Nov. 28, 1967 W. S. SCHNEIDER ETAL 3,354,601

METHOD OF MAKING STAND-UP PACKAGE

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FIG. 1.

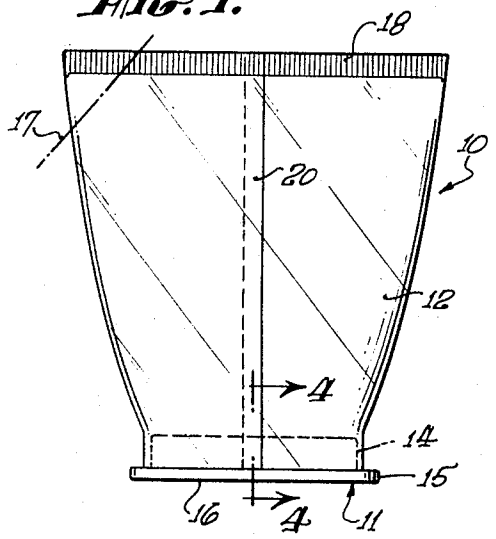


FIG. 2.

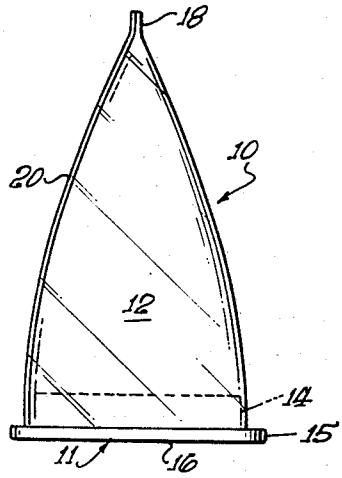


FIG. 3.

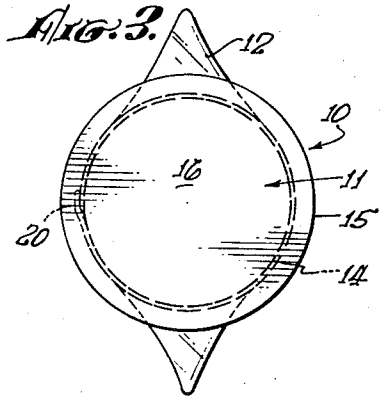


FIG. 4.

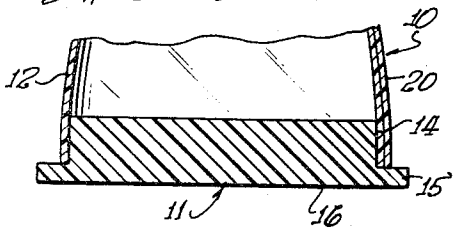


FIG. 6.

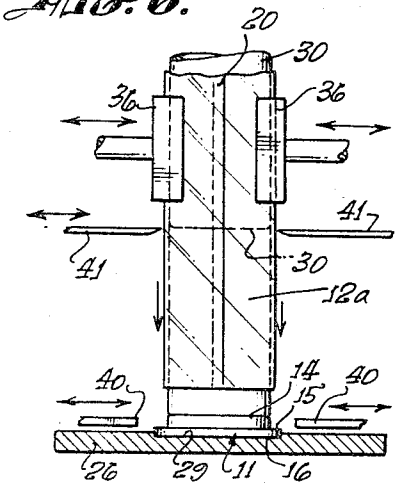
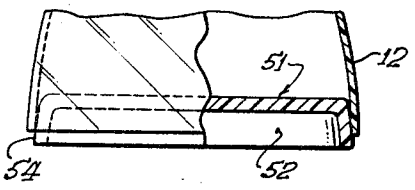


FIG. 9.



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METHOD OF MAKING STAND-UP PACKAGE

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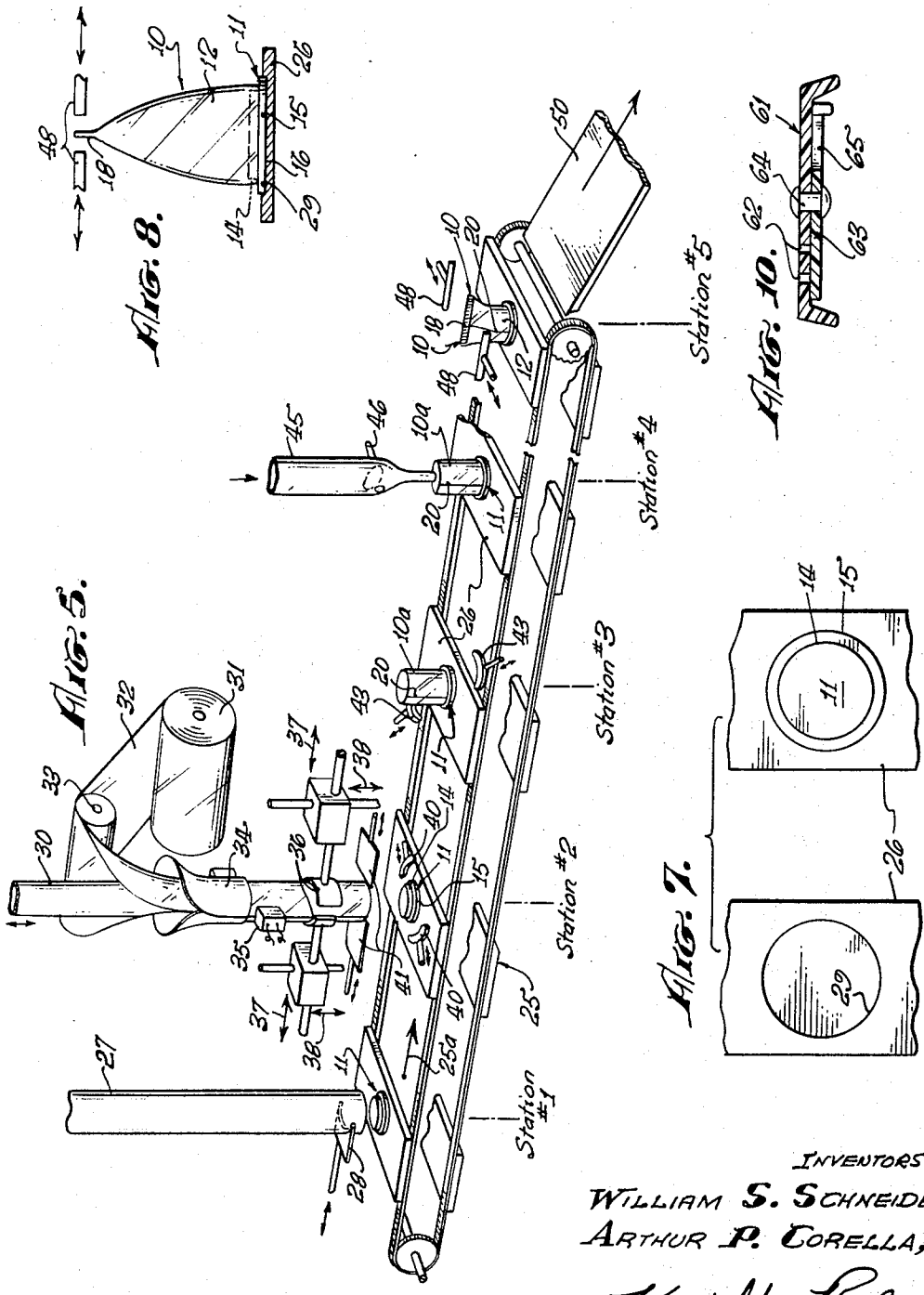


FIG. 8.

FIG. 10.

FIG. 5.

FIG. 7.

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METHOD OF MAKING STAND-UP PACKAGE

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7 Claims. (Cl. 53—28)

The present invention relates generally to packages and/or containers for fluent materials such as liquids, powders, and the like; and it is more especially concerned with a novel construction for packages and/or containers having flexible walls.

One general type of article of this kind is the rigid package or container such as the familiar glass bottle or the cardboard carton. Containers of this type have many advantages since the walls are sufficiently rigid to retain a given shape and various advantages result from this physical characteristic of the container. Thus, containers having rigid walls stand upright on a base, independently of the amount of the contents, and there is no leakage or accidental discharge of the contents after the package is opened. Another advantage of this type of container is that there is a relatively large volume-to-surface ratio which has the practical advantage that a minimum amount of material is required to package a given volume of product.

There are other advantages to containers of a rigid nature. For example, the rigid walled containers do not crush or deform easily, they stand upright on the retailer's shelf for display purposes, and they provide a suitable structure upon which to apply advertising and the like.

Another very popular and well known type of package or container is that in which the walls are entirely made of flexible material, such as the familiar flat or envelope type of packages. These packages are generally made from thin film having heat-sealing characteristics. From a practical standpoint, the flexible wall packages have their advantages too. Most importantly among these advantages is the relatively low cost of packages of this character since they are made entirely from very thin, flexible film which is relatively inexpensive and they can be produced rapidly on form-and-fill machinery which operates at comparatively high speeds. Packages of this type lend themselves readily to the use of a wide range of materials, such as transparent plastic films, metal foils, and various types of laminates which may include an exterior layer of foil. The film or other material can be printed in advance so that no labels are necessary, and attractive display advertising can be imprinted on the packages very economically.

From the standpoint of the user, flexible wall packages of this type have attractive features. They can be closed at at least one end with a flat, transversely extending seal so that the package can easily be opened by tearing across the seal, or even across the entire package, thus making it easy to pour out of the package. Packages of this type are also easily disposable, light in weight and, in many instances, can be easily carried in the pocket or the like.

It is a general object of the present invention to provide a novel type of construction of a container for fluent materials which combines, as far as possible, the advantages of both the general types of packages described above.

More particularly, it is an object of the present invention to provide a novel design for a package, the major portion of which has flexible walls for the sake of economy and yet which is adapted to stand up on a well-defined base to secure various advantages, such as to display advertising and to prevent discharge of contents after the package is opened.

Also, it is a further object of the present invention to

provide a novel design for a package for fluent materials, the major portion of which is made with flexible walls and yet which has a substantially increased volume-to-surface ratio as compared with the usual flat or envelope type packages in order to decrease the amount of film required to package a given volume of material.

It is also an object to provide a package of novel design having the economy of a package made of thin film but having a rigid portion that is crush-resistant in order to permit random drop packaging instead of requiring geometric or pattern stacking or egg-crate separators or the like between packages. These latter arrangements for packing in shipping cartons are often relatively expensive, especially if hand labor is required.

These objects have been achieved according to the present invention by providing in a container a rigid base having an exterior surface on which the container can stand upright and also having a peripheral surface disposed at one side of the exterior surface, and a tube of thin, flexible film open at one end and closed at the other end by the base, the tube being attached to the base at said peripheral surface on the base. After filling through the open end, the tube is then closed by a flat, transverse seal lying essentially in an axial plane, thus completing the filled package.

According to a preferred method of making such a package, a rigid base is registered with the end of a mandrel around which there is a tube of thin, flexible film. The tube may be a segment of seamless tubing; but in a preferred method adapted to high speed machinery the tube is formed around the mandrel from a continuous flat web. The tube is moved axially off the mandrel to surround a portion of the base to which the tube is then attached. The mandrel is then withdrawn from a section of the tube attached to the base, after which the section is severed from the web to form an open-ended container which can be filled in any suitable manner and is subsequently closed by forming a flat seal at the open end. Preferably, the thin flexible film is heat-sealable on the inner surface so that attachment to the base and formation of the flat seal can both be accomplished by the application of heat and pressure to the flexible film.

The method just defined presumes the container is filled at one station and then moved to another station for filling. Alternatively, most of the package forming and filling operations can be carried out at one station, in which case the sequence of operations is preferably changed by filling and closing the package prior to severing the package from the web.

How the above objects and advantages of the present invention, as well as others not specifically mentioned herein, are attained will be more readily understood by reference to the following description and to the annexed drawing, in which:

FIG. 1 is a side elevation of a package having flexible side walls and a rigid base constructed according to the present invention.

FIG. 2 is an end elevation taken from the right of FIG. 1.

FIG. 3 is a bottom plan view of the package of FIG. 2.

FIG. 4 is a fragmentary vertical section on line 4—4 of FIG. 1.

FIG. 5 is a diagram illustrating the various operations involved in making the container and the complete filled package.

FIG. 6 is a fragmentary diagram illustrating the sequence of steps involved in attaching the film tube to the rigid base.

FIG. 7 is a fragmentary plan view of the belt comprising the conveying means for the rigid bases and containers.

FIG. 8 is an enlarged fragmentary view showing the final operation of closing the filled package.

FIG. 9 is a combined fragmentary side elevation and section showing a package with a variational form of base.

FIG. 10 is a vertical section through a variational form of base with a shaker dispenser.

Referring now to the drawing, and especially to FIG. 1 thereof, there is indicated at **10** a package constituting a typical embodiment of the present invention. The package is made in two major portions, one, the rigid base member **11**, and the other the upper tubular portion **12** made from a thin, flexible film.

As shown in FIGS. 3 and 4, base **11** is circular in outline but the invention is not necessarily limited to any particular shape of the base, the circular outline being preferred from a practical standpoint. The base is in the shape of a disc having a cylindrical peripheral surface **14** rising upwardly above and from a radially outstanding flange **15**. The bottom of the disc provides a surface **16** on which the container can stand upright. Although in FIGS. 1–4, surface **16** is shown as being planar, the invention is not limited to this particular shape of the bottom surface. Instead, the bottom surface may have other suitable configurations, since, for example, it may be indented (FIG. 9) or provided with projections, in the form of feet, upon which the package can rest and be supported in an upright position, as will become evident from subsequent description.

The upper tubular portion **12** of the package is made entirely of thin flexible film. At the bottom, where wall **12** is attached to base **11**, the wall conforms to the shape in plan of the peripheral surface **14** of the base. Thus, with the base of the shape shown in FIG. 3, the bottom portion of tubular portion **12** is circular. The upper end of portion **12** is closed by a flat, transversely extending seal **18** which extends entirely across the package as shown in FIG. 1. At this location, the completed package closely resembles the familiar flat package since here the package has two opposing side walls which are sealed together at **18**.

It is preferred to make the package from flexible film which is heat-sealing on the inner face. Film of this type maye be any one of a number of synthetic resins, such as Mylar, cellulose acetate, or other materials, coated on the inside with a layer of polyethylene. The polyethylene is thermoplastic and enables the inner face of the film constituting walls **12** to be sealed to itself, face-to-face. Thus, the transverse seal **18** is formed by the application of heat pressure and the tubular portion **12** of the package is attached to the rigid base **11** also by the application of heat and pressure sealing the inside face of walls **12** to surface **14** of the base.

Although the upper portion of the package may be made from a length of seamless tubing, it is preferred, in order to obtain the economy of high speed machine operations, that the package be made from a flat web which is shaped around the mandrel into tubular form at the time of making the package. As a result, the opposite marginal areas of the flat web are brought together into overlapping relationship and are sealed together to produce the overlapping, longitudinal seal **20**.

Base **12** may be made of any suitable material; but it is preferred to use a material adapted to heat-sealing operations, for example polyethylene. Polyethylene is a highly satisfactory material since it can be used advantageously in an injection molding technique to manufacture bases of the type illustrated. However, other thermoplastic resins can be shaped either by the injection technique, by vacuum forming, or by stamping, or by other suitable methods, to produce a rigid base adaptable to a package of this character.

Package **10** as illustrated comprises a rigid base which does not crush and gives to the package at one end relatively large transverse dimensions as compared to the

flat or envelope package, as well as providing a surface **16** upon which the package can rest in an upright position without danger of tipping over. Thus, after the package is once opened at the upper end, as by cutting off sealed area **18** or by tearing off a corner as along line **17**, it can be set down without danger of the contents spilling or leaking out of the open upper end. At the same time, the major portion of the package in terms of external area is made from inexpensive, flexible film, which readily lends itself to manufacture of the container or package at the time of filling.

FIG. 5 illustrates diagrammatically a sequence of operations involved in manufacturing the container, filling the same, and closing it at a plurality of stations to form a completed filled package.

Referring now to FIG. 5, there is shown therein endless belt **25** as a means for conveying elements of the package from one station to another during the forming and filling operations. Belt **25** may be an articulated member, including a plurality of rigid elements **26** carrying means to engage and position bases **11**. It is advanced intermittently by any suitable drive mechanism (not shown), the upper run of the belt moving from left to right in FIG. 5, as indicated by arrow **25***a*.

At station #**1** is magazine **27** which contains a plurality of rigid bases **11** which have been previously formed and stored in the magazine. These bases are dropped one at a time from the magazine onto the top run of belt **25** by periodic reciprocation of gate **28** at the bottom of the magazine, the gate being operated in timed relation to belt movement.

Belt **25** is provided with any suitable means for engaging and positioning the bases in order that they may be properly registered for the subsequent operations. While the invention is not necessarily limited to any particular means, as exemplary of such means, each belt element **26** is shown at FIG. 7 as having a recess **29** adapted to receive a base **11** when positioned below magazine **27**. The flange **15** on the base serves as a cooperating element of the base to engage the side wall of recess **29** and in cooperation therewith position the rigid base on the belt without in any way interfering with application to the base of the tube of film.

The periodic advance of the belt moves a base **11** from station #**1** to station #**2** where the base is now positioned directly beneath mandrel **30** which is adapted to reciprocate axially of the mandrel toward and away from belt **25**. The container is made in large part from a thin, flexible web which is supplied from roll **31**, the web coming off in a flat continuous sheet at **32**, passing over an idler roll **33**, and then being shaped around mandrel **30** by former **34**, into a tubular configuration. From a practical standpoint, it is preferred that mandrel **30** be circular in cross section so that the tubular web is also circular in cross section, the practical advantages being obvious; but the invention is not necessarily limited to a particular shape of the tube. In any event, the inside shape of the tube is congruent with the exterior peripheral surface **14** of the base.

As web **32** is wrapped around mandrel **30**, longitudinal marginal areas are overlapped to produce the longitudinal seam **20** of the package. In the overlapped area, the edges are sealed together by the application of heat and pressure applied by sealing unit **35**.

A pair of grippers **36** is mounted with its two members at opposite sides of the mandrel below sealer **35** for reciprocating movement toward and away from the mandrel, as indicated by arrows **37** and also for reciprocation parallel to the mandrel, as indicated by arrows **38**.

In order to attach the end of the tube formed from web **32** to a rigid base **11**, mandrel **30** is first moved axially downward to engage the base which has been brought into registration with the mandrel. Part or all of the mandrel moves ahead of the tube and projects down below the film tube. The diameter of the mandrel is, as

shown in FIG. 6, equal to the diameter of the peripheral wall 14 of the base. The mandrel having the same size and shape as wall 14, and being in registration with the base, the web tube can now be moved downwardly by grippers 36 a sufficient distance to completely cover peripheral surface 14, the end of the tube coming to rest against the upper surface of flange 15 as in FIG. 4.

Attachment of the tube to the base is accomplished in two separate operations. Initial attachment is accomplished at station #2 by sealing heads 40 which reciprocate toward and away from base 11 on the belt below mandrel 30, and engage the tube externally at the level of surface 14. By the application of heat and pressure, the tube is sealed by heads 40 to the rigid base. Heads 40 also hold the web and base against travelling upward when mandrel 30 is retracted and raised out of contact with base 11. Previous to retracting the mandrel, grippers 36 are moved horizontally out of contact with the web and then raised upwardly to the level shown in FIG. 5 at which they re-engage the film.

The end of the tube formed around mandrel 30 is now attached to a base 11. The terminal portion of the tube is severed from the following web by cutting blades 41 which shear the tube after the mandrel has been raised to a position above the shear blades.

The result of the operation so far described is to produce a cylindrical container 10*a* which is open at the upper end and partially attached to a rigid base. The container is completed by extending the attachment around the entire periphery of surface 14. This second attachment step takes place at station #3 where opposing sealing heads 43 seal the remaining unsealed circumference of the tube to the base 11.

Like an empty box or bottle, the container could be packed and shipped to a point of filling. However, a more usual and preferred method is to make it adjacent the filling site. Hence, after completion of the container at station #3, it is moved by belt 25 to station #4 where the container is located beneath filling spout 45 and filled with a liquid, powder, or other fluent material. A metering valve 46 operated in timed relation to the movement of belt 25 discharges by gravity a measured quantity of the product from filling spout 45 into the container beneath the spout.

The filled container is now moved from station #4 to station #5 where the filled package is completed by closing the upper end of the open tube. This is accomplished by flattening opposing walls of the tube together between a pair of heated reciprocating sealing heads 48 which move toward and away from each other and the filled container. These heads have flat surfaces; and, upon approaching each other closely, firmly grip between them the opposing walls of tube 12 producing the flat transverse seal 18 as shown in FIG. 1. After the seal is made by applying heat and pressure, the heads 48 retract, freeing the filled and completed container. Upon subsequent advance of belt 25, the container is discharged from the belt by gravity down chute 50 to storage or a boxing operation, as may be desired.

FIG. 9 shows a variational form of the package that is constructed as previously described, the only change being in the shape of base 51. The flange, which cooperated with the recess on the belt to position the base, has been omitted. Instead, the base is recessed on its underside at 52. The recess can be engaged by a suitably shaped cooperating member on the belt for positioning the base.

Another modification is giving to the peripheral surface 54 a slight upward axial taper. The maximum diameter of the base can slightly exceed the inside diameter of the web tube with this shape of base. The tube is pulled down over the base as far it will go, thus insuring the complete absence of wrinkles in the thin film which could be source of leaks. The degree of taper most satisfactory can be selected to fit the materials and process used.

A further modification is shown in FIG. 10 wherein base 61 is designed with openings 62 for discharge of the package contents. A disc 63 rotatably mounted on the base by pivot 64 can be rotated to a position closing the openings 62 or to a discharge position in which disc opening 65 registers with openings 62 to allow the contents to be shaken out of the package. The base here serves not only as a rigid closure member but also as a discharge device for emptying the package.

Either base 51 or 61 can be used in the method of manufacturing previously described, or in any other sequence of operations.

The sequence of operations in making and filling a package is most easily illustrated and described if the operations take place at several spaced stations. However, it is possible to perform at station #2 all the operations described as occurring at stations #2–#5. Some change in sequence is there involved. Mandrel 30 is hollow for its full length and is also used as a filling tube. Filling is done before the severing step, an exemplary method involving filling the end of the tube, placing transverse seal 18, and finally severing the package from the web. The operations are as already described, although some modification in machine elements and their location will be required.

From the foregoing discussion, it will be understood that various changes may be made in the detailed construction and shape of the container and the filled package as well as in the various steps and their sequence involved in the manufacture of the container and package, without departing from the spirit and scope of the present invention. Accordingly, it is to be understood that the foregoing description is considered to be illustrative of, rather than limitative upon, the invention as defined by the appended claims.

We claim:

1. The method of making a container for fluent materials or the like, that comprises:
registering a rigid base and a mandrel;
moving a tube of thin, flexible film axially of the mandrel to surround a portion of the base;
attaching the tube to the base;
and separating the mandrel from the base to withdraw the mandrel from the tube.

2. The method of making a container as in claim 1 that also includes:
forming the tube around the mandrel from a continuous web of thin, flexible film;
and severing a length of tube from the following web.

3. The method of making a filled package containing a fluent product or the like, that includes the steps of:
forming a continuous web of thin, flexible film into a tube around a mandrel;
bringing a base into registration with the mandrel;
advancing the mandrel axially substantially into engagement with the base and advancing the tube axially from the mandrel to surround a portion of the base with the open end of the tube;
attaching the tube to the base;
withdrawing the mandrel from a portion of the tube and from engagement with the base;
severing said portion of the tube from the following web to form an open ended tubular container;
placing a quantity of a product in the container through said open end thereof;
and closing the open end of the container to complete the package.

4. The method of making a filled package according to claim 3 that includes making a face-to-face seal extending transversely of the package to complete it.

5. The method of making a filled package according to claim 3 in which the base and attached tube are moved over a horizontal path and the mandrel is reciprocated vertically toward and away from the path of the base.

6. The method of making a filled package according to claim 3 in which the web is formed into a tube conforming substantially to a portion of the base.

7. The method of making a filled package containing a fluent product or the like, that includes the steps of:
forming a continuous web of thin, flexible film into a tube around a mandrel;
bringing a base into registration with the mandrel;
advancing the mandrel axially substantially into engagement with the base and advancing the tube axially from the mandrel to surround a portion of the base with the open end of the tube;
attaching the tube to the base;
withdrawing the mandrel from a portion of the tube and from engagement with the base;
said portion severing of the tube from the following web to form an open ended tubular container;
placing a quantity of a product in the terminal portion of the tube above the base;
sealing walls of the tube together above said product;
and severing the terminal portion of the tube from the following web.

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