Jan. 5, 1965 C. B. FORD 3,164,280

CONTAINER VALVULAR CAP

Filed Sept. 17, 1962 2 Sheets-Sheet 1

Fig. 1

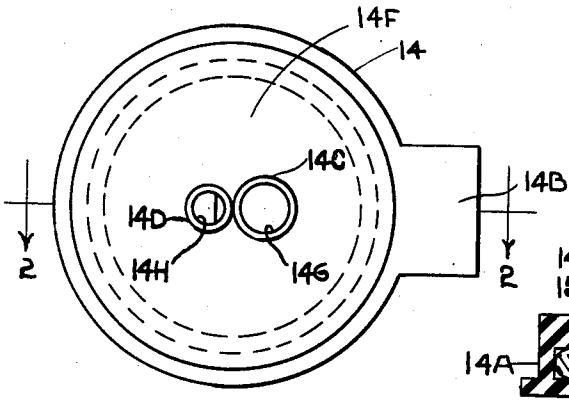


Fig. 3

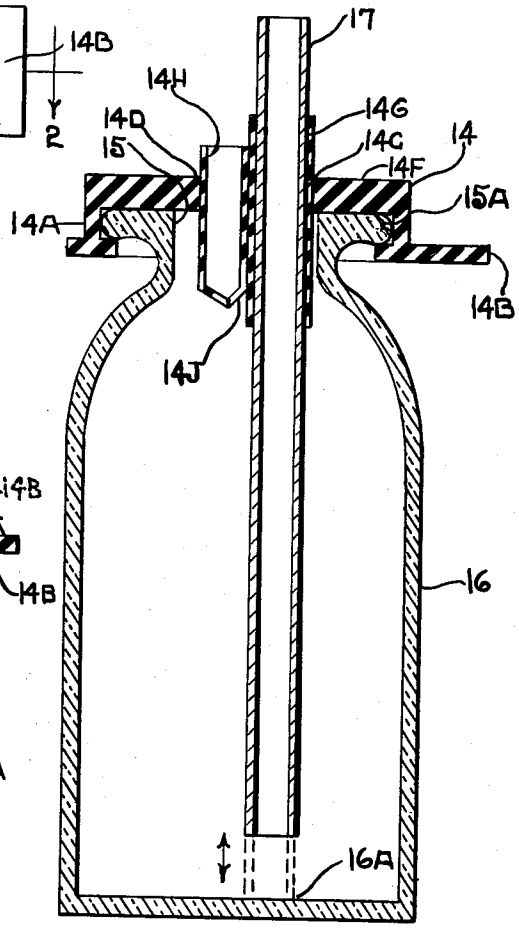
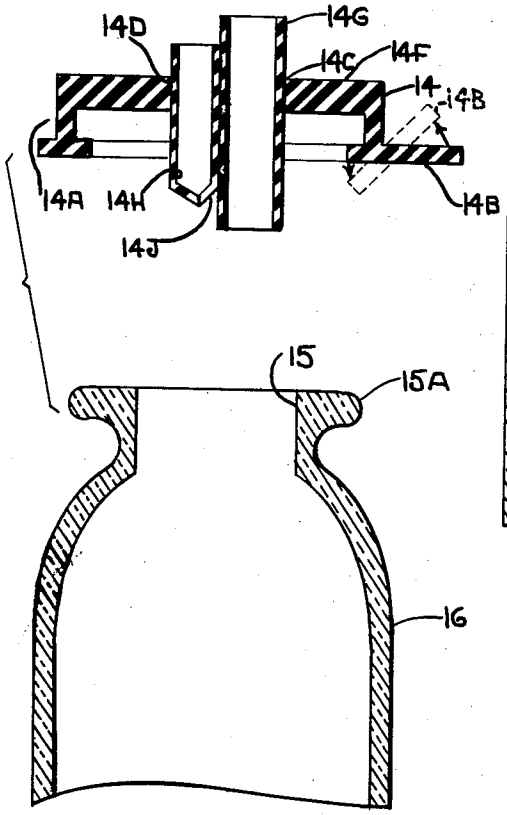


Fig. 2



INVENTOR:

Clancy B Ford

Jan. 5, 1965 C. B. FORD 3,164,280

CONTAINER VALVULAR CAP

Filed Sept. 17, 1962 2 Sheets-Sheet 2

Fig. 4

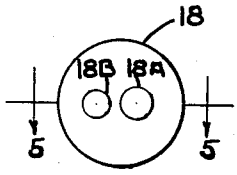


Fig. 5

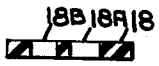


Fig. 6

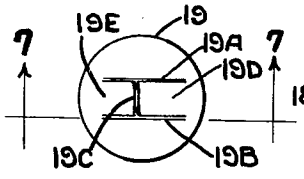


Fig. 7



Fig. 8

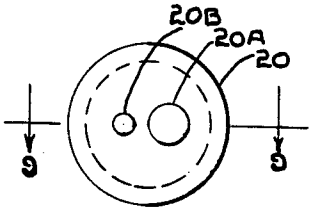


Fig. 9

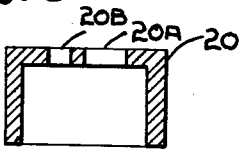


Fig. 10

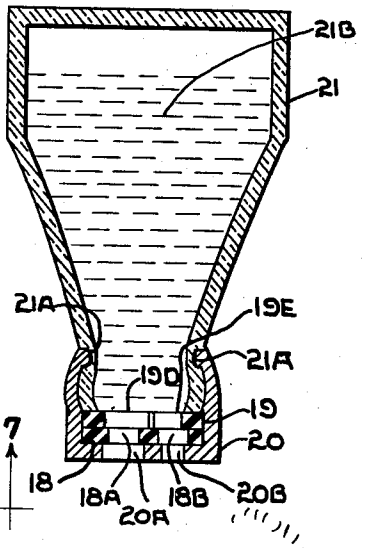


Fig. 11

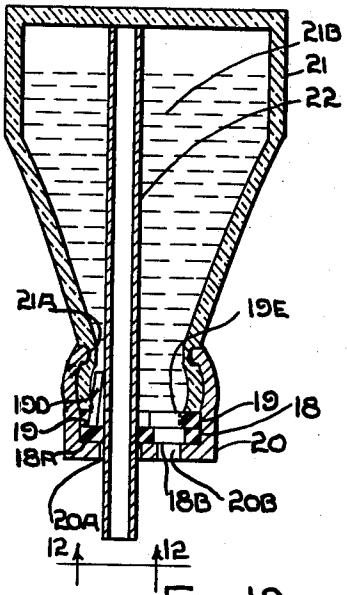


Fig. 12

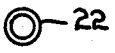


Fig. 13

INVENTOR:

Danny B. Ford

United States Patent Office 3,164,280 Patented Jan. 5, 1965

3,164,280
CONTAINER VALVULAR CAP

Clancy B. Ford, 16901 Schoolcraft St., Van Nuys, Calif.

Filed Sept. 17, 1962, Ser. No. 224,145
3 Claims. (Cl. 215—79)

This invention relates to containers and straws for sucking liquids therefrom and more specifically to sealing-means and valves in connection therewith and is a container valvular cap which is pierceable by a straw, and sealable thereafter, and susceptible of allowing sections of the straw to be slid therethrough from outside into container and up-to and against the bottom of the latter, and of holding the straw in various slid positions, and of allowing air into container without liquid spilling therefrom while contents are being sucked via said straw, and of opening the container without being removed therefrom, and of sealing the latter against pressure from within the container.

Ordinarily the container common seals such as snap-caps, plugs and like, have to be removed for unsealing the container and inserting a straw, and require for their removal special tools or treatment often not readily available.

Ordinarily, when container is finally unsealed but only part of contents consumed, to preserve the remains the straw has to be removed and container resealed, but its original seal is often damaged in the unsealing process and/or becomes misplaced.

Quite often, especially with children and babies, contents are spilled while sucked via straw.

The basis object of this invention is to eliminate the above said inconveniences by providing for a container a pierceable and sealable thereafter valvular cap comprising means for sealing the container against prevailing pressures from therewithin and normal pressures from without, and means for allowing said cap to be manually pierced from outside by a straw, and means for allowing sections of the latter to be tightly slid therethrough into the container, and a one-way valve for allowing air into the container from outside and actuatable by vacuum created within container by and during the sucking of contents via straw, and shut-off means for said valve self-actuated in the absence of opposing force, and means for sealing the cap after it has been pierced by the straw and against prevailing pressure from within.

Another object of this invention and falling within the above scope is to provide means for sealing the container while the straw is piercing the cap and remains in the container.

Consequent object of this invention is to provide self-sealing means with the cap for sealing the capped container automatically after the straw is withdrawn, and prior to the cap being pierced by the straw, and co-operating means for keeping the container sealed against normal air pressure and handling from without and against prevailing pressures from within, if any.

Still another object of this invention is to provide means for flexible handling of the straw in piercing by latter the cap and while sliding the straw forth and back therethrough and/or while using the straw for sucking the contents.

Among other important objects of this invention is to make its reduction to practice practical, convenient and easy to operate, and simple, easy and inexpensive to manufacture.

To illustrate by examples how the above and other objects of this invention may be achieved reference now is being made to the accompanying drawings.

In the drawings:

FIGURE 1 is the top view of a cap comprising some of the features of this invention.

FIGURE 2 is a side cross-sectional view of the same cap and of a neck and section of a container susceptible of being removably secured with said cap.

FIGURE 3 is a side cross-sectional view of the container and above-said cap secured together and of a straw piercing said cap and indicating some of the features of this invention.

FIGURE 4 is a top view of a component for a modified cap and comprising some of the features for this invention.

FIGURE 5 is a cross-section taken at 5—5 of FIGURE 4.

FIGURE 6 is a top view of another component for said modified cap and comprising some of the features for this invention.

FIGURE 7 is a cross-section taken at 7—7 of FIGURE 6.

FIGURE 8 is a top view of still another component for said modified cap and comprising some of the features for this invention.

FIGURE 9 is a cross-section taken at 9—9 of FIGURE 8.

FIGURE 10 is a side cross-sectional view of a turned up-side-down filled container and of its modified cap comprising features of this invention and formed of assembled components shown in FIGURES 4–9.

FIGURE 11 is substantially the same view as in FIGURE 10 and of a lengthwise cross-section of a straw piercing said modified cap and slid into container against its designated bottom.

FIGURE 12 is a top view of the straw open-outer-end and is taken at 12—12 of FIGURE 11.

FIGURE 13 is a side view of the same assembly shown in FIGURE 11 except for the straw here pulled slightly outwardly away from container-bottom and indicated engaged for sucking the contents from the container, and the latter here shown in different position, and some of the features of this invention shown here actuated responsive to sucking action.

In reference to the drawings:

In regard to FIGURES 1–3; Cap 14 is of a snap-on type and has L-shaped edge 14A susceptible of resiliently snapping over shoulder 15A of container-neck 15 of container 16 especially when cap-lever 14B is manually lifted as indicated by dotted lines in FIGURE 2. After being so snapped and lever 14B released the cap 14 assumes secured position over and around container-shoulder 15A as indicated in FIGURE 3. It may be evidently easily removed from said and shown position and container 16 by manually lifting lever 14B and pulling thereby cap 14 sidewise upwardly.

Cap 14 has holes 14C and 14D through its top 14F. Tube 14G is inserted through hole 14C and kept tightly therein in position substantially as shown in FIGURES 2 and 3. The inside diameter and material of tube 14G are adapted for receiving and manually sliding therethrough a sucking straw 17 and for holding the latter in various slid positions when not moved by outside force. A tube 14H is inserted through hole 14D and kept tightly therein in position substantially as shown in FIGURES 2 and 3. The inserted end of tube 14H is spear-shaped and normally closed and has an inwardly opening resilient one-way valve 14J.

The straw 17 may be pushed all way down up to and against bottom 16A of container 16 (as indicated by dotted lines in FIGURE 3). When straw 17 assumes such position it is quite apparent that container 16 will be completely sealed from outside. For sucking liquid from container 16 the straw 17 should be pulled upwardly, for instances, to position shown in FIGURE 3. During the act of sucking the shown one-way valve 14J will open inwardly under excessive air pressure from

outside caused by sucking the contents from container 16. Liquid contents will not be able to leak-out through said valve 14J even during the act of sucking because, in order for said valve to open, the incoming air pressure from outside must be greater than the pressure thereagainst from inside, thus the incoming air from outside will keep liquid away from entering the open valve, and, when there is no sufficient pressure from outside, the resiliency of the valve 14J will shut it closed automatically and it will naturally remain shut against any prevailing pressure from inside.

In regard to FIGURES 4–13; said figures show a modified structure for this invention, i.e., disk 18 (FIGURES 4 and 5) of resilient rubber-like material has hole 18A of slightly smaller diameter than straw 22 (FIGURES 11–13), and another yet smaller hole 18B, substantially as shown.

A likewise disk 19 (FIGURES 6 and 7) has an H-shape-throughout 19A–19C–19B which forms two resiliently hinged flaps 19D and 19E correlative respectively to holes 18A and 18B of disk 18, but each of said flaps substantially larger than said holes respectively.

A conventional snap-and-edge-squeeze-type cap 20 (FIGURES 8 and 9) has holes 20A and 20B correlated to holes 18A and 18B of disk 18 and to flaps 19D and 19E of disk 19, respectively; the hole 20A is of larger diameter than straw 22 (FIGURES 11–13), but is smaller than flap 19D of disk 19 (FIGURE 6); and the hole 20B is corresponding to or smaller than hole 18B of disk 18 (FIGURE 4).

In FIGURE 10 disk 18 is sandwiched between disk 19 and the inner walls of cap 20; the hole 18A is aligned with flap 19D and hole 20A; the hole 18B is aligned with flap 19E and hole 20B; then the cap 20 is snapped over neck-shoulder of conventional container 21, pressed tightly thereagainst, and the edges of its side-walls squeezed into circular groove 21A under the neck-shoulder of container 21, whereby disks 19 and 18 are tightly held over and against the surface of the top edges of the container-21-neck.

Container 21 is shown filled with liquid 21B and turned up-side-down to better illustrate the possible pressure of liquid 21B from within against above said cap composition 19–18–20. Even in such position said liquid cannot escape container 21 because the flaps 19E and 19D are being thereby pressed so much tighter from within against disk 18, and, being larger respectively than holes 18B and 18A and holes 20B and 20A, naturally cannot cave-in therethrough, and, because of the mutual rubber-like nature of disks 18 and 19, form very tight seals, which apparently become even tighter if the contents are effervescent.

FIGURE 11 illustrates how the cap assembly, disclosed in reference to FIGURE 10, may be easily pierced from outside by straw 22, and how contents 21B of container 21 may remain tightly sealed therewithin while straw 22 remains in said container. To achieve the above said one end of straw 22 is easily inserted into the oversized hole 20A and then with slight manual pressure into and through the smaller but resiliently-yielding-sidewise hole 18A, and against resilient but inwardly yielding flap 19D, which will open inwardly under manually pressed straw 22 and allow the latter to enter the container 21 and be pushed further inwardly to any length thereof up to and against the container bottom, substantially as shown in FIGURE 11. When left in shown position the straw 22 becomes rather a component in complete sealing of container 21 because the submerged open end of the straw now is closed and sealed by contact against the bottom of container 21, and the sides of straw 22 are sufficiently squeezed by thereagainst resilent edges of hole 18A to form an efficient seal around the straw. The friction caused by said squeezing will also hold straw 22 in shown and/or other inserted positions.

Thus it becomes unnecessary to remove straw 22 for resealing container 21, however, if the straw 22 is removed (by merely pulling it out of container 21) then it is not necessary to look for any loose caps and/or to reseal container manually since here its cap has not been removed and the resealing (upon removal of the straw) apparently occurs automatically and instantaneously the moment the straw 22 no longer presses against flap 19D, the latter, due to its described resilient nature and after becoming free from outside pressure, would snap back to original sealing position against disk 18 disclosed in reference to FIGURE 10, and, when straw is being pulled out, the friction thereof in sliding it outwardly along and against forcibly open and resilient thereagainst flap 19D would further contribute in pulling the latter to its said original sealing position.

In FIGURE 13 the straw 22 is shown pulled slightly outwardly from the bottom of container 21 whereby liquid 21B may enter the straw 22 when sucked via said straw from the container, as indicated. The sucking process would naturally create vacuum within otherwise sealed container which ordinarily would make the sucking very difficult if not normally impossible. In this invention, however, the moment the sucking process begins to create vacuum, the flap 19E opens inwardly by the pull of said vacuum and pressure of outside air incoming via air holes 20B and 18B to fill-in the vacated space.

There is no danger however, of liquid 21B leakage from container 21 via so opened flap 19E since the force of incoming air must be greater than the resiliency of flap 19E combined with thrust of liquid thereagainst, if any; otherwise said resiliency plus said thrust would close and seal flap 19E against disk 18 before any liquid from container 21 could escape through said flap 19E, and, of course, the moment the sucking stops, the abnormal air pressure from outside against flap 19E ceases and the latter would immediately close due to its resiliency, and any thrust of contents thereagainst from within would only add to tight sealing of closed flap 19E against disk 18.

Therefore it should be apparent that this invention allows container 21 filled, for instance, with milk be given even to a small child to suck milk therefrom as described and without fear of the child spilling the milk. Even if the child turns the container up-side-down, even with straw 22 inserted but not reaching the container-bottom, no milk would be spilled, since, without sucking, no air would enter the container, hence no liquid would be able to come out even via the straw in said position, or in any other position, or with the straw pulled out by the child, or repeatedly pulled out and inserted, even while the container is being held up-side-down or at any angle.

Straw 22 may be flexibly inserted into container 21 and flexibly slid forth and back and flexibly handled while inserted because, as above stated, the hole 20A is of larger diameter than straw 22 and the latter therefore while therein is not restrained thereby from common flexibility in handling; the hole 18A, while normally of smaller diameter than straw 22, does not restrain much said flexibility either because of the yieldability of the rubber-like material of its disk 18; and the oversized flap 19D plus the likewise yieldability of rubber-like material of its disk 19, is even a lesser restraint to above said flexibility in handling the inserted straw.

The above described and illustrated structures are, of course, mere examples of just few of many possible modifications and variations in reduction-to-practice of this invention; for instance, it may become desirable to practice herein disclosed and taught principles of this invention in connection with a plug-type cap, a screw-on-type cap and like; or embody it in a closed container as a unit; or in a cap, plug, cover and like—adjustable to fit various containers; or in molded, cast or machined part, parts and/or units; or in connection with various different and/or suitable materials; or by embodying differently made, shaped and/or constructed valve, valves and/or

sealing and/or self-sealing means; all said and other variations and/or modifications being quite possible as and resultant of mere skill after being taught and guided by present inventive disclosures and herein revealed concept, basic idea, principles, objects and teachings of this invention.

Therefore it is not the purpose to limit the patent protection for this invention to the exemplified herein structures but to extend said protection over various structural modifications within the scope of one or more of the accompanying claims.

I claim as my invention:

1. A closure for an open mouth of walled container comprising a plurality of rubber-like disks mounted one over another, a first of said disks having a plurality of holes therethrough, a first of said holes adapted for inserting therethrough a suction straw and being circular and of slightly smaller diameter than the outside diameter of said straw, a second of said rubber-like disks having pierced therethrough configurations forming therein a plurality of elastic flaps located in said second disk respectively corresponding to locations of respective holes in the first disk and each respectively of larger surface than thereto corresponding hole, a cap-like structure housing said disks and having a top-wall and descending side-wall, the latter adapted for securing the cap-like-structure with side wall of the container, said top-wall having a plurality of holes therethrough corresponding respectively to the respective holes of said first disk, and a first hole in the top-wall corresponding with the first hole in the first disk and being of slightly larger diameter than the outside diameter of the suction straw, said first and second disks mounted within the side-wall of the cap-like-structure, the first disk mounted against the inner face of the top-wall of the cap-like-structure, the holes of the first disk respectively in alignment with respective holes of the top-wall, the second disk mounted over and against said first disk and facing the container open mouth, the flaps of the second disk respectively in alignment with respective holes of the first disk for respectively overlapping and sealing said respective holes against pressure from within the container and for remaining susceptible of being forcibly flapped into container mouth via the respectively aligned holes in said top-wall and the first disk respectively.

2. As stated in claim 1 and the cap-like structure is made of springy material and its side-wall having inverted and inwardly protruding edge and an aligned therewith outwardly protruding elongated handle.

3. An improvement in a pierceable self-sealing valvular cap for an open mouth of walled container in conjunction with a suction straw and comprising a first rubber-like disk having a plurality of holes therethrough and a first of said holes adapted for squeezing therethrough a suction straw, a second rubber-like disk having pierced therethrough flaps respectively corresponding to respective holes in the first disk, and each respectively larger than thereto corresponding hole, a cap with top-wall and descending side-wall the latter adapted for securing the cap with side wall of the container, the cap-top-wall having a plurality of holes therethrough respectively corresponding to respective holes in the first disk, a first hole in the cap-top-wall corresponding with the first hole in the first disk and being of larger diameter, the first and second disks mounted within the cap-side-wall, the first disk mounted against the inner face of the cap-top-wall, the holes of the first disk respectively in alignment with respective holes of the cap-top-wall, the second disk mounted over and against said first disk for facing the container open mouth, the flaps of the second disk respectively in alignment with respective holes of the first disk for respectively overlapping and sealing said respective holes against pressure from within the container and for remaining susceptible of being forcibly flapped into container mouth via the respectively aligned holes in said cap-top-wall and the first disk respectively.

References Cited by the Examiner

UNITED STATES PATENTS

811,811	2/06	Allison.	
3,047,178	7/62	Poitras et al.	215—56

FOREIGN PATENTS

152,594	12/55	Sweden.

THERON E. CONDON, *Primary Examiner.*

FRANKLIN T. GARRETT, *Examiner.*