an internal tapered sealing-wall which interfits with said closure seat, said tapered sealing-wall being at the inner end of said cap and abutting said closure-seat and sealing its said ports when said cap is in its inner closing position, said sealing-wall being located longitudinally outwardly relative to both said ports of said closure seat when said cap is in said opening position, so that the liquid flows out of said liquid-outlet port and air flows into said air-inlet port without flowing through said cap when said cap is in said opening position, said cap having guide-means which contact only with said outer guide body-portion to guide said cap when said cap is moved longitudinally to-and-fro between said positions of said cap, said cap being wholly spaced longitudinally from said neck when said cap is in its opening position.

2. A closure according to claim 1, in which said cap and said body have respective and cooperating stop-means to prevent said cap from being moved longitudinally off said body, the respective stop-means of said body being located wholly on said outer guide body-portion.

3. A closure according to claim 1, in which said outer guide-portion is cylindrical, said cap has a lateral inner flange which slidably abuts said cylindrical outer guide-portion, said outer guide-portion has a lateral head, said cap has a cylindrical part at said outer guide-portion, said cylindrical part being of greater internal diameter than said head and fitting substantially closely in said head, and a compression spring, one end of said compression spring abutting said head, the other end of said compression spring abutting said flange.

4. A closure according to claim 1, in which said cap has a hollow outer end-part, said outer guide-portion being located in said end-part when the cap is in both said positions thereof.

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