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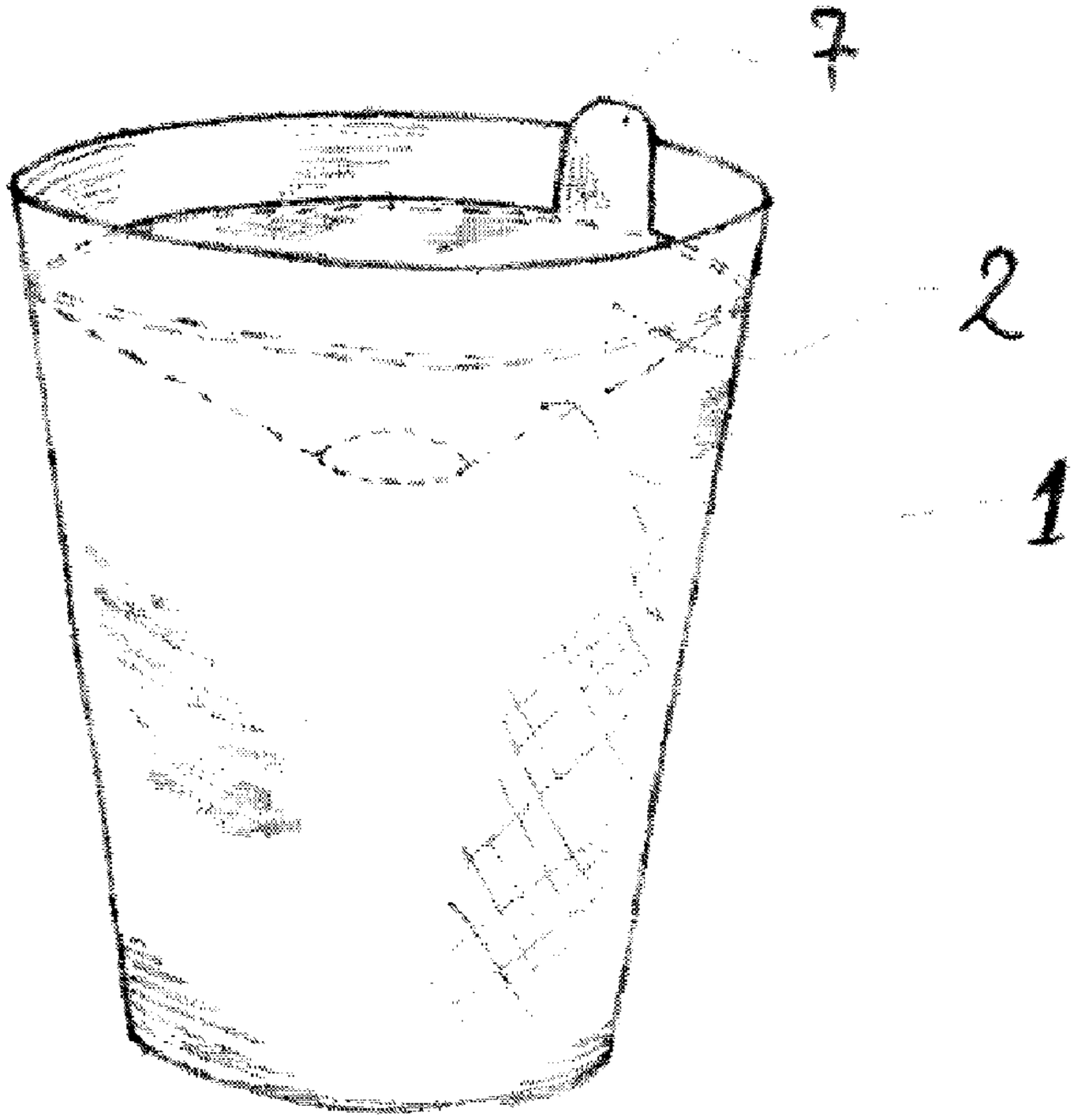
(54) Titre : COUVERCLE DE TASSE RECYCLABLE
(54) Title: RECYCLABLE CUP LID



(57) Abrégé/Abstract:
A lid for disposable cups that can be made of paper or any other suitable material. The lid is provided by an insert for a cup that generally serves as a lid. It can be utilized with a cover for the insert and a plug for the insert. These parts can be used in different

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(57) Abrégé(suite)/Abstract(continued):
combinations but the minimum requirement is that a cup is equipped with the insert. In disposable cups utilization, recycling is a known problem. Disposable cups, most often made of paper, are used with lids made of plastic. The lids contaminate the paper cups, from the perspective of paper cups recycling. This invention resolves this problem by offering the solution for paper cup lids that can be made of paper or any other, recycling wise, compatible material to the material that disposable cups are made of. This provides for 100% cleanly recyclable combination of cup and lid.

Abstract of the Specification

A lid for disposable cups that can be made of paper or any other suitable material. The lid is provided by an insert for a cup that generally serves as a lid. It can be utilized with a cover for the insert and a plug for the insert. These parts can be used in different combinations but the minimum requirement is that a cup is equipped with the insert.
In disposable cups utilization, recycling is a known problem. Disposable cups, most often made of paper, are used with lids made of plastic. The lids contaminate the paper cups, from the perspective of paper cups recycling. This invention resolves this problem by offering the solution for paper cup lids that can be made of paper or any other, recycling wise, compatible material to the material that disposable cups are made of. This provides for 100% cleanly recyclable combination of cup and lid.

Description

Recyclable Cup Lid

Background of the Invention

This invention relates to disposable cups (take-out cups) and lids. The invention is the insert-lid that can be made of material same as the cups or any other material. The area of application includes any utilization of the disposable cups for hot and cold beverages. This includes but is not limited to: coffee, tea, cocoa, all soft drinks, sodas and other.

Problem Discussion and Prior Art

In the aforementioned field of utilization of disposable cups, the growing problem is recycling of cups and lids together. Currently there are various designs of cup lids. However, they are all made of material (plastic e.g. polystyrene) different than the material used for making disposable cups, most often paper/cardboard. This affects recycling process, where the plastic lids contaminate the paper cups, making cups non-recyclable. According to statistics obtained from Toronto Star newspaper (Ontario), issue of March 11th, 350 million cups have been disposed of in last year (2008), in the Great Toronto Area alone. Considering these enormous quantities of discarded cups, the losses incurred by the recyclable process being ineffective or prevented all together are enormous. Currently, existing disposable cups and lids are out of recycling stream.

Disposable cup lids are well known in the art and they are disclosed as in the prior art examples in the list below:

Beverage cup lid, CA2169339, Filled Feb 12 1996, Issued 1999 May 4, by Lane William F., William S. Robert C., Owner Lid Company LLC, US

Foldback Cup Lid Having Confortable Drinking Characteristics, CA2187382, Filled Oct 8 1996, Issued June 22, 1999, by Van Melle Hugh, Owner Amhil Enterprises

Drink Through Container Lid, CA1236426 / 445873, Filled Jan 23 1984, Issued May 10 1988, by Smith George K., Boller Peter K., Owner Lily Cups Inc.

All of the above solutions, and any other existing to date, use lids made of plastic/plastic-involving materials creating above mentioned recycling problem.

So far, plastic lids have been used for the following reasons:
in this field of use of disposable cups, requirement is that at the beginning of the serving process, a cup is open to accommodate pouring of a beverage (such as coffee, tea, soft drinks, add milk, sugar, ice etc.), yet, as a final product the cup needs to be closed, with a cover lid in such matter that the liquid inside is contained effectively and that the cup is reasonably protected from spilling of the liquid in "to go" conditions, where the liquid is consumed at the place other than the place of serving. The lid also serves the purpose of maintaining the temperature of the liquid and for sanitary reasons. For these purposes, plastic lids that tightly cover a cup are produced and they are offered to be separately mounted over the cup after the serving. A lid, that can easily be mounted over a cup, but still provide tight sealed connection to the cup, is required. Plastic was the material that offered such properties. No paper/cardboard lid solution for such application and with above described characteristics, has been offered to date.

This invention solves the recycling problem by offering a feature (insert), like in fig. 1a or fig. 1b, for the recyclable/disposable cups. The feature answers above described requirements. It can be made of paper/cardboard material (or any other material identical, similar or different from the material that a cup is made of). Thus, the invention coupled with the cup comprises the 100% recyclable cup. This insert serves as the cover – lid for a cup, and in addition, it provides more protection (liquid control against splashing) when a liquid is being consumed, thus further adding to cup's usability in above mentioned various "to go" conditions, while never changing the traditional experience of consuming liquid from the cup.
The same solution can be offered for any other material used for such cups, thus always maintaining the complete cup/lid combination 100% cleanly recyclable.

The Drawings List

In the drawings, which form a part of this specification,

Fig.1a is a side 3 dimensional view of the insert (lid) 1;

Fig.1b is a side 3 dimensional view of a version of the insert with extended side walls;

Fig.1c is a side 3 dimensional view of another variation of the insert (horizontal top)

Fig.2 is a side 3 dimensional view of the insert showing a plug 4 used for better sealing;

Fig.3 is a side view of the insert 1, with the cover 2 shown above the insert;

Fig.4 is a top view of the insert;

Fig.5 is showing the positioning ("exploded view") of the insert 1, the cover 2 and the plug 4, including a cup;

Fig.6 is a side 3 dimensional view of the positioning of the insert and the cover;

Fig.7 is a side view of a cup with the insert presenting the behavior of a liquid inside. It shows the principle of this invention;

Fig.8 is a side view of a cup with the insert and liquid, presenting the consumption process;

Fig.9, similar to Fig.8, shows the "negative angle" during consumption;

Fig.10, similar to Fig.8&9, shows the "dead angle" with residual liquid inside a cup;

Fig.11 is an illustration of the insert detachment solution, for dispensing of residual liquid;

Fig.12 is an illustration of the insert tearing solution, for dispensing of residual liquid.

Detailed Description of the Invention

One variation of the insert is shown in fig.1a. This invention can be used in combination with a cover 2 and a plug 4 for it, as shown in fig.2 and fig.3. The invention serves as a lid for recyclable/disposable cups, as described in further detail below.

The Insert

The insert is of a frusta-conical shape with the smaller diameter opening 3 at the bottom (fig.1a and fig.3) and the vertical walls 5 in a form of a ring, forming the bigger opening at the top (fig.3 and fig.4). The "ring" walls 5, extend above the conically shaped walls 6. The walls 5 can as well extend down, below the circumference line of edge where ring shape walls are connected to conical shaped walls 6. Fig.1b illustrates this variation of the insert. The insert can also consist solely of the conical shaped part, without the ring walls. Note that angle of the conical walls 6 can vary (fig.3). It can go from a sharp angle (where walls 6 are close to vertical), to 90 degree angle relative to vertical line, where the walls 6 become horizontal and form a horizontal plane. This variation of the insert is shown in fig.1c.

The insert 1 acts as a lid and is positioned in a cup as shown in fig.6. The positioning of the insert 1 in a cup can vary from the very bottom of the cup to the top of the cup, where best cup volume utilization is achieved when the insert is closer to, or at the top of the cup (as in fig.6).

The insert can be made of paper, cardboard or any other material that is same as, or different from the material used for a cup that the insert is intended for. This includes, but is not limited to: paper, styrofoam, plastic, ceramic, glass etc. It is important to note that

the material for insert can be selected so that it is, recycling vise, compatible with the material used for disposable cup. The equality or compatibility of the materials used for a cup and an insert offers the cup/insert combination completely clean recyclability.

The insert 1 in a cup can be permanently attached to the cup as the integrated part of the cup (i.e. at cup's production), or can be inserted into the cup afterwards, as a separate piece (e.g. insert shown in fig1b).

If produced as an integrated part of a cup the insert can be attached in many ways. For example:

- glued to the cup, or,
- attached to the cup by having insert's vertical walls 5 "rolled" into the cups top rim together with the cup's vertical walls, or,
- sealed to the cup's body by any other means, or
- integrated by using a combination of any of the methods mentioned above.

If inserted at a latter time, the connection and firmness of attachment of the insert to a cup is achieved by such design of the insert so that insert fits in the cup tightly, and is secured into the cup by friction between the insert's and the cup's walls (this connection can be enhanced or locked by using any additional lock mechanism). If the cup is of a frusta-conical shape, as it is predominantly the case, this shape of the cup plays supporting role for firm grip of the insert, where the insert walls 5 would follow the shame shape/angles as the cup. In this case, as it has been empirically proven (tested), the friction between cup's walls and insert's walls (example insert in fig.1b) is enough to provide firm enough grip to hold the insert even when the cup is fully loaded and flipped up side down. Such connection does not allow for any liquid leakage between the walls of cup and the walls of the insert (above tests were performed when the opening of the insert 3 was closed by the plug 4).

With any of these various ways of utilizing the insert, important is that tight, sealed connection is established between external surface of the vertical walls 5 of the insert and

internal surface of the vertical walls of the cup throughout their touching area, in such way that no liquid can pass between.

The insert can be used with a cover 2 (fig.3) and/or with a plug 4 (fig.2) for the insert.

The Cover

A Cover 2 (fig.3) for the insert 1 is a flat object, cut in a shape same as the shape of the cup's top opening, normally circle. It is designed to cover the insert 1, protect any possible splashing of the inside liquid and for sanitary reasons. The cover can feature a "handle" 7, an extension to the cover, extending up when cover is placed in the insert/cup (fig.6). It is intended to provide for ease of removal of the cover when desired.

The Plug

A plug 4 (fig.2) for the insert is a frusta-conical or cylinder shaped object, placed into the opening 3 (fig.1a) of the insert 1. The plug can be used to provide for sealed encapsulation of a liquid in the cup and is used for more challenging sealing requirements (e.g. cup is to be carried for a longer period of time, shaking of the cup is expected etc.). The equality, or compatibility of the materials used for the cup, the insert 1, the cover 2 and the plug 4, offers the cup/insert/cover/plug combination completely clean recyclability.

Above mentioned items (insert 1, cover 2 and plug 4) can be used with a cup all together or in any possible combination – refer to fig.5.

The Principle of the Invention

A cup equipped with the insert 1,
will hold close to 100% of liquid contained under the insert (in the cup), even while undergoing shaking. The above is true even when the cup is filled up to the level of the insert's bottom, which is the most challenging condition from the perspective of volume of the liquid and the cup.

When standing still, such cup will encapsulate 100% of the liquid under the insert, where due to the gravity and the shape of the insert all the liquid naturally flows into the cup. When considerably shaken or exposed to other considerably intensive vibratory movements, such cup will still contain close to 100% of the liquid under the insert, where the insert acts as a simple one way membrane (down direction) and as long as the cup is maintained in normal upright position. The limited amount of liquid that comes out with such movements of the cup, ends up in the insert's conical space (on top of surface of the insert 1) and quickly flows back into the cup, through the inset's opening 3, pulled by the gravity. These amounts of liquid are of small quantities and contain very low kinetic energy, thus resulting in a very controlled liquid splashing. Under such strong movements, very small, close to negligible, quantities of liquid spill out or splash out of the cup. The above results have been tested and measured with moderate to considerable shacking and vibrating of the cup (exceeding expected real life scenarios) and do not stand true in conditions where an extreme, severe shacking or vibrating is performed.

A cup equipped with the insert 1 and the cover 2,
will encapsulate 100% of liquid within the cup, even with moderate to considerable shaking and vibratory movements, as long as the cup is maintained in normal stand up position. In more extreme conditions e.g. cup flipped to the side, such cup will show reasonable resilience in terms of still containing liquid for a short period of time. The specific "hold" times depend on the quality of materials (i.e. cardboard, poly coated paper) and quality of manufacturing processes used. Our tests show that tens of seconds of hold time for this test case can be achieved with proper design and production quality.

A cup equipped with the insert 1, the plug 4, and with or without the cover 2,
will encapsulate 100% of liquid within the cup, even with severe shacking and vibratory movements and will hold the liquid, for reasonable period of time, even in more extreme conditions e.g. cup flipped to the side. The specific "hold" times depend on the quality of materials (i.e. cardboard, poly coated paper) and quality of manufacturing processes used. Our tests show that, for this case (extreme conditions), hold time measured in minutes can be achieved with proper design and production quality.

Note that cup should never be filled with liquid over the level of the bottom opening of the insert. The intention is that all the liquid is contained under the insert.

To illustrate the principle of the invention (refer to fig.7), one vertical cross section of a liquid filled cup, with the insert, will be observed. Approximately the same analysis applies for any vertical cross section (that cuts through opening 3, as the opening is the only path for liquid to "escape out" from the cup), and in any direction. Cup movements produce liquid waves. On its path (shown right to left 7.1 in fig.7), wave hits the right edge of the insert's opening (the edge is circular so the wave will also be split into horizontal left and right movement around the opening – this is neglected in the analysis as only vertical, up movements of the wave, are of interest). When colliding with the opening's right edge, biggest portion of the wave is directed downwards (into the cup) 7.2 and this produces reactive (wave continuation energy) burst of the liquid to the left of the opening 7.3 when hitting the left wall of the cup. This liquid portion 7.3 is contained within the cup. Other portion of the original wave 7.4 goes up back and to the right of the opening. This liquid is also well contained within the cup. Finally very limited amount of liquid 7.5 bounces up and through the opening after the coalition of the original wave with the right edge of the opening. Confirmed by testing, these amounts are very low and limited. They also have very low kinetic energy and most of the liquid is quickly flowed back down the insert walls into the cup.
This wave analysis uses approximations believed to be 96% accurate. It is very close representation of the empirical manifestations, which has been experimentally confirmed.

Intended Use

Liquid in a cup, equipped with the insert 1, can be served with the plug 4 and/or the cover 2. The insert generally serves as a cup's lid. The cover and the plug, if used, can be manually removed from the cup. They can be retained and put back in place for further sealing and sanitary reasons.

Fig.8 illustrates the consumption of liquid from a cup – the flow of the liquid. It is important to note that the flow of the liquid is very controlled. Facilitated by the shape of the insert, the flow is steady and with no splashing, and there is no difference in the experience for a consumer relative to consuming the liquid from a regular cup (8.1 in fig.8)

The "Negative Angle"

Fig.9 illustrates continuation of consumption process. The cup needs to be angled more to allow dispensing of liquid, as there is less liquid left in the cup. The area that channels the liquid 6, will get angled over 90 degrees at the certain point. This will position that area into a "negative angle" 9.2 relative to vertical plane 9.1. It is important to note, that even with such angles, fluid continues to flow down the outside walls of the insert 6, and there is no spilling or splashing over the wall. This has been empirically tested. The tests were conducted under the limitations of what is considered to be a normal cup dispensing motion. With more severe or sudden angling of the cup, some spill-over should be expected; but it is of a much lesser degree then what would occur in the same example with a regular cup with an open plastic lid (see The Principle of the Invention and fig.7).

The "Dead Angle"

At the end of consumption, when a cup is flipped up side down, there will be some residual liquid 10.1 trapped in the cup fig.10. The reminder of the liquid represents a small fraction of the total container's volume capacity (percentage will vary depending on the depth of the cup and the design of the insert - angles of its walls 6). Although the remaining fluid percentages are fairly low, many solutions can be offered to allow for total liquid dispensing. If the insert is an add-on to a cup, it can be pulled out.

When the insert is designed as the integrated part of a cup, an opening can be made to allow for full dispensing. Figures 11 and 12 illustrate two suggested solutions:

Fig.11: an extension, a "pull" 8, is provided and is used to detach a part of the insert from a cup's walls creating a path for the remaining liquid 11.1.

Fig.12: the path is created by ripping insert's walls either from the opening 3 outwards (example sown in fig.12), or in the opposite direction, by using the pull 8. When ripping

is involved, perforation and weakening of the material at the desired ripping lines can be used.

Whether the insert is an add-on or built as an integrated part of a cup, insert's opening 3 will allow for liquid filling and other additions like: milk, sugar etc. It will also facilitate the swirling of the liquid. With soft drinks, when the insert is made as integrated part of a cup, an opening 3 can be made larger to accommodate adding ice. For such purposes a design where the insert is separate add-on to the cup is most suitable (as in fig.1b).

A cup equipped with the insert will much better contain the liquid inside and will handle much stronger movements compared to what traditional cups, with plastic lids opened for consumption, can offer. A cup with the insert and the plug will have at a minimum equal resilience in containing the liquid inside, compared to traditional cups with a plastic lid. Most importantly, the invention allows for getting the disposable cups into the stream of recycling.

All above described principles are applicable for different cup sizes. This includes but is not limited to any standard cup size currently in use in the market.

The Embodiments Of The Invention In Which An Exclusive Property Or Privilege Is Claimed Are Defined As Follows:

1. In a cup, an insert for said cup, consisting of a frusta-conical shaped part and a ring shape formed by round vertical walls, where said ring shape is positioned around the circumference of the top opening of said frusta-conical shaped part and said ring shape is connected to said frusta-conical part along entire said circumference, where said frusta-conical part has its smaller opening at its bottom, where outside surface of walls of said ring shape lay against inside surface of side walls of said cup in such manner that liquids can not pass between walls of said ring shape of said insert and walls of said cup, where said insert is positioned in said cup anywhere from said cup's bottom to said cup's top, where said insert can be fitted in said cup as an add-on to said cup, or be manufactured as integral part of said cup, where said cup can be of conical or cylinder or any similar shape and any size, where said insert can be of any size and any similar shape to said insert's shape described in this claim 1.

2. The insert recited in claim 1 wherein the design includes any angle of walls of said frusta-conical shape part relative to side walls of said cup, including the angle where walls of said frusta-conical shaped part become horizontal and said frusta-conical shape becomes horizontal plane.

3. The insert recited in claim 2 wherein said insert is constructed as right frusta-cone where axis of said frusta-cone passes through the centre of said frusta-cone's base at right angle, or said insert is constructed as oblique frusta-cone where axis of said frusta-cone does not pass perpendicularly through the centre of said frusta-cone's base.

4. The insert recited in claim 3 wherein said bottom opening of said frusta-conical shape is of a shape of a circle or any other shape and said bottom opening is of

any size including the case where there is no opening so said frusta-conical part is closed at its bottom.

5. The insert recited in claim 4 wherein the touching surface of walls of said ring shape and walls of said cup can be of varying height, and the design of said insert includes any possible combination of following cases where the walls of said ring shape:

   i) extend above said circumference where said ring shape is connected to said frusta-conical shaped part

   ii) do not extend above said circumference where said ring shape is connected to said frusta-conical shaped part

   iii) extend below said circumference where said ring shape is connected to said frusta-conical shaped part

   iv) do not extend below said circumference where said ring shape is connected to said frusta-conical shaped part.

6. The insert recited in claim 5 wherein said cup is made of paper or any other material, and said insert is made of paper or any other material including the material that said cup is made of.

7. In a cup, an insert for said cup, consisting of a frusta-conical shaped part, where said frusta-conical part has its smaller opening at its bottom, where said insert is designed so that edge of a circumference of a top opening of said frusta-conical shaped part lays against inside surface of side walls of said cup in such manner that liquids can not pass between said edge of said insert and walls of said cup, where said insert is positioned in said cup anywhere from said cup's bottom to said cup's top, where said insert can be fitted in said cup as an add-on to said cup, or be manufactured as integral part of said cup, where said cup can be of conical or cylinder or any similar shape and any size, where said insert can be of any size and any similar shape to said insert's shape described in this claim 7.

8. The insert recited in claim 7 wherein the design includes any angle of walls of said frusta-conical shape part relative to side walls of said cup, including the angle where walls of said frusta-conical shaped part become horizontal and said frusta-conical shape becomes horizontal plane.

9. The insert recited in claim 8 wherein said insert is constructed as right frusta-cone where axis of said frusta-cone passes through the centre of said frusta-cone's base at right angle, or said insert is constructed as oblique frusta-cone where axis of said frusta-cone does not pass perpendicularly through the centre of said frusta-cone's base.

10. The insert recited in claim 9 wherein said bottom opening of said frusta-conical shape is of a shape of a circle or any other shape and said bottom opening is of any size including the case where there is no opening so said frusta-conical part is closed at its bottom.

11. The insert recited in claim 10 wherein said cup is made of paper or any other material, and said insert is made of paper or any other material including the material that said cup is made of.

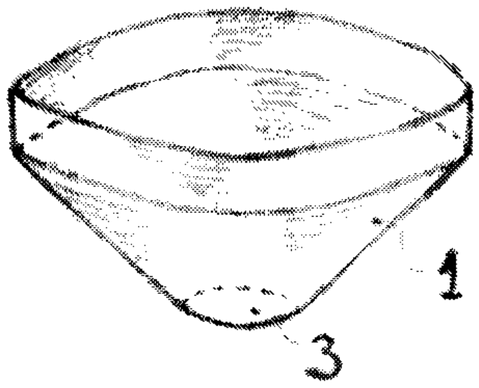

FIG. 1a

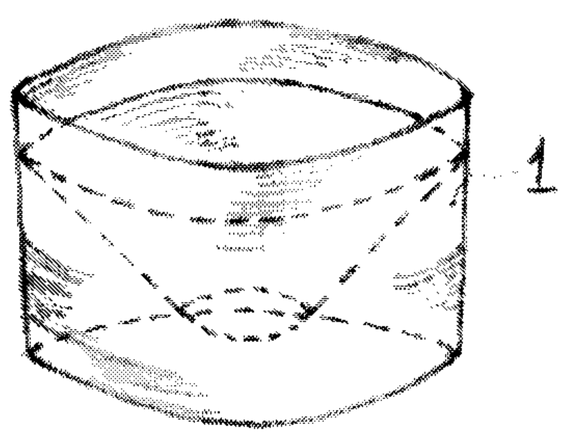

FIG. 1b

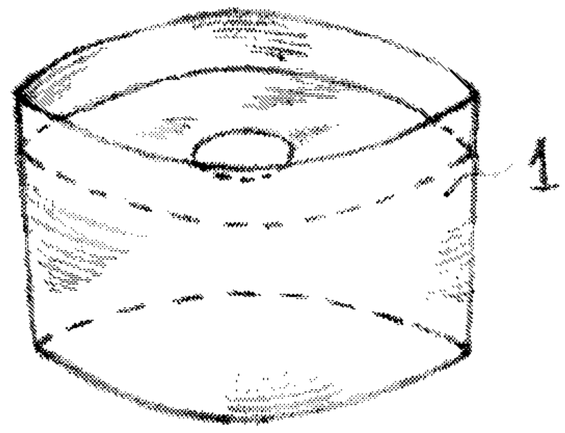

FIG. 1c

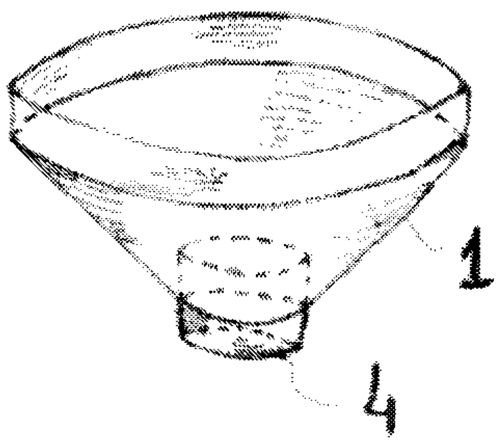

FIG. 2

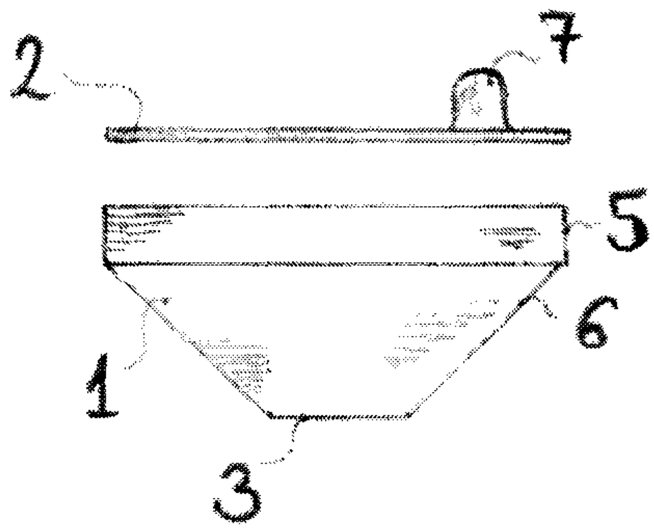

FIG. 3

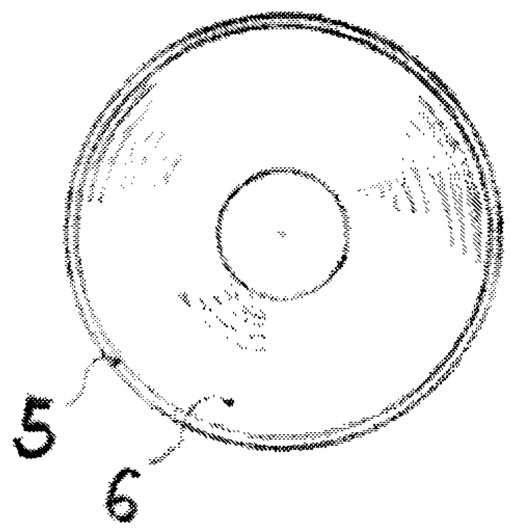

FIG. 4

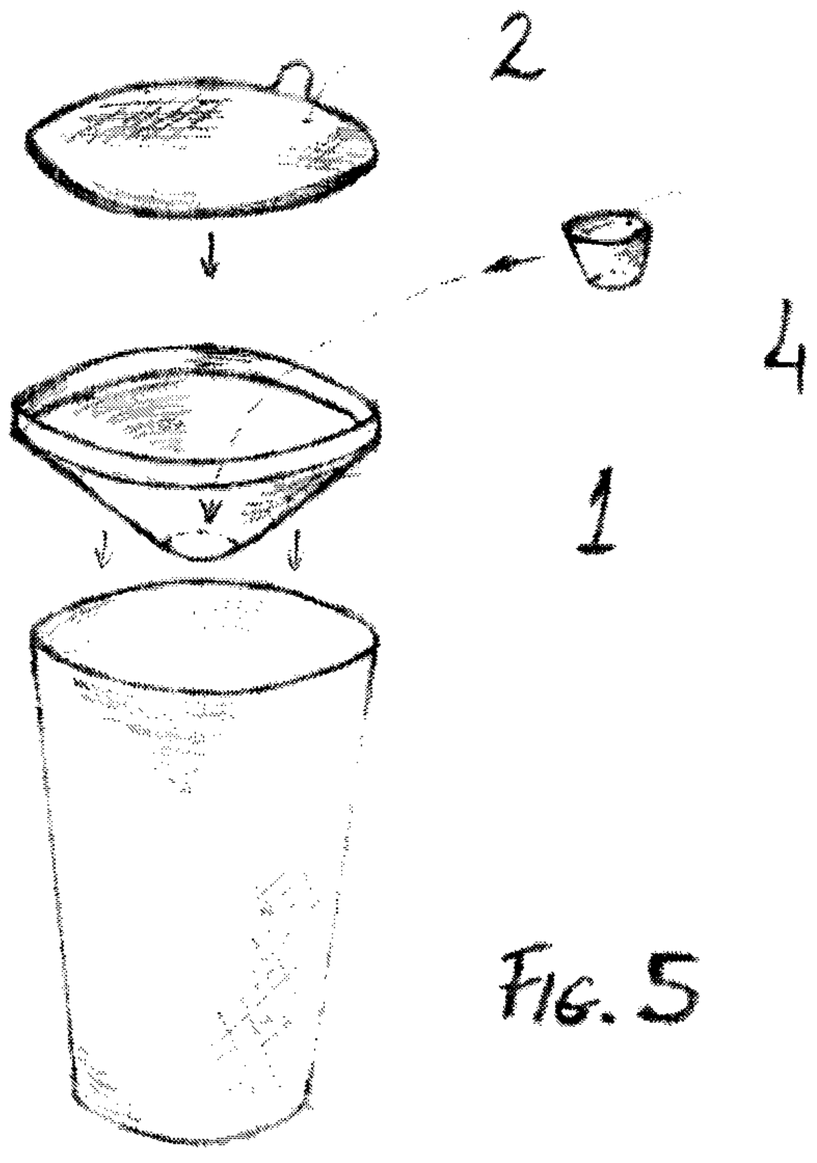

FIG. 5

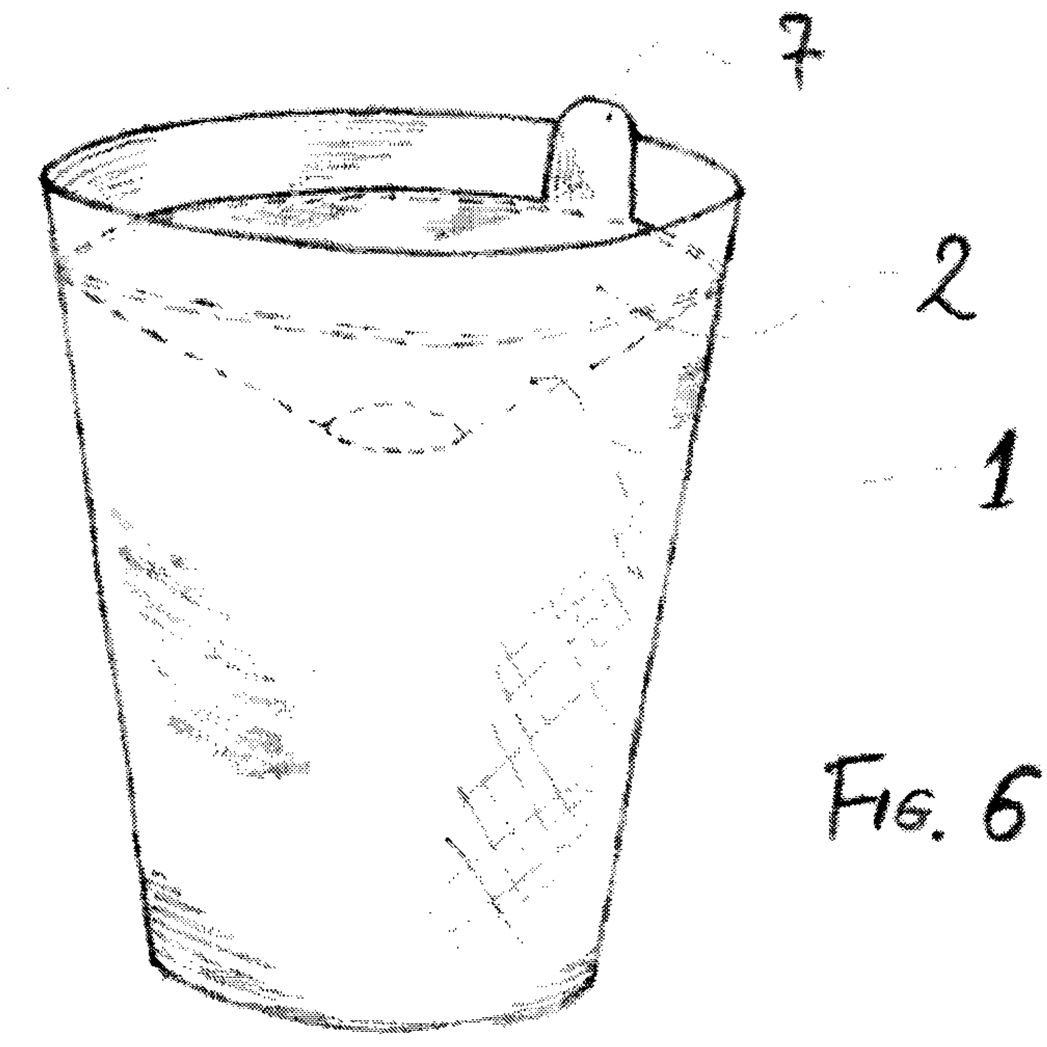

FIG. 6

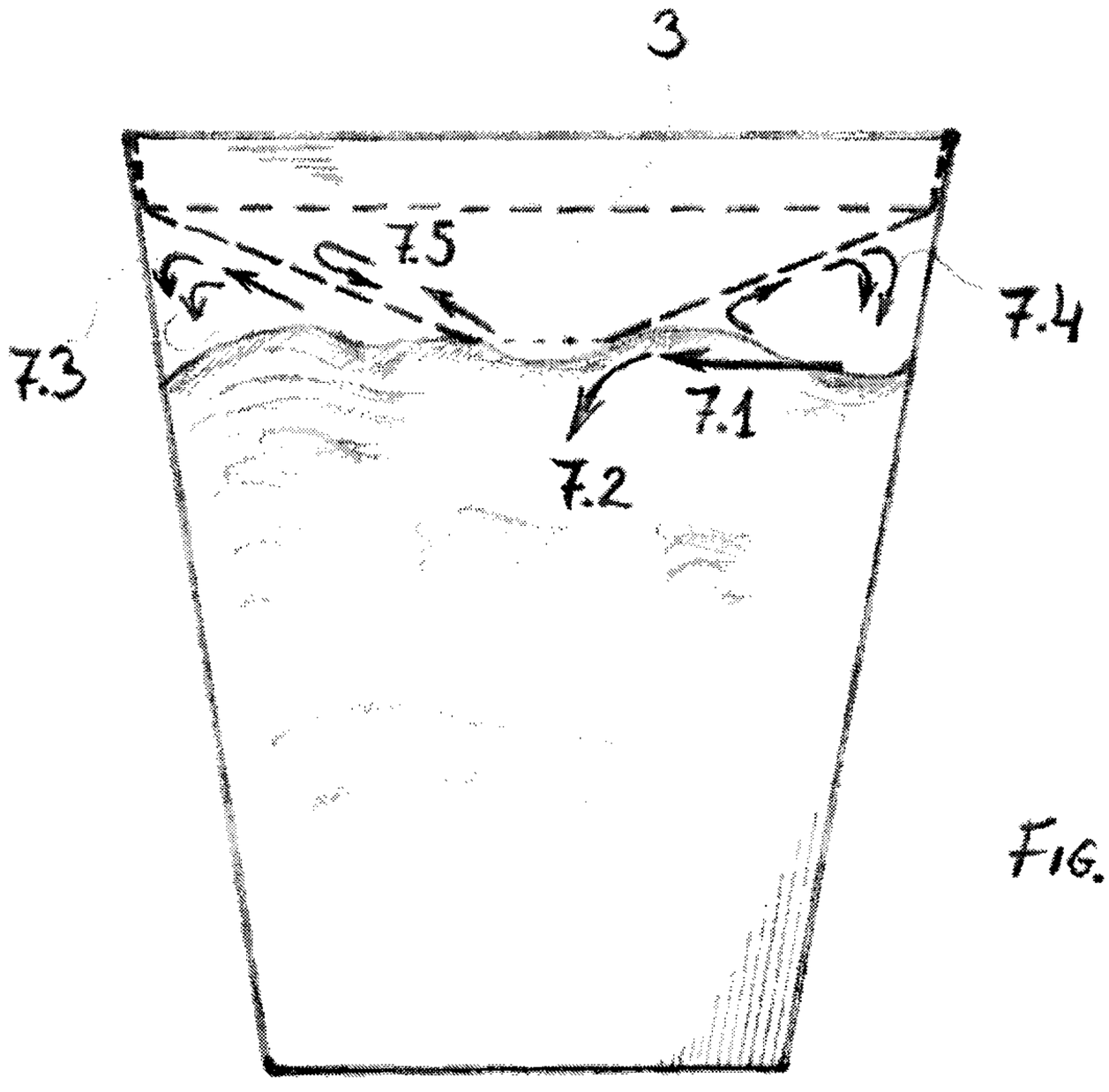

FIG. 7

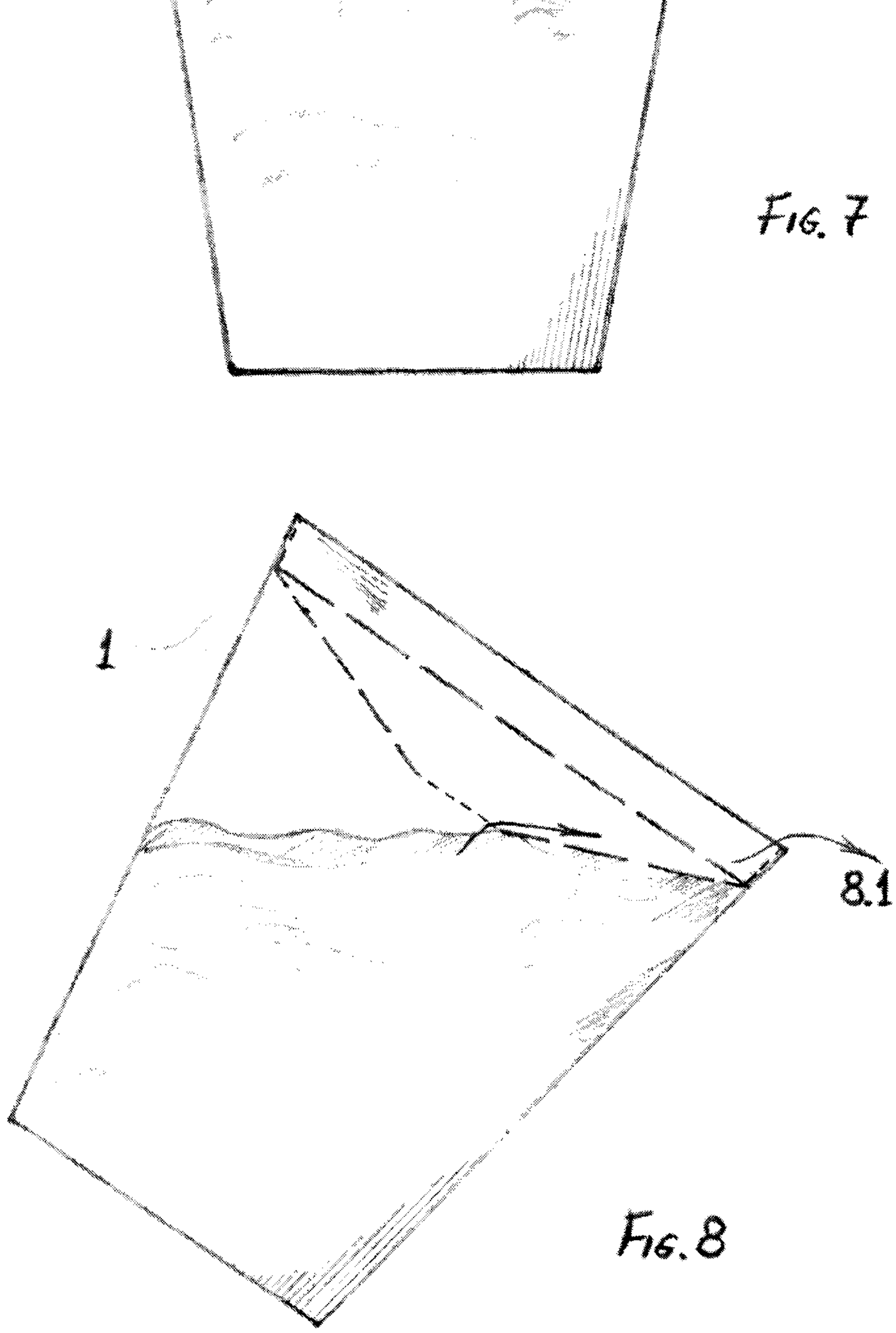

FIG. 8

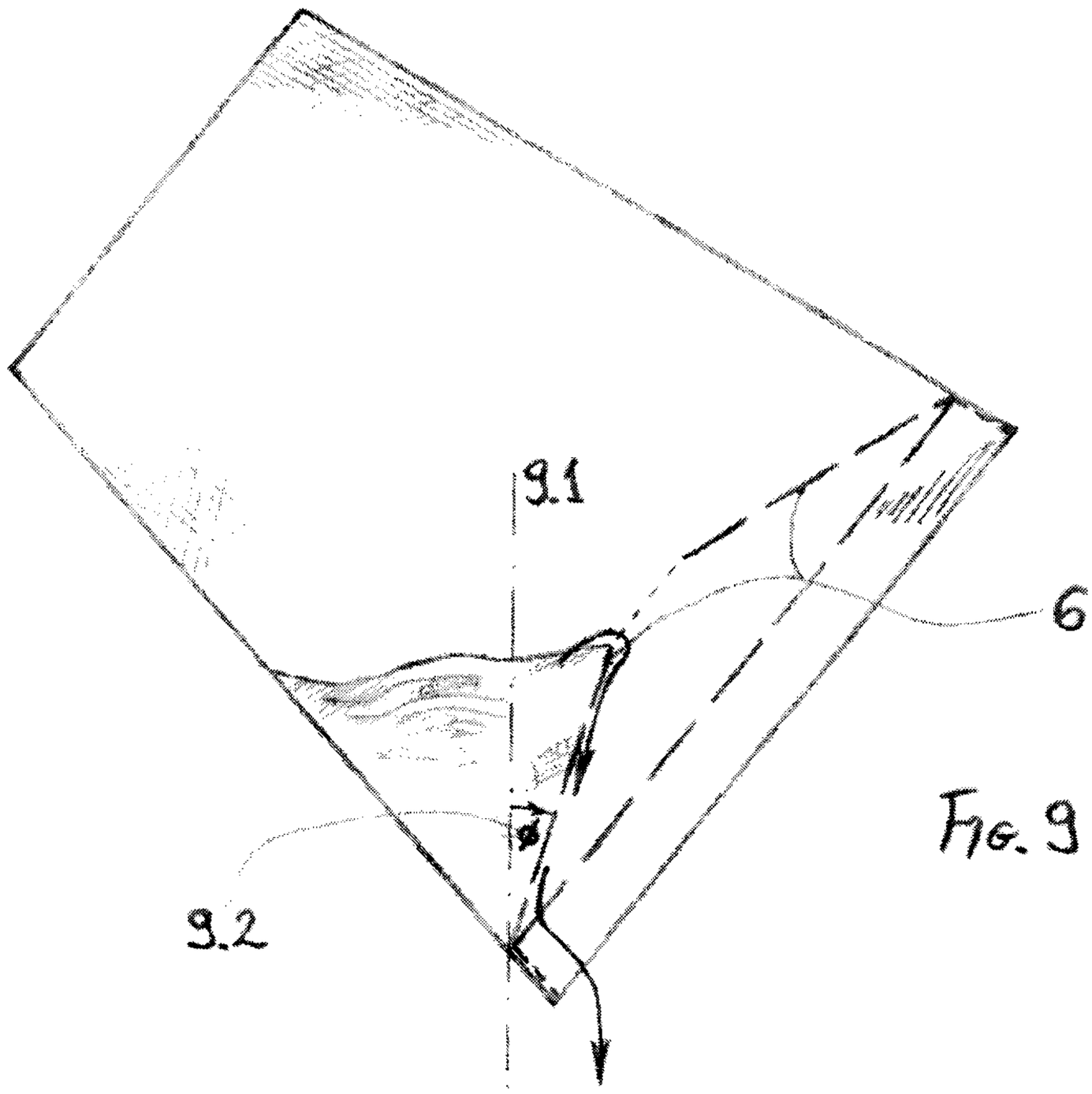

FIG. 9

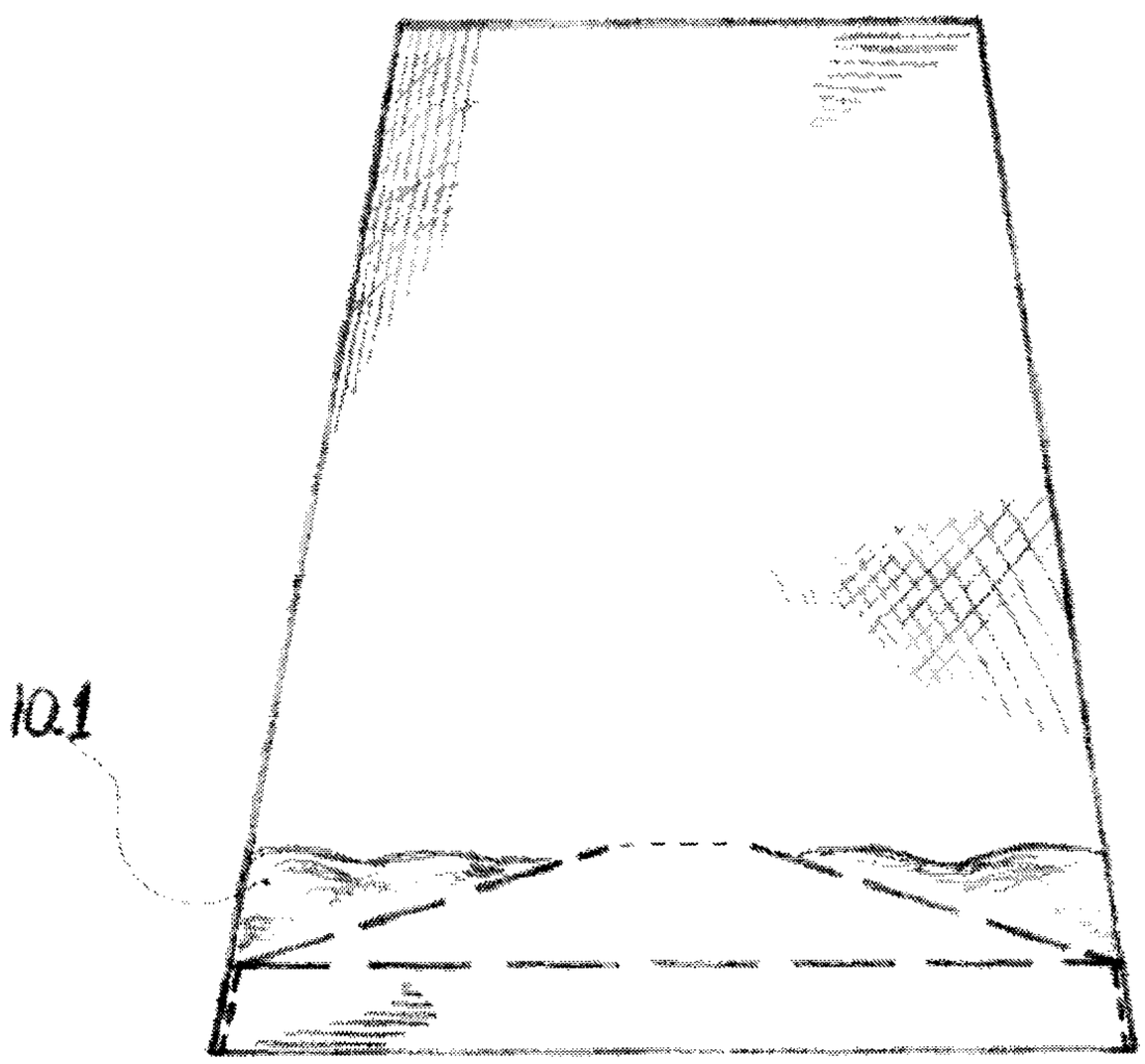

FIG. 10

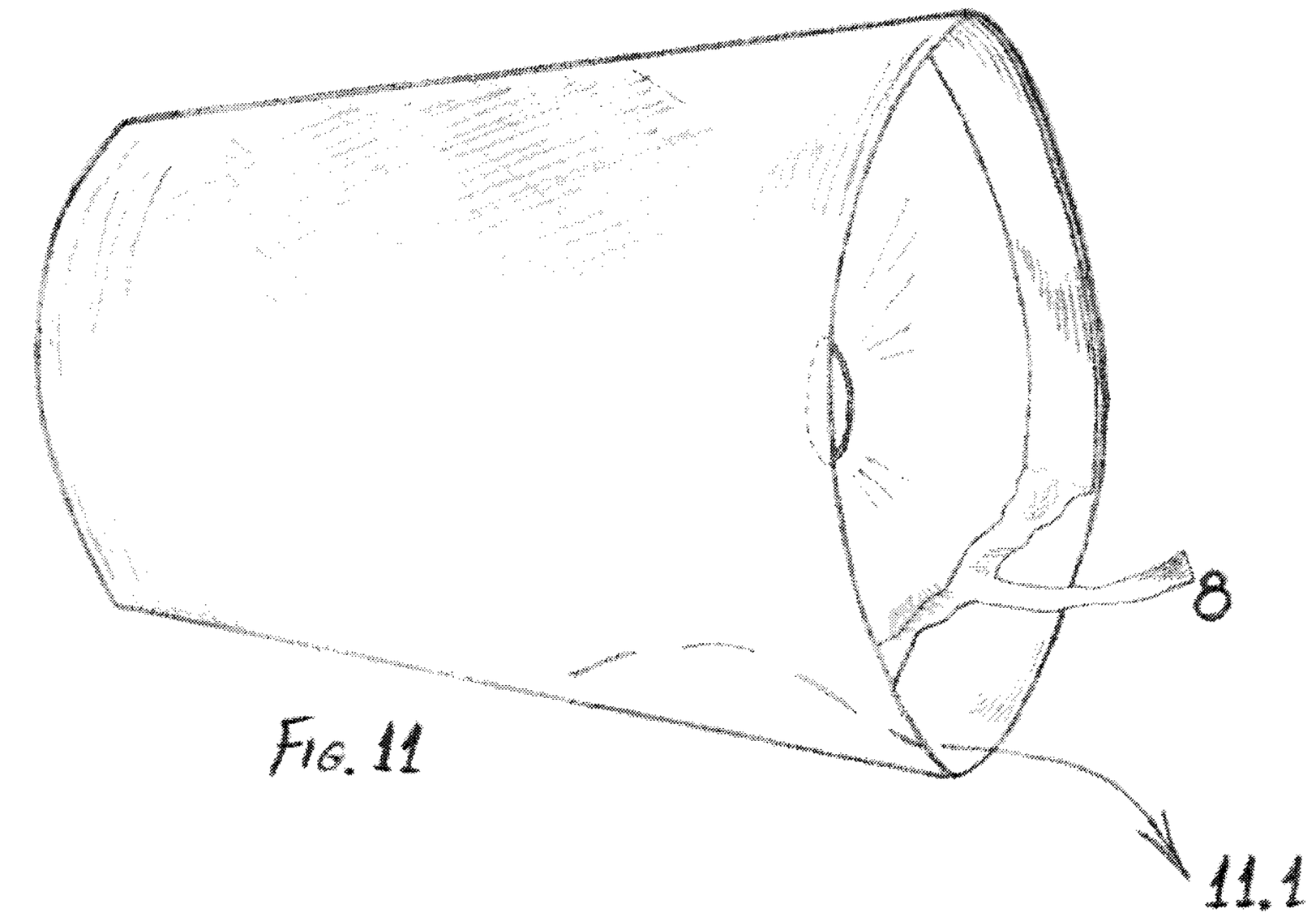

FIG. 11

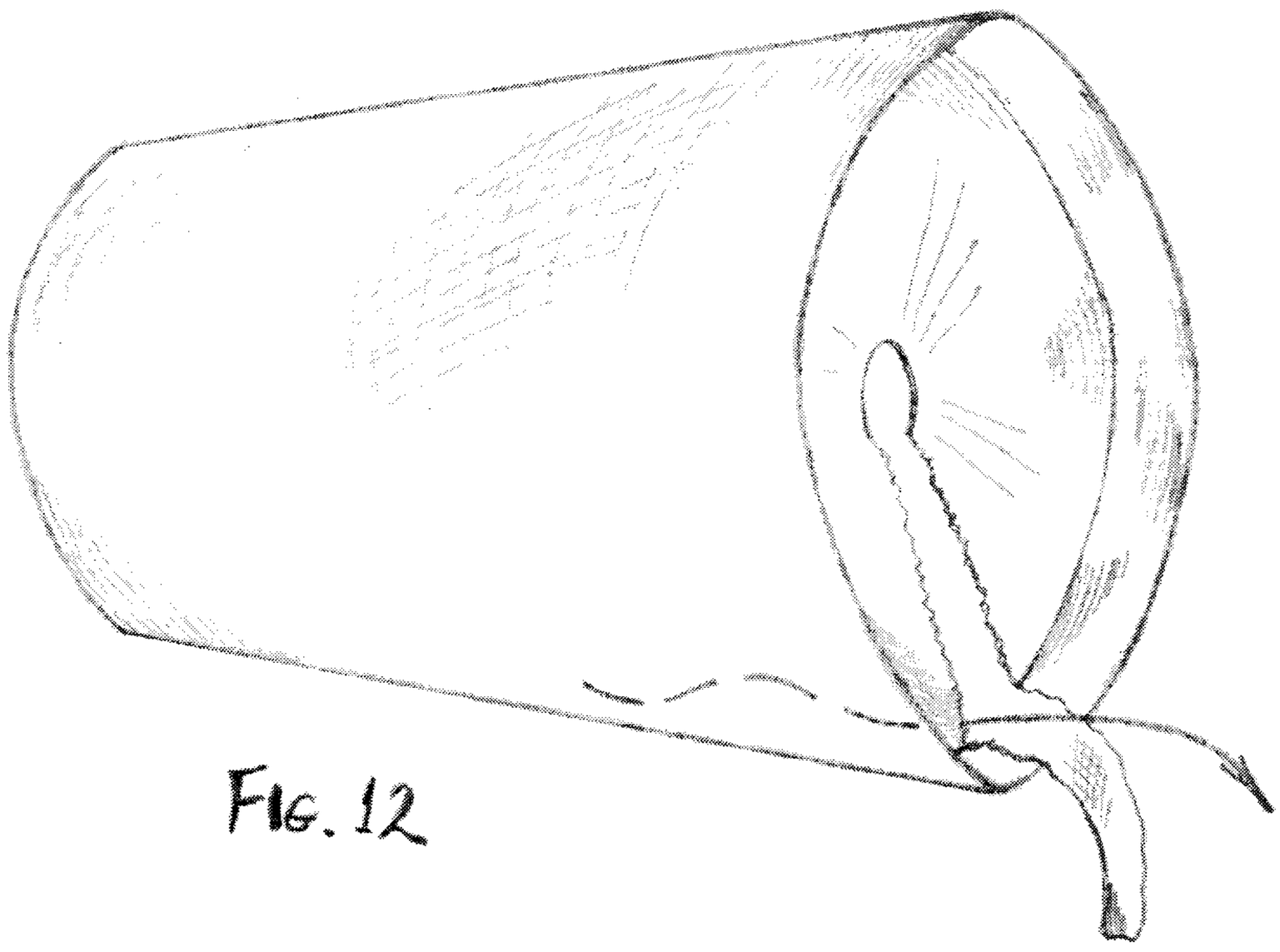

FIG. 12