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(71) Demandeur/Applicant:
AMSEL, HAIM SIMCHA, IL
(72) Inventeur/Inventor:
AMSEL, HAIM SIMCHA, IL
(74) Agent: TEITELBAUM & MACLEAN

(54) Titre : GODET JETABLE RENFERMANT UNE SUBSTANCE, EMBALLE DANS UN EMBALLAGE A EMPILEMENT A L'EPREUVE DE L'OXYGENE ET L'HUMIDITE, IDENTIQUE A L'EMBALLAGE A EMPILEMENT DE GODETS JETABLES NE RENFERMANT PAS DE SUBSTANCE

(54) Title: DISPOSABLE CUP WITH SUBSTANCE INSIDE, PACKED IN A OXYGEN AND HUMIDITY-PROOF STACK PACKAGE, IDENTICAL TO THE STACK PACKAGE OF DISPOSABLE CUPS WITHOUT ANY SUBSTANCE INSIDE

(57) **Abrégé/Abstract:**

The present invention provides a capsule for enclosing a substance on a bottom of a first disposable cup comprising a bottom and a rim deformed from the bottom of the first cup, the capsule comprising: a bottom having a circumference; a wall extending from the circumference; and an opening, wherein the capsule is configured to be accommodated in a space defined by the bottom and the rim of a second disposable cup inserted inside the first disposable cup. The capsule may further comprise at least one handle and at least one inner wall. Furthermore the present invention provides a method for packaging a plurality of disposable cup, capsules and substance in a manner that keeps the substance fresh for an extended period of time.



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(72) Inventor; and

(71) Applicant : AMSEL, Haim, Simcha [CA/IL]; c/o Sorek, 1/7 Eli Cohen St., 2231501 Naharia (IL).

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(54) Title: A CAPSULE FOR STORING A SUBSTANCE IN A DISPOSABLE CUP AND USES THEREOF

(57) Abstract: The present invention provides a capsule for enclosing a substance on a bottom of a first disposable cup comprising a bottom and a rim deformed from the bottom of the first cup, the capsule comprising: a bottom having a circumference; a wall extending from the circumference; and an opening, wherein the capsule is configured to be accommodated in a space defined by the bottom and the rim of a second disposable cup inserted inside the first disposable cup. The capsule may further comprise at least one handle and at least one inner wall. Furthermore the present invention provides a method for packaging a plurality of disposable cup, capsules and substance in a manner that keeps the substance fresh for an extended period of time.

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**DISPOSABLE CUP WITH SUBSTANCE INSIDE, PACKED IN A OXYGEN AND
HUMIDITY-PROOF STACK PACKAGE, IDENTICAL TO THE STACK PACKAGE
OF DISPOSABLE CUPS WITHOUT ANY SUBSTANCE INSIDE**

FIELD OF THE INVENTION

In a disposable cup there is an individual serving of a substance covered with a lid. The lid is designed in a way that enables inserting an additional disposable cup into the first cup, so that the additional cup reaches the bottom of the preceding cup in the same way it could have reached its bottom without the substance covered with a lid. The design also allows packing an amount of disposable cups placed one inside the other in a stack in a way that ensures proofness against oxygen and humidity. The size of such package will be similar to the same amount of disposable paper cups without a substance covered with a lid placed on their bottom and packed one inside the other in a stack.

BACKGROUND OF THE INVENTION

We will refer for example to a personal portion of coffee. In order to drink a cup of coffee, preparations are required, which might be cumbersome and a nuisance to the consumer. Therefore people look for cheap, convenient, fast and clean solutions and if they have the possibility to buy a sleeve of disposable cups, having at their bottom a personal ready portion of coffee and they will only have to remove the lid and add hot water, they will enjoy from a cheap, convenient, fast and clean solution.

Needless to say, that the consumers shall obtain all the above without giving up on the coffee's quality and aroma and without being troubled by the usage manner and cost of the product.

Indeed, I found out that various ideas were already filed as patents for a personal portion at a disposable cup but all of them have substantial disadvantages which were not resolved, such as the need to give up on the coffee's quality and aroma and/or ideas that cause significant inconvenience to the users and/or ideas that do not allow to pack them in a sleeve package identical to the disposable cups sleeve package without personal portion. This disadvantage significantly affects in a negative way both the convenience of the cups' purchase and storage and adds considerable costs to the product, as shall be detailed below, and therefore they prevent from many populations the possibility to use this product, thus it is not a product available to everybody.

Following are details of examples from products registered as patent and an explanation of their significant disadvantages:

5 For example, United States patent application No. 2006/0096462 A1 discloses a disposable cup having a floor to which there is affixed a cake of water-soluble flavoursome material to dissolve when water is added to the cup. The water-soluble flavoursome material that is affixed to the floor of the disposable cup is not covered and therefore vulnerable to exposure to oxygen and moisture that adversely affect the freshness of the water-soluble
10 flavoursome material. Furthermore, the water-soluble flavoursome material undergoes artificial treatments in order to solidify it to form a cake and to affix it to the floor of the disposable cup. This may prevent usage of this disposable cup by some potential consumers, for example those who avoid consuming artificially-treated beverages and foods. In addition, this disposable cup may not be marketed in countries where there are regulations preventing
15 the marketing of unpacked beverages and foods, since the cake of water-soluble flavoursome material is not covered or packaged. Furthermore, covering the water-soluble flavoursome material with a cover inside the cup would not allow stacking of a plurality of such disposable cups in a maximal compactness, for example in a manner similar to the stacking of disposable cups without a material and/or a cover inside them. This may increase the space
20 these cups occupy during storage and delivery, and thereby influence the costs of delivery which eventually increase the price of the product.

Another approach which does not involve solidification of the beverage or food substance, but rather involves covering the substance with a cover permeable to liquid, is
25 disclosed for example in the following publications. Chinese utility model No. 2564505 Y discloses a paper tea cup with an interlayer on the bottom of the main body of the paper tea cup. Dry powders of a soluble beverage, such as tea, coffee and milk powders, can be appropriately placed in the interlayer, and the interlayer is made of strong filterable material including non-woven fabrics. A beverage can be instantly brewed in the paper tea cup
30 without having to add additional beverage, thus bringing more convenience and practicality to the usage of a paper tea cup. In addition, Chinese utility model No. 200981738 Y discloses a disposable water cup, wherein the bottom of a cup body is placed with tea, the top of the tea is provided with a layer of filter paper which is ventilating and permeable, and the periphery of the filter paper is fixed on the cup wall near the bottom of the cup. The tea can be replaced

by other edible infusing things, such as coffee, milk powder, fruit juice powder and so on. These approaches involve the coverage of the substance on the bottom of the disposable cup with a cover permeable to liquid. During the preparation and consumption of the beverage the cover remains in the disposable cup – a characteristic that may prevent the usage of this type of product by potential consumers, for example those who may be concerned about the possibility that the cover may be released from the bottom of the disposable cup during consumption of the beverage. Furthermore, since the cover is permeable to liquid it does not block the passage of oxygen and moisture that might adversely affect the freshness of the material that is stored in the disposable cup. In addition, the presence of the cover in the disposable cup does not allow a compact stacking of a plurality of such disposable cups, as discussed above.

A solution for the issue of the presence of a cover in the disposable cup that covers the beverage or food substance and still remains in the disposable cup during consumption of the beverage or food, is provided for example by Chinese utility model No. 2687065, which discloses a paper cup and a charging interlayer positioned in the paper cup in which a material for the preparation of a beverage, such as instant coffee, powdered milk, malted milk and tea, is stored. The charging interlayer is made of an edible starch paper. Therefore, when water is added to the cup, the charging interlayer dissolves and allows mixing of the beverage material with the water. The presence of an edible starch paper in the paper cup and its consumption by the user after being dissolved in the beverage prepared in the paper cup, may prevent the usage of this type of product by potential consumers, for example those who may be concerned about consuming edible paper. Furthermore, starch paper does not block the passage of oxygen and moisture that might adversely affect the freshness of the material that is stored in the paper cup, and the presence of the charging interlayer in the paper cup does not allow a compact stacking of a plurality of such paper cups, as discussed above.

Another approach that is commercially available, is a capsule attached to a disposable cup, the capsule comprises a cover, and a beverage or food substance is stored in the capsule. Before usage, the cover of the capsule is removed, and a liquid is poured into the disposable cup. Similarly, Chinese utility model No. 2606080 Y discloses a cup comprising a cup body, a cup bottom, and a chamber that is formed between the cup body and the cup bottom, and a support frame is arranged at the place which is around the chamber and clings to the inner wall of the chamber, wherein a seal membrane is covered upon the support frame; the

chamber positioned on the lower part of the cup is filled with a quantitative instant drink, such as coffee, powdered milk, fruit powder, instant tea and composite instant drink. Before usage, the seal membrane is teared off and water is poured into the cup. Even though this approach may solve the problem of avoiding exposure of the substance to oxygen and moisture if an appropriate seal membrane is used, it still does not address the issue of hesitation of using this product by potential consumers due to the presence of a capsule or a chamber in the beverage or food dose during consumption, and the inability to compactly stack a plurality of disposable cups harboring a capsule or chamber in them, as discussed in detail above.

Thus, there is a need for a disposable cup containing a substance for the preparation of a beverage or food dose that allows an easy, fast and convenient preparation of the beverage or food dose, keeps the freshness of the substance for an extended period of time, and further allows stacking of a plurality of disposable cups that contain the substance in a stack, in maximal compactness, for example in a manner similar to the stacking of disposable cups without a substance inside them. The currently available solutions, demonstrated in the aforementioned publications, do not address this need.

SUMMARY OF THE INVENTION

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present invention, suitable methods and materials are described below. In case of conflict, the patent specification, including definitions, will control. In addition, the materials, methods, and examples are illustrative only and not intended to be limiting.

According to one aspect of the present invention, there is provided a capsule for enclosing a substance on a bottom of a first disposable cup comprising a bottom and a rim deformed from the bottom of the first cup, the capsule comprising: a bottom having a circumference; a wall extending from the circumference; and an opening, wherein the capsule

is configured to be accommodated in a space defined by the bottom and the rim of a second disposable cup inserted inside the first disposable cup.

According to one embodiment, the capsule further comprises a margin extending
5 outwards from an edge of the wall.

According to another embodiment, the capsule further comprises at least one handle attached to the wall.

10 According to yet another embodiment, the capsule further comprises at least one handle attached to the margin.

According to still another embodiment, at least part of the margin is configured to be accommodated in a slot in the lower part of the first disposable cup.

15

According to yet another embodiment, the slot in the first disposable cup is substantially 1 mm deep.

20 According to a further embodiment, the capsule further comprises a slot near an edge of the wall, wherein the capsule's slot is configured to accommodate a protrusion along the wall of the first disposable cup substantially near a bottom of the first disposable cup.

According to yet a further embodiment, the at least one handle is hollow.

25 According to still a further embodiment, the capsule further comprises at least one inner wall which divides the capsule to at least two sub-compartments.

30 According to an additional embodiment, the capsule further comprises a first compartment and a second compartment, wherein the first compartment is configured to face the bottom of a disposable cup in which the capsule is placed, and the second compartment is configured to face an inner space of the disposable cup.

According to yet an additional embodiment, the second compartment is covered with a cover.

According to still an additional embodiment, the cover is made of an oxygen and moisture proof material.

5 According to one embodiment, the capsule is further covered with a liquid permeable cover.

According to another aspect of the present invention, there is provided a system comprising a stack of a plurality of disposable cups, comprising a bottom and a rim deformed
10 from the bottom, and a plurality of capsules comprising a bottom having a circumference, a wall extending from the circumference and an opening, wherein each of the capsules is accommodate in a space defined by the bottom and the rim of a disposable cup.

According to one embodiment, the plurality of capsules are configured to avoid
15 exposure of a substance enclosed by the plurality of capsules to oxygen and moisture.

According to a further aspect of the present invention, there is provided a method for stacking a plurality of disposable cups, comprising a bottom and a rim deformed from the bottom, and a plurality of capsules comprising a bottom having a circumference, a wall
20 extending from the circumference and an opening, and a substance enclosed by the capsules, the method for stacking comprising: positioning a disposable cup with the bottom and rim pointing upwards; providing a capsule with the opening pointing upwards in a space formed by the bottom and rim of the disposable cup; providing a substance into the capsule; covering
25 the capsule with another disposable cup with the bottom and rim pointing upwards; repeating the previous steps from the step of providing a capsule with the opening pointing upwards in a space formed by the bottom and rim of the disposable cup, until a stack with a desired number of disposable cups, capsules and substance is formed.

According to an additional aspect of the present invention, there is provided a method
30 for keeping the freshness for an extended period of time of a substance packaged in a stack of a plurality of disposable cups, comprising a bottom and a rim deformed from the bottom, and a plurality of capsules comprising a bottom having a circumference, a wall extending from the circumference and an opening, wherein each of the capsules is accommodate in a space

defined by the bottom and the rim of a disposable cup, the method for keeping the freshness comprises: packaging the stack in a package made of an oxygen and moisture proof material.

According to one embodiment, the method for keeping the freshness for an extended
5 period of time of a substance packaged in a stack of a plurality of disposable cups further comprises applying an inert gas into the package.

According to another embodiment, the inert gas is nitrogen.

10 According to yet another embodiment, the method for keeping the freshness for an extended period of time of a substance packaged in a stack of a plurality of disposable cups further comprises creating a negative pressure in the package.

15

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments are herein described, by way of example only, with reference to the accompanying drawings. With specific reference now to the drawings in detail, it is stressed
20 that the particulars shown are by way of example and for purposes of illustrative discussion of the preferred embodiments, and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the embodiments. In this regard, no attempt is made to show structural details in more detail than is necessary for a fundamental understanding, the description taken with the
25 drawings making apparent to those skilled in the art how several forms may be embodied in practice.

In the drawings:

- Fig. 1 schematically illustrates, according to an exemplary embodiment, a cross-section
30 view of a prior art disposable cup adapted to contain warm or cold beverages or foods.
- Fig. 2A schematically illustrates, according to an exemplary embodiment, a cross-section view of a disposable cup and a capsule enclosing a substance on the bottom of the disposable cup.

- Fig. 2B schematically illustrates, according to an exemplary embodiment, a cross-section view of a capsule further comprising at least one handle, placed on a bottom of a disposable cup.
- Fig. 3 schematically illustrates, according to an exemplary embodiment, a cross-section
5 view of a system comprising a stack of a plurality of disposable cups.
- Fig. 4 schematically illustrates, according to an exemplary embodiment, a cross-section view of a capsule comprising a slot near the edge of the wall of the capsule, positioned on a bottom of a disposable cup comprising a protrusion along the wall of the disposable cup near the bottom of the disposable cup.
- 10 - Fig. 5 schematically illustrates, according to an exemplary embodiment, a cross-section view of a capsule positioned on a bottom of a disposable cup, which comprises a slot in the lower part of the disposable cup's wall, which is configured to accommodate at least part of the margin of the capsule.
- Fig. 6 schematically illustrates, according to an exemplary embodiment, a cross-section
15 view of a capsule comprising at least one hollow handle.
- Fig. 7 schematically illustrates, according to an exemplary embodiment, a cross-section view of a capsule comprising two inner walls that divide the capsule to three sub-compartments.
- Fig. 8 schematically illustrates, according to an exemplary embodiment, a cross-section
20 view of a capsule comprising a first compartment configured to face a bottom of a disposable cup and a second compartment facing an inner space of the disposable cup, while the first compartment further comprises an inner wall which divides the first compartment to two sub-compartments.
- Fig. 9 schematically illustrates, according to an exemplary embodiment, a cross-section
25 view of a capsule covered with a liquid permeable cover.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Before explaining at least one embodiment in detail, it is to be understood that the
30 invention is not limited in its application to the details of construction and the arrangement of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments or of being practiced or carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and should not be regarded as limiting. In discussion of the

various figures described herein below, like numbers refer to like parts. The drawings are generally not to scale.

For clarity, non-essential elements were omitted from some of the drawings.

5 One aim of the present invention is to provide a capsule configured to enclose a substance placed on a bottom of a disposable cup.

Another aim of the present invention is to provide a capsule configured to enclose a substance placed on a bottom of a disposable cup that enables compact stacking of a plurality
10 of disposable cups accommodating the capsule in a manner similar to the stacking of empty disposable cups.

Yet another aim of the present invention is to provide a capsule configured to enclose a substance placed on a bottom of a disposable cup that enables keeping the freshness of the
15 substance for a substantially extended period of time.

The present invention provides an open capsule that is suitable for usage with typical disposable cups which are adapted to contain warm or cold beverages or foods. Fig. 1 schematically illustrates, according to an exemplary embodiment, a cross-section view of a prior art disposable cup 100 adapted to contain warm or cold beverages or foods, for example
20 a disposable cup 100 made of paper. A disposable cup 100 comprises a cup wall 110, essentially, but not necessarily, in the form of a truncated cone, and a bottom 120, for example in the form of a disk. The inner surface of the wall 110 and the bottom 120 of the disposable cup 100 are typically coated with a thin layer of a waterproof material (not shown), for example polyethylene, configured to avoid leakage of liquid through the wall 110
25 and bottom 120 of the disposable cup 100. In addition, the bottom 120 is deformed to provide a rim 130, configured to provide stability to the disposable cup 100 when it is standing on a surface. According to some embodiments, the height of the rim 130 of a disposable cup 100 is in the range of substantially 4-8 mm. The rim 130 and the bottom 120 of the disposable cup 100 both define a space 140 under the bottom 120 of the disposable cup 100.

30 The present invention provides a capsule configured to be accommodated in the space 140 defined by the bottom 120 and the rim 130 of the disposable cup 100.

It should be noted that the disposable cup 100 that is illustrated in Fig. 1 is only an exemplary embodiment of a disposable dish to which the capsule of the present invention fits. The capsule of the present invention is configured to fit any disposable dish known in the art, which comprises a rim deformed from the bottom of the disposable dish, for example but not limited to, a disposable bowl containing instant soup powder, and disposable mug containing dried noodles and sauce powder, and the like. Therefore, for the sake of convenience only, the term "disposable cup" is used throughout the description and claims of the present application. However, it should be appreciated that the meaning of the term "disposable cup" refers to any disposable dish having a rim deformed from the bottom of the disposable dish, as illustrated in Fig. 1.

Fig. 2A schematically illustrates, according to an exemplary embodiment, a cross-section view of a disposable cup 100 and a capsule 1 enclosing a substance 500 on the bottom 120 of the disposable cup 100. The substance 500 is any substance known in the art for the preparation of a beverage or food dose, for example a solid substance, a powdered substance and a liquid substance. Example of such a substance 500 include, but not limited to, coffee powder, chopped and dried tea leaves, instant soup powder, dried noodles, instant potato puree powder and the like. According to one embodiment, the capsule 1 comprises a bottom 10 having a circumference (not shown), a wall 20 and an opening 30.

Fig. 3 schematically illustrates, according to an exemplary embodiment, a cross-section view of a system 200 comprising a stack of a plurality of disposable cups 100, where a capsule 1 is accommodated in each space 140 defined by a bottom 120 and a rim 130 of each one of the disposable cups 100. As illustrated in Fig. 3, the capsules 1 allow compact stacking of the plurality of disposable cups 100 in a manner similar to the stacking of a plurality of disposable cups 100 without the capsules 1.

According to one embodiment, the structure and diameter of the bottom 10 of the capsule 1 is similar to the structure and diameter of the bottom 120 of the disposable cup 100, and the wall 20 of the capsule 1 has a structure and height similar to the structure and height of the rim 130 of the disposable cup 100. According to another embodiment, the diameter of the bottom 10 of the capsule 1 is somewhat shorter than the diameter of the bottom 120 of the disposable cup 100 in order to facilitate insertion of the capsule 1 into the space 140 defined by the bottom 120 and rim 130 of the disposable cup 100. For example, the diameter of the

bottom 10 of the capsule 1 is substantially 1 mm shorter than the diameter of the bottom 120 of the disposable cup 100. According to yet another embodiment, the height of the wall 20 of the capsule 1 is lower than the height of the rim 130 of the disposable cup 100.

5 As may be appreciated from Fig. 3, when a capsule 1 is accommodated in the space 140 defined by the bottom 120 and rim 130 of a disposable cup 100, an inner surface of a bottom 120 of a disposable cup 100 serves as a cover for the capsule 1 with which it is in contact. Thus, a substance 500 that is enclosed by the capsules 1 in the stack of a plurality of disposable cups 100 is well packaged in a manner that does not expose the substance 500 to
10 oxygen and moisture, thus extending the shelf life of the substance 500, or in other words – keeps the substance 500 fresh for an extended period of time.

It should be noted that keeping the substance 500 fresh for an extended period of time means keeping the substance 500 fresh for a period of substantially a year. Any means for
15 eliminating exposure of the substance 500 to oxygen and moisture is under the scope of the present invention, including but not limited to, making the disposable cup 100 and/or the capsule 1 of a material that is oxygen and moisture proof; removal of air from, and creating a negative pressure in, the interior of the capsule 1 that is covered by the bottom 120 of the disposable cup 100 or in a package comprising a stack of a plurality of disposable cups 100
20 and capsules 1 enclosing a substance 500; and providing nitrogen, or any other suitable gas, into the interior of the capsule 1 that is covered by the bottom 120 of the disposable cup 100 or into a package comprising a stack of a plurality of disposable cups 100 and capsules 1 enclosing a substance 500. In addition, occupation of the interior of the capsule 1 that is covered by the bottom 120 of the disposable cup 100 with which it is in contact, with a
25 substance 500 decreases the amount of oxygen and moisture trapped in the interior of the capsule 1, thus also contributing to the freshness of the substance 500 during storage.

Furthermore, it should be noted that all the materials of which the disposable cup 100 and the capsule 1 of the present invention are made of are food grade and heatproof, thus
30 enabling their usage in the storage of beverage and food substances, as well as preparation of cold and hot beverages or food doses.

Returning now to Fig. 2A, according to yet another embodiment, the capsule 1 further comprises a margin 40 extending outwards from the edge of the wall 20 of the capsule 1. In a

stack of disposable cups 100 with capsules 1, as illustrated in Fig. 3, the lower edge of a rim 130 of a disposable cup 100 presses the margin 40 of the capsule 1 with which it comes in contact towards the bottom 120 of the disposable cup 100, and thus seals the interior of the capsule 1 and prevents exposure of a substance 500 enclosed by the capsule 1 to oxygen and moisture. According to still another embodiment, during a packaging process of a plurality of disposable cups 100, capsules 1 and substance 500 in a stack, the margin 40 of the capsule 1 may be adhered to the bottom 120 of the disposable cup 100 with which it is in contact in order to increase and stabilize the sealing of the interior of the capsule 1. The adherence of the capsule's 1 margin 40 to the bottom 120 of the disposable cup 100 may be performed in any method known in the art, for example welding, adhering with a food grade adhesive and the like.

There are several ways to eliminate exposure of a substance present inside the capsule 1 to oxygen and moisture. According to one embodiment, the capsule 1 is made of an oxygen and moisture proof material, for example plastic or aluminum foil. According to another embodiment, the inner surface of the capsule 1 is covered with a layer made of an oxygen and moisture proof material. According to yet another embodiment, the disposable cup 100, or at least the bottom 120 of the disposable cup 100, which serves as a cover of the capsule 1 in a stack of disposable cups 100 and capsules 1, is made of an oxygen and moisture proof material. According to still another embodiment, both surfaces of the bottom 120 and the inner surface of the rim 130 of the disposable cup 100 that face the space 140 in which the capsule 1 is accommodated, is made of an oxygen and moisture proof material, or covered with a layer of an oxygen and moisture proof material. According to a further embodiment, the stack of disposable cups 100 and capsules 1 harboring a substance 500 is packaged with a packaging material that is oxygen and moisture proof, for example an aluminum laminate. According to yet a further embodiment, vacuum, or negative pressure, may be applied in the package of disposable cups 100 and capsules 1 in order to reduce the amount of oxygen and moisture inside the package.

Fig. 2B schematically illustrates, according to an exemplary embodiment, a cross-section view of a capsule 1 further comprising at least one handle 50, placed on a bottom 120 of a disposable cup 100. According to a preferred embodiment, the capsule 1 further comprises at least one handle 50 configured to facilitate removal of the capsule 1 from the disposable cup 100 before pouring a liquid into the disposable cup 100, in order to prepare a

beverage or food dose with a substance 500 that was enclosed by the capsule 1 in the disposable cup 100. According to one embodiment, the at least one handle 50 extends from the edge of the wall 20 of the capsule 1. According to another embodiment, the at least one handle 50 is attached to the edge of the wall 20 of the capsule 1 in a flexible manner, thus enabling folding of the at least one handle 50 relative to the capsule 1. According to another embodiment, the length of the at least one handle 50 is at least similar to the height of a wall 110 of disposable cup 100. According to a preferred embodiment the length of the at least one handle 50 is slightly higher than the height of a wall 110 of a disposable cup 100. According to another preferred embodiment, the length of the at least one handle 50 is higher in a range of substantially 1-2 mm than the height of a wall 110 of a disposable cup 100. Thus, when a capsule 1 is positioned on a bottom 120 of a disposable cup 100, the at least one handle 50 protrudes above the wall 110 of the disposable cup 100 in a manner that facilitates grasping the at least one handle 50 by a user and removing the capsule 1 from the disposable cup 100. According to a further embodiment, the width of the at least one handle 50 is such that it does not interfere with the stacking of a plurality of disposable cups 100 and capsules 1 comprising a handle 50. According to a preferred embodiment, the width of the at least one handle 50 is substantially 0.5 mm, which is slightly lower than the space between disposable cups 100 in a stack of a plurality of disposable cups 100. According to yet a further embodiment, after removal of the capsule 1 from the disposable cup 1 the at least one handle 1 may be used as a stirrer during the preparation of a beverage or food dose in the disposable cup 100. Accordingly, the at least one handle 50, and according to some embodiments also the capsule 1, is made of a food grade and heatproof material.

Fig. 4 schematically illustrates, according to an exemplary embodiment, a cross-section view of a capsule 1 comprising a slot 25 near the edge of the wall 20 of the capsule 1, positioned on a bottom 120 of a disposable cup 100 comprising a protrusion 117 along the wall 110 of the disposable cup 100 near the bottom 120 of the disposable cup 100. According to one embodiment, the slot 25 of the capsule 1 is configured to accommodate the protrusion 117 of the disposable cup 100, thus a further sealing of the interior of the capsule 1 is achieved, as well as stability of the capsule 1 when positioned in the disposable cup 100. According to another embodiment, the protrusion 117 of the disposable cup 100 is removably attached to the wall 110 of the disposable cup 100. Thus, during the packaging process, after enclosing a substance 500 by the capsule 1, the slot 25 of a capsule 1 is adhered to a protrusion 117 of a disposable cup 100, in any manner known in the art, for example welding,

adhering with a food grade adhesive and the like. Thus, before usage, removal of the capsule 1 from the disposable cup 100 causes removal of the protrusion 117 from the wall 110 of the disposable cup 100 while still adhered to the slot 25 of the capsule 1. In this manner the protrusion 117 does not remain in the disposable cup 100 when a beverage or food dose is prepared in the disposable cup 100.

Fig. 5 schematically illustrates, according to an exemplary embodiment, a cross-section view of a capsule 1 positioned on a bottom 120 of a disposable cup 100, which comprises a slot 115 in the lower part of the disposable cup's 100 wall 110, which is configured to accommodate at least part of the margin 40 of the capsule 1. According to one embodiment, the slot 115 is substantially 1 mm deep. According to another embodiment, the diameter of the open side of the capsule 1 together with the margin 40 is slightly longer, for example in substantially 1 mm, than the diameter of the disposable cup 100 where the slot 115 is made. When at least part of the margin 40 of the capsule 1 is inserted in the slot 115, a further sealing of the interior of the capsule 1 is achieved, as well as stability of the capsule 1 when positioned in the disposable cup 100.

Fig. 6 schematically illustrates, according to an exemplary embodiment, a cross-section view of a capsule 1 comprising at least one hollow handle 52. According to this embodiment, the space 55 inside the at least one hollow handle 52 is configured to harbor a substance that may be added to substance 500 enclosed by the capsule 1 during the preparation of a beverage or a food dose in a disposable cup 100. For example, the capsule 1 may enclose an instant soup powder and a hollow handle 52 may contain in its space 55 a spice, like pepper, that the user may add to the soup when prepared in the disposable cup 100.

According to still another embodiment, the capsule comprises at least one inner wall 15 that divides the capsule 1 to at least two sub-compartments 16. Fig. 7 schematically illustrates, according to an exemplary embodiment, a cross-section view of a capsule 1 comprising two inner walls 15 that divide the capsule to three sub-compartments 16. The at least two sub-compartments 16, or three sub-compartments 16 of the capsule 1, as exemplarily illustrated in Fig. 7, are configured to harbor at least two substances 500, or three substances 502, 504 and 506, as exemplarily illustrated in Fig. 7, which are separated from each other, for example coffee powder, sugar and dried milk powder. More particularly, the at least two sub-compartments 16 of the capsule 1 are configured to harbor substances

500 that cannot be mixed together for an extended period of time during the storage period of the disposable cups 100 and the substances 500 inside them, which are enclosed by capsules 1.

5 According to a further embodiment, the capsule 1 comprises a first compartment 60 and a second compartment 70, when the first compartment is configured to face the bottom 120 of a disposable cup 100 in which the capsule 1 is placed, and the second compartment 70 is configured to face an inner space of a disposable cup 100. According to yet a further embodiment, the first compartment 60 and/or the second compartment 70 of the capsule
10 further comprises at least one inner wall that further divides the first compartment 60 and/or the second compartment 70 to at least two sub-compartments. Fig. 8 schematically illustrates, according to an exemplary embodiment, a cross-section view of a capsule 1 comprising a first compartment 60 configured to face a bottom 120 of a disposable cup 100 and a second compartment 70 facing an inner space of the disposable cup 100, while the first compartment
15 60 further comprises an inner wall 65 which divides the first compartment 60 to two sub-compartments 67. Each compartment 60, 70 and sub-compartment 67 is configured to harbor a separate substance 500, 504 and 506 as discussed above. According to an additional embodiment, the second compartment is removably covered with a cover 77, preferably made of an oxygen and moisture proof material, like plastic and aluminum foil, in order to avoid
20 exposure of the at least one substance 506 placed in the second compartment 70 to oxygen and moisture. During usage, the user may decide whether to add the at least one substance 506 stored in the second compartment 70 to the beverage or food dose that is prepared in the disposable cup 100 with the at least one substance 502 and 504 that was enclosed by the first compartment 60 of the capsule 1.

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Fig. 9 schematically illustrates, according to an exemplary embodiment, a cross-section view of a capsule 1 covered with a liquid permeable cover 80. According to one embodiment the capsule 1 which covered with a liquid permeable cover 80 is configured to enclose a substance 500 that is to be extracted with a liquid in a disposable cup 100, for
30 example chopped and dried tea leaves, and allowing removal of the substance 500 from the liquid after the extraction. The liquid permeable cover 80 is made of a material that allows passage of liquid therethrough, for example fabric, porous plastic and the like. During usage, a liquid, for example hot water, is poured into a disposable cup 100 harboring a capsule 1 covered with a liquid permeable cover 80, and a substance 500 enclosed by the capsule 1 is

extracted by the added liquid. Before consuming the extracted beverage the capsule 1 may be removed from the disposable cup 1. If according to some embodiments, the capsule 1 covered with a liquid permeable cover 80 further comprises a handle 50, a user may hold the handle 50 and immerse the capsule 1 several times in a liquid poured into the disposable cup 100 in order to facilitate the extraction of the substance 500 enclosed by the capsule 1. According to an additional embodiment, the liquid permeable cover 80 is attached to the edge of the wall 20 or the margin 40 of the capsule 1, in a manner that keeps the liquid permeable cover 80 attached to the edge of the wall 20 or the margin 40 of the capsule 1 when it comes in contact with a liquid, particularly warm or hot liquid. For example, the liquid permeable cover 80 may be welded, or adhered with a waterproof food grade adhesive to the edge of the wall 20 or to the margin 40 of the capsule 1.

According to one embodiment, a method for stacking a plurality of disposable cups, comprising a bottom and a rim deformed from the bottom, and a plurality of capsules comprising a bottom having a circumference, a wall extending from the circumference and an opening, and a substance enclosed by the capsules, the method for stacking comprising: positioning a disposable cup with the bottom and rim pointing upwards; providing a capsule with the opening pointing upwards in a space formed by the bottom and rim of the disposable cup; providing a substance into the capsule; covering the capsule with another disposable cup with the bottom and rim pointing upwards; repeating the previous steps from the step of providing a capsule with the opening pointing upwards in a space formed by the bottom and rim of the disposable cup, until a stack with a desired number of disposable cups, capsules and substance is formed.

According to another embodiment, a method for keeping the freshness for an extended period of time of a substance packaged in a stack of a plurality of disposable cups, comprising a bottom and a rim deformed from the bottom, and a plurality of capsules comprising a bottom having a circumference, a wall extending from the circumference and an opening, wherein each of the capsules is accommodated in a space defined by the bottom and the rim of a disposable cup, the method for keeping the freshness comprises: packaging the stack in a package made of an oxygen and moisture proof material. According to yet another embodiment, the method further comprises applying an inert gas into the package, for example nitrogen.

According to yet another embodiment, the method for keeping the freshness for an extended period of time of a substance packaged in a stack of a plurality of disposable cups further comprises creating a negative pressure in the package, for example by extracting the air from the package and creating a vacuum in the package.

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It should be noted that packaging a stack of disposable cups harboring a substance, and either applying an inert gas in the package or creating a negative pressure in the package, without using capsules of the present invention is not efficient in term of keeping the substance fresh for an extended period of time, because there is still air entrapped in the space defined by the bottom and rim of a disposable cup. On the other hand, using capsules of the present invention is efficient in terms of keeping the substance fresh for an extended period of time because enclosing the substance with the capsule substantially decreases the amount of air entrapped in the space defined by the bottom and rim of a disposable cup.

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It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable sub combination.

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Although the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is intended to embrace all such alternatives, modifications and variations that fall within the spirit and broad scope of the appended claims.

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CLAIMS

1. A method for inserting a capsule with a substance into a disposable cup, comprising: filling the capsule with the substance to a brim, while a rim of a circular opening of the capsule is left uncovered with the substance, and while the capsule is held with the circular opening up; and bringing the disposable cup down onto the capsule until a bottom of the disposable cup is pressed onto the rim of the capsule thus forming a closed volume for storing the substance therein, while the orientation of the cup is such that its circular opening is down, while an inner diameter of the cup at the bottom equals an outer diameter of the rim of capsule, and while a diameter of the cup at its rim is larger than the inner diameter of the cup at the bottom.
2. The method according to claim 1, wherein the cup further includes a cylindrical space formed by the bottom of the cup and side walls of the cup extending beyond the bottom of the cup in a direction opposite the circular opening of the cup, wherein the cylindrical space ends in a second circular opening, and wherein an inner height and diameter of the cylindrical space equal a height of the capsule and the outer diameter of the capsule, respectively.
3. The method according to claim 1 or 2, wherein the capsule is made of a material impermeable to oxygen and humidity, whereby the substance is impermeably contained in an impermeable volume defined by the capsule in the disposable cup and a capsule in another cup the disposable cup is inserted therein, wherein the other cup has an identical shape to that of the disposable cup and has another capsule mounted at its bottom.
4. The method according to claim 1 or 2, the method further including: tightly attaching the capsule to the bottom by soldering and/or gluing, thereby storing the substance in the closed volume from release, until the capsule is removed for the purpose of using the substance.
5. The method according to claim 1 or 2, the method further including: flaring outwards, by a cylindrical wall of the capsule, at the second side to form a circular ring (annulus), wherein an external diameter of the ring is slightly larger than the inner diameter of the cup at the proximal side, thus forming the closed volume as the capsule is inserted by pressure into the disposable cup until the ring is adjacent to the bottom, thereby storing the substance in the closed volume from release, until the capsule is removed for the purpose of using the substance.
6. The method according to claim 1 or 2, the method further including: keeping a freshness and aroma of the substance for an extended period of time, by means comprising packing two or more disposable cups arranged in a stack, wherein each disposable cup including the substance covered with the capsule.
7. The method according to claim 1 or 2, wherein the capsule further includes a handle for removing the capsule from the cup, wherein the handle is attached to the capsule at its first end and reaches the distal side of the rim at its second end.
8. The method according to claim 7, wherein the handle comprises a hollowed out structure for adding additional substances such as sugar, to the substance contained at the bottom.
9. The method according to claim 1 or 2, wherein the substance is made of dry and/or solid, and/or powder, and/or liquid, and/or gel materials, and/or flavors.

10. The method according to claim 1 or 2, wherein the capsule further includes means for separating the capsule into two or more volumes.
11. The method according to claim 10, wherein a total height including the means for separating the capsule is equal to or smaller than the depth of the cylindrical space.
12. The method according to claim 10 or 11, wherein each volume is fully or partially covered with a liquid-permeable permanent cover or with a removable temporary cover.
13. The product of the method of Claim 1.
14. The product of the method of Claim 2.
15. The product of the method of Claim 3.
16. The product of the method of Claim 4.
17. The product of the method of Claim 5.
18. The product of the method of Claim 6.
19. The product of the method of Claim 7.
20. The product of the method of Claim 8.

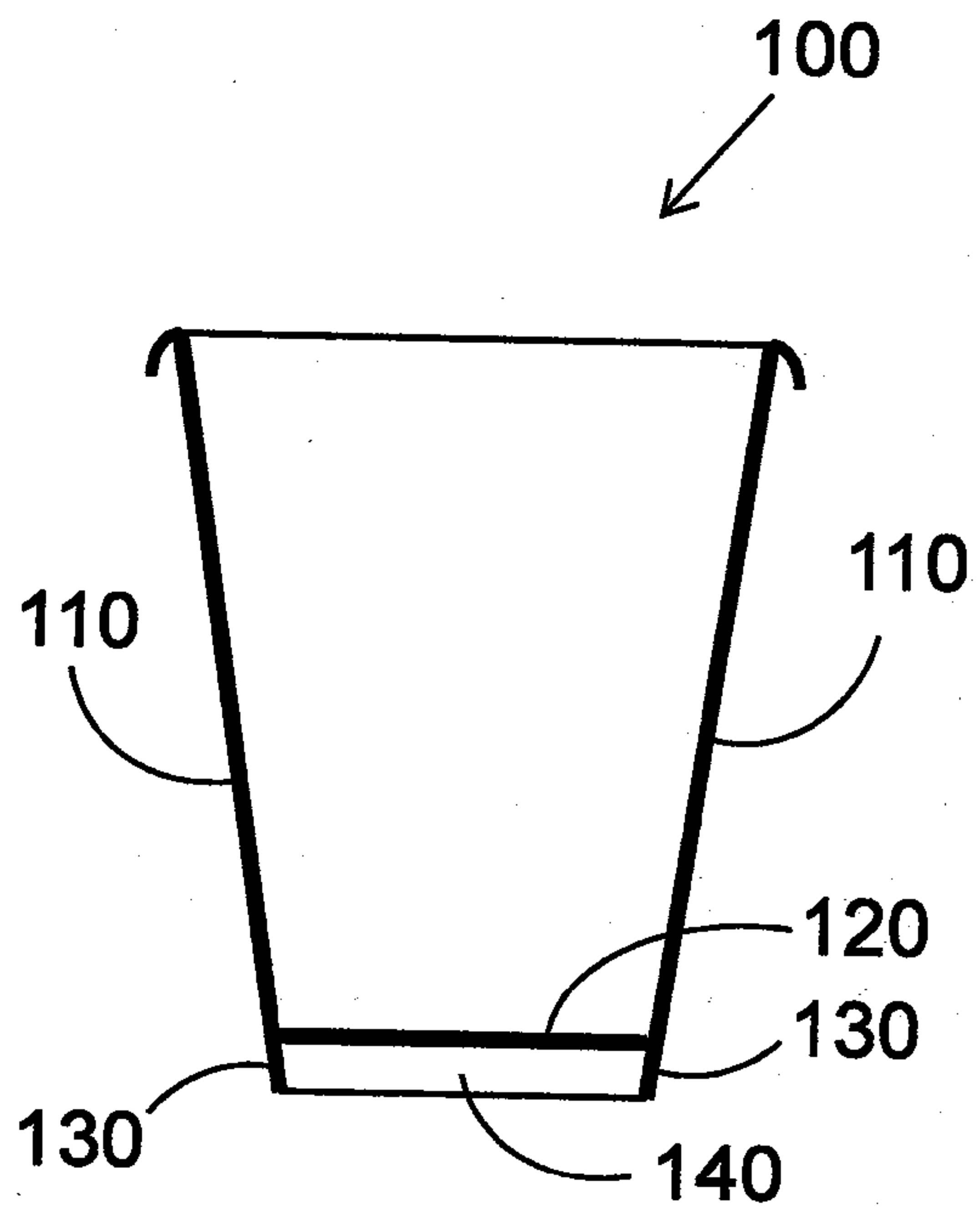


Figure 1 – Prior art

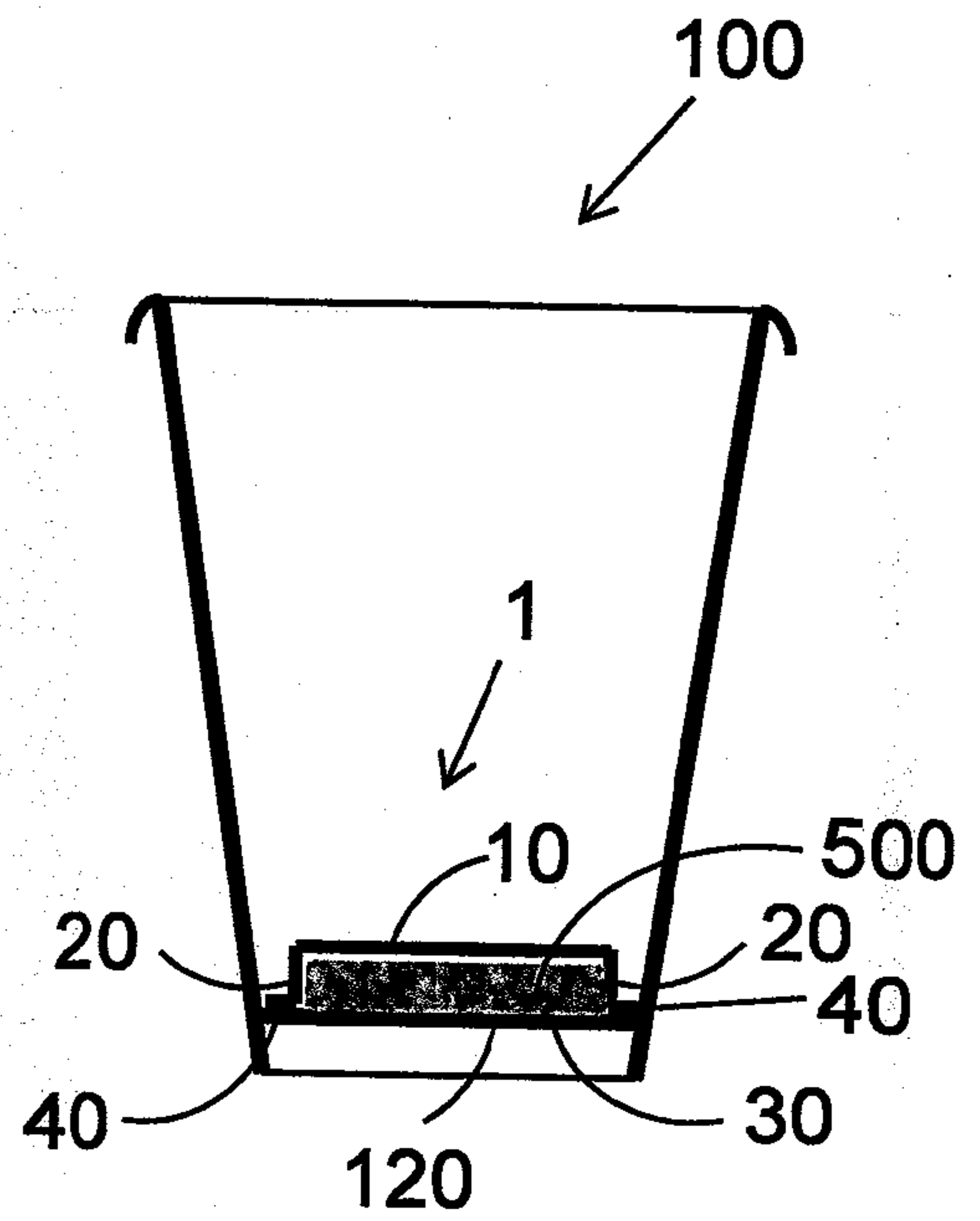


Figure 2A

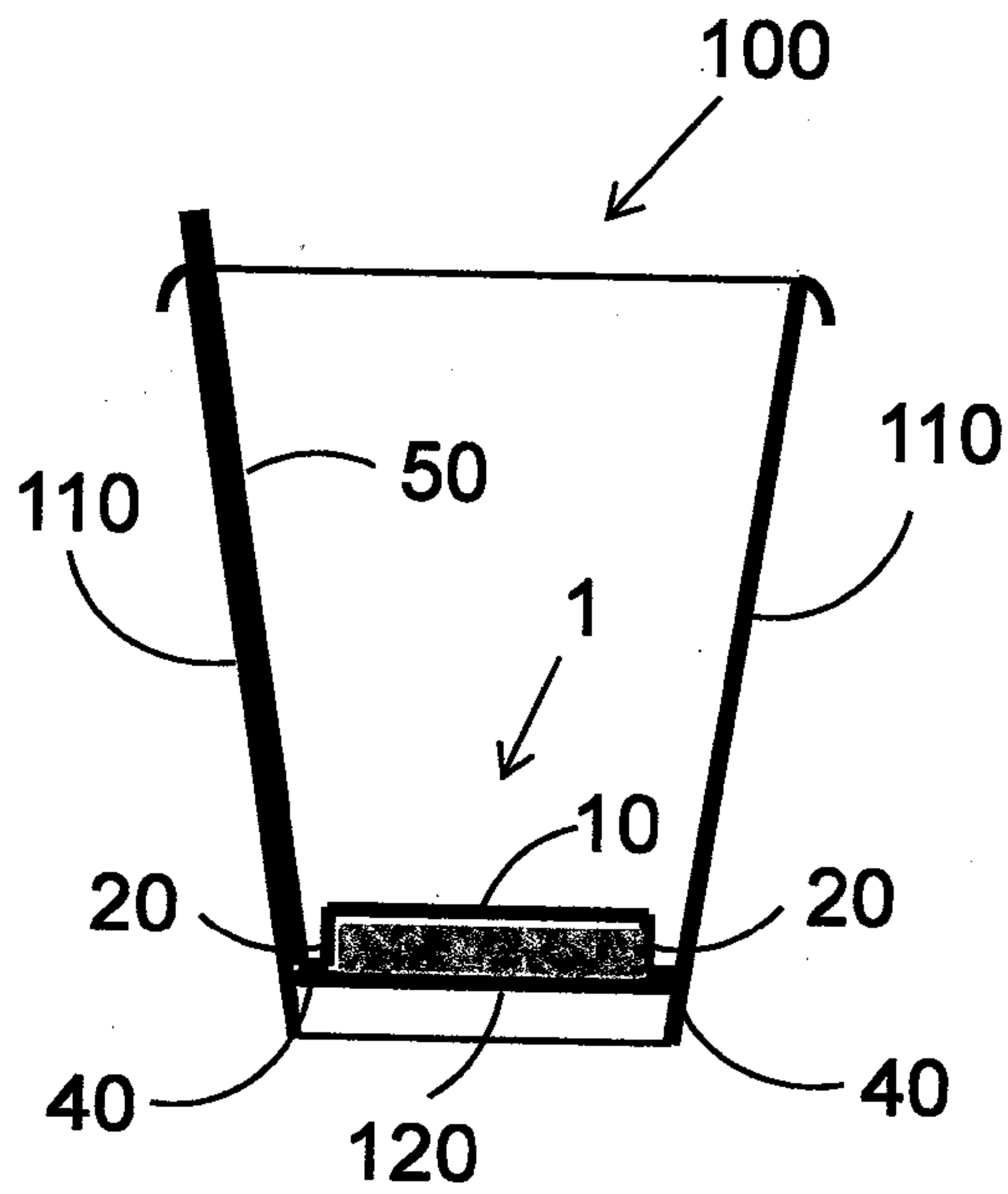


Figure 2B

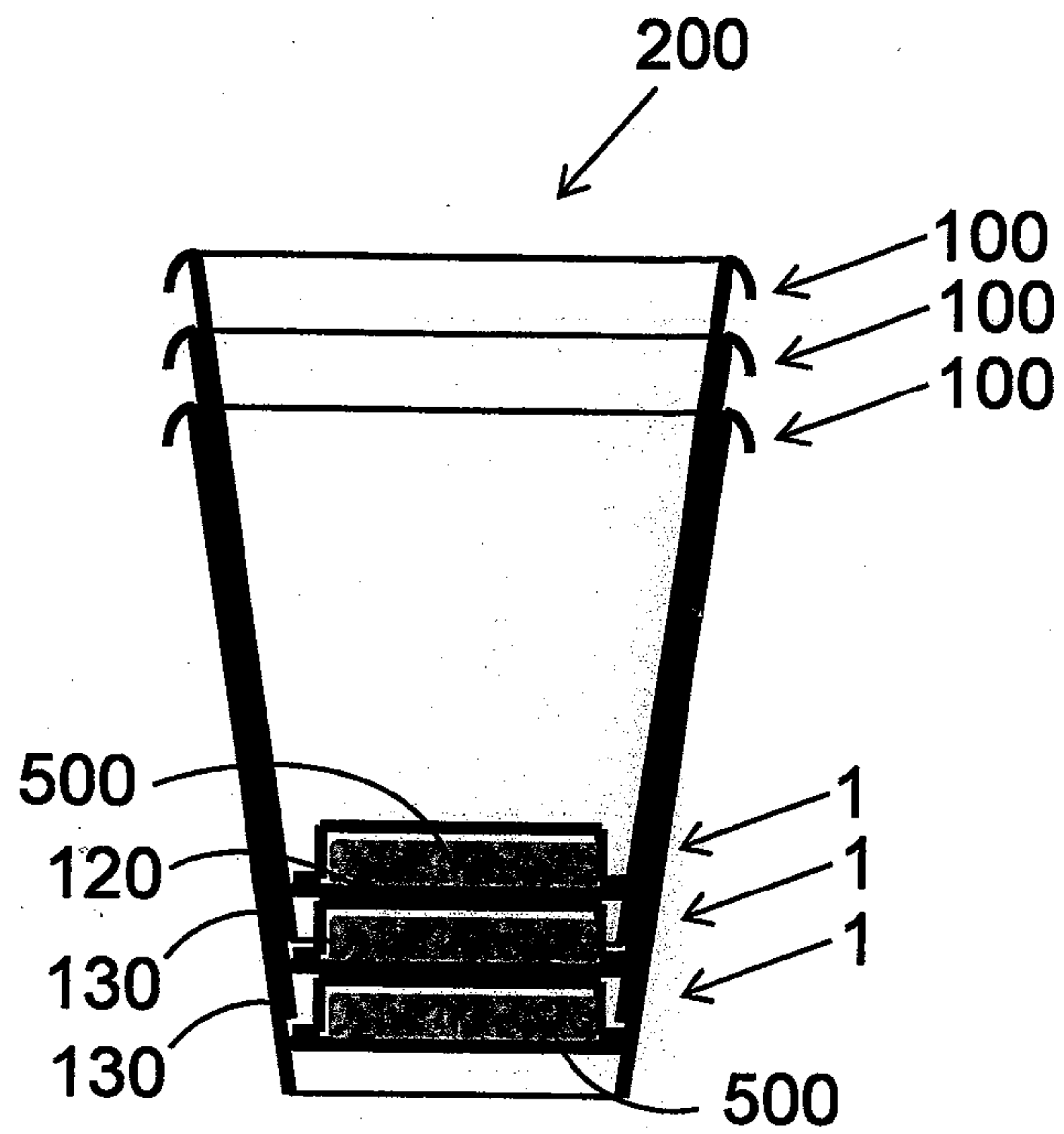


Figure 3

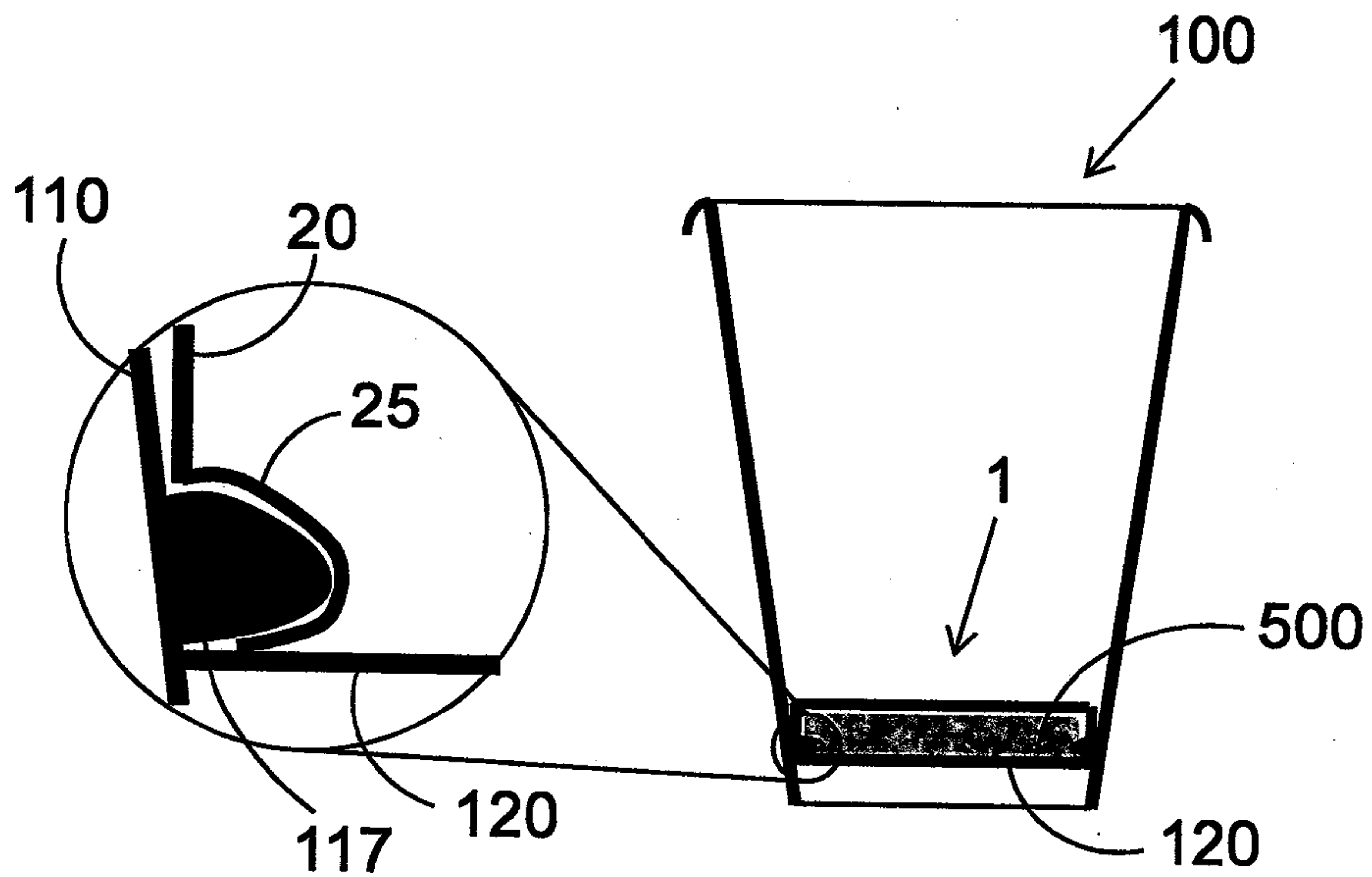


Figure 4

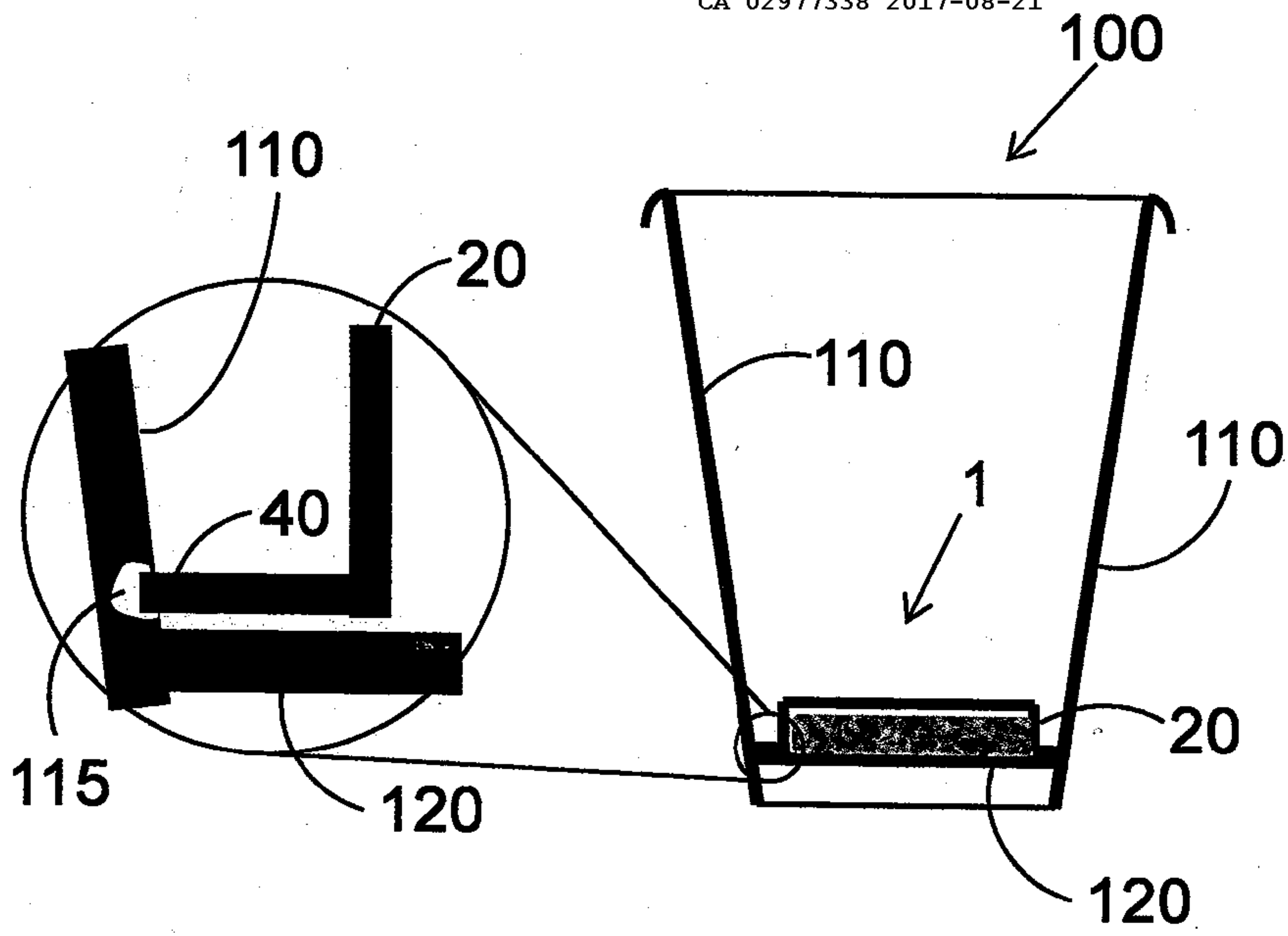


Figure 5

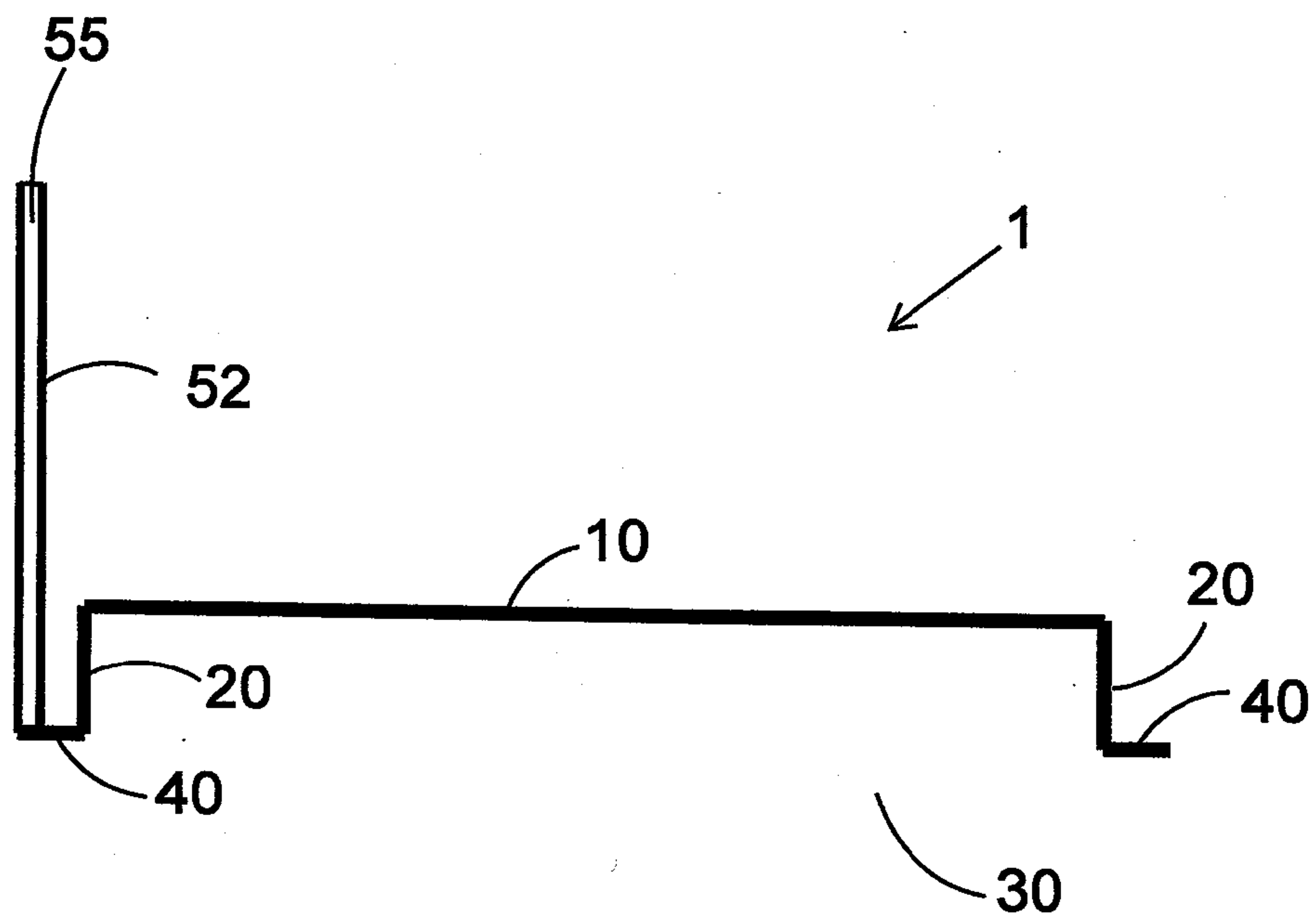


Figure 6

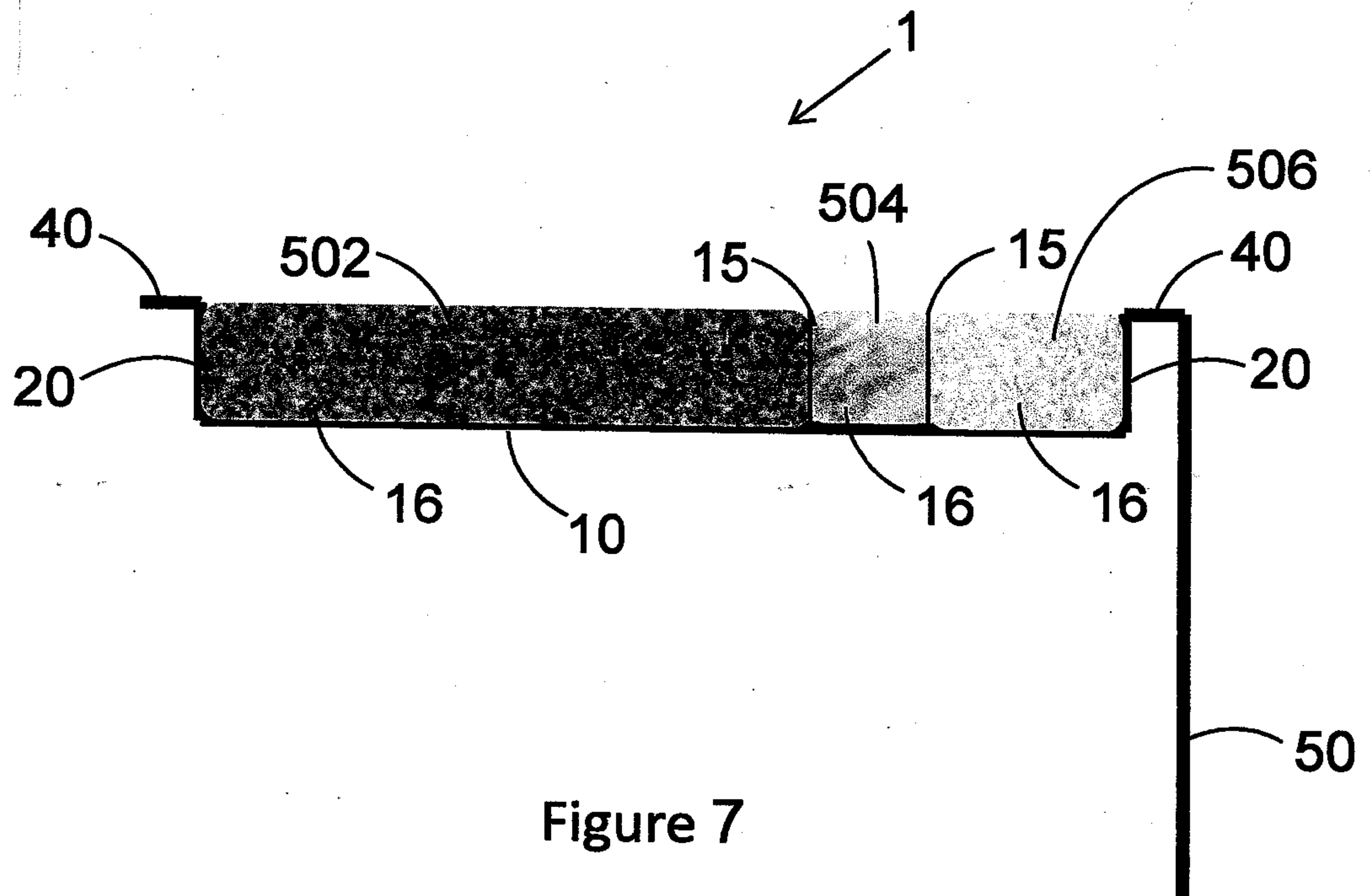


Figure 7

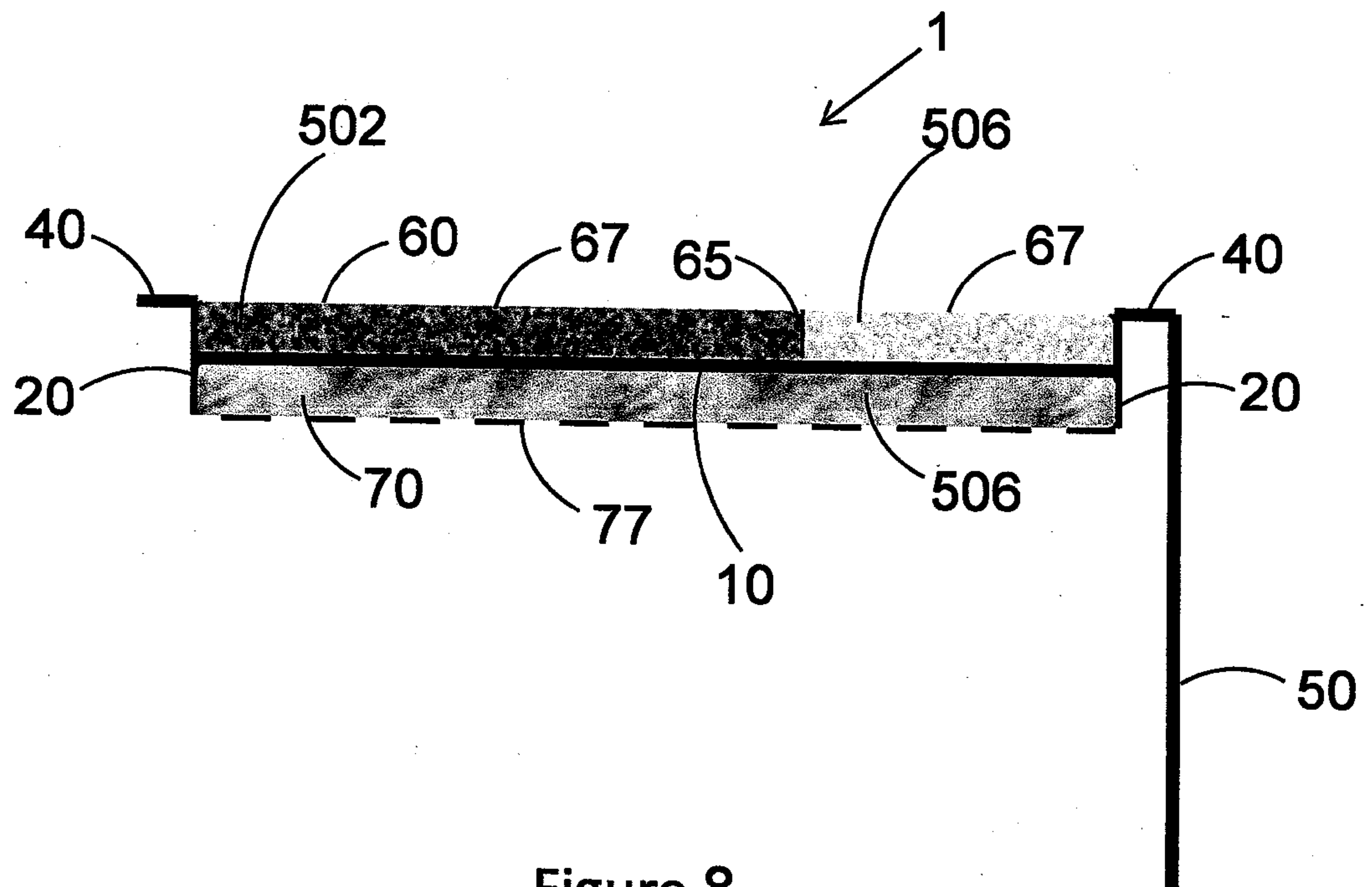


Figure 8

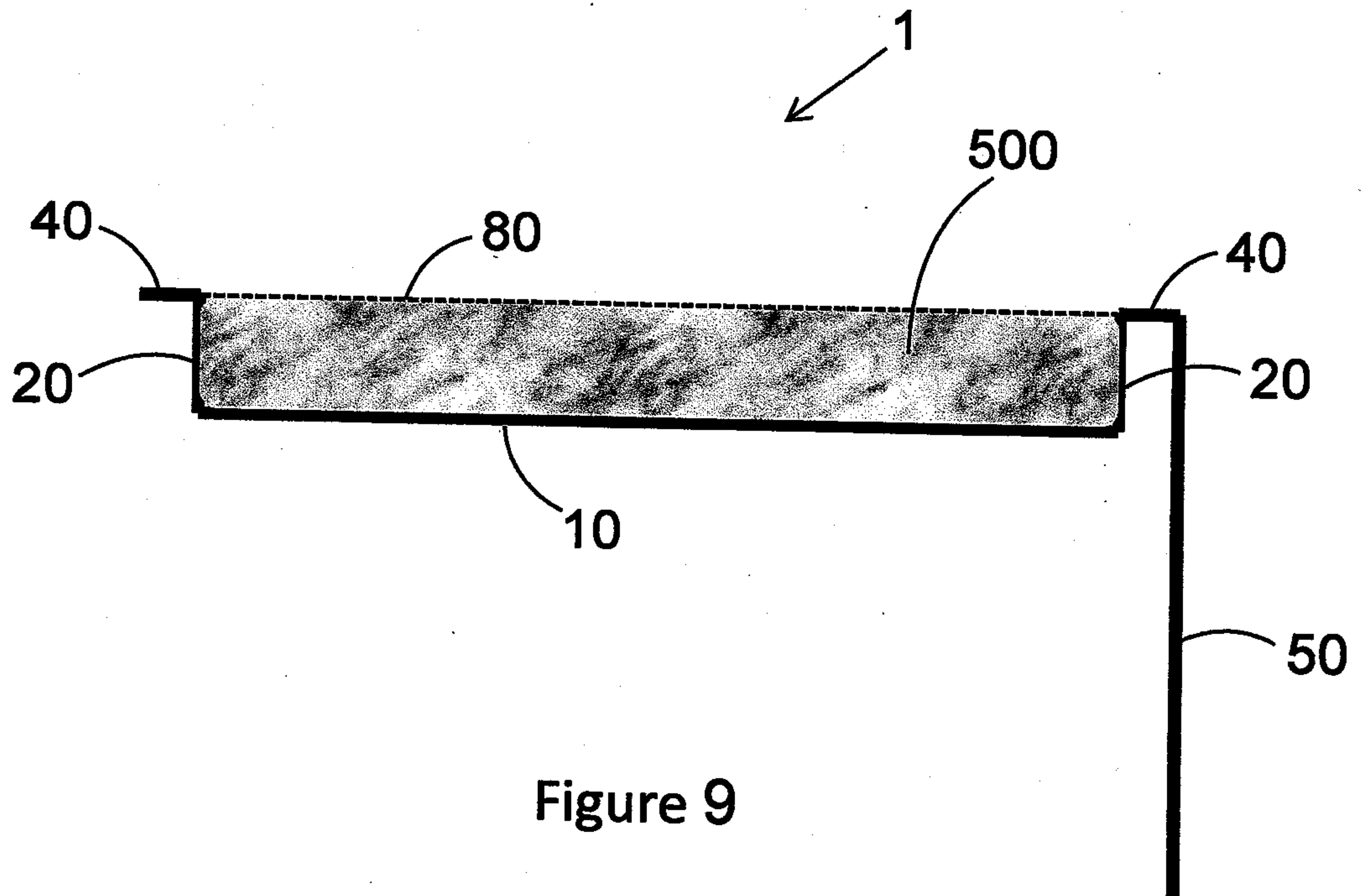


Figure 9