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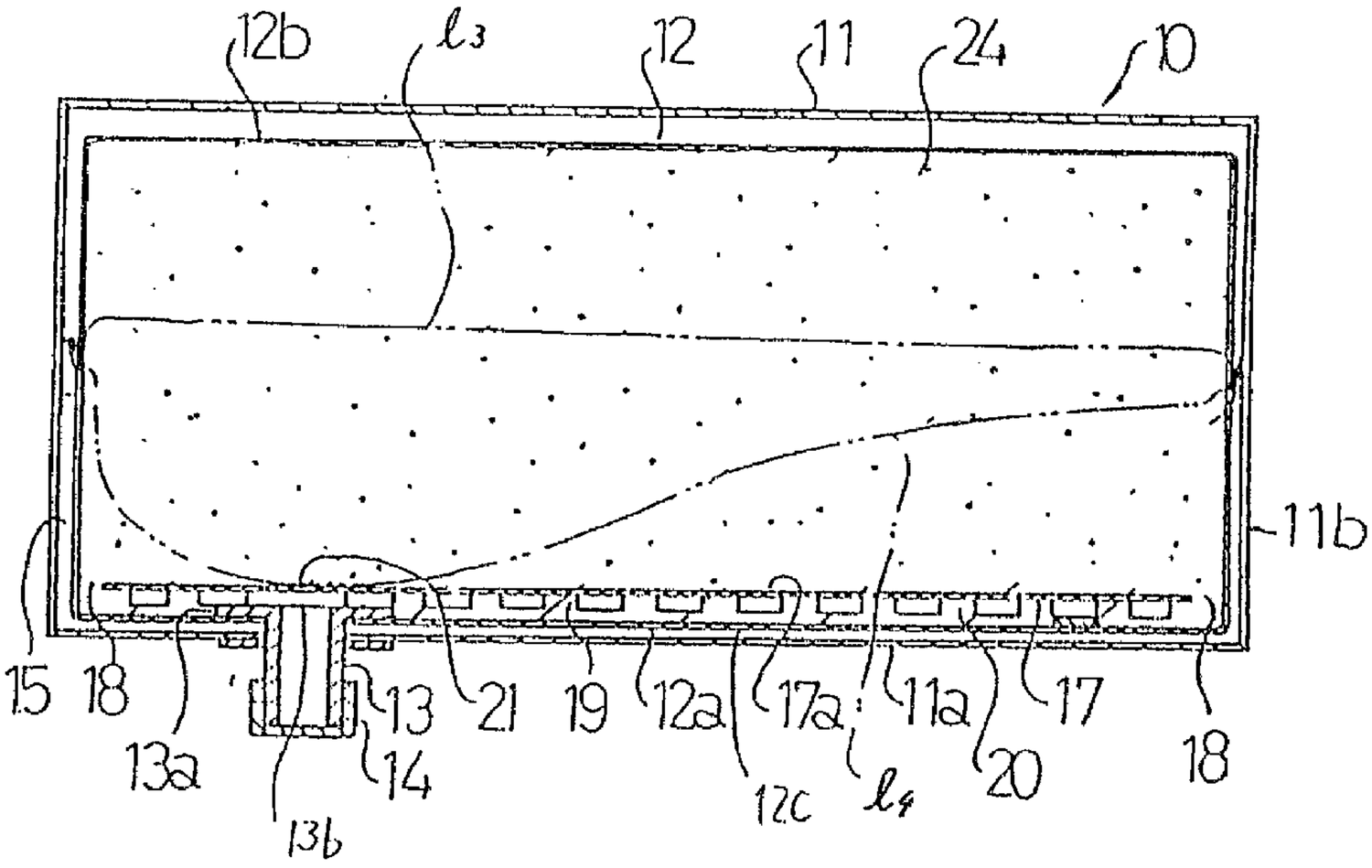
(54) **CONTENANT A LIQUIDE ET BEC CONNEXE**
(54) **LIQUID CONTAINER AND MOUTH THEREOF**



(57) A liquid container has a hard outer box, a flexible inner bag and a path forming member for forming a liquid path communicated with a mouth which has a restrictred path for permitting the liquid to flow out of the mouth slowly.

ABSTRACT OF THE DISCLOSURE

2040283

A liquid container has a hard outer box, a flexible inner bag and a path forming member for forming a liquid path communicated with a mouth which has a restrictred path for permitting the liquid to flow out of the mouth slowly.

LIQUID CONTAINER AND MOUTH THEREOF 2040283

BACKGROUND OF THE INVENTION

This invention relates to a liquid container and its mouth, and more particularly to a liquid container of bag-in-box type in which a flexible bag for containing a liquid having a high viscosity is accommodated in an outer hard box and a mouth fixed to the liquid container for filling and taking the liquid into and out of the liquid container therethrough. There has appeared a bag-in-box in which a flexible inner bag for containing a liquid such as juice, syrup, beer or ink is accommodated in an outer box made of hard material such as cardboard, plastic and the like. A pump is connected to a mouth of the bag-in-box to take liquid contents out of the flexible inner bag.

However, when the liquid contents are sucked out, the inner flexible bag is deformed to be apt to close the mouth thereof thereby make impossible taking out of liquid contents any more. In the case of liquid having a high viscosity such as ink or adhesive, this phenomenon occurs prominently.

Further, such a bag-in-box is normally set upside down, that is, with the mouth directed downwardly. When the pump is connected to the mouth to suck the liquid contents out of the inner bag, a cap fixed to the mouth is disconnected therefrom to expose an inner plug with a membrane for

closing the liquid path of the mouth. A connector on the side of the pump is connected to the mouth, and a projection formed in the connector breaks the membrane to open the path for the liquid contents. The structure of the mouth increases its cost because the inner plug and the projection for breaking the membrane of the inner plug are necessary.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a liquid container from which liquid contents can be taken out sufficiently with a small amount of the remaining liquid contents therein.

It is another object of this invention to provide a mouth for permitting liquid contents with a high viscosity to flow slowly therethrough.

The present invention may be considered as meeting the above objects by providing a liquid container for containing a liquid therein which comprises: a) an outer box having at least one flat wall; b) a flexible inner bag accommodated in the outer box; c) a mouth fixed to the inner bag so as to be projected outwardly of the flat wall of the outer box; and d) a path forming member provided on a flat wall of the inner bag, provided along the flat wall of the outer box in the inner bag so as to cover the mouth therewith for ensuring liquid paths between the flat wall of the inner bag and a deformed portion of the inner bag, wherein: the path forming member comprises (1) a path forming plate having substantially the same area as the flat wall of the inner bag, the path forming plate having liquid openings for communicating the liquid paths with an upper space

over the path forming plate in the inner bag and (2) a number of projections formed on the path forming plate at predetermined intervals and directed toward the flat wall of the inner bag so as to permit the liquid in a lower space under the path forming plate to flow into the mouth.

Furthermore, the present invention may be considered as providing a liquid container for containing a liquid therein which comprises: a) a flexible bag for containing the liquid therein; b) a mount fixed to the bag so as to be projected outwardly of the bag; and c) a path forming member provided in the bag so as to cover the mouth therewith for ensuring liquid paths between a portion of the bag near the mouth and a deformed portion of the bag which is deformed when the liquid is sucked out, wherein: the path forming member comprises (1) a flat base portion having substantially the same area as a flat wall of the bag, the flat base portion having liquid openings for communicating the liquid paths with an upper space over the flat base portion in the bag and (2) a number of projections formed on the flat base portion in one direction from the flat base portion to form liquid paths therebetween so as to permit the liquid in a lower space under the flat base portion to flow into the mouth.

Further objects, features and other aspects of this invention will be understood from the following detailed description of the preferred embodiment of this invention with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is a longitudinally sectional view of a bag-in-box according to this invention;

FIG. 2 is a cross sectional view of the bag-in-box shown in FIG. 1;

FIG. 3 is a perspective view of the bag-in-box shown in FIGS. 1 and 2;

FIG. 4 is a perspective view of a path forming plate accommodated in an inner bag of the bag-in-box;

FIG. 5 is a plan view of a path forming plate showing another embodiment thereof;

FIG. 6 is a perspective view of the path forming plate shown in FIG. 5;

FIG. 7 is a perspective view of a center portion of the path forming plate shown in FIG. 6;

FIG. 8 is a longitudinally sectional view of a bag-in-box showing another embodiment thereof;

FIG. 9 is a longitudinally sectional view of a mouth fixed to the bag-in-box;

FIG. 10 is a plan view of the mouth shown in FIG. 9;

FIG. 11 is a longitudinally sectional view of the mouth showing a state wherein a connector is connected to the mouth; and

FIG. 12 is a longitudinally sectional view of a conventional bag-in-box.

DETAILED DESCRIPTION OF THE INVENTION

As conductive to a full understanding of the nature and utility of the present invention, a brief consideration of a typical liquid container will be first presented below with reference to FIG. 12.

FIG. 12 shows a so-called bag-in-box 100 for containing liquid such as juice, syrup, ink, adhesive or the like. The box 100 comprises an outer hard box 101 formed of paper, cardboard, plastic or the like and a flexible inner bag 102 accommodated in the outer box 101 and formed of plastic film or the like. A mouth 103 is fixed to a part of the inner bag 102 so as to be projected outwardly from the outer box 101. The mouth 103 is connected to a connector 104 when the liquid contents are taken out of the inner bag 102 by a pump (not shown). As the liquid contents are taken out therefrom, the inner bag 102 is deformed so that the volume of the inner bag 102 is decreased.

However, when the liquid contents are simply sucked from the inner bag 102 by the pump, the liquid contents are partially sucked to be apt to form wrinkles on the inner bag 102. Further, a part of the inner bag 102 is tightly adhered to the bottom of the inner bag 102 before the liquid contents are not totally taken out thereby to leave a part of the liquid contents in the inner bag 102. Especially, in the case of a liquid having a high viscosity such as ink, and adhesive, this problem often occurs.

That is, in such a case, the liquid such as ink does not flow smoothly in the inner bag 102 not to reach the mouth 13 easily when the ink is sucked out of the inner bag 102. Therefore, the ink near the mouth 103 is mainly sucked, the upper portion of the flexible inner bag 102 is deformed as indicated by a dotted line ℓ1, resulting in closing the mouth 103 in a state wherein a large amount of ink is left in the inner bag 102 or resulting in that the bottom and the upper portion of the inner bag 102 contact partially near the mouth 103 together with each other to obstruct the flow of the remaining ink.

In addition, the bag-in-box 100 is normally used in an upside down manner. When the connector 104 is connected to the lower end of the mouth 103, a cap 105 is disconnected from the mouth 103. An inner plug 106 is inserted into the mouth 103 to prevent the liquid such as ink from flowing out when the cap 106 is disconnected therefrom. The inner plug 106 has a membrane 107 which is broken by a projection 108 formed in the connector 104 when the connector 104 is connected to the mouth 103.

This invention is made to provide a liquid container whose liquid contents can be almost completely taken out therefrom and which has an inexpensive mouth with a relatively simple structure to enable liquid contents to flow out through the mouth.

A preferred embodiment of this invention will now be

explained.

In FIGS. 1, 2 and 3, a liquid container 10 for containing a liquid 24 having a high viscosity such as ink, adhesive or other viscous liquids comprises a rectangular outer box 11 made of hard material and an inner flexible bag 12 accommodated in the outer box 11. A mouth 13 is fixed to the inner bag 12, and the lower end of the mouth 13 is closed by a cap 14. The mouth 13 is also fixed to the outer box 11 so as to be projected from its flat bottom surface 11a. The inner bag 12 has a lower portion 12a and an upper portion 12b. The lower portion 12a to which the mouth 13 is fixed is held by a proper adhesive means, e.g., a both-face-tape 15 whose front and back surfaces have adhesive, to the bottom flat surface 11a of the outer box 11 and the side flat surface 11b thereof whereby a flat bottom surface 12c of the inner bag 12 is formed along the flat bottom surface 11a of the outer box 11. Instead of the both-face-tape, an adhesive such as hot-melt may be used. The upper portion 12b of the inner bag 12 is freely accommodated in the outer box 11. In this manner, if the lower portion 12a of the inner bag 12 is fixed to the inner wall of the outer box 11, the upper portion 12b of the inner bag 12 is only deformed in a state wherein the joint portion between the lower and upper portions 12a, 12b is held on the inner intermediate surface of the outer box 11 when ink is filled into and taken from the inner bag 12. Therefore, the stable

deformation of the inner bag 12 is ensured and the remaining amount of ink accommodated in each bag-in-box manufactured becomes even.

The outer box 11 and the inner bag 12 may be made of known various materials. For example, as the outer box 11, paper, corrugated cardboard, plastic, metal and the like may be used, and, as the inner bag 12, a single layer film, a laminated film formed of the same material or a laminated film formed of combination of plastic and paper, or combination of plastic, paper, metallic film and the like may be used. Moreover, the mouth 13 may be a plastic molding product.

In the inner bag 12 is accommodated a path forming plate 17 for maintaining a path of ink especially when the ink is taken out of the inner bag 12 in such a manner that the opening of the mouth 13 is covered therewith. The path forming plate 17 is disposed along the bottom walls 11a, 12c of the outer box 11 and the inner bag 12, and fixed, at a plurality of positions, to the bottom flat wall 12c of the inner bag 12.

The largeness of the path forming plate 17 is not limited, and, however, an area slightly less than that of the flat bottom wall 12c of the inner bag 12 is preferable as shown in FIGS. 1 and 2. The path forming plate 17 is also disposed so as to form an ink path 18 between the periphery of the plate 17 and the bottom corners of the

inner bag 12.

As shown enlargedly in FIG. 4, the path forming plate 17 comprises a flat base 17a and a number of projections 19 formed at predetermined intervals, which are projected in one direction from the flat base 17a. The plate 17 is, as shown in FIGS. 1 and 2, disposed in the inner bag 12 so that the projections 19 are directed downwardly to ride on the flange 13a of the mouth 13 and the bottom wall 12c of the inner bag 12, and some projections 19 are adhered to the inner bag 12. In this embodiment, the plate 17 is adhered by heat to the inner bag 12 at four corners thereof and at two positions of the center portion thereof in a spot-like manner.

At a position of the plate 17, corresponding to the mouth 13 is provided a flat portion 17a without the projections 19 to facilitate passing of ink through the mouth 13. In this manner, a lattice-like path 20 for permitting ink to pass therethrough is formed between the plate 17 and the bottom wall 12c of the inner bag 12. The ink path 20 permits ink to pass therethrough toward the mouth 13 when the ink in the inner bag 12 is sacked out. In order to take ink out of the inner bag 12 as much as possible, a large ink path is preferable. However, in order to decrease amount of the remaining ink in the inner bag 12 as much as possible, a small ink path is preferable because a certain amount of ink is always left in the ink path 20

after the ink is sucked from the inner bag 12. In view of these points, the size of the ink path 20 is determined. For example, the height and width of the ink path 20 are determined at 2 to 3 mm and 3 to 5 mm, respectively.

The path forming plate 17 has, as shown in FIG. 4, a main liquid opening 21 formed at a position corresponding to the mouth 13, and a plurality of supplementary small liquid openings 22 formed at positions corresponding to the lattice-like ink path 20. The material and manufacturing method of the plate 17 are not limited, and it is preferable to manufacture the plate 17 through plastic-molding. In FIG. 4, a number of recesses 23 are formed, corresponding to the projections 19, on the upper surface of the plate 13. However, as the remaining ink is stagnant in the recesses 23 after the sucking of ink, it is desirable to close the recesses 23 with film, sheet or the like, a plurality of holes 23a may be formed on the side walls of the recesses 23 to communicate the recesses 23 with the ink path 20. An ink path forming plate with a flat base without recesses may be formed through injection molding.

The operation of the container 10 will now be explained.

As shown in FIGS. 1 and 2, when the inner bag 12 is filled with ink, the upper portion 12b is expanded as indicated by a solid line to accommodate ink sufficiently. When the ink in the inner bag 12 is taken out therefrom, the ink mainly passes through the large main liquid opening 21

of the base portion 17a to enter the mouth 13. In addition to the large liquid opening 21, the ink passes through the ink path 18 at the periphery of the plate 17 and the small supplementary openings 22 to enter the ink path 20 then to reach the opening of the mouth 13. Therefore, the ink is taken out through a large region in the inner bag 12. When the ink is sucked, the upper portion 12b is deformed downwardly with its upper surface being kept almost horizontally as indicated by a dotted line ℓ3. The ink can be thus almost completely sucked out from the inner bag 12.

In addition, even if the upper portion 12b of the inner bag 12 is deformed distortedly in such a manner that a part of the upper portion 12b is lowered partially to close the large main liquid opening 21 of the plate 17, the ink in the inner bag 12 can be sucked out through the ink path 20 between the plate 17 and the bottom wall 12c of the inner bag 12 because the opening 13b of the mouth 13 is not closed by the lowered part of the upper portion 12b. Accordingly. until most of the upper portion 12b tightly contacts the upper surface of the plate 17, the ink can be sucked out thereby to enable almost all of ink to be taken out of the inner bag 12.

In this embodiment, the ink is sucked out through a wide region in the inner bag 12, and the inner bag 12 is accommodated so that its lower portion 12a is fixed to the inner wall of the outer box 11 and that its upper portion

12b can be only deformed. Therefore, the upper portion 12b can be deformed stably to enable the ink of every bag-in-box manufactured to be taken out with a small amount of the remaining ink.

FIGS. 5 and 6 show another embodiment of a path forming plate 30. The plate 30 has, as a whole, a rectangular shape, and a flat base portion 30a and a number of square projections 31 disposed at predetermined intervals on the flat base portion 30a. At the center of the base portion 30a is provided a large main liquid opening 32 for permitting the ink in the inner bag 12 to pass therethrough, and around the large main liquid opening 32 is provided a circular recessed path 33 from which liquid path 34 is extended in the four directions. Further, the plate 30 has a lattice-like liquid path 35 on the almost whole surfaces of the plate 30 except the center portion 30b of the base portion 30a. The circular recessed path 33 is defined by four deformed projections 36 separated from each other, each of which has an arched wall 36a surrounding the large opening 32. Further, a number of supplementary liquid openings 37 are formed at a plurality of crossing points of the lattice-like liquid path 35 on the almost whole surface of the base portion 30a except the center portion 30b thereof. The supplementary openings 37 comprise a number of cross-shaped openings 37a, a number of three-branch-shaped openings 37b provided along the periphery of the plate 30,

and four L-shaped openings 37c provided at the four corners of the plate 30. The formation of the supplementary openings 37 ensures that the ink in the inner bag 12 can be sucked evenly from the whole area of the path forming plate 30. The projections 31, 36 may be closed in the same manner as those of the plate 17 to prevent the ink from being stagnant therein. The plate 30, shown in FIG. 5, has the large main opening 32 at the center thereof, and the mouth 13 is, as shown in FIG. 8, projected outward from the center positions of the inner bag 12 and the outer box 11. If the large main opening 32 is formed at the center of the plate 30, the ink can be taken out uniformedly or evenly from the whole region in the inner bag 12. Further, the plate 30 occupies most of the bottom surface of the inner bag 12 and, therefore, most of ink in the inner bag 12 can be taken out.

In the above embodiment, the bag-in-box 10 is disposed upside down so as to direct the mouth 13 downwardly, and however, the bag-in-box 10 is not necessarily disposed upside down. That is, the bag-in-box 10 may be disposed laterally and uprightly. Even in these cases, the ink in the inner bag 12 can be sucked out because of a sucking force of the pump. The plates 17, 30 have a number of openings 22, 37 at positions corresponding to the ink paths 20, 35, respectively. However, those openings 22, 37 are not necessarily provided, and the ink may be sucked from the peripheral space of the plates 17, 30 into the respective

ink paths 20, 35. In contrast, the plates 17, 30 may have a size to completely cover the bottom wall of the inner bag 12 so as not to flow the ink from the peripheral space into their respective ink paths 20, 35 in a state wherein only the openings 22, 37 permit the ink to pass therethrough.

The flow of ink can be controlled by determination of the positions and number of the openings 22, 37 to form a desirable flow pattern of ink. In addition, the lower portion 12a of the inner bag 12 is not necessarily adhered to the inner wall of the outer box 11, and the inner bag 12 may be simply accommodated in the outer box 11. The shape of the outer box 11 can be arbitrarily selected. For example, a cylindrical shape may be selected.

The type of the inner bag 12 is not limited to a pouch with four sides sealed as shown in FIGS. 1, 2 and 8, and a stand pack or a gazette type bag may be used.

The above embodiments can be adapted for a liquid container for containing other liquids in addition to ink.

The mouth of the bag-in-box may be formed in the following manner. The following mouth is suitable for taking out therethrough a liquid with a relatively high viscosity such as ink, adhesive, enrichment juice, enrichment syrup and the like.

In FIGS. 9 and 10, a mouth 40 comprises a main body 41 formed in a step manner, an engaging ring 42 screw-engaged with a root portion of the main body 41, and a cap 43 screw-

engaged with the distal end of the main body 41. The main body 41 comprises a flange 41a adhered to the inner bag 12, a large diameter portion 41b having a male screw for engaging with the engaging ring 32 at its outer circumferential surface, a small diameter portion 41c having a male screw for engaging with the cap 43 at its circumferential surface and a plurality of tongue pieces 44 extended inwardly from the step portion 41d formed between the large and small diameter portions 41b, 41c so as to form a restricted path 45. Each tongue piece 44 is thinly formed to be elastically deformed, and it has, e.g., a thickness of 0.4 mm. The area of the path 45 is so determined that a liquid having a high viscosity does not instantly flow out of the path 45 when the mouth 40 is directed downwardly. That is, as shown in FIG. 11, when the mouth 40 is directed downwardly, the liquid contents in the inner bag 12 flow down while forming a liquid drip 50 to come out of the mouth 40. The area of the path 45 is so determined that it takes 2 or 3 seconds until the drop 50 comes out of the mouth 40. For example, in the case of ink having a viscosity of 50 to 400 poises, it is preferable that the diameter d of a center path defined by the distal ends of the tongue pieces 44 is 1 to 4 mm, and the width of a plurality of spaces extended radially from the center path is 0.1 to 2 mm. The main body 41 of the mouth 40 is integrally manufactured by injection molding of resin such as polyethylene.

The bag 12 is adhered to the flange 41a of the main body 41 by heat sealing or the like. However, the flange 41a may be inserted so that the inner surface of the inner bag 12 is adhered to the front surface of the flange 41a.

The engaging ring 42 has a flange 42a abutting against the outer surface of the outer box 11, an operating portion 42b formed separately from the flange 42a and held by fingers when the ring 42 is fastened or released, and a reinforcing rib 42c for reinforcing the operating portion 42b. The main body 41 of the mouth 40 is reliably fixed to the outer box 11 in such a manner that the ring 42 is screw-engaged with the male screw of the main body 41 to put the outer box 11 between the flange 41a of the main body 41 and the flange 42a of the ring 42. The ring 42 and the cap 43 are also manufactured by injection molding of resin.

The operation of the mouth 40 will now be explained.

First, the flange 41a of the main body 41 is adhered to the inner bag 11 so as to project the main body 41 outwardly from the inside of the outer box 11, and the ring 42 is screw-engaged with the male screw of the main body 41 thereby to fix the mouth 40 to the outer box 11. A liquid is poured into the inner bag 12 through the mouth 40. At this time, the liquid flows into the inner bag through the restricted path 45 provided by the tongue pieces 44 while deforming them elastically by liquid pressure to expand the restricted path 45. This enables prompt filling of the

liquid. Further, a filling nozzle for filling the liquid into the inner bag 12 may be formed so that a part of the filling nozzle pushes the tongue pieces to expand the restricted path 45 when the nozzle is engaged with the mouth 40. After the liquid is filled into the inner bag 12, the mouth 40 is covered with the cap 43. With this state, the bag-in-box 10 is transported and stored.

When the liquid is taken out of the bag-in-box 10, the cap 43 is disconnected from the mouth 40, and a connector 60 connected to a pump is connected to the mouth 40. Thus, the liquid is sucked out by the operation of the pump. When the mouth 40 is connected to the connector 60, the bag-in-box 10 is placed upside down to connect the mouth 40 with the connector 60 from the above. At this time, if the mouth 40 is directed downwardly in a state wherein the cap 43 is disconnected therefrom, the liquid in the inner bag 12 is going to flow out through the restricted path 45. However, as the area of the path 45 is small, the liquid flows downwardly while forming the liquid drop 50. Therefore, the liquid does not flow out of the mouth 40 for a relatively short time until the mouth 40 is connected with the connector 60. After the connector 60 is connected to the mouth 40, the liquid is sucked out by the pump. At this time, each tongue piece 44 is curved downwardly by the suction force to expand the restricted path 45.

The connector 60 may be formed so as to have a long

projection 61a so that the long projections 61a pushes upwardly the tongue pieces 44 to expand the restricted path 45 when the connector 60 is engaged with the mouth 40.

In the above embodiment, the restricted path 45 is formed of a plurality of elastically deformed tongue pieces 44, and, however, a circular path, an elliptic path, groove-like path and the like may be simply formed. If the path 45 is formed of the elastic tongue pieces, the pass resistance of the liquid is decreased because of the expansion of the path 45 by the elastic deformation of the tongue pieces. The engaging ring 42 is not necessarily provided, and the mouth 45 may be simply projected from the outer box 11. The above mouth can be adapted for other boxes in addition to the bag-in-box 10.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A liquid container for containing a liquid therein which comprises:

a) an outer box having at least one flat wall;

b) a flexible inner bag accommodated in the outer box;

c) a mouth fixed to the inner bag so as to be projected outwardly of the flat wall of the outer box; and

d) a path forming member provided on a flat wall of the inner bag, provided along the flat wall of the outer box in the inner bag so as to cover the mouth therewith for ensuring liquid paths between the flat wall of the inner bag and a deformed portion of the inner bag,

wherein:

the path forming member comprises (1) a path forming plate having substantially the same area as the flat wall of the inner bag, said path forming plate having liquid openings for communicating the liquid paths with an upper space over the path forming plate in the inner bag and (2) a number of projections formed on the path forming plate at predetermined intervals and directed toward the flat wall of the inner bag so as to permit the liquid in a lower space under the path forming plate to flow into the mouth.

2. A liquid container according to claim 1, wherein the path forming member forms a lattice-like liquid path.

3. A liquid container according to claim 2, wherein the liquid openings include a main liquid opening formed on the path forming member at a position corresponding to the mouth.

4. A liquid container according to claim 3, wherein the liquid openings also include a plurality of supplementary openings formed on the path forming member, for communicating the lattice-like liquid path with the upper space over the path forming member in the inner bag.

5. A liquid container according to claim 3, wherein the path forming member has a size to cover most of the flat wall of the inner bag therewith so as to form a liquid path between a periphery of the path forming member and the inner bag.

6. A liquid container according to claim 2, wherein the path forming member is formed by injection molding, a number of recesses being formed corresponding to the projections, at least one opening to communicate each recess with the lattice-like liquid path being provided.

7. A liquid container according to claim 2, wherein the path forming member is formed by injection molding, a number of recesses being formed corresponding to the projections, the recesses being covered with a film member.

8. A liquid container according to claim 4, wherein the supplementary openings are provided at crossing points of the lattice-like liquid path.

9. A liquid container according to claim 3, wherein a circular liquid path is formed around the main liquid opening by projections each having an arched surface.

10. A liquid container according to claim 1, wherein the mouth is provided at the center of the flat wall of the inner bag and the outer box.

11. A liquid container according to claim 1, wherein the mouth has inside a restricted path so that a liquid with a high viscosity flows out slowly.

12. A liquid container according to claim 11, wherein the restricted path is formed of a plurality of elastic tongue pieces projected radially from an inner wall of the mouth.

13. A liquid container according to claim 1, wherein an approximately half portion of the inner bag is fixed to the outer box.

14. A liquid container for containing a liquid therein which comprises:

a) a flexible bag for containing the liquid therein;

b) a mount fixed to the bag so as to be projected outwardly of the bag; and

c) a path forming member provided in the bag so as to cover the mouth therewith for ensuring liquid paths between a portion of the bag near the mouth and a deformed portion of the bag which is deformed when the liquid is sucked out,

wherein:

the path forming member comprises (1) a flat base portion having substantially the same area as a flat wall of the bag, said flat base portion having liquid openings for communicating the liquid paths with an upper space over the flat base portion in the bag and (2) a number of projections formed on the flat base portion in one direction from the flat base

portion to form liquid paths therebetween so as to permit the liquid in a lower space under the flat base portion to flow into the mouth.

FIG. 1

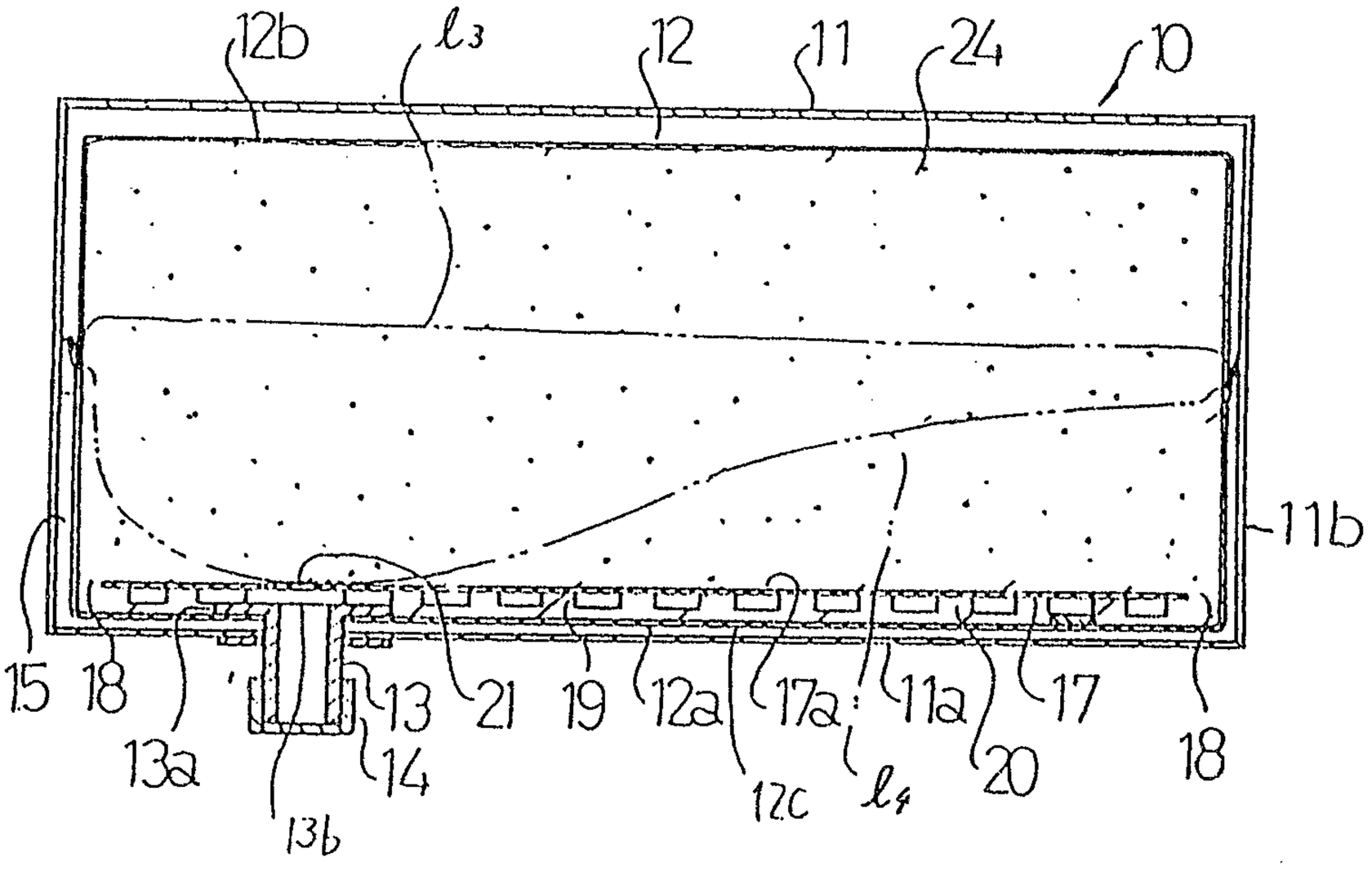


FIG. 2

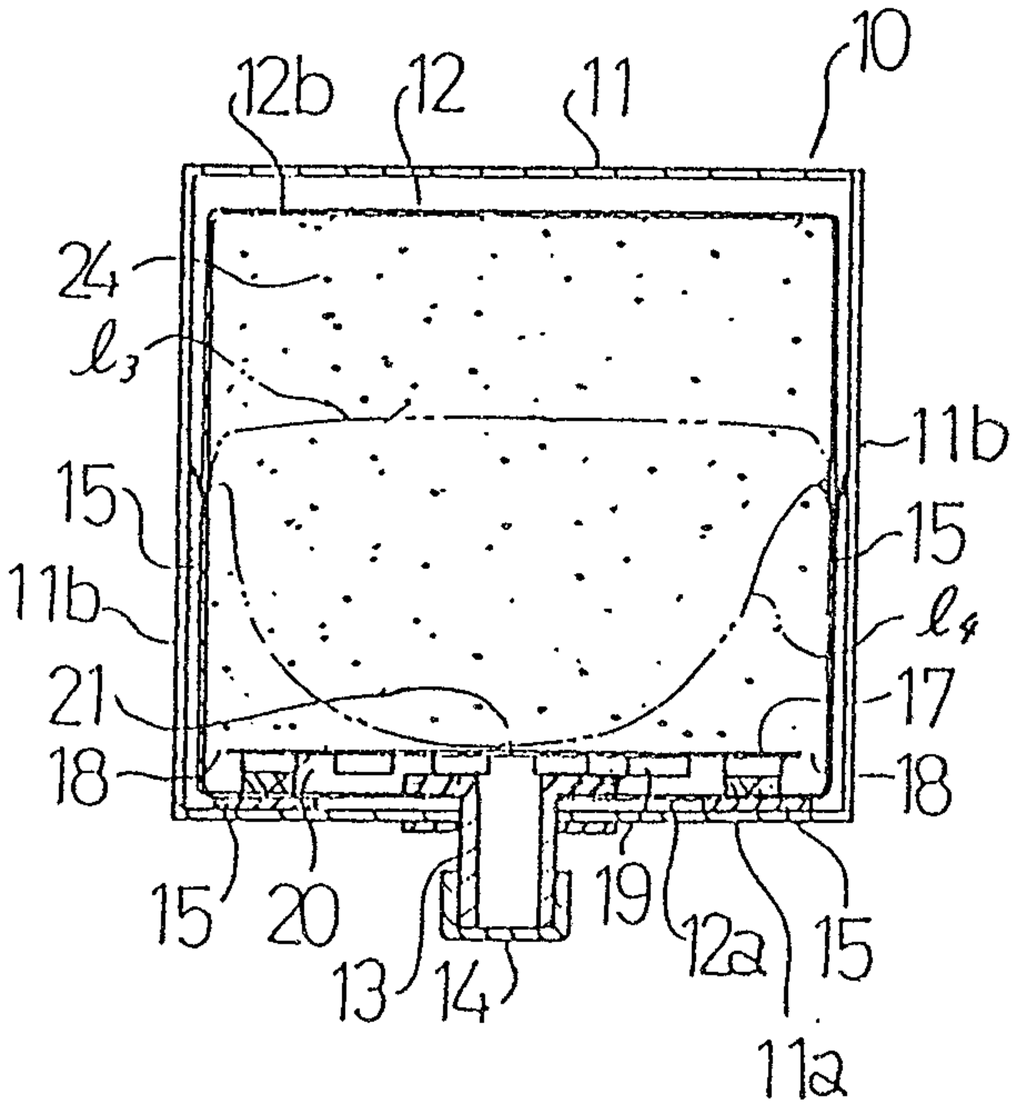


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FIG. 3

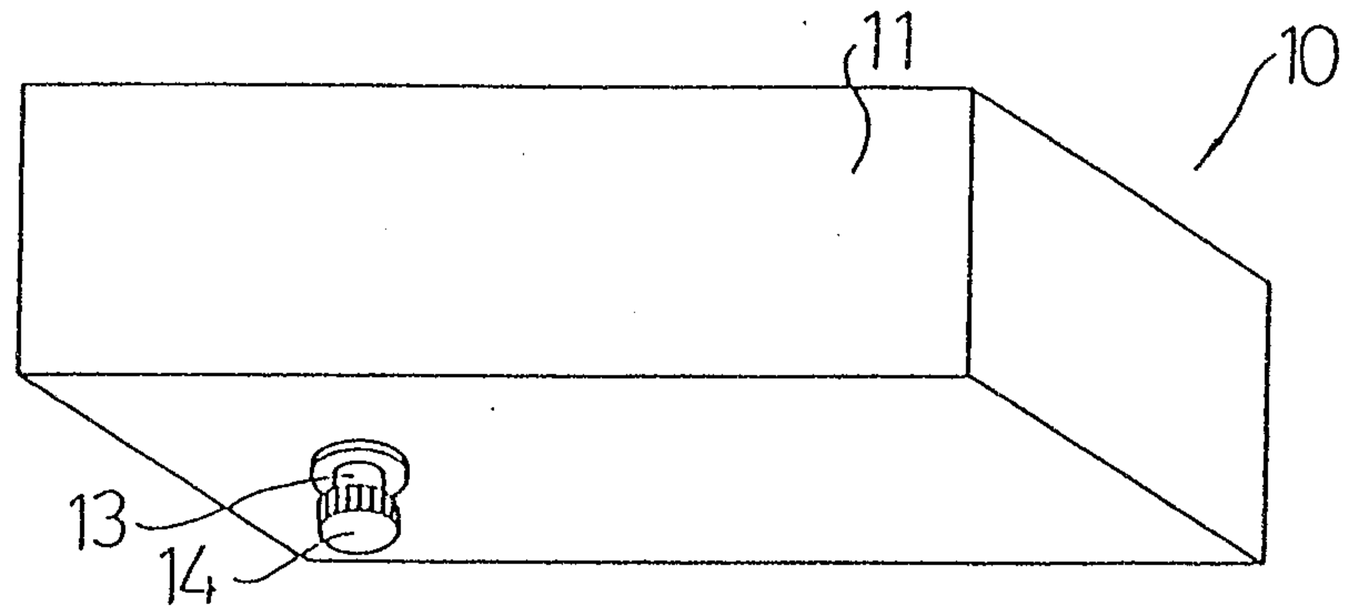

FIG. 4

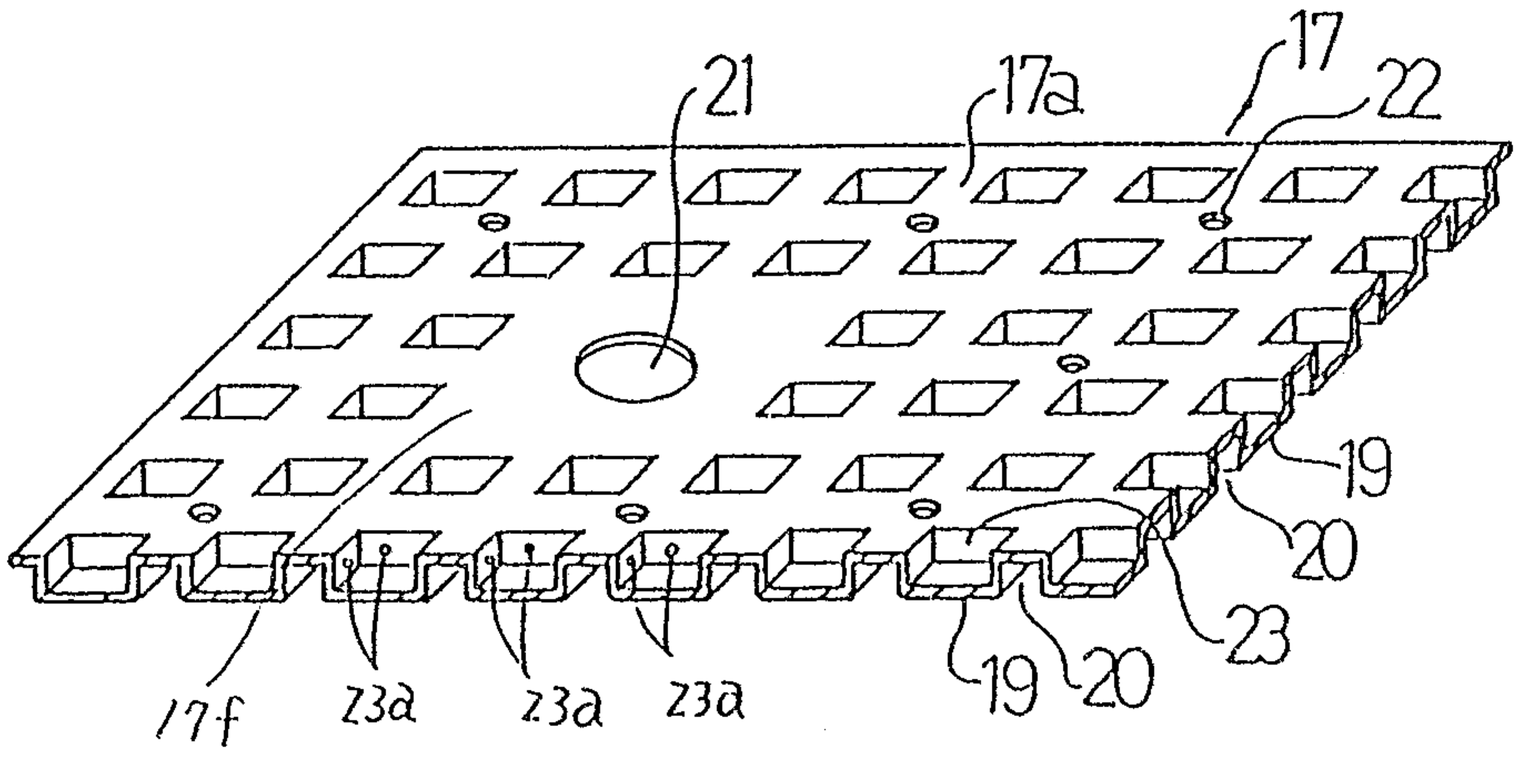

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FIG. 5

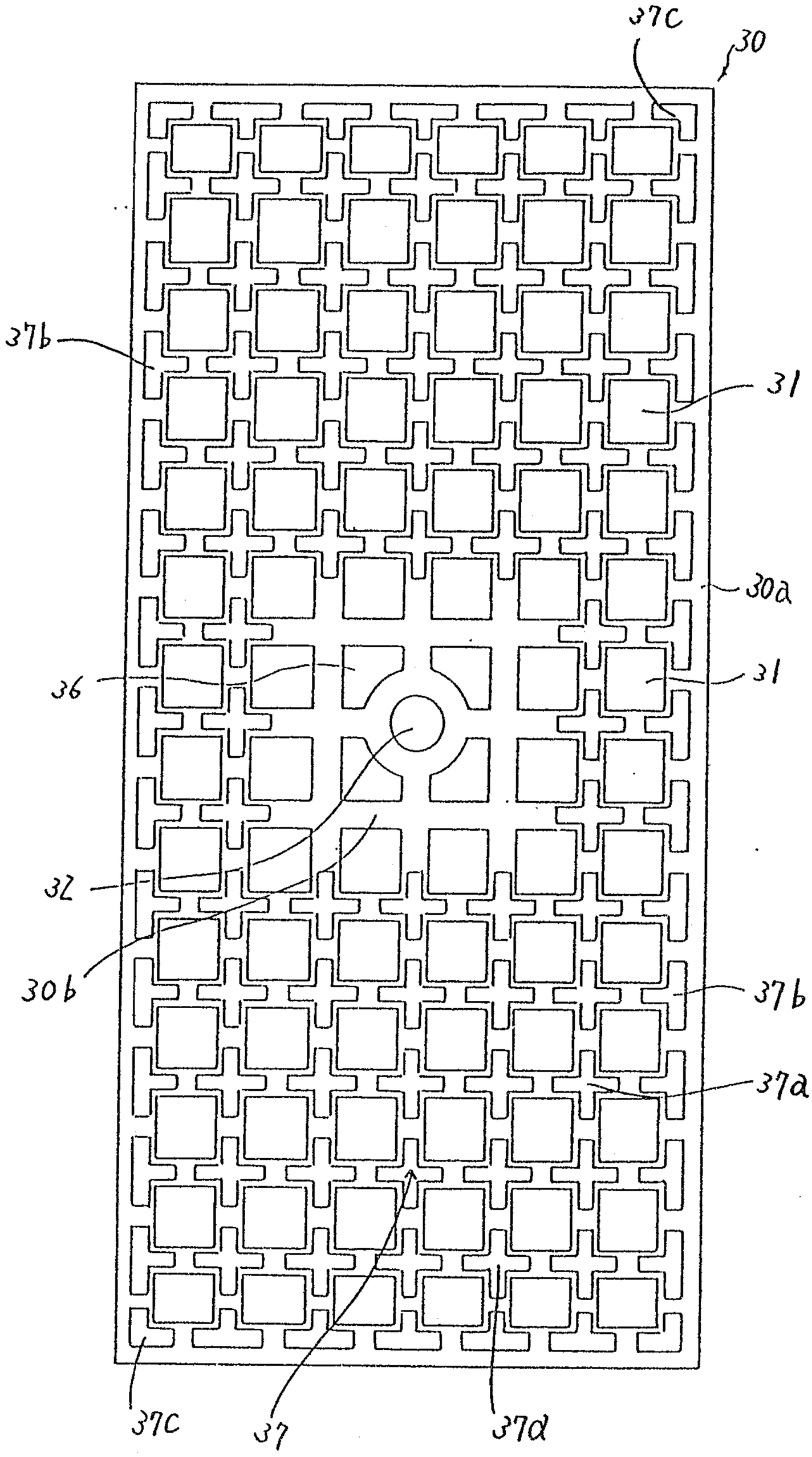

FIG. 6

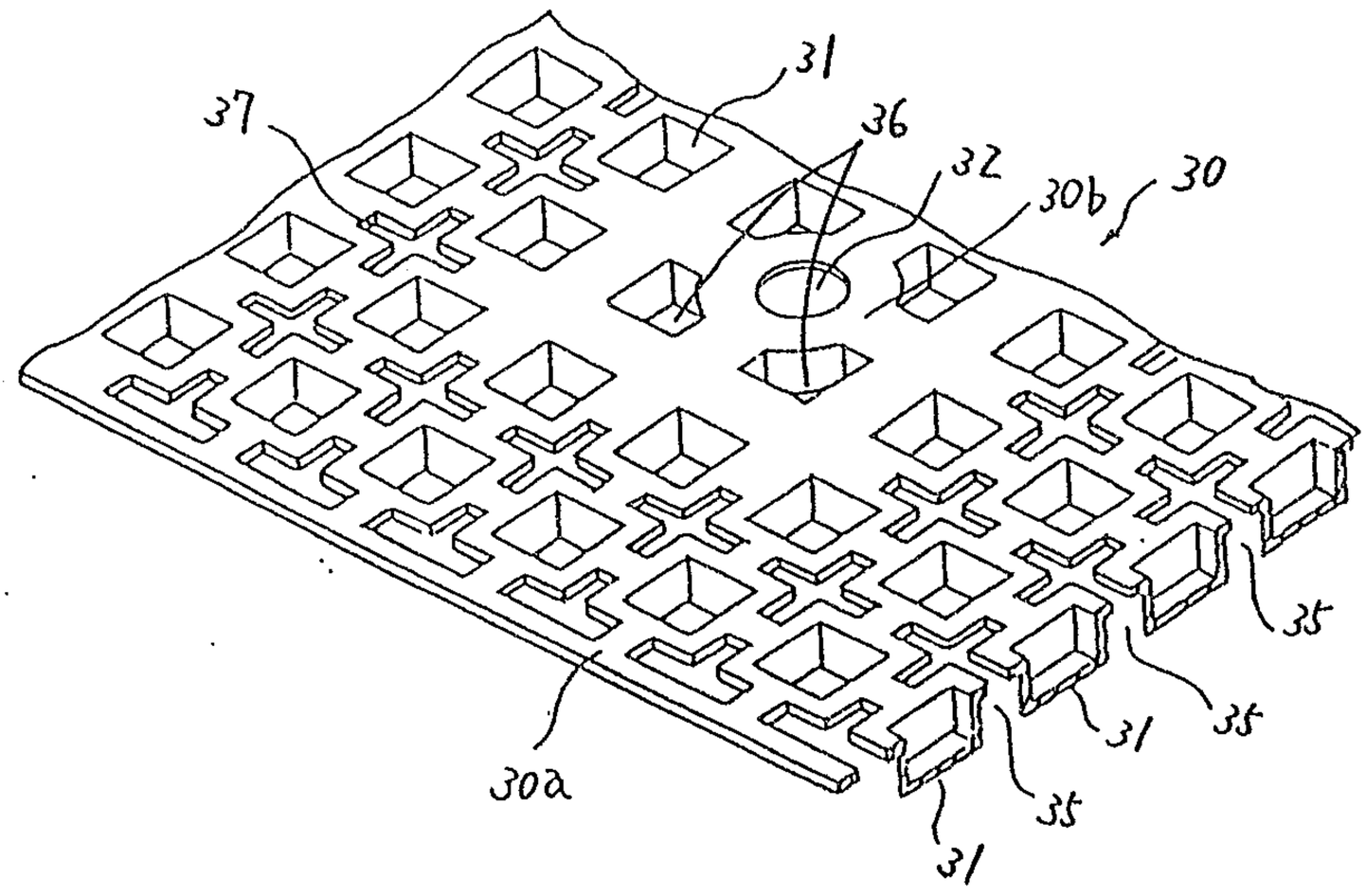
31
37
36
32
30b
30
35
31
35
31
35
30a
31

FIG. 8

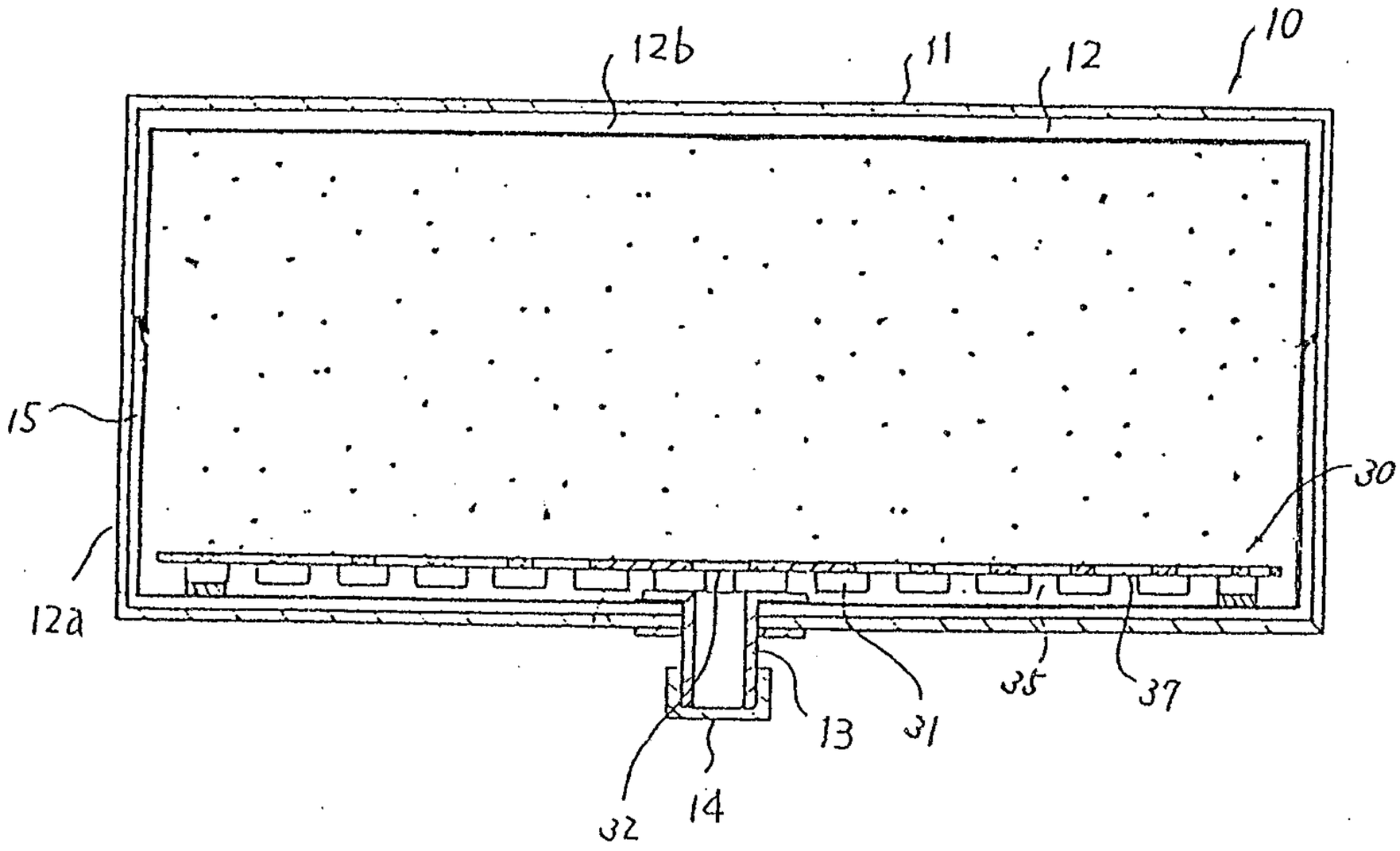
12b
11
12
10
15
30
12a
35
37
13
31
32
14

FIG. 7

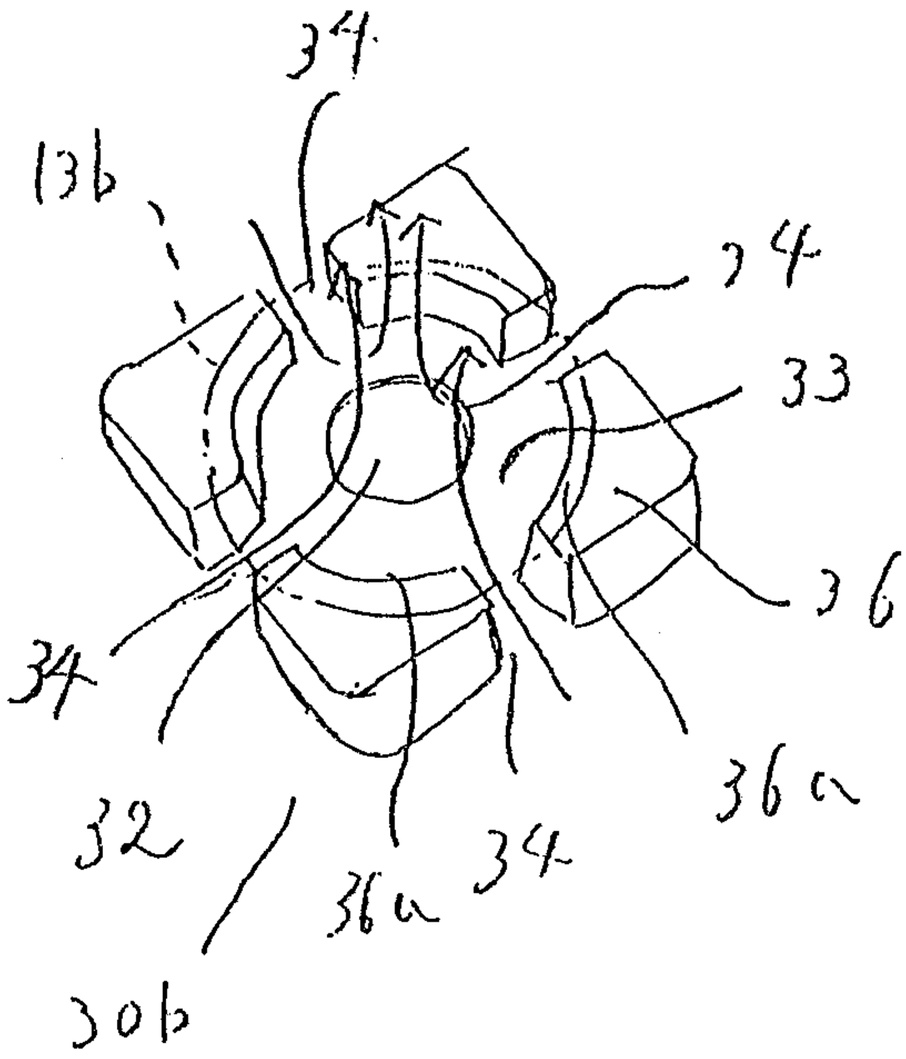

FIG. 9

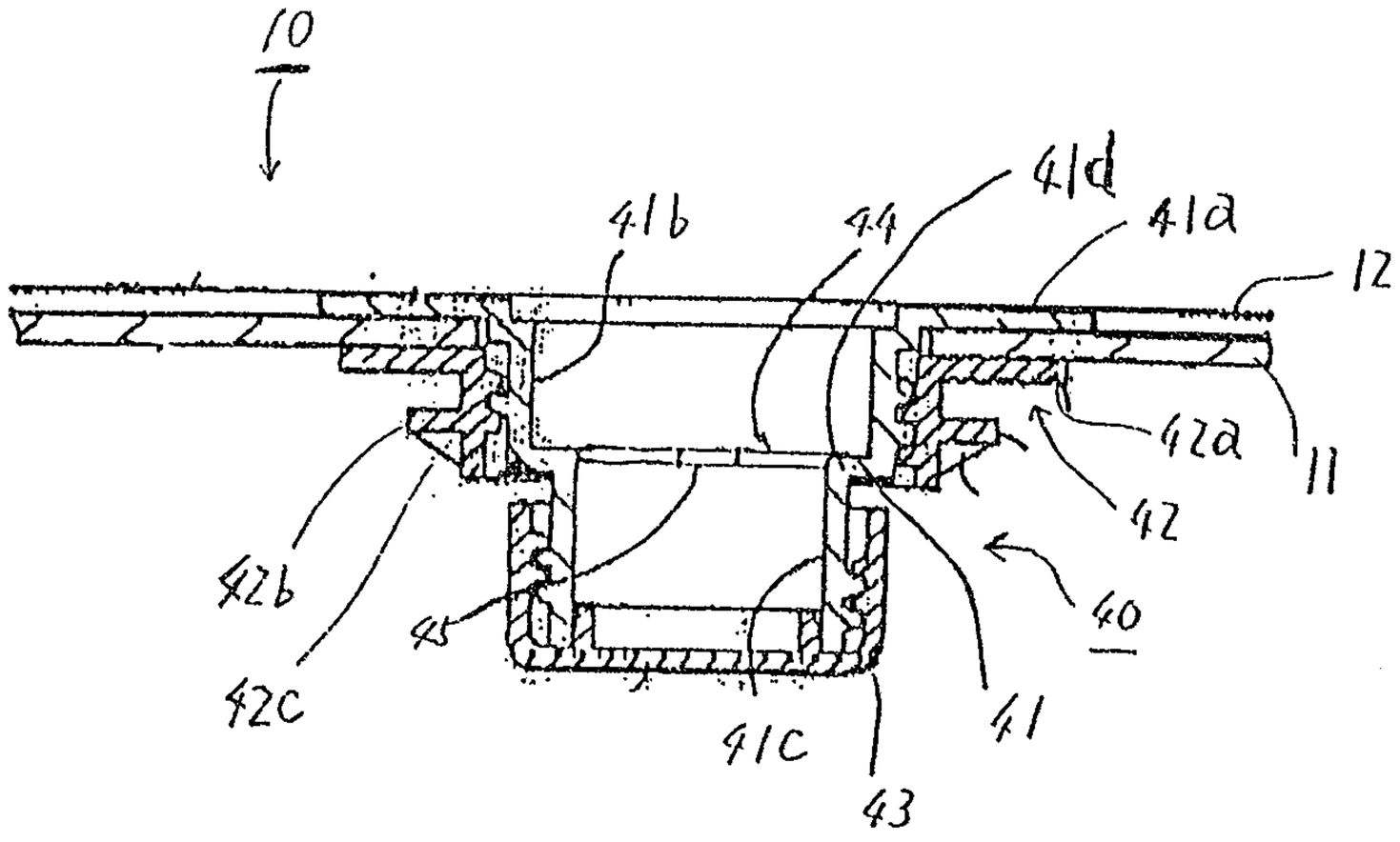
10
41b
44
41d
41a
12
42a
11
42
40
42b
45
42c
41c
41
43

FIG. 10

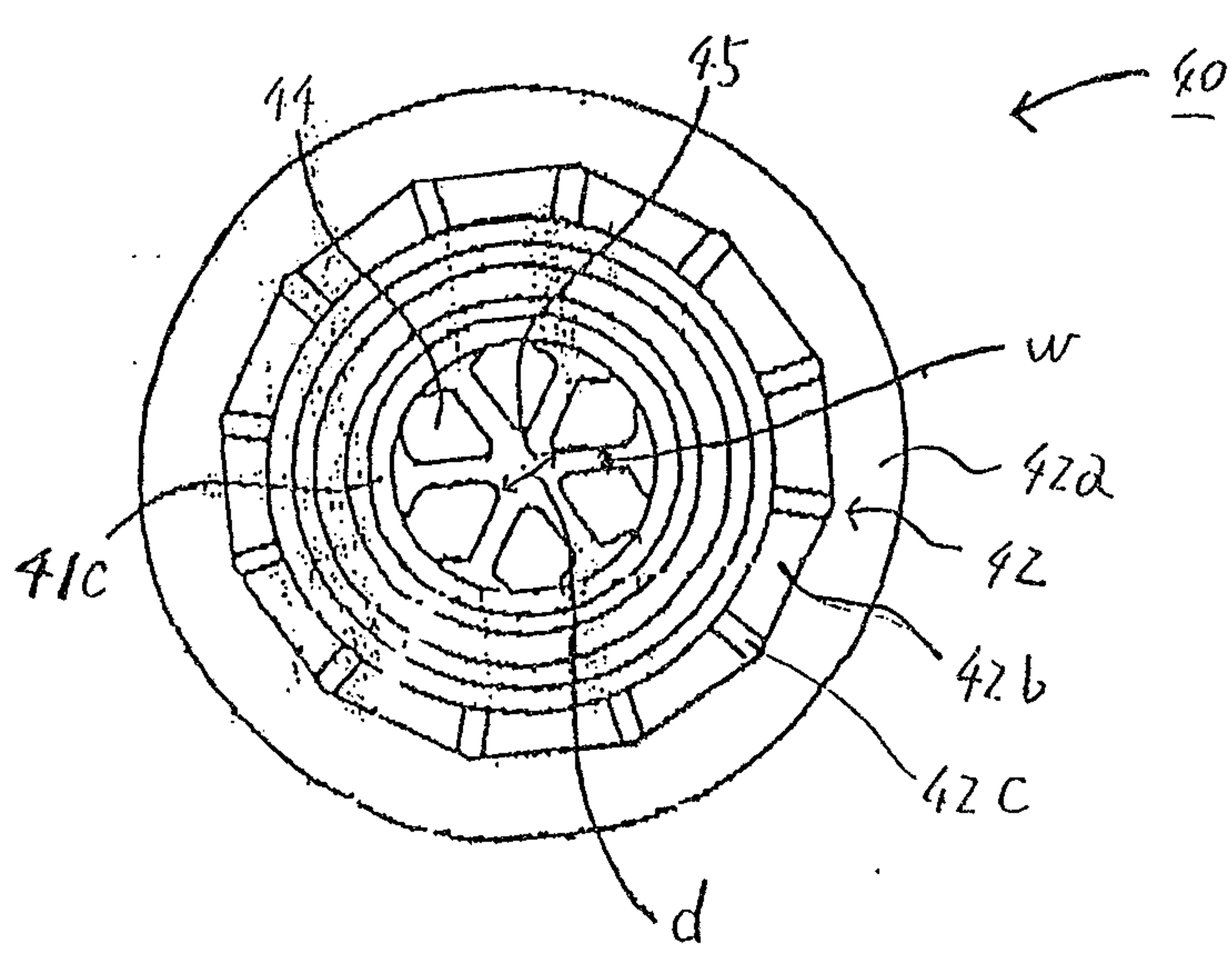
11
45
40
w
42a
42
42b
42c
41c
d

FIG. 11

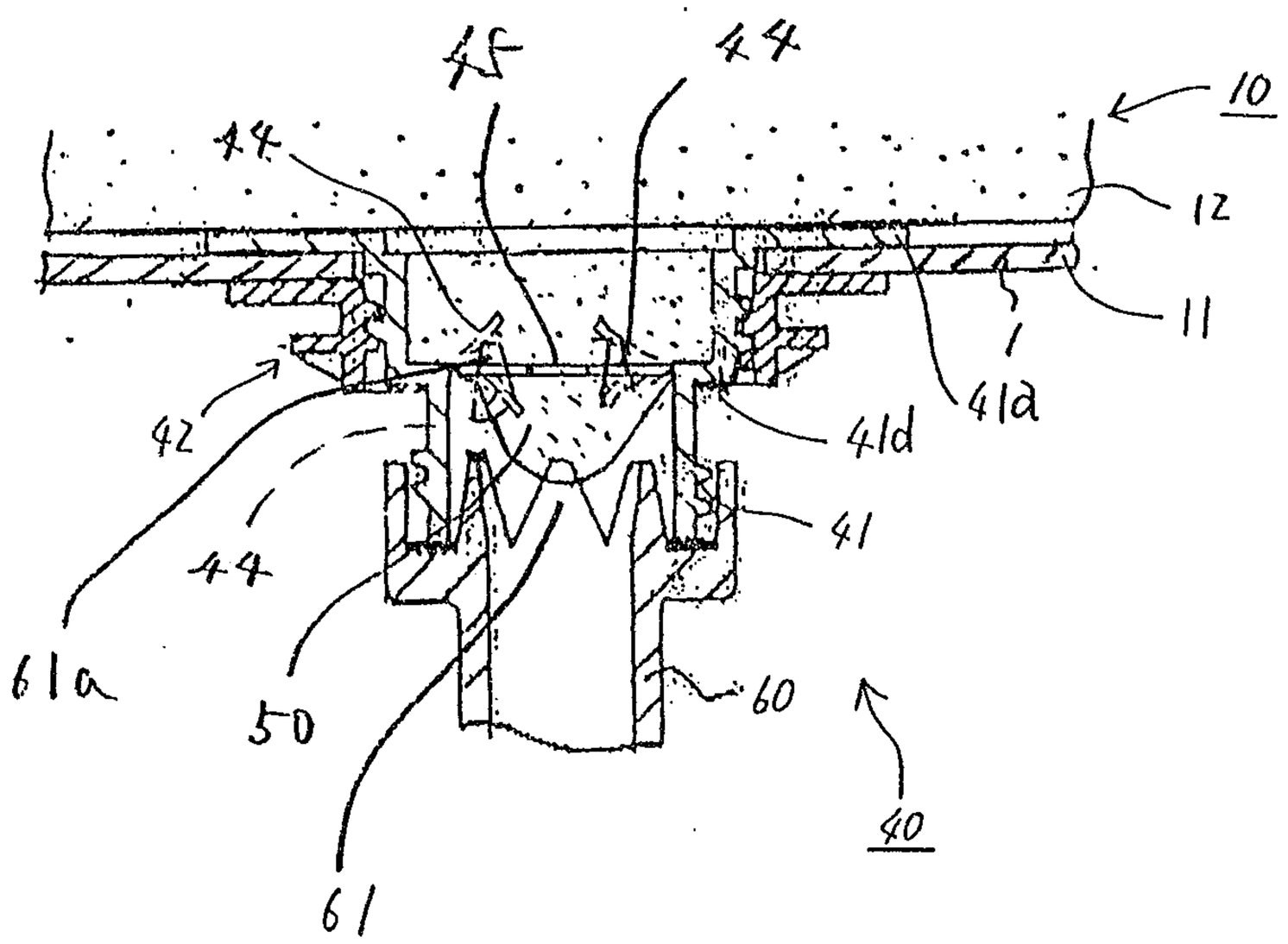

FIG. 12

PRIOR ART