

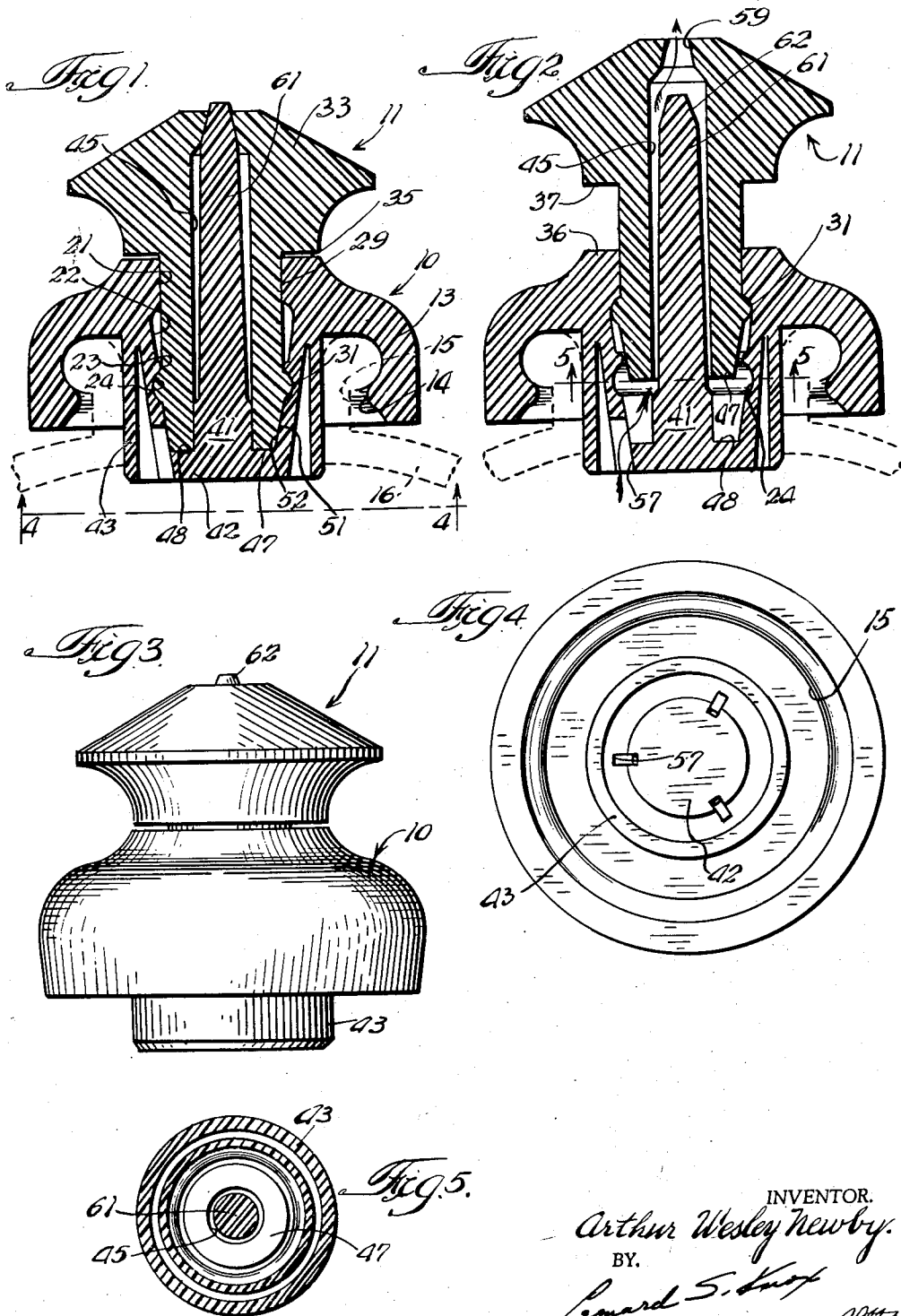
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DISPENSING CLOSURES

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DISPENSING CLOSURES

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1 Claim. (Cl. 222—525)

This invention relates to dispensing closures of the two-piece type in which a fixed part is adapted for attachment to a portion of a fluid-containing receptacle and receives a slidable plunger in a complementary bore thereof and wherein sliding movement of the plunger between two positions respectively opens passages for dispensing of fluid through a bore of the plunger and reverse movement closes such passages. At least one of the two parts is made of resilient material so that initial assembly of the plunger in the fixed part may be accomplished and the parts thereafter maintained in operative relation.

In closures of this type there is a fixed part adapted for attachment to a receptacle either by forcing a collar of the fixed part over a neck of the receptacle, by forcing a male termination of the fixed part into an aperture of the receptacle or by integrating the fixed part with the wall of the receptacle, e.g. a polyethylene fixed part with the neck of a squeeze bottle of polyethylene. The valve for permitting or interrupting flow from the receptacle through the closure is constituted by a seat on the fixed part and an obturating element cooperable therewith, this element being a part of a movable member arranged for movement with respect to the fixed part between "on" and "off" positions. Means are included for limiting the stroke of the movable member to "on" position to avoid inadvertent disengagement of the two parts.

In the device disclosed in the application aforesaid flow from the receptacle occurs through the valve and thence through a bore in the movable member. Inasmuch as the valve is at the inner end of the movable part and the bore is somewhat elongated the bore is, at all times, open at its outer end and foreign matter may therefore lodge therein while the article stands on the dealer's shelves. Consequently the saleability thereof is adversely affected. Moreover, in the case of viscous liquids a residue will accumulate in the bore during use by the purchaser. Not only is this condition unsanitary but the hardening thereof will, in many cases, interfere with flow. Obviously cleaning of the bore periodically is a nuisance against which the customer will rebel.

Having the foregoing in view the present invention has for its principal object a two-part dispensing closure in which a valve is positioned at the outer or exit end of the dispensing bore and wherein a male member in the nature of a tapered plug is caused to intrude a complementary seat forming part of the bore when the valve is closed and vice versa. Thus the bore is never exposed to the atmosphere except during actual pouring.

Another object is to provide a closure in accordance with the foregoing wherein the valve at the exit end of the flow passage is supplementary to the principal valve means to insure additional tightness—particularly in closures intended to dispense highly volatile fluids.

A further object is to provide a dispensing closure in accordance with the foregoing objects in which the parts are adapted to be molded of a plastic composition at minimum cost.

Other objects and advantages will become apparent

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from the ensuing description which, taken with the accompanying drawing, discloses a preferred mode in which the invention may be embodied in practice.

In this drawing:

Fig. 1 is a medial, longitudinal cross section of a dispensing closure in accordance with the invention shown in closed or "off" condition;

Fig. 2 is a similar view but in open or "on" position;

Fig. 3 is a side elevational view in the closed condition;

Fig. 4 is a bottom plan view as seen on the line 4—4 of Fig. 1; and

Fig. 5 is a cross section taken on the line 5—5 of Fig. 2.

Broadly regarded the invention, in one aspect, comprises a two part dispensing closure in which a fixed part is attached to a receptacle and a movable part is engaged with the fixed part to be shifted between open and closed positions. In a preferred form the parts are relatively shiftable translationally to which end the movable part is provided with a cap or button for gripping by the fingers. The movable part and the fixed part carry the elements constituting a valve. For example, the fixed part may have a seat and the movable part an element adapted to close upon the seat. These valve elements may be reversed. Preferably the seat is a cylindrical opening having a slightly inclined wall and the obturating element is a correspondingly tapered plug. In accordance with the invention an additional valve is located at the exit of the fluid passage through the closure. Desirably, the passage or passages providing fluid communication from the interior of the receptacle to and through the closure are arranged so as to facilitate withdrawal of the parts from the mold having in mind that the nature of the invention is such that a resiliently deformable plastic composition represents a preferred material for the parts. The invention closure includes means for limiting the stroke of the movable part between "on" and "off" and, desirably, the same means also functions to prevent separation of the parts under the force required to open the valve when such force is applied in a direction opposite to that in which the parts are initially assembled at the factory.

Turning now to the drawing I have shown a two-part closure comprising a fixed part 10 and a movable part 11. In the example the fixed part has a collar 13 which is beaded on its inner periphery at 14 for tight, snap engagement over the beaded neck 15 of a receptacle 16. Obviously the closure may be provided with a male attaching member of any well-known type whereby the same may be secured in an aperture in a wall of the receptacle. Alternatively the fixed part of the closure may be an integral part of the receptacle, e.g. a squeeze bottle of polyethylene or material having similar characteristics. At this juncture it will be noted that in order to assemble the two parts of the closure at least one of them is necessarily of resiliently deformable material, e.g. polyethylene. In practice it is preferred to make both parts of such material. By employing resilient material in this manner an efficient, reliable, wedging contact between the valve parts may be realized.

The fixed part 10 is provided with a cylindrical bore 21 which continues as an enlargement at 22, is constricted in a zone 23 and is then enlarged as a peripheral groove 24. Slidably received within the bore is the movable part 11 having a uniform diameter 29 over the outer part of its extent and a peripheral bead 31. The outer diameter of the bead 31 is in excess of the diameter of the bore 21. Thus, at the time of initial assembly of the parts the bead 31 is forced through the bore 21 during which the bore is stretched and the bead compressed to permit the parts to assume operative relationship. In the closed position (Fig. 1) of the valve (to be subsequently detailed) the bead 31 is received

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snugly in the groove 24 to insure maintenance of the "off" position and a fluid-tight seal. In the "on" position (Fig. 2) of the valve the bead 31 abuts the upper margin of the enlargement 22 whereby the stroke of the movable member 11 is limited. The axial length of the bore 21 is selected to provide proper guidance to the movable member 11 but is not of such length as to present undue friction. A button or cap 33 surmounts the cylindrical piston and is shaped to facilitate digital operation thereof. To assure reliable seating of the valve a clearance 35 is allowed between the confronting faces 36 and 37 of the fixed and movable parts respectively.

For convenience referring to the outer valve as a supplementary valve and the inner valve as a principal valve, this latter comprises a plug 41 upstanding from the end wall 42 of a body extension 43. Such plug may have a slight taper adapted for wedging engagement in a complementary bore 45 in the movable part or stem 11. Additional sealing action may be had by providing that the flat inner end 47 of the stem abut a confronting end face of the bore 21. Still additional sealing action may be obtained by forming the end of the cylindrical stem frusto-conically as at 51 to fit tightly a correspondingly shaped wall portion 52 forming the innermost end of the bore 21. In the "off" position the bead 31 is received in the groove 24 in a manner which provides a downward component of force supplementing the closing action of the valve. It will be understood that the dimensions are such that abutment of the surfaces 51 and 52 results in radial force components which assist in the sealing action.

Fluid communication between the interior of the receptacle and the bore 21 is through a plurality of gates 57 (Fig. 4) passing through the end wall 42 and extending above the surface 48. By providing passages of this character a considerably simplified mold may be utilized. From Fig. 2 it will be apparent that the fluid flows as shown by arrows.

In accordance with the invention means are provided for closing the exit of the bore 45. To this end the valve plug 41 is reduced in diameter and extended upwardly as a post 61 terminating in a frusto-conical plug 62 adapted, in the "off" position of the device, to fit tightly a frusto-conical port 59 forming the exit of the dispensing device. Accordingly, when the device is "off" the opening 59 is sealed against entry of foreign matter and the effect of the atmosphere upon congealable contents of the receptacle.

It has been found, that in closures of the general class in which the instant device is embraced, there is sometimes a tendency to regurgitate upon closing action. By "regurgitate" I mean to refer to minor gushing of the fluid contained in the receptacle due to the pump-like action of the stem, as it is moved inwardly, momentarily increasing the air pressure above the fluid. While this condition is usually minor in character and is ordinarily unobjectionable the invention alleviates the same by providing the two concurrently operative points of closure

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in the passage 45. It will be apparent from the foregoing that the plugs 41 and 62 are so related to their respective seating areas that closure of both occurs substantially simultaneously. Minor variations in the surfaces due to the exigencies of molding the device of resilient material preclude such dual closing action being exactly simultaneous, but it is possible to render the same sufficiently concurrent in point of time to obtain not only the foregoing advantage but the other advantages set forth hereinabove.

While I have shown a certain embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made and, I therefore, contemplate by the appended claim to cover any such modifications as fall within the true spirit and scope of my invention.

I claim:

A combined dispensing and valve device for a receptacle for fluent material comprising: a fixed part having a portion for attaching the device to opening-defining means forming part of the receptacle for flow there-through, said fixed part including means defining a bore open at the outer end of the device and an end wall at the inner end of said bore, said wall having at least one aperture therethrough for flow of the material from the receptacle into the bore, a stem snugly fitting said bore for frictional, axial movement therein between dispensing and non-dispensing positions, means mutual to said fixed part and stem for limiting the stroke of said stem to dispensing position, said stem having a portion obturating said aperture when the stem is moved to non-dispensing position constituting a first seal to interrupt flow through the device, said stem having a passage therethrough adapted to provide fluid communication between said aperture and the exterior of the device when said stem is moved to dispensing position, a closure member for said stem passage upstanding from said end wall through said passage, said closure member being of generally cylindrical configuration with an enlarged portion adjacent said end wall for plug-type engagement with a complementary portion of the inner end of the stem passage to constitute a second seal against flow and a distal end for plug type engagement with the outer end of the stem passage to constitute a third seal against flow, both said enlarged portion and distal end engaging the stem passage substantially simultaneously upon movement of the stem to non-dispensing position.

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