

United States Patent

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[56]

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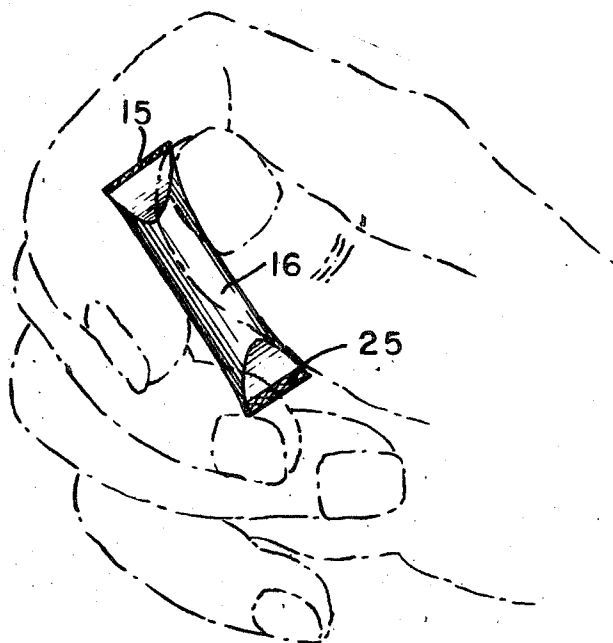
[54] **BURST PACK**
5 Claims, 7 Drawing Figs.

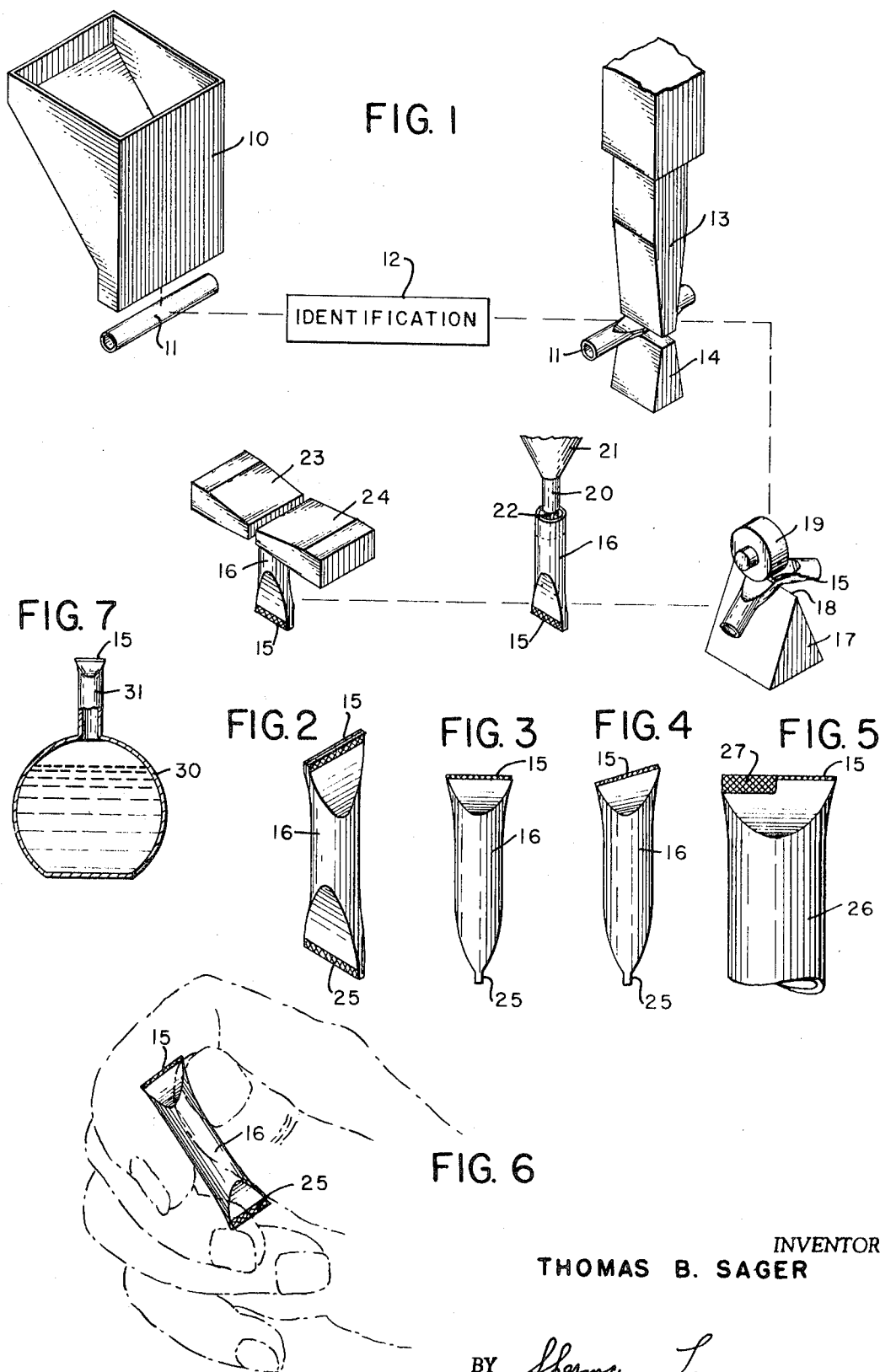
[52] U.S. Cl. **206/56 AA,**
229/66, 220/DIG. 31, 215/1 C, 150/5

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B65d 77/38

[50] Field of Search **229/66, 7**
R, 17 R; 206/56 AA; 222/107, 541; 220/Dig. 31

ABSTRACT: A container having a tubular portion of heat-sealable material which is sealed at one end in such a manner that such seal will rupture when a predetermined pressure is applied to the opposite ends thereof.





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BURST PACK**BACKGROUND OF THE INVENTION****1. Field of the Invention**

This invention relates generally to containers for fluid and other materials and relates particularly to a container having a tubular portion which is sealed at one end in such a manner that the seal is adapted to rupture when a predetermined pressure is applied lengthwise of the seal so that the contents can be discharged. The invention also relates to the method by which the container is filled and sealed.

2. Description of the Prior Art

Heretofore many efforts have been made to provide a container adapted to contain fluent or other material and being sealed in a manner to rupture when pressure is applied. Some efforts have been made to provide containers for individual units of measure, however, most of these prior art devices have provided a tear strip or notch by which one end of the container was adapted to be torn or cut so that the contents could be discharged. The containers which were adapted to be torn have not been satisfactory due to varying tensile strength of the material, and the containers which have been adapted to be cut have not been satisfactory because a severing tool such as a knife or pair of scissors has not always been available. Also, some additional efforts have been made to produce a container having a weakened portion or weakened seal at one end which was adapted to rupture by internal pressure when the container was squeezed. These devices have not been satisfactory since the squeezing of the container to rupture the seal frequently discharged a substantial portion of the contents unintentionally and therefore these prior art devices have not been satisfactory from either the standpoint of use or manufacture.

SUMMARY OF THE INVENTION

The present invention is a burst pack and method of making the same in which the burst pack includes a container adapted to contain single or multiple portions of any desired material. The burst pack container includes a generally cylindrical portion having a molecular bond or seal at the end which will rupture when a predetermined force is applied to opposite ends of the seal. The method of making the device includes the steps of forming a molecular bond or seal in one end of a plastic tube or container by means of an ultrasonic horn and transducer or other kinetic energy under a predetermined pressure and for a predetermined length of time, severing the tube to a predetermined length, and filling the tube or container with any desired fluent or solid material and thereafter sealing the container so that when a predetermined pressure is applied to opposite ends of the molecular bond, such bond will rupture and pop open so that the contents of the container can be discharged.

It is an object of the invention to provide a container adapted to contain fluent or other material and which includes a generally cylindrical portion with a molecular bond or ultrasonic seal at the end which will rupture or pop open when a predetermined pressure is applied to opposite ends of the ultrasonic seal.

Another object of the invention is to provide a method of manufacturing a container for fluent or other material having a tubular portion with a weakened seal at the end.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a flow diagram illustrating the steps involved in the process of manufacturing the present invention.

FIG. 2 is a perspective view of the article formed in accordance with the process of FIG. 1.

FIG. 3 is a side elevation of the structure of FIG. 2.

FIG. 4 is a side elevation of a modified form of the container.

FIG. 5 is a fragmentary side elevation of a further modified form of the container.

FIG. 6 is a perspective illustrating one of the containers being opened.

FIG. 7 is a section of a still further modified form of container.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIG. 1 of the drawing, a hopper 10 is provided in which a plurality of tubular members or sleeves 11 are received, and such tubular members are adapted to be dispensed one at a time from the hopper. Preferably each tubular member is constructed of plastic or other flexible or semiflexible material which can be sealed by the application of heat including kinetic energy. The tubular members may be made of any desired internal diameter, wall thickness and length in accordance with the material being packaged.

From the hopper 10 the tubular member 11 may be carried to an identification station 12 where suitable indicia may be applied to the tubular member to identify the contents which will be placed therein. It is noted that this step could be omitted, particularly where small containers are being formed, and instead the identifying indicia could be marked on a box or other carton in which the containers are to be stored and shipped.

Thereafter, the tubular members 11 are carried to a molecular bonding or sealing station having a source of kinetic energy such as an ultrasonic tool 13 and an anvil 14. The tool 13 is connected to an ultrasonic transducer (not shown) so that when the tool and anvil are moved into close proximity to each other with the tubular member 11 therebetween the ultrasonic transducer is activated to transmit ultrasonic vibrations through the tool and cause the molecules of material to fuse or bond together and form an ultrasonic seal 15 across the middle of the member 11. After the molecular bond has been made the tubular member 11 is separated into the independent containers 16 in any desired manner.

One method of separating the containers which lends itself to this type of operation is a base 17 having a sharp upper edge 18 over which the tubular member 11 is folded or bent with the ultrasonic seal 15 disposed in alignment with the sharp edge 18 and with portions of such seal disposed on both sides of the edge. A roller 19 is moved across the tubular member so that pressure is applied to such member to force the same downwardly against the sharp edge 18 to sever the tubular member into two separate containers, each of which has an ultrasonic seal at one end.

Thereafter, the containers 16 are placed in an upright position and are moved until they are located below the nozzle 20 of a hopper 21 containing the material to be dispensed into the containers. When the containers are in position a valve (not shown) is opened to discharge a predetermined amount of material 22 through the nozzle 20 into the container.

The filled container then is moved to a permanent sealing station having a source of heat such as heated blades 23 and 24. The blades 23 and 24 are moved into close proximity to each other with the end of the container 16 therebetween and apply a predetermined amount of heat and pressure to form a permanent seal 25 across the open end of the container and generally normal to the longitudinal axis thereof.

While the method illustrated in FIG. 1 has been tried and found successful, it is contemplated that the tubular members 11 could be supplied in longer lengths which could be sealed and separated into individual lengths or the tubular members could be formed in a continuous length in an extrusion machine and then sealed and separated into individual members. Also, the method illustrated for separating the containers is exemplary of a method which lends itself to this process, however, any conventional method of separating the tubular members into individual containers would be satisfactory.

It is contemplated that an additional step between the filling of the container and the permanent sealing of the end could be provided in which the container is squeezed to extrude most of the air out of the container prior to the forming of the permanent seal. The squeezing of the container before sealing

creates a partial vacuum or negative pressure within the container to permit expansion of the contents when subjected to heat so that the ultrasonic seal will not be forced open accidentally during shipping and storing.

With reference to FIGS. 2-6, the container 16 is preferably in the shape of a tetrahedron with the molecular bond 15 at one end being substantially at right angles to the permanent seal 25 at the opposite end. By forming the container in this manner rolling or sliding of the container is substantially reduced as well as the enhancing of the identification of the end with the ultrasonic seal. As illustrated in FIGS. 2 and 3, the ultrasonic seal 15 extends substantially across the container 16 and is generally normal to the longitudinal axis thereof. When the ultrasonic seal is ruptured, as will be described later, the end of the container will be generally round. In FIG. 4 the ultrasonic seal 15 is disposed at an angle to the longitudinal axis of the container so that when the seal is ruptured the end of the container will be generally oval and will provide a larger pouring area. As illustrated in FIG. 5, a larger container 26 is provided in which the end is partially sealed with a permanent seal 27 and is partially sealed with an ultrasonic seal 15 so that when pressure is applied to the end of the container 26 the ultrasonic seal will rupture and form a teardrop-shaped opening while the permanent seal 27 will remain sealed.

In the operation of the device illustrated in FIGS. 1-6, a plurality of individual containers 16 or 26 are formed by providing a molecular bond 15 in a tubular member 11 and thereafter severing the tubular member along the bond to provide a pair of containers 16, each of which has a seal at one end. Thereafter, a predetermined amount of liquid, granular or solid material is introduced into each of the containers and the open end of the container is sealed. When it is desired to open the container, such container is grasped in one hand of a person with the thumb on one end of the molecular bond and with the forefinger on the opposite end. When a predetermined pressure is applied by the thumb and finger the bond will rupture for its entire length and the end of the container will pop open.

It is noted that, if desired, a molecular seal 15 could be applied to both ends of the container 16 so that either end could be opened by the application of pressure.

With reference to FIG. 7, a modified form of the invention is illustrated in which a relatively large container 30 is provided with a spout or neck 31. The container 30 may be constructed of any desired material and in any configuration as well as being adapted to contain any desired material. The spout or neck 31 is generally tubular in cross section and is constructed of heat sealable material as was the container 16 previously described. If the container 30 and neck 31 are made of different materials, they can be joined together in any desired manner as by fusion, adhesive, friction or the like. Since the rupturing of the molecular seal is not dependent upon internal pressure of a relatively small container, the container 30 may be as large or as small as desired.

In the operation of this modification, it is contemplated that the neck 31 could be formed of heat-sealable material in substantially the same manner as the container 16 previously described except that material to be contained is not discharged into the same and the permanent seal 25 is not formed. Instead, the material to be contained is received within the container 30 after which the neck 31 and container 30 are connected together in assembled relation.

Also it is contemplated that the container 30 and neck 31

could be assembled prior to the introduction of material into the container and then the molecular bond 15 could be applied to the neck 31.

If desired, the container 30 could be supplied with a pair of necks 31 spaced apart from each other so that one neck would permit the ingress of air into the container while the other neck is discharging material.

Many tests have been made to determine the feasibility of the burst pack, and an example of a satisfactory structure is as follows: A 5/16 ID plastic tube having a wall thickness of 0.010 plus or minus 0.002 was provided and the ultrasonic tool 13 and the anvil 14 were moved toward each other until they were 0.0015 inch apart with the plastic tube clamped therebetween. The ultrasonic transducer was energized for 0.15 second and the resulting seal was well within the prescribed limits for the burst pack. The results were repeated throughout the entire trial run even though the setting for the ultrasonic tool and anvil were intentionally changed and reset to test for repeatability.

In the present instance it was determined that the seal should burst if a pressure of 7 pounds plus 5 pounds or minus 3 pounds were applied across the ends of the molecular bond. In making the tests, tubular members of different materials including polypropylene, polyvinylidene fluoride, kel-F, Plaskos 2,200, Nylon 6 and seran were utilized. Of the materials tested polypropylene was the most successful. In a test run of 1,000 units using polypropylene tubing and filling the containers with water all units popped open when a pressure of 7 pounds plus 5 pounds or minus 3 pounds was applied to opposite ends of the bond.

While a preferred embodiment in accordance with the present invention has been illustrated and described, it is understood that various modifications may be resorted to without departing from the spirit and the scope of the appended claims.

1. A burst pack containing a quantity of material to be dispensed, and said burst pack being discardable after the material therein is dispensed and discharged, said burst pack embodying a container provided with a permanent seal at one end only, a molecular ultrasonic bond at the opposite end of the container from the permanent seal, said molecular bond providing a temporary seal, said molecular bond being weaker than the material of the container and being weaker than the permanent seal, said molecular bond at the end of the container being ruptured when a predetermined pressure is applied to the length of the molecular bond so that the material within the container will be discharged out through the ruptured end only after the bond has been ruptured and whereby when the container is squeezed the molecular bond will rupture to open the end of the container, the seals being liquid-tight.

2. The structure as defined in claim 1, wherein the molecular bond includes a permanent portion as well as a ruptureable partial portion that is adapted to be broken.

3. The structure as defined in claim 1, wherein the material in the container is a liquid.

4. The structure as defined in claim 1, wherein the molecular bond is positioned substantially normal to the longitudinal axis of the container and substantially at a right angle to the permanent seal.

5. The structure as defined in claim 1, wherein the molecular bond is disposed angularly with respect to the longitudinal axis of the container.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,601,252 Dated August 24, 1971

Inventor(s) Thomas B. Sager

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet [73], "Kleer-Vu Industries, Inc. New York, N. Y." should read -- Ultrasonic Systems, Inc. Farmingdale, N. Y. --.

Signed and sealed this 30th day of May 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents