Jan. 21, 1964 A. E. ESTABROOK 3,118,577

CLOSURE FOR MATERIAL DISPENSING DEVICE

Filed Oct. 14, 1960

Fig. 1.

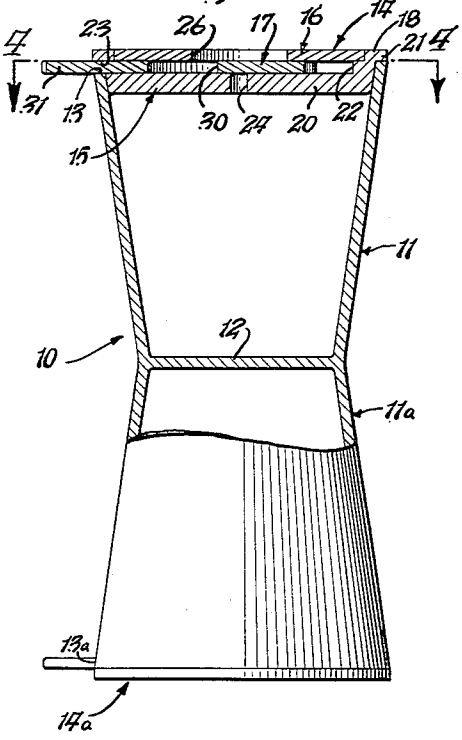


Fig. 2.

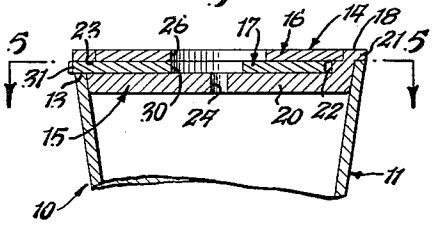


Fig. 4.

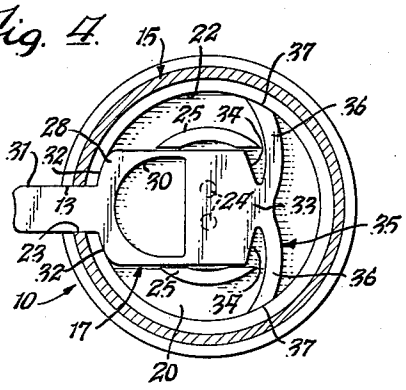


Fig. 3.

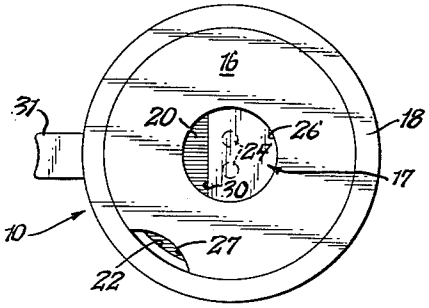
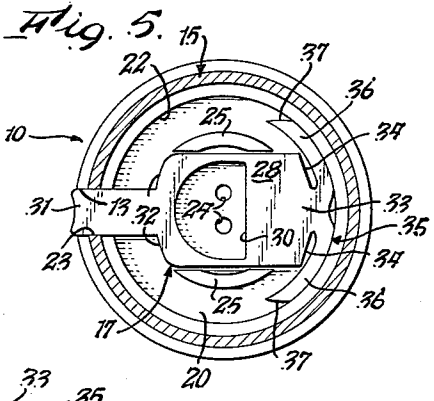


Fig. 5.



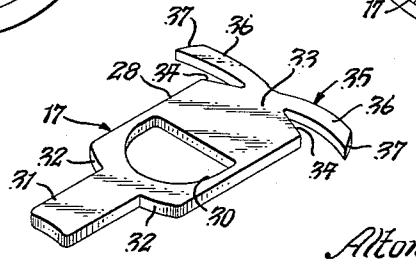


Fig. 6.

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United States Patent Office 3,118,577 Patented Jan. 21, 1964

3,118,577
CLOSURE FOR MATERIAL DISPENSING DEVICE

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Filed Oct. 14, 1960, Ser. No. 62,725
2 Claims. (Cl. 222—511)

This invention relates to material dispensing devices, and more particularly to a new and improved closure therefor incorporating self-closing movable valve means.

The inventive closure is particularly adapted for use in dispensing solid material in granular form such as condiments like salt and pepper. However, such closure can also be used for dispensing particulate solid material, such as tablets or pills, and even liquids, if desired.

A primary object of the invention is to provide such a closure incorporating self-closing movable valve means which is both deformable for opening the material dispensing device and recoverable for automatically closing such device.

Another object is to provide such a closure which is economical to manufacture, simple in construction, and easy to assemble and disassemble, as well as most effective in operation.

Other objects and advantages of the invention will become apparent upon a consideration of the description and drawings wherein:

FIG. 1 is a vertical elevational view, partly in section, of a material dispensing device in the form of a combined salt and pepper shaker, at each end of which is located a preferred embodiment of the inventive closure and self-closing movable valve means incorporated therein; the valve means being shown in its outermost position, closing the dispensing device;

FIG. 2 is a partial sectional view similar to FIG. 1, but illustrating the valve means in its innermost position, opening the dispensing device;

FIG. 3 is a top plan view of FIG. 1;

FIG. 4 is a sectional view taken on line 4—4 of FIG. 1;

FIG. 5 is a sectional view taken on line 5—5 of FIG. 2, and

FIG. 6 is a perspective view of the self-closing valve means shown in FIGS. 1–5.

Referring to the drawing, and particularly FIG. 1, a suitable material dispensing device in the form of a combined salt and pepper shaker is generally indicated at 10. The device is divided into an upper compartment 11 for containing salt for example, and a lower compartment 11*a* suitable for containing pepper. These compartments are divided at their inner ends by a transverse dividing wall 12. While the dispensing device 10 may take any desired shape, it is preferred that it take the form similar to an hour glass, and that it be generally circular in cross section. It is also preferred that the divided compartments of the dispensing device be molded in one piece from suitable plastic material such as polyethylene, polystyrene or an acrylic resin (Lucite), or from glass, if desired.

At their open ends, each compartment is also preferably provided with a peripheral notch opening in the same direction as the open end. In the drawing, the notch at the upper end is designated as 13, and at the lower end as 13*a*. Likewise, at their open ends, each compartment is provided with a closure, the upper closure being designated as 14 and the lower closure as 14*a*. Inasmuch as these closures 14 and 14*a*, each of which constitute a preferred embodiment of the invention, are identical, a description of the upper closure 14 will suffice for both.

The closure 14 is preferably composed of a lower or inner circular cup-shaped element 15, an upper or outer

circular disk-shaped element 16, and an intermediate, self-closing, movable valve element 17. Each of these elements is preferably molded in one piece from suitable plastic material such as used for the compartments. However, while elements 15 and 16 could be made from glass, the preferred material is polyethylene, which is the most resilient of the plastic materials mentioned, to insure a tight fit between element 15 and compartment 14 as well as between elements 15 and 16. As for the valve element 17, glass is not suitable because too rigid, and once again, the preferred plastic material is polyethylene, to insure not only sufficient deformation but also rapid recovery of the valve element, for proper operation thereof, as will be described in detail below.

As best seen in FIGS. 1, 2, 4 and 5, the lower cup-shaped element 15 is preferably composed of an upstanding peripheral rim portion 18 and a flat transverse wall portion 20. The peripheral rim portion 18 is designed to fit snugly within the open end of compartment 11 and is preferably provided with an outstanding peripheral flange 21 which rests upon the open end of the compartment. The peripheral rim portion 18 is also provided with an internal annular shoulder 22, the purpose of which will be described below, and a peripheral notch 23 extending transversely through the peripheral rim portion including shoulder 22 and opening upwardly.

The transverse wall portion 20 is preferably provided with two relatively small and centrally located through openings 24 which are communicable with the interior of the material containing compartment 11. In addition, the transverse wall portion 20 is preferably provided with a pair of spaced and diametrically opposed guides 25. Each guide is preferably in the form of a circular segment, the free ends of which are flattened and coplanar, and their function will be described in detail below.

The second element 16 in closure 14 is preferably in the form of a circular disk which rests upon the upper face of the internal shoulder 22 provided in the cup-shaped element 15. This disk-shaped element 16 is also provided with an enlarged central through opening 26 which is communicable with the smaller openings 24 in the cup-shaped element 15 and the interior of compartment 11. In addition, as best seen in FIG. 3, the disk-shaped element 16 is preferably provided with an arcuate peripheral recess 27 to facilitate insertion and removal of the element which fits snugly in the cup-shaped element on shoulder 22 therein.

Referring now to FIGS. 4–6, the closure 14 is completed by the intermediate valve element 17 arranged between elements 15 and 16. This element 17 is generally flat and elongated, and is preferably composed of an enlarged, generally rectangular central body portion 28 which is arranged to cover and uncover openings 24 and is provided with an enlarged and generally D-shaped through opening 30 of intermediate size, i.e. smaller than opening 26 and larger than openings 24. As best seen in FIGS. 1–3, opening 30 is always in communication with opening 26, but is movable into and out of communication with openings 24 to establish and prevent respectively communication between openings 24 and opening 26. Returning to FIGS. 4–6, the central body portion 28 terminates at its outer end in a reduced finger pressure-operated portion 31 which extends through the notches 13, 23 in compartment 11 and cup-shaped element 15, respectively. The junctures of the central body portion 28 and finger operated portion 31 are preferably in the form of outwardly convex arcuate shoulders 32 which, in the closed position, are adapted to engage the inner face of shoulder 22 in cup-shaped element 15, as shown in FIG. 4.

The body portion 28 of valve element 17 also preferably includes a tapered inner end 33 formed by inwardly converging surfaces 34, and the valve element is completed by an elongated and resilient transverse wing portion co-planar with body portion 28 and generally indicated at 35. This wing portion preferably is composed of a pair of arcuate segments 36 curved concavely toward and merging at their inner ends with inner end 33, but projecting laterally beyond the sides of the enlarged central body portion 28 of the valve element in spaced relation to the converging surfaces 34 of tapered end 33. These wing segments 36 are also provided with inwardly converging arcuate outer ends 37 which engage the inner face of the peripheral rim portion 22 in the cup-shaped element 15, when valve element 17 is closed, as best seen in FIG. 4.

In assembling the closure 14, the valve element 17 is first inserted into the cup-shaped element 15, the finger operated portion 31 readily fitting within notch 23, the enlarged central body portion 28 fitting between guides 25, and the outer ends 37 of the wing segments 36 engaging the inner face of shoulder 22. Next, it is but a simple matter to snap the disk-shaped element or cover 16 into the cup-shaped element 15, the former resting upon the upper face of shoulder 22 and permitting endwise reciprocation of the elongated valve element 17 along the guides 25.

In assembling the closure 14 with the compartment 11 of the dispensing device 10, the cup-shaped element 15 is inserted within the open end of the compartment, care being taken to insure that the slot 23 in the cup-shaped element 15 and slot 13 in compartment 11 are alined to permit insertion of the finger operated portion 31 into notch 13. The depth to which the cup-shaped element 15 is inserted, is determined by the outstanding flange 21 which rests upon the outer end of compartment 11, and to insure a snug fit between the closure 14 and the compartment 11, the outer diameter of the downwardly and inwardly tapered peripheral rim portion 18 is preferably made either the same or slightly larger than the internal diameter of the downwardly and inwardly open end of compartment 11, depending upon the material employed for each.

In operating the closure 14 to control the flow of material from compartment 11, the valve element 17 is reciprocated endwise in a substantially straight line transversely of compartment 11 from the closed position of FIG. 4 to the open position of FIG. 5 and vice versa. This is easily accomplished by manually applying finger pressure to the outer end of the reduced portion 31, the movement of the valve element 17 in the direction of tapered end 33 being controlled by the guides 25 on each side of the valve element. To permit such inward transverse opening movement of the valve element 17, as shown in FIG. 5, the wing segments 36 are readily deformable transversely toward the tapered inner end 33 of the valve element, and when completely deformed, these wing segments generally conform to the circular inner face of shoulder 22 in the cup-shaped element 15. In this open position, the body portion 28 uncovers openings 24, the enlarged central opening 30 within the valve element being moved into registry with the enlarged opening 26 in the disk-shaped cover element 16 and into communication with the smaller openings 24 in the cup-shaped element 15. Thus, communication is established between openings 24 and each of openings 26 and 30, as well as between such openings and the interior of compartment 11 for permitting dispensing of the material therein.

To close the dispensing device, the finger pressure is simply released from portion 31 of valve element 17, and immediately, the previously deformed, resilient wing segments 36, which act like springs, recover and automatically cause closing movement of the valve element outwardly in the opposite direction, thereby preventing communication between openings 24 and opening 26, as body portion 28 covers openings 24 and opening 30 moves out of communication with openings 24. As a result, the dispensing device 10 is automatically and rapidly closed.

It will be noted from an examination of FIGS. 4 and 5, that the D-shaped opening 30 in valve element 17 not only facilitates quick opening, but also rapid closing of the closure 14. The flat side of the D-shaped opening, which side is preferably located and crosses at about the center of valve body portion 28 and faces tapered end 33, serves to open and close both openings 24 rapidly and uniformly in the initial stages of the inward and outward motion of the valve element. This makes for effective control of the dispensing and shut-off operations. In addition, from an examination of FIG. 2, it will be noted that the dispensing openings gradually increase in size from element 15 on up. This feature also facilitates dispensing of the material and together with the close fit between elements 15, 16 and 17 effectively ensures continued proper operation of the valve element by preventing lodging of the material, e.g. grains of salt, between such elements.

It will now be seen how the invention accomplishes its various objects, and the advantages adherent in the invention will be apparent. It is to be especially noted that the only moving part in the invention closure is the valve element, and that this element is constructed in such a manner as to be self-closing. Moreover, it will be noted that the one piece molded construction of not only the movable valve element, but also of the cup and disk-shaped elements, makes not only for economical manufacture, and ease of assembly and disassembly of the closure, but also for most effective operation thereof.

While this invention has been described and illustrated herein with reference to only a single, preferred embodiment, it is to be understood that various changes and modifications may be made in the invention by those skilled in the art, without departing from the spirit of the invention, the scope of which is to be determined by the appended claims.

What is claimed is:

1. A closure for a material dispensing device and comprising:

(*a*) a valve housing including an inner substantially cup-shaped element having a peripheral rim portion and a transverse wall portion provided with a first through opening, and

(*b*) an outer, substantially disk-shaped element secured within said peripheral rim portion in spaced, substantially parallel relation with said transverse wall portion and provided with a second through opening communicable with said first opening; and

(*c*) a one-piece, substantially flat and elongated, self-closing valve element arranged between said inner and outer elements and reciprocable endwise in said housing, each of said inner, outer and valve elements being formed of plastic material, and said valve element being formed of resilient plastic material such as polyethylene,

(*d*) said valve element including the following portions arranged entirely between said inner and outer elements, a body portion arranged to cover and uncover said first opening and having a tapered end, and co-planar with said body portion,

(*e*) an elongated resilient transverse wing portion merging with said tapered end and projecting laterally beyond the sides of said body portion in spaced relation to said tapered end and engageable with the interior of said peripheral rim portion,

(*f*) said wing portion being deformable transversely toward said tapered end to permit opening movement of said valve element in the direction of said tapered end to uncover said first opening and establish communication between said first and second openings, and

(*g*) recoverable for automatically causing closing movement of said valve element in the opposite direction to cover said first opening and prevent communication between said first and second openings.

2. A closure for a material dispensing device and comprising:

(*a*) a valve housing including an inner substantially cup-shaped element having a peripheral rim portion and a substantially flat transverse wall portion provided with a first through opening, and

(*b*) an outer, substantially disk-shaped element secured within said peripheral rim portion in spaced, substantially parallel relation with said transverse wall portion and provided with a second through opening larger than and communicable with said first opening; and

(*c*) a one-piece, substantially flat and elongated, self-closing valve element arranged between said inner and outer elements and reciprocable endwise in said housing,

(*d*) each of said inner, outer and valve elements being formed of plastic material, and said valve element being formed of resilient plastic material such as polyethylene,

(*e*) said valve element including the following portions arranged entirely between said inner and outer elements, a body portion arranged to cover and uncover said first opening, and co-planar with said body portion,

(*f*) an elongated resilient transverse wing portion,

(*g*) said body portion having a tapered end and a third, generally D-shaped through opening of intermediate size arranged intermediate its ends with the flat side

of said third D-shaped opening facing said tapered end,

(*h*) said third opening being movable into and out of communication with said first opening to establish and prevent respectively communication between said first and second openings,

(*i*) said wing portion including a pair of arcuate segments concavely curved toward and merging at their inner ends with said tapered end but projecting laterally beyond the sides of said body portion in spaced relation to said tapered end and engageable with the interior of said peripheral rim portion,

(*j*) said segments being deformable transversely toward said tapered end for permitting opening movement of said valve element in the direction of said tapered end to uncover said first opening and establish communication between said first opening and each of said second and third openings, and

(*k*) recoverable for automatically causing closing movement of said valve element in the opposite direction to cover said first opening and prevent communication between said first opening and each of said second and third openings.

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