June 15, 1965 T. A. MILLER 3,189,252

PLASTIC SELF-SEALED VALVED CONTAINER

Filed Sept. 21, 1962

FIG. 1

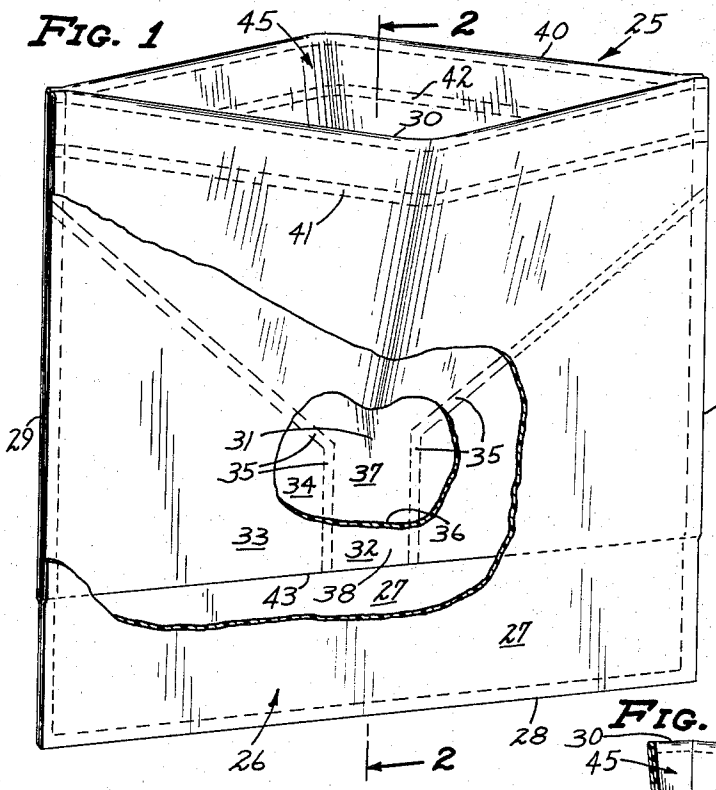


FIG. 2

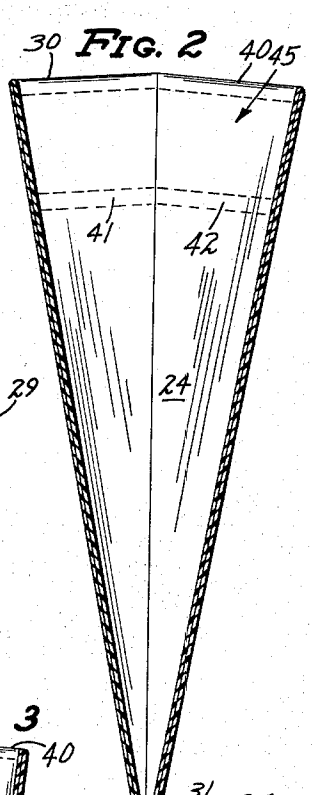


FIG. 3

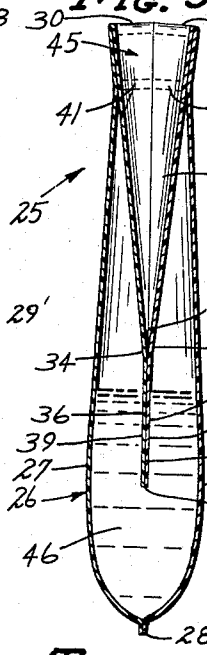
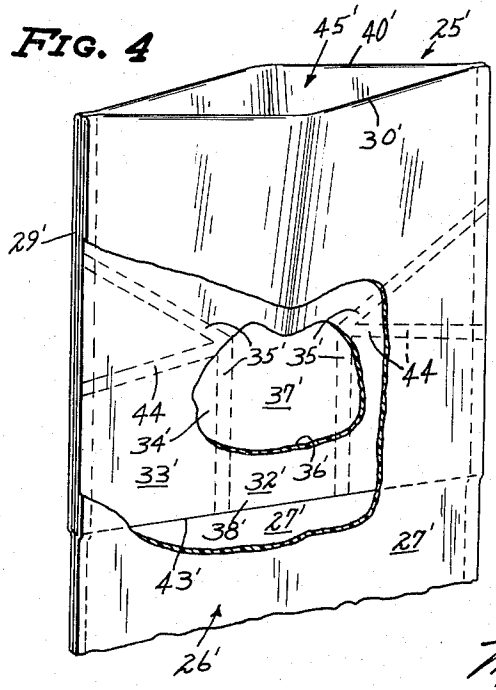


FIG. 4



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PLASTIC SELF-SEALED VALVED CONTAINER

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1 Claim. (Cl. 229—62.5)

This application is a continuation-in-part of my earlier application, Serial No. 91,512, filed February 24, 1961, now abandoned.

This invention relates generally to fluid containers, and more particularly it relates to valved unbreakable fluid containers.

An important object of this invention is the provision of an unbreakable package which is formed from thin, flexible, relatively smooth-surfaced, organic polymeric material, and which is provided with a one-way valve which will open easily to permit filling of the package with liquid but which prevents leakage of fluid from within the package.

Another object of this invention is the provision of a package which is provided with upwardly and outwardly extending side edges which define an upwardly opening funnel having its reduced lower end portion communicating with the valve of the package whereby to aid in the collection and funneling of fluid to be introduced through the valve into the package.

Another object of this invention is the provision of a package which includes upwardly opening fluid receiving compartments for separating the fluid received therein into separate portions to provide a plurality of individual separate sections to be used in testing.

Another object of this invention is the provision of a package which is formed from thin, flexible, unbreakable material which will not in any way affect the composition of the fluid to be received therein, and which is formed from a material which may be easily sterilized.

Another object of this invention is the provision of a fluid container formed from thin, flexible, relatively smooth-surfaced organic polymeric material comprising an envelope having contained therein a self-sealing one-way valve.

Another object of this invention is to provide a self-sealing one-way valve construction formed in two adjacent sheets of thin, flexible, relatively smooth-surfaced organic polymeric material by sealing lines, the region between said sealing lines being adapted to open by movement of the adjacent sheets in transversely opposite direction to the plane of said sheets.

Another object of this invention is to provide a package equipped with a one-way valve, which valve admits fluid downwardly therethrough under gravitational forces at atmospheric pressures.

Other objects of this invention reside in the provision of a package containing an integral one-way self-sealing valve which is extremely economical to manufacture, strong and durable for its intended uses, and highly efficient in the vindication of its purposes.

The above and still further objects of this invention will become apparent from the following detailed specification, appended claim and attached drawings.

Referring to the drawings, wherein like reference characters indicate like parts or elements through the several views:

FIG. 1 is a view in perspective of one embodiment of my invention, some parts being broken away and some parts being shown in section;

FIG. 2 is an enlarged view in vertical section taken on the line 2—2 of FIG. 1;

FIG. 3 is a view corresponding to FIG. 2 but showing

the embodiment of FIG. 1 partially filled with fluid; and

FIG. 4 is a view in perspective of a second embodiment of my invention, some parts being broken away and some parts being shown in section.

FIGS. 1–3 illustrate a preferred embodiment of my invention, represented in general by the reference numeral 25, in which the package has a envelope 26 which may be suitably formed by folding back upon itself each of a pair of sheets of a material such as polyethylene to define spaced side walls 27. The respective folds form the top edges 30 and 40 of envelope 26, the side edges 29 of the envelope 26 are sealed as by heat sealing. The top edges 30 and 40 respectively, are each optionally heat sealed together, as shown in FIGS. 1–3 thereby serving to better define an inlet opening 45 which leads into the interior of envelope 26.

A one-way valve 32 and a funnel shaped passageway 24 extending between inlet opening 45 of envelope 26 and inlet opening 31 of the one-way valve 32 is formed by a pair of adjacent sheets 33 and 34 of a material, such as polyethylene, which can each be the same respective sheet material as their respective adjacent side walls 27. These valve sheets 33 and 34 are sealed together as by heat sealing along lines 35 extending longitudinally and generally downwardly from opposite sides of the envelope 26 so as to form funnel shaped passageway 24. The seals 35 can be conveniently formed in sheets 33 and 34 as a first step before inlet opening 45 is formed by folding back upon each sheet 33 and 34 the respective sides 27, as described. The sides of sheets 33 and 34 and the sides of the spaced side walls 27 thus coincide and are conveniently closed by sealing the four layers together on their edges, as by heat sealing.

The bottom edge 28 of envelope 26, which falls below the bottom edge 43 of sheets 33 and 34, is formed by sealing the bottom edges of adjacent side walls together as by heat sealing. In order to better define the inlet opening 45, seals 41 and 42 are optionally placed across each top edge, in general parallel alignment with edges 30 and 40 between walls 27 and respective sheets 33 and 34 as shown in FIGS. 1–3.

I theorize that the one-way valve 32 operates primarily because of the mutual force of attraction between the inner faces 36 and 37 of respective adjacent valve sheets 33 and 34 in combination with the pressure exerted upon the outer faces 38 and 39 of sheets 33 and 34 by fluid within the envelope 26 after fluid has been introduced into envelope 26. Fluid in the envelope 26 apparently causes sheets 33 and 34 of the valve 32 to engage one another in sealing relationship. I also theorize that an auxiliary force tending to produce sealing relationship between adjacent sheets 33 and 34 is provided by the tensioning or pulling action upon the side edges 29 by sheets 33 and 34 when the envelope 26 is filled with fluid 46 in the manner shown in FIG. 3, for example.

FIG. 4 illustrates a second embodiment of my invention which generally conforms in all respects to the parts of elements of the embodiment shown in FIGS. 1, 2 and 3, such similar parts or elements being represented by the same reference characters used in FIGS. 1–3, but with the addition of prime marks thereto, except as now noted. In this embodiment, the adjacent sheets of the one-way valve 32′, in addition to being sealed together along the seal lines 35′, are also sealed together along lines 44, as by heat sealing. Seams 44 produce a somewhat different tensioning effect upon the sides 29′ and appear thereby to augment the self-sealing action between adjacent faces 36′ and 37′ upon valve 32′. Note that here no seams are formed along the top edges 30′; 40′.

When a container construction of this invention is filled with fluid to a level above the bottom of its integral valve

(with the container in a vertical position), it will be appreciated that the valve and perhaps even its associated funnel may hold some residual fluid after cessation of a filling operation. These few drops are easily removed through the inlet opening by inverting the construction. Thereafter the container constructions of this invention are substantially nonleaking and can be stored and handled indefinitely without appreciable leakage or spillage.

As will be appreciated from each of the above described drawings, the package or container constructions of this invention are all formed from a plurality of sheets of thin, flexible, relatively smooth-surfaced, organic polymeric material in face-to-face relationship. The container defines an envelope and a self-sealing one-way valve. The envelope has spaced, generally parallel, side walls which are closed at their bottom and side edges. The top of the envelope defines an inlet opening leading to the envelope's interior.

Inside the envelope is a self-sealing one-way valve formed from an adjacent pair of the sheets of thin, flexible, relatively smooth-surfaced, organic polymeric material. These adjacent sheets mounted across the top of the envelope so as to define an inlet opening and are sealed to the upper side edges of the envelope. This pair of adjacent sheets is sealed together along a pair of laterally spaced, generally vertically, positioned lines which define, in the bottom mid-region of said sheets, a generally rectangularly shaped channel. This channel opens toward the interior bottom edge of the envelope.

The top of each spaced line which defines this rectangularly shaped channel opening extends from such bottom mid-region generally diagonally and upwardly to an opposite side edge of the envelope so as to define a generally funnel-shaped passageway extending from the inlet opening in the top of the envelope to the beginning of the channel opening.

It is this channel portion which forms the heart of this self-sealing one-way valve used in the fluid containers of this invention.

The channel, in general, ranges in width from about ½ inch to about 2 inches and has a length usually not less than about 1½ inches.

It is a remarkable feature of this invention that fluid passes through the valve under atmospheric pressures and gravitational forces without the aid of auxiliary straws, tubes, or the like, so that, in a sense, the container constructions of this invention containing the self-sealing, one-way valves can be said to be self-filling.

When the channel has a width of less than about ¾ inch or ⅞ inch, the valve passes fluid at a slower rate than when the width is larger.

As will be appreciated from the valve constructions shown in the figures, the valve channel is, in preferred embodiments, usually wider than about ⅞ inch.

As indicated above, the package or container constructions of this invention can be suitably formed from thin, flexible, relatively smooth-surfaced, organic polymeric material. The thickness of this film is generally unimportant, although for reasons of convenience and cost, the thickness of the film generally falls in the range of about ¼ to 10 mils. Commonly, such materials of construction are translucent or even transparent.

Although innumerable uses for my invention are foreseen, the same is thought to possess particular utility with regard to the taking of fluid samples such as are often required in industrial quality control work. Also, my invention is extremely useful with respect to the taking of urine specimens and for shipment and storage of preprepared food mixes and the like, since the sample package 1 is unbreakable, disposable, self-sealing and therefore does not leak and may be sterilized. Although the problems which my invention is intended to solve are excellently illustrated in the use of my invention as a sample package or as a container for urine specimens, the problems are not so limited in occurrence. Thus, the foregoing is not intended to restrict the solutions which the present invention affords to the application thereof with respect to the taking of fluid samples, inasmuch as many other forms of packages and containers may be similarly affected by the application of my invention.

This invention has been thoroughly tested and found to be completely satisfactory for the accomplishment of the above objects; and while I have shown a preferred embodiment thereof, I wish it to be specifically understood that the same may be modified without departure from the scope and spirit of the appended claim.

I claim:

A flexible container consisting of a pair of identical rectangular sheets of thermoplastic material which are identically folded, said sheets being assembled with each other to form the entire container and each sheet being folded only once to form an elongated fold from which a pair of layers of each sheet extend, one of said layers forming an inside layer of each sheet and the other of said layers forming an outside layer thereof, and said inside layers respectively terminating distant from said folds in free edges which are nearer to said folds than free edges of said outside layers which are distant from said folds respectively, and said sheets being superimposed upon each other with said inside layers next to each other and between said outside layers and with said elongated folds coextensively arranged to define between themselves a mouth of the container through which access may be had to the interior thereof, said free edges of said outside layers which are distant from said folds being heat-sealed to each other to define the bottom of the container and said sheets being heat-sealed to each other along opposed side edges extending between said folds and bottom of the container so that the mouth defined between said folds forms the only entry into the container, the inner layers of said sheets being heat-sealed to each other at their opposed side edges and also being heat-sealed to said outer layers at the opposed side edges of the latter while said outer layers are heat-sealed directly to each other only at the portions thereof which extend beyond said inner layers, said inner layers being heat-sealed to each other, but not to said outer layers, along a pair of lines which extend from said side edges of said inner layers at points spaced from said free edges toward each other along oppositely inclined paths while approaching said free edges of said inner layers and which before reaching said free edges extend parallel to each other substantially perpendicularly to said free edges and terminate at said free edges to define in the region of said free edges of said inner layers an elongated one-way closure passage through which fluid may enter into the interior of the container but not pass outwardly thereof.

References Cited by the Examiner

UNITED STATES PATENTS

172,039	1/76	Lazarevitch	299—62.5
2,640,484	6/53	Johnson	128—295
2,697,531	12/54	Hood	229—62.5 X
2,799,314	7/57	Dreyer	150—0.5
2,800,269	7/57	Smith	229—62.5
3,095,023	6/23	Rang	229—62.5 X

FOREIGN PATENTS

1,095,696	12/60	Germany.
875,848	8/61	Great Britain.

OTHER REFERENCES

Modern Packaging Encyclopedia, 1950, pp. 180–181.

FRANKLIN T. GARRETT, *Primary Examiner.*

EARLE J. DRUMMOND, *Examiner.*