Sept. 26, 1967 J. L. KASTAMO ETAL 3,343,719

METHOD AND APPARATUS FOR DISTRIBUTING AND DISPENSING LIQUID PRODUCTS

Filed Oct. 20, 1965 3 Sheets-Sheet 1

FIG. 1

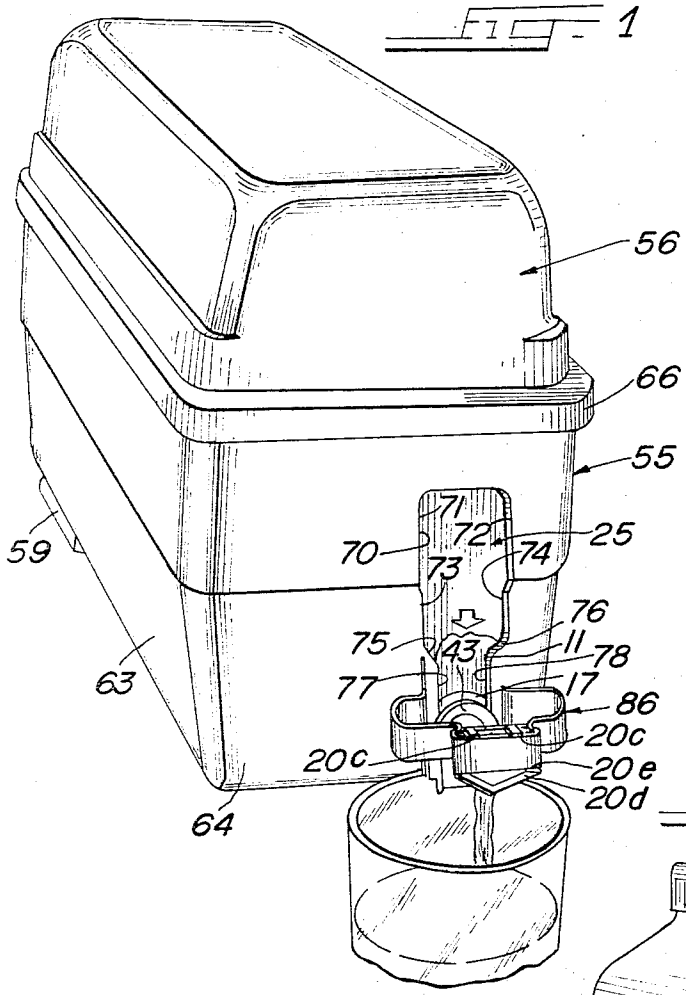


FIG. 3

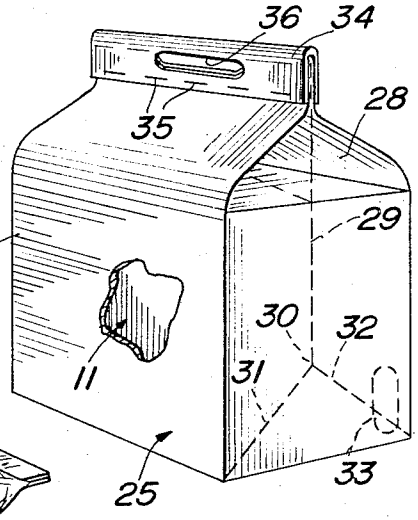
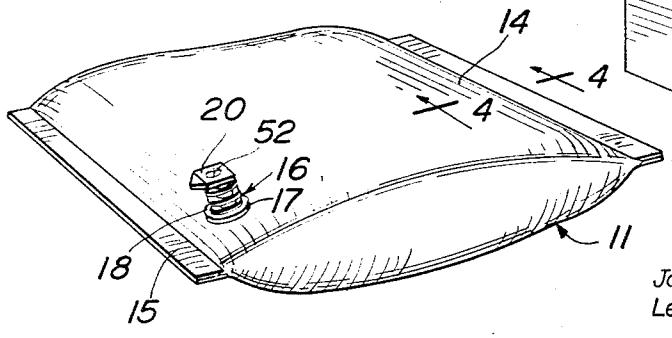


FIG. 2



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METHOD AND APPARATUS FOR DISTRIBUTING AND DISPENSING LIQUID PRODUCTS

Filed Oct. 20, 1965 3 Sheets-Sheet 2

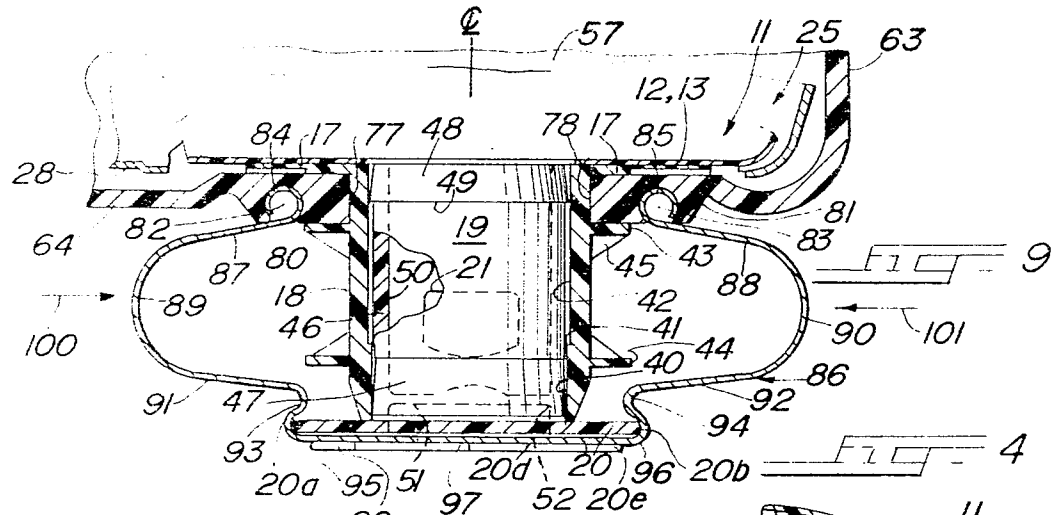


FIG. 9

FIG. 4

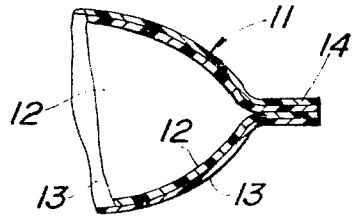


FIG. 5

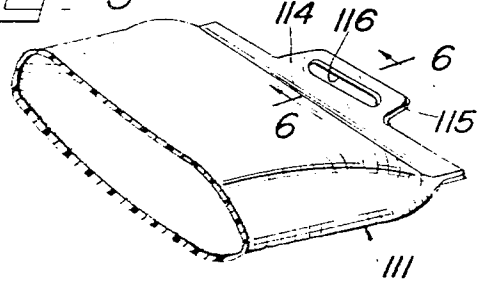


FIG. 6

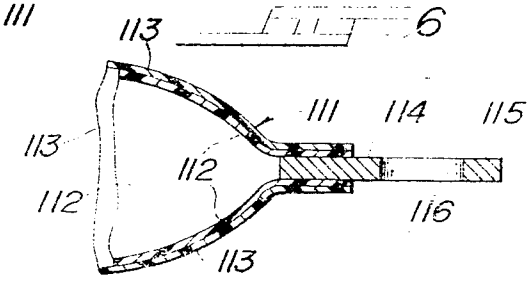


FIG. 10

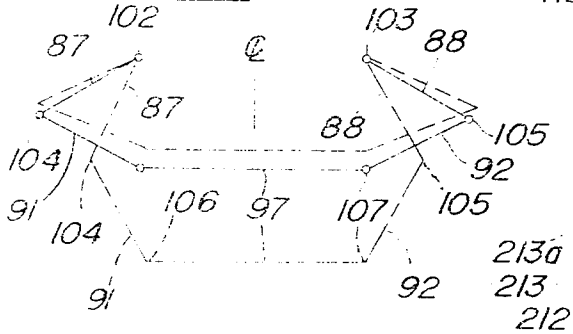
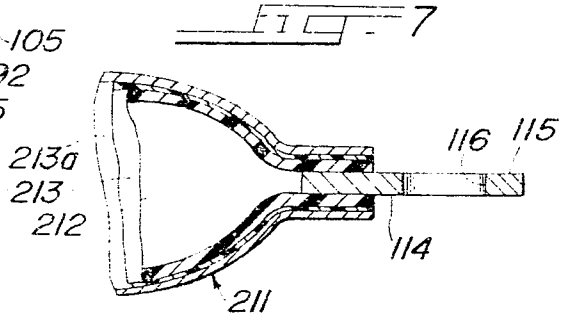


FIG. 7



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METHOD AND APPARATUS FOR DISTRIBUTING AND DISPENSING LIQUID PRODUCTS

Filed Oct. 20, 1965 3 Sheets-Sheet 3

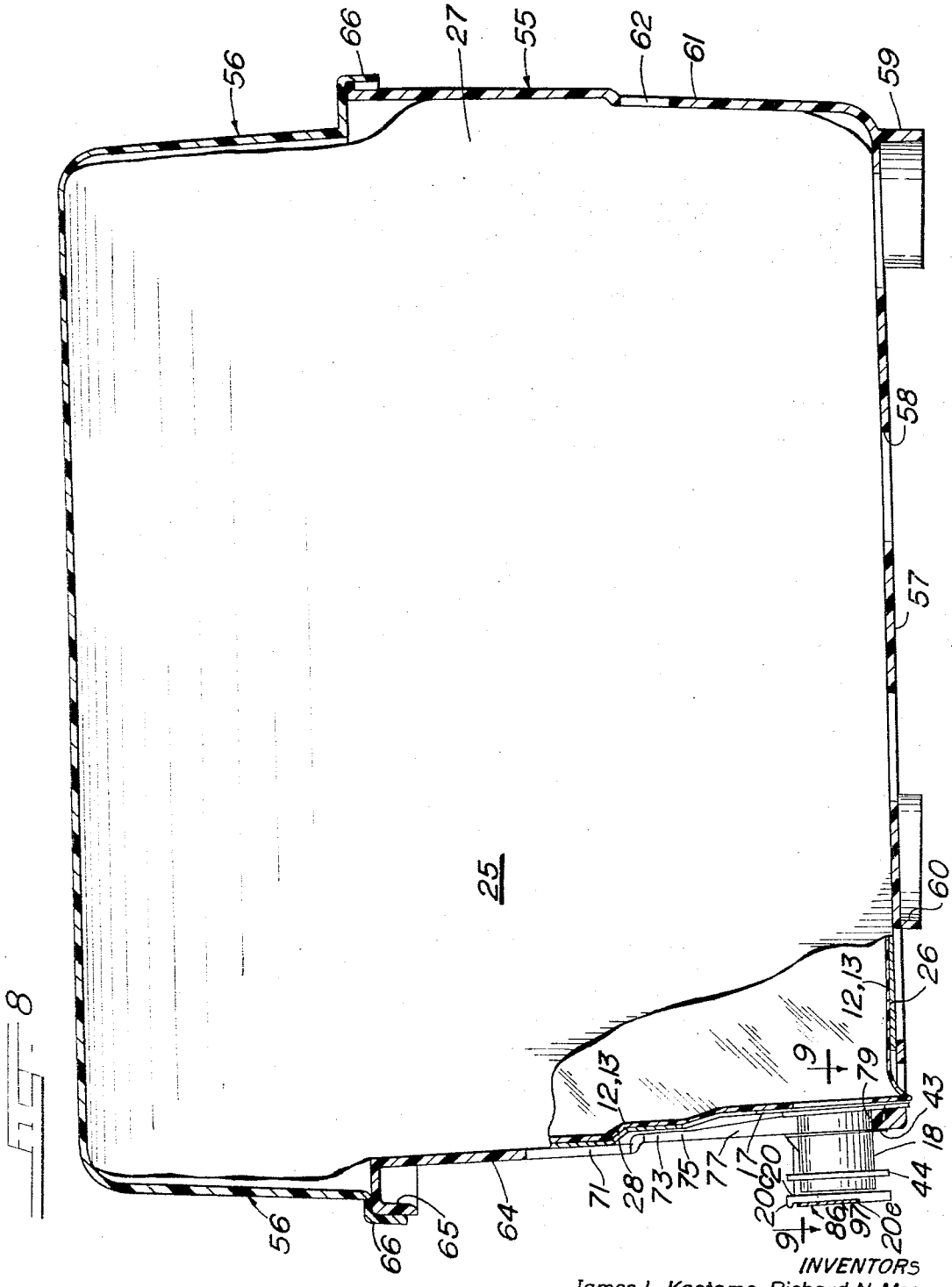


FIG. 8

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3,343,719

METHOD AND APPARATUS FOR DISTRIBUTING AND DISPENSING LIQUID PRODUCTS

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9 Claims. (Cl. 222—1)

The present invention relates to improvements in methods and apparatus for distributing and dispensing liquid products and particularly to an improved method and improved apparatus that are especially useful in the distribution and dispensing of liquids which need to be distributed to numerous consumer locations and there selectively dispensed as and when needed or desired.

The distribution of liquid products to numerous consumer locations, and the selective dispensing of the liquid products at those locations, have for many years been accomplished mainly with the use of bottles of various sizes, shapes, and kinds. In many cases, however, the use of bottles in the distribution and subsequent dispensing of liquid products is not economical and is not entirely satisfactory or convenient, and it has long been recognized that better distribution methods and apparatus are needed.

The milk or dairy industry is, in many respects, representative of those industries which rely upon the "bottle" system for the distribution of their products, and the dairy industry provides numerous examples of the inefficiencies, difficulties, and deficiencies which are inherent in the old "bottle" system for distributing and dispensing liquid products. Difficulties, special problems, and inefficiencies are experienced by dairies even before the filling of their bottles with dairy products is begun. In the first place, the bottles are quite expensive. The bottles, particularly if glass bottles are used, must be sterilized and inspected for cracks, dirt, and damage before the filling operation can properly be started. During the filling operation, whether the bottles are glass or waxed paper, care must be taken to insure that the bottles are not damaged, and, upon completion of the filling operation, special care must be taken to insure that the bottles are fully and adequately closed or capped.

The expense, inconvenience, and disadvantages inherent in the "bottle" system in conjunction with dairies continue to be present during the delivery and use of the dairy products. During delivery of the bottled products, from the dairy to the consumer location, the extra weight of the bottles adds to the space, expense, and effort involved in transportation, and special care must constantly be taken to avoid damaging the bottles in any way that would cause breakage or leakage. Experience shows that the problem of leakage is particularly prevalent in the dairy industry when waxed paper bottles are employed, but it is also well-known that special care must be taken to insure that the ordinary glass bottles used by dairies are kept upright if leakage at their caps is to be avoided. When the milk bottles are ultimately delivered to the home, they occupy excessive and much-needed space in home refrigerators, and leakage and breakage continue to be problems. Furthermore, although the public has long been accustomed to dispensing milk from a bottle simply by tipping the bottle and by pouring, this is not an entirely convenient way to dispense the product, particularly if the bottle is relatively large and is full and heavy. Since the bottle must be opened and closed, usually with a paper cap, each time milk is poured from the bottle, the bottle usually is not well sealed once it has been opened. In any event, further inconvenience arises when glass bottles become empty, because such bottles are relatively expensive and therefore must be returned to the dairy for refilling. This returning operation normally involves washing of the bottles by the housewife, storage of the bottles at the home until they are picked up by the dairy delivery man, transportation to the dairy, and then cleaning and sterilizing of the bottles, preparatory to their filling.

While the foregoing operations are customary and very widely accepted, both by dairy and other industries, and by the public, it will readily be appreciated that the ordinary "bottle" systems for delivering and dispensing liquid products have many undesirable features inherent therein.

One of the principal objects of the present invention is to overcome and avoid the disadvantages of prior methods and apparatus for the distribution and dispensing of liquid products, and to provide a new and highly-improved method and apparatus by which liquid products, including milk and beverages and most any other liquid product, may be quickly and relatively-inexpensively packaged, easily and economically delivered to the individual consumption locations, conveniently and economically stored at those consumption locations, and easily, conveniently, and selectively dispensed at those locations, without spillage or leakage, when it is desired that the liquid product be consumed or used. A further object of the present invention is to provide an improved method and an improved apparatus having the qualities just stated, which method and apparatus lend themselves to a very high degree of sanitation and are thus ideally suited for use in the distribution of liquid dairy products and other liquid foods and beverages, but are equally useful in the distribution and dispensing of other liquid products.

Still another object of the invention is to provide an improved method and apparatus having the attributes set forth above, wherein the problems of breakage and those inherent in the return of bottles are entirely eliminated and avoided.

Still another object of the present invention is to provide a new and improved method and apparatus for distributing and dispensing liquid products, which method and apparatus are particularly useful in distribution and dispensing systems wherein multiple consumption locations need to be repeatedly resupplied with the liquid product involved.

Yet another object of the invention is to provide highly-improved packages in which liquid products may be distributed to consumer locations and in which the liquid products may there be stored, and from which said liquid products may be easily and conveniently dispensed at said locations, as and when needed.

Still another object of the invention is to provide a highly-improved container for receiving the above-mentioned packages at the consumer location.

Yet another object of the invention is to provide in the above-mentioned packages a highly-improved valve mechanism, and to provide improved mechanism for operating said valve means.

These and other objects and advantages of the present invention will be apparent from the following description of preferred practices and embodiments thereof, taken with the accompanying drawings, wherein:

FIGURE 1 is a perspective view of one form of a preferred storage and dispensing container employed at the consumer or dispenser location in the practice of the present method;

FIG. 2 is a perspective view, on a somewhat reduced scale, of one form of flexible film bag embodying the present invention and used in the practice of the method;

FIG. 3 is a perspective view, on still a further reduced scale, of a bag assembly, which may have therein a film bag of the kind illustrated in FIG. 2, and which is deposited within the container of FIG. 1;

FIG. 4 is an enlarged fragmentary cross-section taken substantially along the line 4—4 in FIG. 2;

FIG. 5 is a fragmentary perspective illustration of a bag substantially like that illustrated in FIG. 2, but showing a modification of one end thereof to provide rigidifying means across the end and a handle for carrying the bag;

FIG. 6 is an enlarged fragmentary cross-section taken substantially along the line 6—6 in FIG. 5;

FIG. 7 is a view similar to FIG. 6, but illustrating in cross-section a bag of still another construction;

FIG. 8 is a vertical cross-sectional view taken longitudinally through the container illustrated in FIG. 1;

FIG. 9 is an enlarged fragmentary horizontal cross-sectional view taken substantially along the line 9—9 in FIG. 8; and

FIG. 10 is a schematic mechanical representation of the toggle-like action of a valve-actuating mechanism illustrated in FIG. 9.

At the outset, it should be pointed out that the method and apparatus of the present invention will hereinafter be described in conjunction with their use in the distribution and dispensing of milk, but it will readily be appreciated that the description is only illustrative and that the method and apparatus may be employed equally well in conjunction with the distribution and dispensing of substantially any other liquid product.

In the practice of the present method in the distribution and dispensing of liquid products, the operator provides at the bulk supply of the liquid product a supply of flexible plastic film bags, each of which is provided with a dispensing valve. Preferred forms of these flexible plastic film bags are illustrated in the accompanying drawings and will be hereinafter described. In a preferred practice of the method, the operator also provides, at the bulk supply of the liquid product, a supply of flexible paper bags, such as that illustrated in FIG. 3, which paper bags will hereinafter be more fully described. In addition, the operator also provides at the individual consumer sites, or at the individual locations where the liquid product is to be dispensed, one or more substantially-rigid containers, a preferred form of the container being that illustrated in FIGS. 1, 8, and 9. In the practice of the method in the distribution and dispensing of milk, for example, the above-mentioned supply of the flexible plastic film bags and the supply of the flexible paper bags are provided at the dairy, and the substantially-rigid containers are provided at the homes of the customers of the dairy, where the containers are kept in home refrigerators or other coolers.

In the practice of the invention in the distribution and dispensing of milk, the individual plastic film bags are filled at the dairy by any suitable filling apparatus or machine, it being appropriate, for example, for each bag to be held on a weighing-scale platform during its filling, so that the supply of milk to the bag may be shut off, either manually or automatically, when a predetermined weight of milk has been deposited in the bag. The bag is then closed to render the same liquid-tight, and, in a preferred practice of the method, each filled bag is respectively deposited in one of the flexible paper bags, whereupon each of the paper bags is closed and sealed, thereby to protect the filled flexible film bag therein and also to protect the dispensing valve of the bag from damage, dirt, and tampering.

After the filling and closing or sealing of the bag assemblies have been completed, the individual bag assemblies are respectively delivered to the individual dispensing locations, these being the homes of the dairy customers when the product being delivered is milk. The housewife receives a bag assembly, which, for example, may contain 10 quarts of milk, and she deposits the bag assembly into the substantially-rigid container which is maintained in her refrigerator. In the case of the bag assembly which employs the outer paper bag referred to above, the housewife, before depositing the bag assembly in the container, tears the wall of the outer paper bag of the bag assembly, there to expose and permit the withdrawal of the dispensing valve of the flexible film bag which is within the paper bag. When the bag assembly does not include the above-mentioned outer paper bag, the valve assembly of the flexible film bag will have been appropriately covered or sealed at the diary to prevent contamination of the valve assembly and tampering therewith. The housewife will, of course, remove that cover or seal from the dispensing valve at the time she deposits the bag in the container.

At the time the flexible bag assembly is deposited in the home container, the exposed dispensing valve of the bag assembly is secured to the container in position readily accessible to the user for selectively dispensing the milk product from the interior of the flexible film bag. The substantially-rigid container, with the milk-containing flexible bag assembly therein, is maintained in the home refrigerator. Thus, when the housewife wishes to obtain milk, she merely opens the refrigerator door and selectively dispenses from the flexible bag assembly, by the use of the above-mentioned dispensing valve, the amount of milk which she desires. The milk is preferably gravity-fed from the flexible bag through the dispensing valve, so that all of the milk within the flexible bag will ultimately be dispensed. Fresh bag assemblies of milk are delivered to the home as needed by the delivery man, and a fresh full bag assembly of milk may be placed within the container on top of a substantially-empty bag assembly therein, so that the weight of the fresh bag assembly will force all of the milk from the interior of the underlying bag assembly. If desired, the same forceful discharge of the residual milk from a bag assembly may be accomplished by applying force to the bag assembly by other means, such as by placing a weight upon the bag assembly.

One form of flexible film bag utilized in the practice of the present invention is illustrated in FIGS. 2 and 4. This particular bag assembly is (designated by the numeral **11**) preferably fabricated of polyethylene film, or the like. As best illustrated in FIG. 4, the bag is provided with inner and outer walls **12** and **13**, the two walls preferably being physically joined to each other only at the opposite ends **14** and **15** of the bag and at the base of a dispensing-valve assembly designated generally by the numeral **16**. The bags **11** may be successively formed from endless tubes of polyethylene film, one tube providing the inner walls **12** and being disposed within an outer tube which provides the outer walls **13**. The two tubes may be simultaneously cut transversely at appropriate lengths and the severed edges heat-sealed at **14** and **15**, thereby to close the opposite ends of the bag and render the same liquid-tight.

At the time the bag **11** is formed, a hole is punched through the walls **12** and **13** and a base flange **17** of a valve assembly **16** is heat-sealed to the outer wall **13** over the opening, and the inner wall **12** is simultaneously heat-sealed to the outer wall **13** beneath the flange **17**, the dispensing valve **16** being thus secured to the bag assembly **11** and operative to dispense the liquid contents that may be placed within the bag.

The details of the dispensing valve **16** will be described hereinafter, it being sufficient at the moment to explain that the dispensing valve is comprised of a generally-tubular fitment **18** integral with the flange **17**, with the fitment having slidably mounted therein a plunger **19** having formed on its outer end a terminal flange **20**. The plunger **19** is tubular with its inner end open to the interior of the bag **11**, the plunger having a dispensing opening **21** in its side wall. The details of the valve assembly **16** are illustrated in FIG. 9 where the valve assembly is shown in its closed position.

In filling the bag **11** with milk, the plunger **19** of the valve assembly is preferably bodily removed from the

tubular fitment 18, by grasping and pulling outwardly on the edges of the terminal flange 20, the bag 11 thereupon being filled through the then open interior of the fitment 18. The bag 11 is preferably weighed, as it is being filled, as previously mentioned, and the supplying of milk to the bag 11 is terminated when a predetermined desired weight of milk has been fed into the bag. When the proper amount of milk has been fed into the bag 11, the plunger 19 is reinserted into the tubular fitment 18, with the plunger being moved to its closed position relative to the fitment, whereupon the bag 11 and its contents are completely enclosed and effectively sealed.

After the bag 11 has thus been filled with milk, each bag 11 is deposited, in one practice of the invention, into an outer flexible paper bag designated generally by the numeral 25. Each of the paper bags 25 may be constructed of relatively-heavy, but flexible, kraft paper, and each bag is preferably of the ordinary sugar bag configuration, that is: each bag has a bottom wall 26 (see FIG. 8) that is generally rectangular in shape, with upstanding side walls 27 and opposite end walls 28, each end wall having a longitudinally-extending intermediate fold line 29 which terminates at 30 and is there joined by diverging fold lines 31 and 32 which respectively extend to the adjacent lower corners of the bag. One end wall 28 of the bag 25 is provided with a scored tear tab 33 of substantial size, as seen in FIG. 3.

Each filled bag 11 is deposited downwardly inside a bag 25 in such a position that the dispensing valve assembly 16 of each bag 11 is deposited opposite and immediately inside the tear tab 33 of the outer flexible paper bag 25. With the flexible plastic film bag 11 so deposited, the upper ends of the side walls 27 of the bag 25 are brought together, as illustrated in FIG. 3, and are preferably sealed in closed position. This may be done in various ways. One preferred way is to encompass the uppermost ends of the walls 27 within an inverted U-shaped longitudinally-extending heavy paper strip 34 which is stapled to the bag 25 by a plurality of staples 35. The strip 34 preferably has an opening 36 therein which provides a hand opening by which the bag 25 and the filled flexible plastic film bag 11 therein may be conveniently carried.

The bag assembly, as illustrated in FIG. 3, when filled with milk, may be delivered by route delivery trucks, to the customers' homes, much in the same fashion as is customarily done with bottles, one of the advantages of the present package assembly, however, being it occupies a minimum amount of space, has a minimum weight, is flexible, is extremely durable, and is not subject to breakage.

The generally-cylindrical fitment 18 of the valve assembly 16, and the flange 17 which is integral with the fitment, are preferably molded of a relatively-pliable polyethylene, or the like, The fitment 18, as best seen in FIG. 9, is provided with a bore extending therethrough. The outer end portion of this bore, which is designated in FIG. 9 by the numeral 40 is preferably cylindrical and of uniform diameter, but this outer portion 40 of the bore terminates at its inward end at a shallow shoulder 41. The remaining portion 42 of the bore of the fitment, inwardly from the shoulder 41, preferably has a diameter slightly larger than the portion 40 of the bore, and the bore 42 at its rearwardmost end adjacent the flange 17 preferably has a diameter slightly greater than the diameter thereof adjacent the shoulder 41, the walls of the portion 42 of the bore thus being slightly tapered. In practice, this taper may amount only to a few thousandths of an inch, and is, therefore, too little to illustrate in the present drawings.

On the outer portion of the tubular fitment 18, there is integrally formed a pair of ring-like flanges 43 and 44. The ring-like flange 43 is spaced from the rear flange 17, and the ring-like flange 44 is formed adjacent the outer end of the fitment 18, as illustrated in FIG. 9. Each of the ring-like flanges 43 and 44 may be reinforced by a plurality of triangularly-shaped brace elements 45 which are integral with the flanges and the body of the fitment 18.

The plunger 19 has a main body portion 46 which has a substantially-uniform outside diameter. This main body portion 46 is joined at its forward end by an outwardly-flared outer end portion 47 which has a truncated conical shape. The taper of the outer wall of the portion 47 is greatly exaggerated in FIG. 9, but it will be appreciated that its purpose is to create a positive liquid-tight fit within the portion 40 of the bore of the fitment 18. The plunger 19 is preferably molded of a polyethylene of a type that is somewhat less flexible than the polyethylene from which the fitment is molded. For example, the plunger 19 may be molded of a polyethylene known as "Alaikon 34," whereas the fitment 18 may be molded of a polyethylene known as "Dow 700." When the parts are so molded, it has been found that the maximum diameter of the outer portion 47 of the plunger 19, at the time the parts are molded, should be substantially greater than the interior diameter of the portion 40 of the bore within the fitment 18. For example, when the diameter of the portion 40 of the bore is approximately .754 inch, the maximum diameter of the outer portion 47 of the plunger 19, at the time the parts are initially manufactured, may preferably be approximately .776 inch. As a result of these initial dimensional differences, the plastic in the fitment, about the portion 40 of the bore of the fitment, is caused to cold flow so as to accommodate the outer portion 47 of the plunger 19, thereby providing extremely efficient and fluid-tight closure for the fitment.

The rear portion 48 of the plunger 19 is also tapered in the same direction as the taper of the front portion 47, with the forward edge of the portion 48 providing a shoulder 49 at the junction with the intermediate portion 46 of the plunger 19. This shoulder 49 co-operates with the previously-mentioned shoulder 41 to prevent the plunger 19 from inadvertently being pulled forwardly out of the bore of the fitment 18.

The plunger 19 is hollow, as previously described, and is itself provided with a bore 50 which opens at the rear of the plunger 49 into the interior of the flexible plastic bag 11. The wall of the bore 50, in the area of the portion 46 of the plunger 49, is provided with the previously-mentioned fluid discharge opening 21 through which the contents of the bag 11 are dispensed, this dispensing taking place when the plunger 19 is moved forwardly within the bore of the fitment 18 to expose the opening 21, thus permitting the contents of the bag 11 to flow through the bore 50 and outwardly through the opening 21. The forward end of the bore 50 is closed by a wall 51, this wall being located inwardly of the outermost end of the plunger 19, so as to provide a recess 52 in the face of the terminal or outermost flange 20 on the forward end of the plunger 19. This recess 52 may be utilized, by an automatic machine for filling the bag 11, in conjunction with automatic removal of the plunger 19 from the fitment 18 prior to filling, and in conjunction with automatic reinsertion of the plunger 19 into the filament 18 when the filling of the bag 11 has been completed. The recess 52 may also be utilized by automatic machinery which may be employed in placing and orienting the dispensing valve assembly 16 upon the bag 11 during the manufacture of the bag. It is to be noted that the wall 51, which forms the bottom of the recess 52, has a thickness, adjacent its juncture with the forward portion 47 of the plunger 19, that is substantially less than the thickness of the wall of said portion 47 at that juncture. This avoids distortion of the outer tapered surface of the portion 47, thereby assuring a proper tight fit between the latter surface and the portion 40 of the bore of the fitment 18.

The container which is kept at the home of the dairy customer is shown in FIGS. 1, 8, and 9 of the accompany-

ing drawings. This container, as illustrated, is of a two-piece construction, preferably formed of a substantially-rigid synthetic, organic plastic material, having a lower basket-like bag or package-receiving portion, designated generally by the numeral **55**, and a cover portion which is designated generally by the numeral **56**. The lower portion **55** of the container is provided with a sloping bottom wall **57** (see FIG. 8) which is preferably provided with a plurality of vent openings **58** therein. The bottom wall **57**, adjacent its rear, is provided with an integral downwardly-extending leg **59**, whereas, rearwardly of the front portion of the bottom wall **57**, there is provided an integral downwardly-extending leg **60**. The leg **60** is shorter than the leg **59**, so that the bottom wall **57** of the container slopes forwardly, thereby causing the milk within the bag or bag assemblies that are placed within the container to tend to flow forwardly toward the dispensing valve assembly **16**, the latter of which is secured to the container, as will hereinafter be described.

The lower portion **55** of the container is provided with an upstanding integral wall **61** having a handle opening **62** therein, and with upstanding integral side walls **63**. The lower portion of the container also has an integral upstanding forward wall **64** which is joined to the side walls **63** at curved corners. The uppermost edges of the front wall **64**, the side walls **63**, and the rear wall **61** are provided with an integral peripheral flange **65** which receives a mating flange **66** formed on the inverted hollow cover portion **56**.

The forward wall **64** of the lower portion **65** of the container is provided with a large keyhole slot or opening **70**. The uppermost portion of this opening or slot **70**, at its sides, is defined by edges **71** and **72** which are generally parallel. Below these edges **71** and **72**, however, the slot or opening **70** narrows, with the edges of the slot being defined by edges **73** and **74**. These edges **73** and **74** converge toward each other at **75** and **76** and merge with substantially-vertically-extending parallel edges **77** and **78**. The edges **77** and **78**, at their lowermost portions adjacent the lower edge of the forward face **64** of the container, converge toward each other and form the lowermost edge **79** (see FIG. 8) of the opening **70**. The edges **77** and **78** are spaced apart a distance only slightly greater than the outside diameter of the tubular body portion of the fitment **18** of the dispensing valve assembly **16**.

The forward wall **64** of the bottom portion **55** of the container, along the opposite sides of the edges **77** and **78** of the opening **70**, is reinforced at **80** and **81** substantially to increase the thickness of the wall. These reinforced areas are respectively provided with vertically-extending slots **82** and **83** which are open at their lower ends and are also open forwardly in the forward faces of the reinforced portions **80** and **81** of the wall **64**. The inner surfaces of these vertically-extending slots **82** and **83** are substantially cylindrical in shape, as illustrated in FIG. 9.

The slots **82** and **83** respectively receive and retain the oppositely-rolled ends **84** and **85** of a unitary spring member designated generally by the numeral **86**. The spring member **86** is substantially concentric with respect to a vertical plane passing through the axis of the plunger **19** of the valve assembly **16**, when the latter is secured in place within the container **55**, as will later be explained. The spring member **86** has legs **87** and **88** which respectively extend outwardly from the rolled ends **84** and **85**, the legs **87** and **88** respectively merging, in curved portions **89** and **90** with outer converging legs **91** and **92**. The legs **91** and **92**, in turn, respectively merge with relatively-sharp-curved sections **93** and **94**, the latter of which respectively merge with oppositely-curved sections **95** and **96**. The curved sections **95** and **96** integrally join the opposite ends of a substantially-straight portion **97** of the spring element **86**. The curved spring elements **95** and **96**, it will be observed, form opposed recesses, the bottoms of which are spaced apart a distance substantially equal to the width of the terminal or end flange **20** on the forward end of the plunger **19**, between its opposite lateral edges **20***a* and **20***b*.

The spring member **86** is permanently installed on the forward face of the forward end wall **64** of the bottom portion **55** of the container by sliding the rolled ends **84** and **85** upwardly in an axial direction into the internally cylindrical slots **82** and **83**, the lowermost ends of which, as previously mentioned, are open.

When the housewife receives a filled bag asembly **25** from the dairy, she may immediately lift the cover **56** of the substantially-rigid container which will have been left in her possession by the dairy and which will normally be kept by the housewife in her refrigerator, and she may deposit the newly-received bag assembly **25** downwardly into the lower portion **55** of the container, where the newly-received bag assembly **25** may rest upon a substantially-empty-like bag assembly, thereby positively to cause the milk in the latter bag assembly forcefully to be discharged when its dispensing valve is opened. In any event, when the housewife is ready to install the filled bag assembly **25** in the substantially-rigid container, she removes from the container any previously-installed bag assembly that may be therein, and she prepares the filled bag for installation by ripping off the tear tab **33** which, as previously mentioned, is provided in one end wall **28** of the outer kraft paper bag. When the tear tab **33** has been removed, the dispensing valve assembly **16** of the inner flexible plastic bag is exposed, and the housewife reaches through the now open tab hole, grips the dispensing valve assembly **16**, preferably with the fingers on opposite sides of the tubular fitment **18** and to the rear of, but in contact with, the flange **44**, and thereupon withdraws the valve assembly **16** from the bag assembly **25**.

The housewife then lowers the bag assembly **25** into the lower portion **55** of the substantially-rigid container and, at the same time, feeds the dispensing valve assemly **16** forwardly and outwardly through the relatively-wide upper portion of the opening **70** in the forward wall **64** of the container. As the bag assembly **25** is lowered into the container, the dispensing valve assembly **16** is similarly lowered within the opening **70**. As the valve assembly **16** approaches the narrow lower portion of the opening **70** defined by the opposed vertically-extending edges **77** and **78**, the housewife guides the valve assembly, so that the base flange **17** of the tubular fitment **18** is in contact with the inner surface of the front wall **64** of the container, and the flange **43** of the fitment is disposed outside the container and in sliding contact with the forward wall **64** thereof adjacent the edges **77** and **78**. The dispensing valve **16** is thus, in effect, keyed into the lower portion of the opening **70**, with the flanges **17** and **43** of the fitment **18** straddling the respective edges **77** and **78**.

As the loading of the bag assembly **25** progresses and reaches completion, the tubular fitment **18** of the valve assembly is moved downwardly in the opening **70** until the tubular body of the fitment, between the flanges **17** and **43** thereof, comes into stopping contact with the lowermost edge **79** of the opening **70**. In this lowermost position the tubular fitment **18**, and thus the dispensing valve **16**, is secured to the substantially-rigid lower portion **55** of the container by the engagement of the flanges **17** and **43** upon the respective rear and front surfaces of the front wall **64** of the container. As the valve assembly **16** reaches its lowermost position in the opening **70** during the loading or installation of a bag assembly **25** into the lower portion **55** of the substantially-rigid container, the terminal flange **20** on the outermost end of the plunger **19** of the dispensing valve assembly **16** is guided vertically downwardly immediately behind the substantially-straight front portion **97** of the spring member **86**, and with the opposite lateral edges **20***a* and **20***b* of the ter-

minal flange **20** being slidably received, as illustrated in FIG. 9, in the recesses provided by the previously-mentioned oppositely-curved sections **95** and **96**. The upper edge portion of the flange **20** preferably has formed thereon a pair of forwardly-projecting tabs **20***c* which engage the upper edge of the substantially-straight portion **97** of the spring member **86** as the valve assembly **16** reaches its lowermost position. The forward surface of the flange **20** also has formed thereon a pair of converging embossments **20***d* which may, together, form the image of a downwardly pointing arrow and which, in any event, provide a pair of forwardly-projecting surfaces **20***e* which underlies the lower edge of the substantially-straight portion **97** of the spring member **86** and thus prevent the valve assembly **16** from inadvertently being raised in the opening **70**.

With the filled bag assembly **25** installed in the container as just described, the cover **56** may be replaced upon the container and the container placed for storage in a convenient location on a shelf in a home refrigerator, with the forward end of the container facing forwardly within the refrigerator, so that the milk within the bag assembly in the container may be dispensed when desired. In its normal condition, as illustrated in FIG. 9, the spring member **86** constantly urges the plunger **19** of the valve assembly **16** toward its closed position, with the tapered surface of the portion **47** of the plunger being in liquid-tight contact with the inner surface of the portion **40** of the bore of the fitment **18**. The rear surface of the terminal flange **20** may also be in forceful contact with the forwardmost edge of the fitment **18**, as illustrated in FIG. 9. This continuous urging, by the spring member **86**, of the valve assembly **16** toward and into its closed position provides an automatic shut-off for the valve assembly **16** and avoids inadvertent opening of the valve assembly.

In order to dispense milk from the dispenser assembly just described, the housewife places a glass or other container beneath the dispensing valve **16**, as illustrated in FIG. 1, and then presses between her fingers, in the direction of the arrows **100** and **101** (see FIG. 9), the opposite ends or curved portions **89** and **90** of the spring member **86**. This depresses the curved portions **89** and **90**, as will be described more fully herein below, and causes the substantially-straight forward portion **97** of the spring **86** to be moved or carried forwardly or outwardly with respect to the tubular fitment **18** of the valve assembly **16**. This movement, because the opposite lateral edges **20***a* and **20***b* of the terminal flange **20** are lodged within the recesses provided by the oppositely-curved sections **95** and **96** of the spring member, carries with it the terminal flange **20** and thus moves the plunger **19** of the valve assembly forwardly and to an open position wherein the dispensing opening **21** is disposed forwardly of the forward end of the tubular fitment **18**. This open position is maintained by the continued pressing upon the curved portions **89** and **90** in the direction of the arrows **100** and **101**, and, while the valve assembly is in its open condition, the milk from within the flexible plastic bag **11** flows freely through the bore **50** of the plunger **19** and outwardly through the opening **21** and into the drinking glass, pitcher, or other receptacle that may be employed by the housewife for receiving the milk. In order to close the valve and terminate the dispensing of the milk, the housewife merely releases her hand or finger pressure upon the curved portions **89** and **90** of the spring member **86**, whereupon that spring member immediately causes the valve plunger **19** to be returned to its fully-closed position illustrated in FIG. 9.

A simplified schematic illustration showing the mechanics involved in the operation of the spring member **86** is illustrated in FIG. 10. The rolled ends **84** and **85** of the spring member **86** (see FIG. 9) are fixed within the slots **82** and **83**, as previously explained, and the legs **87** and **88** flex with respect to those fixed rolled ends immediately externally of the slots **82** and **83**. These areas of flexure, for purposes of simplification, are represented in FIG. 10 by fixed pivot points **102** and **103**. Similarly, the leg **87** flexes with respect to the leg **91** in the area of the curved portion **89** at the left end portion of the spring member **86**, as viewed in FIG. 9. This latter area of flexure, again for purposes of simplification, is illustrated as a pivot point **104** in FIG. 10, and the area of flexure between the legs **88** and **92** of the spring member is similarly represented in FIG. 10 by a pivot point **105**. The respective areas of flexure between the legs **91** and **92**, on the one hand, and the substantially-straight element **97**, on the other hand, are represented in FIG. 10 by pivot points **106** and **107**. It will thus immediately be understood that the legs **87** and **91**, together with their intermediate curved portion **89**, constitute, in effect, a toggle located on one side of the longitudinal center line of the plunger **19** of the valve assembly **16**, and the legs **88** and **92**, with their intermediate curved portion **90**, constitute, in effect, a second toggle on the other side of that center line, the two toggles being of the same size and being mirror images of each other. It will also be understood that the outer ends of the respective legs **91** and **92** of the effective toggles are, in effect, pivotally joined to the opposite ends of the substantially-straight portion **97** of the spring member **86**. Thus, when the housewife presses upon the opposite ends of the spring member **86** in the direction of the arrows **100** and **101**, from the mechanical standpoint, she is, in effect, moving the pivot points **104** and **105** of FIG. 10 toward each other, thereby causing the angle between the legs **87** and **91** and between the legs **88** and **92** to be increased, thereby causing the substantially-straight portion **97** of the spring member to be moved outwardly, with the center of the substantially-straight member **97** remaining coincident with the center line of the plunger **19** of the valve assembly **16**.

In FIG. 10 the solid-line representation of the spring member **86** schematically illustrates the spring in the position which it occupies, as shown in FIG. 9, when the valve assembly is in its fully-closed position. It has previously been stated herein that, when the valve is in its fully-closed position, the spring member **86** is, in effect, continuing to apply pressure to the valve plunger **19** in the closing direction, the spring member **86** thus being strained at that time. The position that the spring would occupy in its free or unstrained condition has been represented schematically in FIG. 10 by the light-weight broken lines. On the other hand, the position occupied by the various principal parts of the spring member **86**, when the spring member has been flexed, in the manner described above, to open the valve assembly, is schematically represented in FIG. 10 by the heavy broken lines.

Another form of plastic film bag is illustrated in FIGS. 5 and 6, where the bag itself is represented generally by the numeral **111**. The body portion of this bag may have a same general size as that of the bag **11** and, like the bag **11**, the bag **111** is provided with a dispensing valve **16**. The bag **111**, however, is formed of two plies of polyethylene film, or the like, providing double inner and outer walls **112** and **113** which, if desired, may be somewhat greater in thickness than the walls **12** and **13** of the film bag **11**. At one end of the bag **111** the walls **112** and **113** are heat-sealed to the opposite sides of a base portion **114** of a handle **115** which has a hand opening **116** therein and is preferably formed of polyethylene or the like. The base portion **114** of the handle **115** preferably extends from one side of the bag to the other or at least along a length of one end of the bag sufficiently to prevent the bag from collapsing when the filled bag **111** is picked up and carried by the handle **115**.

The plastic film bag **111**, being of sturdy and durable construction, having its own dispensing valve **16** thereon, and being equipped with its own carrying handle **115**, may be used for delivering milk, liquid foods, and beverages

and other fluid products to the consumer and dispensing sites without the use of a paper outer bag **25** thereabout, and without the use of any independent protective covering.

In FIG. 7 there is shown a modified form of bag, the bag being similar to the bag **111** in certain respects. The bag illustrated in FIG. 7 is comprised of a heavy inner wall **212** of flexible, synthetic, organic film such as polyethylene and an outer separate wall which is comprised of another film **213** of a flexible synthetic organic material, the outer surface of the latter of which has bonded thereto a coating of paper **213***a*. Like the bag **111**, the bag of FIG. 7 has a handle **115** provided with a base **114** upon the opposite sides of which the double film walls of the bag are secured by heat-sealing or the like. Like the bag **111**, the bag of FIG. 7 is provided with a dispensing valve assembly **16** in its wall, and, like the bag **111**, the bag of FIG. 7 may be used, without any external or independent protective covering, in place of the combination bag assembly **11**, **25**, in the distribution and dispensing of liquid foods and beverages and other fluid products.

In the use of the bags **111** of FIGS. 5 and 6 and the bags **211** of FIG. 7, particularly in connection with the distribution and dispensing of milk or beverages for human consumption, no outer protective kraft paper bag **25** is used, but a seal of metal foil or plastic film is deposited over the dispensing valve **16** after the bags **111** or **211** have been filled in the same manner that was previously described herein with respect to the bag **11**. Thereafter, when the bags **111** and **211** are delivered to the housewife and she prepares to install them in the substantially-rigid container illustrated in FIG. 1, the housewife removes the protective seal from the dispensing valve **16** preparatory to depositing the bag in the container. The seal in each instance, of course, protects the dispensing valve **16** from dirt and from tampering.

While there have been described above what are presently considered to be the preferred practices of the method and the preferred embodiments of the apparatus, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

We claim:

1. Apparatus for distributing and dispensing a fluid product, comprising: a pair of flexible, synthetic, organic, plastic film tubes disposed axially, one inside the other, with the walls of said tubes at one end thereof sealed together in liquid-tight fasion; a carrying handle disposed between and sealed to the walls of said tubes at a second end thereof, thereby to provide a flexible, double-walled, generally-pillow-shaped, liquid-tight flexible bag with said carrying handle on one end thereof; a dispensing valve body mounted upon and sealed in liquid-tight fashion upon the wall of the outer one of said tubes; and a movable valve member co-operating with said valve body to open and close the same for selectively dispensing from the interior of said bag the fluid contents which may be contained therein, said flexible bag being adapted to contain a fluid product both during shipment and transportation thereof and during the dispensing of said product at a consumer location.

2. Apparatus for distributing and dispensing a fluid product, comprising: a first flexible, synthetic, organic plastic film tube having a paper coating bonded to the outer surface thereof; a second flexible, synthetic, organic plastic film tube disposed axially inside said first tube, with the walls of said tubes at one end thereof sealed together in liquid-tight fashion; a carrying handle disposed between and sealed to the walls of said tubes at a second end thereof, thereby to provide a flexible, double-walled, generally-pillow-shaped, liquid-tight flexible bag with said carrying handle on one end thereof; and valve means on said flexible bag through which fluid contents within said bag may be selectively dispensed, said flexible bag being adapted to contain a fluid product both during shipment and transportation thereof and during the dispensing of said product at a consumer location.

3. Apparatus for distributing and dispensing a fluid product, comprising: a first flexible, synthetic, organic plastic film tube having a paper coating bonded to the outer surface thereof; a second flexible, synthetic, organic plastic film tube disposed axially inside said first tube, with the walls of said tubes at one end thereof sealed together in liquid-tight fashion; a carrying handle disposed between and sealed to the walls of said tubes at a second end thereof, thereby to provide a flexible, double-walled, generally pillow-shaped, liquid-tight flexible bag with said carrying handle on one end thereof; a dispensing valve body mounted upon and sealed in liquid-tight fashion upon the wall of the outer one of said tubes; and a movable valve member cooperating with said valve body to open and close the same for selectively dispensing from the interior of said bag the fluid contents which may be contained therein, said flexible bag being adapted to contain a fluid product both during shipment and transportation thereof and during the dispensing of said product at a consumer location.

4. Apparatus for selectively dispensing a fluid product, comprising: a substantially-rigid plastic container adapted to be retained at a dispensing location; a disposable, fluid-tight, flexible, synthetic, organic, plastic film bag residing within said substantially-rigid container and supported thereby, said flexible bag being adapted to contain a fluid to be dispensed; a dispensing valve including a valve body fixed to the wall of said flexible bag, said valve body having a bore therein communicating with the interior of said bag; means for detachably securing said valve body to said substantially-rigid plastic container; a valve plunger element slidably mounted in said bore for longitudinal movement therein for opening and closing said dispensing valve and for thereby dispensing from said flexible film bag the fluid product contained therein; and spring means mounted on said substantially-rigid plastic container and removably and operatively associated with said valve plunger element for biasing said valve plunger toward its closed position and for moving said valve plunger element toward an open position under the control of an operator, said spring means being detachable from said valve plunger element and said flexible bag being removable from said container when the contents of said bag have been emptied, whereby said bag and said dispensing valve may be discarded while said spring means remains mounted on said container for engagement with the valve plunger element on the next disposable bag placed in said container.

5. The combination set forth in claim **4**, wherein said spring means includes first and second resilient toggle means respectively disposed on opposite sides of said valve plunger element, and means for detachably joining said valve plunger element to said toggle means.

6. The combination set forth in claim **4**, wherein said spring means includes first and second toggle means respectively disposed on opposite sides of said valve plunger element, each of said toggle means including a first leg secured to said substantially-rigid plastic container for angular movement with respect thereto, and a second leg having one of its ends attached to said first leg for angular movement with respect thereto and having its other end detachably and operatively attached to said valve plunger element.

7. The combination set forth in claim **6**, wherein said toggle elements consist of a single-piece, curved, leaf spring.

8. The combination set forth in claim **4** wherein said spring means includes a single-piece, curved, leaf spring having its opposite ends secured to said substantially-rigid plastic container adjacent opposite sides of said valve plunger element, and means detachably securing said leaf spring to an end of said plunger element.

9. The method of distributing and dispensing a liquid prdouct, comprising the steps of: providing at a bulk supply of the liquid product a supply of flexible plastic film bags respectively having dispensing valves therein; providing substantially rigid containers at individual locations where the liquid product is to be dispensed; filling the flexible film bags with the liquid product from said bulk supply and closing said film bags to render the same liquid-tight; covering the external portions of said dispensing valves, thereby to protect the same against dirt and tampering; respectively delivering said filled flexible plastic film bags to said dispensing locations; uncovering said dispensing valve of each said delivered bag; respectively depositing each said delivered bag into one of said substantially rigid containers at one of said dispensing locations; securing the dispensing valve of each said deposited bag to the associated substantially-rigid container in position readily accessible to a user for selectively dispensing the liquid product from the interior of said bag; forcing the liquid from substantially-empty ones of said flexible plastic film bags in said substantially-rigid containers, by placing filled ones of said bags on said substantially-empty ones in said containers; and finally removing the empty bags from said substantially-rigid containers and respectively replacing said empty bags with filled ones while said containers remain at said dispensing locations.

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