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(54) Title: INSERT FOR A COLLAPSIBLE CONTAINER

(57) Abstract

An insert member (25; 25a; 25b; 25c) for a collapsible container (20) having a spout (21; 21a; 21b) comprises an attachment section (36; 36a; 36b; 36c) by means of which the insert can be mounted on the spout and an elongate body section (35; 35c) pivotally attached to the attachment section and having a continuous liquid passage (37; 37b; 37c) along its whole length, this passage being in fluid communication with liquid inside the container. As the walls (23, 24) of the container (20) collapse during emptying, the insert member maintains a clear channel for flow of liquid from the interior of the container via the insert member to the spout.

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INSERT FOR A COLLAPSIBLE CONTAINER

This invention relates to an insert for a collapsible container. More specifically, this insert relates to such an insert which can be connected to a spout on the container so that it will extend into the filled container and, as the contents are withdrawn from the container, the container will gradually collapse around the insert to maintain an outlet passage to the spout until the container is completely empty.

One form of such an insert proposed in the prior art comprises a perforated tube attached to a closure valve and about which the container collapses. A second proposed insert comprises a flexible helical coil-adapter attached to a spout and about which the container collapses to form a tubular passageway. A third proposed form of insert comprises a dip tube which is attached to a closure valve and which has longitudinal slots in the peripheral surface thereof leading into straight passages. These prior art inserts cannot be placed in the container before filling; it is necessary to first fill the container and thereafter insert the closure valve or spout with the insert attached. Insertion of the insert after filling of the container at a reasonable rate, without making a mess and

without excessive labor costs is impossible. Also, undesirable introduction of air into the container will occur. This invention provides an insert which can be placed in a collapsible container before the container is filled.

In one aspect, this invention provides an insert member capable of being placed within a collapsible container capable of containing liquid, the container having a spout to which the insert member can be connected and through which the liquid can leave the container, thereby causing the walls of the container to collapse about the insert member. The insert member of the present invention comprises an attachment section, by means of which the insert member can be mounted upon the spout, the attachment section having an aperture therethrough, and an elongate body section pivotally attached to the attachment section, the body section having a continuous liquid passage extending from adjacent the attachment section along substantially the whole length of the body section, the passage being in fluid communication with the external surface of the insert over substantially the whole length of the passage, such that, as liquid leaves the container and the walls of the container collapse about the insert member, the insert member will maintain a clear channel

for flow of liquid from the interior of the container into the passage, along the passage to the attachment section, through the aperture in the attachment section and out of the container via the spout.

This invention extends to a collapsible container capable of containing liquid and having a spout through which liquid can leave the container, this container having an insert member of the invention disposed within the container and mounted upon the spout.

Finally, this invention provides a method of producing a collapsed container having a spout and a insert member disposed within the container and mounted on the spout. This method comprises affixing a spout to a first web of liquid-impervious material, bringing the first web of material adjacent a second web of liquid-impervious material and sealing the two webs of material to one another along a closed contour surrounding the spout to form the collapsed container. In this method, before the webs are sealed to one another, the insert member, which has an attachment section having an aperture therethrough and an elongate body section connected to the attachment section and having at least one continuous longitudinal passage open along its length, is mounted on the spout by means of its attachment section such that, after the webs are

sealed to one another, the insert member is disposed between the opposed webs forming the opposed walls of the finished container. In this method, the insert member may be mounted on the spout before or after the spout is affixed to the first web of material, although it will usually be more convenient to first mount the insert member on the spout and thereafter affix the spout to the first web of material.

Preferred insert members, collapsible containers and methods of the invention will now be described, though by way of illustration only, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a flexible container with a first insert member of the invention disposed therein and attached to the spout thereof;

Figure 2 is an enlarged section along line 2-2 in Figure 1;

Figure 3 is an underneath plan view of the insert member shown in Figures 1 and 2;

Figure 4 is a side elevation of the insert member shown in Figures 1, 2 and 3;

Figure 5 is an end elevation of the insert member shown in Figures 1 to 4 looking from the left in Figure 4;

Figure 6 is an enlarged section along line 6-6 in

Figure 3;

Figure 7 is an underneath plan view, similar to that of Figure 3 but showing a second insert member of the invention;

Figure 8 shows schematically an insert member of the invention in use in a filled bag-in-a-box before use;

Figure 8A is a schematic view similar to Figure 8 but showing the bag in a partially-collapsed condition;

Figure 9 is an enlarged section along line 9-9 in Figure 8A and shows one type of service line connector for evacuating the bag;

Figure 10 is a section similar to that of Figure 9 but showing a different type of service line connector;

Figure 11 is a section similar to that of Figures 9 and 10 but showing a third type of service line connector;

Figure 12 is a schematic side elevation of an apparatus for manufacturing flexible containers with insert members of the invention disposed therein and attached to the spouts thereof;

Figure 13 is a section along the line 13-13 in Figure 12 with some parts omitted for the sake of clarity;

Figure 14 is an underneath plan view similar to

that of Figure 3 but showing a third insert member of the invention;

Figure 14A is an enlarged section along line 14A-14A in Figure 14;

Figure 15 is a side elevation of the insert member shown in Figure 14;

Figure 16 is an underneath plan view similar to that of Figure 3 but showing a fourth insert member of the invention;

Figure 16A is an enlarged section along line 16A-16A in Figure 16;

Figure 17 is an enlarged section similar to that of Figure 9 but showing the third insert member shown in Figure 14 in use;

Figure 18 is an enlarged section similar to that of Figure 10 but showing the fourth insert member shown in Figure 16 in use;

Figure 19 is an enlarged section similar to that of Figure 18 but showing a different type of service line connector;

Figure 20 is an enlarged section similar to that of Figure 19 but showing the third insert member shown in Figure 14 in use; and

Figure 21 is a section along line 21-21 in Figure 20.

Figures 1 and 2 show a collapsible container of the invention in the form of a plastic bag 20. This bag 20 is shown in its substantially collapsed form as originally manufactured. The bag is formed from two superimposed webs of liquid-impervious material in the form of sheets of plastic which form the superimposed flat walls 23 and 24 of the bag. These walls may be of single or multiple plies. The walls 23 and 24 are sealed to each other around their peripheries in a liquid-tight manner by heat seals 22, 22a. The bag 20 is provided with a spout 21 affixed to and extending outwardly from the upper wall 23 adjacent one end of this wall. An insert member (or evacuation channel form unit) 25 of the present invention was inserted in the bag during manufacture and lies flat between the superimposed walls 23 and 24.

Although the spout 21 may assume a variety of forms, the specific spout 21 shown in Figures 1 and 2 is molded of semi-rigid plastic and includes a hollow tubular body 26 through which the bag 20 can be filled and emptied. The hollow tubular body 26 is formed so that it can receive a dispensing valve member to control the flow of liquid through the spout, and a closure. The bag 20 is intended for use in a bag-in-box package such as that shown in Figures 8 and 8A, and is

accordingly provided with spaced flanges 27 and 28 extending radially-outwardly from the body 26. Below the flange 28, the spout has a section of enlarged diameter, and at the extreme lower or inward end the spout 21 has a large radially-outwardly-extending flange 29 which is heat-sealed to the upper wall 23 of the bag 22 to attach the spout 21 in a liquid-tight manner to the bag. The section of enlarged diameter between the flanges 28 and 29 provides a socket 30, which is open to the interior of the bag and which is provided on its inner cylindrical surface 32 with a locking rib 31. The socket 30 receives the attachment section or ring 36 of the insert 25.

The insert 25, best seen in Figures 3 to 6, is molded as a single integer from plastic. It consists of two main sections, namely the aforementioned attachment section or ring 36, by means of which the insert 25 is mounted on the spout 21, and an elongate body section (or channel form section) 35 which is pivotally connected to the ring 36 by means of an integral hinge 40, which spaces the inner end 35a of the body section 35 from the ring 36. As best seen in Figures 4 and 5, the ring 36 and body section 35 are molded so that they can lie in substantially the same plane with the body section 35 extending radially-outwardly from the ring,

but the hinge 40 permits the body section 35 to swing out of this plane at various angles. The ring 36 is formed so that its outer cylindrical surface 42 can fit lockingly within the inner cylindrical surface 32 of the socket 30 on the spout. The outer cylindrical surface 42 of the ring have an annular groove 41 formed therein, this groove 41 receiving the rib 31 on the surface 32 of the socket. (It will be apparent that provided the rib 31 and the groove 41 are present on opposed ones of the wall 32 of the socket 30 and the ring 36, which integer bears the rib and which the groove is merely a matter of convenience of design and manufacture. Accordingly, to illustrate both possibilities, the insert 25 is illustrated in Fig. 2 with the groove 41 on the rib 36, but is shown in Figures 8, 9 and 10 in a modified form with the rib 31 on the ring 36.)

The body section 35 of the insert 25 has a flat, multi-channel form and comprises a flat wall 39 bearing four spaced parallel ribs 38 which project downwardly from the wall 39. These ribs 38 run longitudinally the full length of the body section 35. Thus, the ribs 38 define three parallel channels 37 which run the full length of the body section 35 from the inner end 35a to the outer end 35b thereof. The channels 37 are open at both ends and are open along their whole length toward

the interior of the bag 20. Although the wall 39 normally lies in a plane, as shown in Figures 3 to 6, the ribs 38 and the wall 39 are sufficiently flexible to permit flexing of the body section 35 in a direction perpendicular to this plane.

The second insert of the invention shown in Figure 7 is identical to the first insert shown in Figures 1-6 except that its body section 25a is deformed in a sinuousoidal curve in the plane of the wall 39 to give it greater lateral stability.

As already mentioned, the insert 25 shown in Figures 1 and 2 is mounted on the spout 21 by inserting the ring 36 into the spout 30 on the socket, whereupon the ring is locked into position by entry of the rib 31 into the groove 41. As shown in Figure 1, the body section 35 runs longitudinally along the bag 20 with the outer end 35b of the body section 35 lying near the bottom seam 22a of the bag 20.

The collapsed bag shown in Figure 1 may be filled through the spout 21 with the insert 25 in place and thereafter placed within a box B for storage and shipping, as shown in Figure 8. To dispense the liquid from the bag 20, the spout 21 is mounted on the wall of the box B, as shown in Figure 8A, whereupon the body section 35 of the insert extends into the bag 20. The

box B is shown in Figure 8A lying on its side, but may be upright or in any other position. Whatever the position adopted, the body section 35 will pivot about the hinge 40 relative to the ring 36, and the body section 35 is long enough to extend to the farthest point in the box. As the liquid is withdrawn from the bag 20, the bag collapses from the end adjacent the spout 21 inwardly around the body section 35. Thus, the channels 37 in the body section 35 to provide multiple clear channels or passages for flow of liquid from the interior of the bag 20 into the channels 37, along the channels 37 to the ring 36, through the aperture in the ring 36 and out of the bag 20 via the spout 21.

The passage of liquid through the spout 21 may be controlled by various dispensing valves and various evacuation systems previously known and used. In Figures 8A and 9, for example, the spout has mounted thereon an evacuation system of the type disclosed in U.S. Patent No. 4,421,146. This evacuation system consists of a removable service line connector 45, which is connected to a pump or other evacuator and which has an axially-reciprocable probe 46 mounted thereon. This probe 46 cooperates with a dispensing valve unit 47 mounted on the spout 21. As disclosed in the aforementioned patent, axial movement of the probe 46

causes a slidable valve member 48 to move axially relative to the spout between a closed position, in which radial outlet bores 49 on the valve member 48 lie within and are closed by the spout 21, and an open position (as shown in Figure 9), in which the outlet bores 49 lie within the socket 30 of the spout 21 so that liquid can flow through these outlet bores 49 out of the bag.

The valve member 48 carries a wall-engaging member in the form of a hollow cylindrical skirt 50 extending axially inwardly from the inner end of the valve member 48. As shown in Figure 9, when the valve member 48 is in its open position the skirt 50 engages the wall 24 of the bag 20 as it collapses toward the inner end of the spout, thereby preventing the wall 24 being sucked into the spout and blocking the flow of liquid therethrough. The skirt 50 ensures exposure of the inner open end 35a of the body section 35 of the insert member and maintains a clear channel or passage through the ring 36 to the outward bores 49. The ring 36 is of sufficient internal diameter to permit the skirt 50 to pass axially therethrough. Thus, the body section 35 of the insert member and the skirt 50 always maintain passages or channels through the collapsed part of the bag through the ring 36 and the outward bores 49 as shown in Figure

9. Other types of valve members and spouts in common use today may be modified to function in the same manner in combination with the insert member 25 of the invention.

Figure 10 shows the insert member 25 of this invention used with a different type of spout and evacuation system. The spout 21a shown in Figure 10 is of tubular form and is attached to the bag 20 by means of a flange 29 in a similar manner to that described above with reference to Figure 2. The spout 21a includes an inwardly-opening socket 30a for receiving the ring 36 and spaced flanges 27a and 28a for mounting the spout in the wall of a box, these parts being similar to the corresponding parts of the spout 21. After filling, the spout 21a receives a closure (not shown) which remains sealed to the spout during shipping and storage. When the spout is put into use, the closure is removed and an evacuation system is connected to the spout. This evacuation system includes a plug-in service line connector which will be connected to a pump or suitable evacuator by tubing connected to an outlet tube 45a. The evacuation system includes a tubular adaptor for 46a which is inserted into the spout 21a and is frictionally retained therein. The inner end of the adaptor 46a bears an inwardly-projecting skirt 50a

having radial outward bores 49a in fluid communication with the outlet tube 45a. When the adaptor 46a is inserted into the spout 21a to the extent fixed by coaction of a flange 46b at the outer end of the adaptor with the outer end of the spout 21a, the inner end of the adaptor projects axially into the ring 36 and the skirt 50a projects even further into the interior of the bag. Thus, the skirt 50a serves as a wall-engaging member functioning in the same manner as the skirt 50 shown in Figure 9 and allowing the whole contents of the bag to be emptied through the spout 21a.

In Figure 11, the spout 21a is identical to that shown in Figure 10. This spout is being used with an evacuation system having an adaptor 46c identical to that shown in Figure 10, except that the cylindrical skirt 50a is replaced with a plurality of axially-inwardly projecting, angularly-spaced pins 50b which serve as wall-engaging members functioning a manner identical to the skirt 50a shown in Figure 10. Obviously, many other different types of spouts and evacuation systems can be used in the collapsible containers of the invention.

Figures 12 and 13 show schematically a preferred method of forming the bag 20 with the insert member 25 in position therein, the bag being in the collapsed

condition shown in Figure 1. The bag is formed from two plies of liquid-impervious plastic or other material as is well-known to those skilled in the art of manufacturing collapsible containers. For simplicity, Figure 12 shows a first web 230' of single ply material, which is used to form the upper wall 23 of the bag 20, being drawn from a roll 230, and a second web 240', which is used to form the lower wall 24, being drawn from a roll 240. The web 230' is pulled intermittently under tension from the roll 230 and is first subjected to a punch unit 61 of conventional type. The punch unit 61, which comprises a fixed upper punch 61a disposed above the web 230' and a vertically movable die 61b disposed below the web 230', is actuated to punch a hole in the web 230' to receive the spout. The web 230' then moves to a spout insertion unit 62 which is of conventional type and which inserts the spout 21 into the hole formed by the punch unit 61. The spout insertion unit 62 comprises a piston-and-cylinder unit 62a which supports the spout 21 and moves it upwardly into the hole, and an upper fixed heating element 62b, which heat seals the flange 29 of the spout to the portion of the web 230' surrounding the hole formed by the punch unit 61. Next, the insert member 25 is moved beneath the web 230' to a position on the longitudinal

center line of the web. This movement of the insert member 25 is effected by a support conveyor 64 (best seen in Figure 13) which runs perpendicular to the web 230'; the upper run of the conveyor 64 lies directly below the web 230'. The conveyor 64 has regularly-spaced transverse sockets 65 which, in the upper run of the conveyor 64, receive the insert members 25 with their rings 36 projecting laterally of the conveyor 64 so that the movement of the conveyor 64 moves the rings into alignment with the spouts 21 already fixed to the web 230'. When a ring 36 is disposed beneath a spout 21, the ring is inserted into the spout by a unit 66 which comprises a plunger on the end of a lower piston-and-cylinder unit 66a. This plunger moves upwardly to engage the ring 36 and pushes it up into the downwardly-opening socket 30 of the spout 21 which, at that moment, is supported from above by a fixed downwardly-extending spout support.

The web 240' is pulled intermittedly horizontally from the roll 240 around a lower guide roll 60 and then vertically upwardly to an upper guide roll 60', from where it travels horizontally closely beneath the portion of the web 230' immediately downstream of the unit 66. Thus, at this point, the two webs 230' and 240' are traveling parallel and close together with the

insert member 25 positioned between them. The webs and insert member are now carried to a heat sealing unit 68, of conventional type, which heat seals the edges of the two webs to each other to form the side seals of the bag 20. From the unit 68, the webs pass to a second heat sealing unit 69, of conventional type, which heat seals the two webs to one another along lines extending laterally across the webs, to seal the ends of the bags being formed. At this point, the completed bags 20 are connected to one another in a continuous strip and may be supplied to the user in that form with either a closure or valve 70 positioned on each spout 21 by a capping unit 71 of a conventional type. Alternatively, the strip of bags may first pass through to a perforating unit 72, of conventional type, to form perforations between adjacent bags, or this perforating unit may be replaced by a separating unit, of conventional type, if separate individual bags are to be supplied.

The movement of the webs 230' and 240' of the conveyor 64, and the operation of the unit 61, 62, 66, 68, 69, 71 and 72 may be synchronized in any conventional manner.

From the foregoing description, it will be apparent that the method of the invention provides a simple

method for forming the bags 20 with the insert members 25 positioned flat thererin between the top and bottom walls 23 and 24 so that the flat, collapsed bags 20 can be stacked on top of one another (if they are in the form of separate, individual bags) or folded adjacent the perforation (if they in the form of a continuous strip with perforations between adjacent bags).

The third insert member 25b of the invention shown in Figure 14 is generally similar to the first insert member shown in Figure 3 except that the form of the ring 36b of the insert member 25b has been modified to further ensure that the open ends of the channels 37b adjacent the ring 36b remain clear, and to ensure a clear passage for liquid through the ring. The ring 36b is thicker or deeper (i.e. has a greater dimension along its axis) than the ring 36 shown in Figure 3 and is provided with a substantially hollow-cylindrical flange 34b which, when the ring 36b is substantially coplanar with the body section 25b as shown in Figures 14 and 15, projects from the ring 36b in the same direction, and to at least to the same extent, as the ribs 38b (see Figures 14 and 15) project from the flat wall of 39b i.e. the axial dimension of the flange 34b is at least equal to the depth of the ribs 38b. As best seen in Figure 14A, the flange 34b is interrupted adjacent the

body section 25b so as to provide an outlet notch 33b. Also the flange 34b is of lesser diameter than the ring 36b.

Figure 17 shows the third insert member 25b in use with the same evacuation system as in Figure 9. The ring 36b snaps into position within the socket 30 on the spout 21 in exactly the same manner as the ring 36 previously described, the ring 36b being provided with a rib which snaps into a corresponding groove 41b provided in the socket 30. (As with Figures 2 and 9 discussed above, to show alternative embodiments, Figure 17 shows the rib on the ring and the groove on the socket, contrary to Figure 15.) When the ring 36b is thus snapped into position with the socket 30, the flange 34b extends out of the socket 30 into the interior of the bag 20 and, as the bag collapses during emptying, engages the wall 24 of the bag to flex it inwardly than would be the case in the absence of the flange 36b, so as to hold the wall 24 away from the outlet ends of the channels 36b, thus permitting passage of liquid from the channels 37b through the notch 33b into the interior of ring 36b to the outlet bores 49. The flange 36b also provides a longer toroidal channel 32b around the outlet bores 49 and thereby prevents the bag wall 24 from being sucked into that channel over the outlet bores 49 under

high vacuum conditions.

Figure 19 shows the third insert member 25b and a spout 21b, which differs in form from the spout 21 previously described, in use with a different type of dispensing valve which is now being used. This valve assembly includes an adaptor 46d which is mounted onto the spout and which carries a spring-biased valve member 48d. The adaptor 46d includes an axially-inwardly extending tubular extension 47d having a central outlet opening 49d at its inner end and outlets 49e surrounding the extension 47d. Angularly-spaced pins 50d project inwardly from the inward end of the extension 47d and function as wall-engaging members in exactly the same manner as the pins 50b shown in Figure 10, engaging the wall 24 of the bag as it collapses and preventing it from being sucked into the ring 36b and covering the outlet opening 49d and the outlets 49e. The mounting of the ring 36 within the socket 30d of the spout 21b is achieved in exactly the same manner as in Figure 17, except that, since the valve assembly shown in Figure 19 has no skirt corresponding to the skirt 50 shown in Figure 17, the flange 34b, which projects inwardly beyond the inward end of the socket 30d in the inner end of the spout, functions as a wall-engaging member, engaging the wall 24 of the bag as the bag collapses and

preventing this wall covering the ends of the channels 37b of the insert member 25b adjacent the ring 36b. Since the flange 34b is of lesser diameter than the ring 36b a substantially hollow cylindrical passage 37d extends from the notch 33b around the outer wall of the flange 34b to permit flow of liquid through substantially 360° around the ring from the channels 37b towards the outlet opening 49d and the outlets 49e.

Figure 20 shows the third insert member 25b in use with a different type of dispensing valve assembly which uses the same spout 21b as the valve assembly shown in Figure 19 but in which the adaptor 46d is replaced with a modified adaptor 46e.

The ring 36b of the insert member 25b is mounted and locked in the socket 30d of the spout in exactly the same manner as described above with reference to Figure 19. However, the adaptor 46e shown in Figure 20 carries a tubular extension 47e (see Fig. 21) which carries at its inward end six equiangularly-spaced fins 50e which extend radially-outwardly from the axis of the extension 47e. These fins 50e serve as wall-engaging members which engage the wall 24 of the bag 20 as the bag collapses and prevent the wall 24 from being sucked into the ring 36b and blocking the outlet opening 49d or the outlets 49e. In addition the fins 50e aid in preventing

covering of the outlet ends of the channels 37b of the insert member 25b. The fins 50e have a substantial extent parallel to the axis of the spout 21b, extending inwardly at least as far as the inward end of the flange 34b. The radially-outward ends of the fins 50e terminate radially-inwardly of the flange 34b to provide a substantially toroidal passageway 37d which functions in the same manner as described above with reference to Figure 19 to assist flow of liquid from the channels 37b into the adaptor.

The fourth insert member 25c of the invention shown in Figures 16 and 16A is similar to the third insert member 25b shown in Figures 14, 14A and 15, except that the insert member 25c has a ring 36c having a plurality of spaced projections in the form of fins 50c which are arranged at 60° intervals around the ring 36c and which project radially-inwardly into the aperture in the ring, but terminate short of the center of the ring to provide a central clear space. The fins 50c prevent the bag wall from collapsing into the aperture in the ring as the bag collapses during emptying. The fourth insert member 25c, like the third insert member 25b, has on its ring a flange 34c which is of smaller diameter than the ring and is of the same or greater thickness than the body section 35c of the insert member 25c. Also, the

flange 34c is interrupted adjacent the body section 25c to provide a flow notch 33c. From Figures 16 and 16A, it can be seen that the outlet ends of the channels 37c are disposed directly opposite one of the fins 50c.

Figure 18 shows the fourth insert member 25c in use with the same spout 21a and an evacuation system very similar to that previously shown in Fig. 10. The ring 36c snaps into place within the socket 30a as previously described. However, the flange 34c being of substantial depth, projects axially-inwardly beyond the inner end of the spout 21a and, together with pins 54c, serves as a wall-engaging member to prevent collapse of the wall 24 into the ring, which would block flow to the outlet tube 45a. The flange 34c and the pins 50c are of sufficient axial length to prevent the wall 24 being sucked into the ring 35c and covering the outlet end of the channels 37c. Because the flange 34c is of lesser diameter than the ring 36c, a substantially toroidal passage 37d is left around the flange 34c; this passage 37d functions in exactly the same manner as the corresponding passages described above with reference to Figures 19 and 20.

The containers or bags of the invention, whether supplied as separate individual bags or as a strip of bags, with the insert members of the invention already inserted therein, can be filled by conventional

automatic or semi-automatic filling machines. When the bags are filled and disposed within a box, the insert member can extend to a point in the box farthest from the spout, whether the box is upright or on its side. As the bag is emptied and collapses, it will collapse around the insert member, thereby leaving clear passages by which liquid can leave the spout. The attachment section of the insert member can be arranged as so not to interfere with movement of dispensing valves or connecting parts inwardly through the spout into the bag.

Claims

1. An insert member (25; 25a; 25b; 25c) capable of being placed within a collapsible container (20) capable of containing liquid, the container having a spout (21; 21a; 21b) to which the insert member can be connected and through which the liquid can leave the container to collapse about the insert member, the insert member being characterized in that it comprises an attachment section (36; 36a; 36b; 36c), by means of which the insert member can be mounted upon the spout, the attachment section having an aperture therethrough, and an elongate body section (35; 35c;) pivotally attached to the attachment section, the body section having a continuous liquid passage (37; 37b; 37c) extending from adjacent the attachment section along substantially the whole length of the body section, the passage being in fluid communication with the external surface of the insert member over substantially the whole length of the passage, such that, as liquid leaves the container and the walls of the container collapse about the insert member, the insert member will maintain a clear channel for flow of liquid from the interior of the container into the passage, along the passage to the attachment section, through the aperture in the attachment section

and out of the container via the spout.

2. An insert member according to claim 1 characterized in that the attachment section (36; 36a; 36b) has a thickness at least equal to that of the body section (35; 35c), the thicknesses being measured parallel to the axis of the spout.

3. An insert member according to either of the preceding claims characterized in that the body section comprises a flat wall (39) having a plurality of spaced ribs (38; 38b) extending outwardly from one face of the wall (39), the spaces between the ribs (38; 38b) defining the passage or passages (37; 37b; 37c)of the insert member.

4. An insert member according to claim 3 characterized in that the attachment section (36b; 36c) has a flange (34b; 34c) adjacent its periphery, this flange extending away from the attachment section in substantially the same direction as the ribs on the body section.

5. An insert member according to claim 4 characterized in that the flange (34b; 34c) is interrupted adjacent the body section (35; 35c) to provide a flowing opening (33b; 33c) through which the liquid can flow from the passage(s) (37b; 37c) in the body section to the aperture in the attachment section.

6. An insert member according to any one of the preceding claims for use with a spout having a circular inner end, the insert member (25; 25a; 25b; 25c) being characterized in that the attachment section (36; 36a; 36b; 36c) comprises a hollow ring and the body section (35; 35c) extends radially outwardly from the ring and is pivotally connected thereto by means of a flexible hinge (40).

7. An insert member according to any one of the preceding claims characterized in that the attachment section (36c) has a plurality of spaced projections (50c) extending into the aperture in the attachment section.

8. An insert member according to claim 7 characterized in that the attachment section (36c) has the form of a hollow ring and in that the projections (50c) extend radially-inwardly into the circular aperture in the ring.

9. A collapsible container (20) capable of containing liquid and having a spout (21; 21a; 21b) through which liquid can leave the container, the container being characterized in that it has an insert member (25; 25a; 25b; 25c) according to any one of the preceding claims disposed within the container and mounted upon the spout.

10. A collapsible container according to claim 9 characterized in that a wall-engaging member (50; 50a; 50b; 34b; 50c; 34c; 50d; 50e) is provided extending inwardly beyond the inner end of the spout which that, as the liquid leaves the wall and the walls of the container collapse, the wall-engaging member will engaging the walls (24) of the container (20), thereby preventing the walls being sucked into the spout and blocking the flow of liquid therethrough.

11. A collapsible container according to claim 10 characterized in that a valve member (47) is disposed within the spout and is movable relative thereto to control the flow of liquid through the spout, and in that the wall-engaging member (50) is mounted on the valve member.

12. An empty collapsible container according to any one of claims 9 to 11 characterized in that the container comprises two superimposed sheets (23, 24) of liquid-impervious flexible material sealed in a liquid-tight manner to one another around their peripheries (22, 22a), the spout (21) extends outwardly from one of the sheets, and the insert member (25) lies flat between the superimposed sheets.

13. A method of producing a collapsed container having a spout and a form insert disposed within the

container and mounted on the spout, the method comprising affixing a spout (21) to a first web (230') of liquid-impervious material, bringing the first web (230') of material adjacent a second web (240') of liquid-impervious material and sealing the two webs of material to one another along a closed contour surrounding the spout (21) to form the collapsed container (20) characterized in that, before the webs (230', 240') are sealed to one another, the insert member (25), which has an attachment section (36) having an aperture therethrough and an elongate body section connected to the attachment section and having at least one continuous longitudinal passage (37) open along its length, is mounted on the spout by means of its attachment section such that, after the webs are sealed to one another, the insert member is disposed between the opposed webs forming the opposed walls of the finished container.

AMENDED CLAIMS

[received by the International Bureau on 10 September 1985 (10.09.85); original claims 1–13 unchanged; claims 14–19 added (9 pages)]

14. A substantially flat collapsed container (20) comprising opposed, superimposed, substantially flat walls (23, 24) and a spout (21; 21a; 21b) extending outwardly from one of the walls (23,24) adjacent one end of the container (20), the container (20) being capable of holding liquid and collapsing as the liquid is withdrawn therefrom via the spout (21; 21a; 21b) the container (20) being characterized by an insert member (25; 25a; 25b; 25c) comprising an attachment section (36; 36a; 36b; 36c) connected to the spout (21; 21a; 21b) and an elongate body reaction (35; 35c) flexibly attached to the attachment section (36; 36a; 36b; 36c), the body section (35; 35c) having a flat, flexible wall (39) having a plurality of spaced ribs (38; 38b) extending outwardly from one face of the wall (39), thereby providing between the ribs (38; 38b) one or more passages (37; 37b; 37c) disposed side-by-side

and open to the interior of the container (20), such that, as liquid leaves the container (20) and the walls (23, 24) of the container (20) collapse about the insert member (25; 25a; 25b; 25c), the passages (37; 37b; 37c) will direct the liquid to the spout (21; 21a; 21b).

15. A collapsible container (20) having a spout (21; 21a; 21b) extending outwardly therefrom, the spout (21; 21a; 21b) having a passageway through which liquid can leave the container, the container being characterized in that the spout (21; 21a; 21b) has an socket (30; 30a; 30d) at its inward end and in that an insert member (25; 25a; 25b; 25c) is disposed within the container (20) so that the container can collapse about the insert member (25; 25a; 25b; 25c) as the contents of the container (20) are removed through the spout (21; 21a; 21b), the insert member (25; 25a; 25b; 25c) comprising an attachment section (36; 36a; 36b; 36c) fitting into the socket (30; 30a; 30d) and an elongate body section (35; 35c) flexibly connected to the attachment section (36; 36a; 36b; 36c), the attachment section (36; 36a; 36b; 36c) having an aperture extending

therethrough, the attachment section (36; 36a; 36b; 36c) being of larger cross-section than the passagway in the spout (21; 21a; 21b) such that a valve member (47) mounted in the passageway in the spout (21; 21a; 21b) can pass through the aperture in the attachment section (36; 36c; 36b; 36c), cooperating members (31, 41; 41b) being provided on the spout (21; 21a; 21b) and the attachment section (36; 36a; 36b; 36c) to retain the attachment section (36; 36a; 36b; 36c) in the socket (30; 30a; 30d).

16. A collapsible container (20) for liquids, the container (20) comprising two superimposed substantially flat walls (23, 24) of liquid-impervious material sealed in a liquid-tight manner to one another about their peripheries (22, 22a) and a spout (21; 21a; 21b) extending outwardly from one of the walls (23, 24) characterized in that an insert member (25; 25a; 25b; 25c) extends from the spout (21; 21a; 21b) into the remote reaches of the interior of the container (20), the insert member (25; 25a; 25b; 25c) comprising an attachment section (36; 36a; 36b; 36c) secured to the

spout (21; 21a; 21b), the spout (21; 21a; 21b) and attachment section (36; 36a; 36b; 36c) bearing mechanically interfitting cooperating members (31, 41; 41b), and the insert member (25; 25a; 25b; 25c) further comprising an elongate body section (35; 35c) flexibly connected at one end to the attachment section (36; 36a; 36b; 36c) and having one or more continuous longitudinal passages (37; 37b; 37c) capable of communicating along their length with a body of liquid in the container (20) and being capable of maintaining the integrity of the one or more passages (37; 37b; 37c) from the liquid body to the spout (21; 21a; 21b) as the walls (23, 24) collapse about the insert member (25; 25a; 25b; 25c) as liquid is removed from the container (20) via the spout (21; 21a; 21b), the cooperating members (31, 41; 41b) enabling the elongate body section (35; 35c) to extend transversely from the spout (21; 21a; 21b) so as to lie flat between the superimposed walls (23, 24) before the container (20) is filled but to swing flexibly from the walls (23, 24) into the body of liquid when the container is filled.

17. A substantially flat collapsed container (20) for liquids, the container (20) comprising opposed substantially flat walls (23, 24) and a spout (21; 21a; 21b) extending outwardly from one of the walls (23, 24) characterized in that an insert member (25; 25a; 25b; 25c) extends from the spout (21; 21a; 21b) into the remote reaches of the interior of the container (20), the insert member (25; 25a; 25b; 25c) comprising an elongate body section (35; 35c) having one or more continuous longitudinal passages (37; 37b; 37c) capable of communicating along their length with a body of liquid in the container (20) and being capable of maintaining the integrity of the one or more passages (37; 37b; 37c) from the liquid body to the spout (21; 21a; 21b) as the walls (23, 24) collapse about the insert member (25; 25a; 25b; 25c) as liquid is removed from the container (20) via the spout (21; 21a; 21b) the insert member (25; 25a; 25b; 25c) further comprising an attachment section (36; 36a; 36b; 36c) flexibly connected to one end of the elongate body section (35; 35c) and also secured to the spout (21; 21a; 21b), the

spout (21; 21a; 21b), and attachment section (36; 36a; 36b; 36c) bearing mechanically interfitting cooperating members (31, 41; 41b) which enable the elongate body section to extend transversely from the spout (21; 21a; 21b) so as to lie flat between the superimposed walls (23, 24) before the container (20) is filled but to swing flexibly from the walls (23, 24) into the body of liquid when the container is filled.

18. A substantially flat collapsed container (20) for liquids, the container (20) comprising opposed substantially flat walls (23, 24) and a spout (21; 21a; 21b) extending outwardly from one of the walls (23, 24) characterized in that an insert member (25; 25a; 25b; 25c) extends from the spout (21; 21a; 21b) into the remote reaches of the interior of the container (20), the insert member (25; 25a; 25b; 25c) comprising an elongate body section (35; 35c) having one or more continuous longitudinal passages (37; 37b; 37c) with their inner ends connected to the spout (21; 21a; 21b), the longitudinal passages (37; 37b; 37c) being capable of communicating along their length with a body of

liquid in the container (20) and being capable of maintaining the integrity of the one or more passages (37; 37b; 37c) from the liquid body to the spout (21; 21a; 21b) as the walls (23, 24) collapse about the insert member (25; 25a; 25b; 25c) as liquid is removed from the container (20) via the spout (21; 21a; 21b), the end of the elongate body section adjacent the spout being flexibly attached to, and in fluid communication with, the spout (21; 21a; 21b), so as to enable the elongate body section (35; 35c) to extend transversely from the spout (21; 21a; 21b) so as to lie flat between the superimposed walls (23, 24) before the container (20) is filled but to swing flexibly from the walls (23, 24) into the body of liquid when the container is filled.

19. A method of producing a collapsed container (20) having a spout (21; 21a; 21b) and an insert member (25; 25a; 25b; 25c) disposed within the container (20) and mounted on the spout (21; 21a; 21b), the method comprising affixing a spout 21; 21a; 21b) to a first web (230') of material, bringing the first web of material

(230') of material adjacent to a second web (240') of material and joining the two webs of material to one another along a closed contour surrounding the spout (21; 21a; 21b) to form the collapsed container (20) characterized in that, before the webs (230', 240') are sealed to one another, the insert member (25; 25a; 25b; 25c), which has an elongate body section (35; 35c) upon which the container (20) can collapse as liquid is removed therefrom, and which has one or more continuous longitudinal passages (37; 37b; 37c) open along their length and at their end adjacent the spout (21; 21a; 21b), is flexibly secured to the spout (21; 21a; 21b), with the open end(s) of the passage(s) (37; 37b; 37c) in fluid communication with the spout (21; 21a; 21b), and with the elongate body section (35; 35c) extending transversely therefrom so that after the webs (230', 240') are joined the elongate body section (35; 35c) will lie flat between the two webs (230', 240') but that as the container (20) is filled with liquid, the elongate body section (35; 35c) will swing into the liquid, thereby enabling the container (20) to collapse

around the insert member (25; 25a; 25b; 25c) as liquid is removed therefrom.

FIG. 1

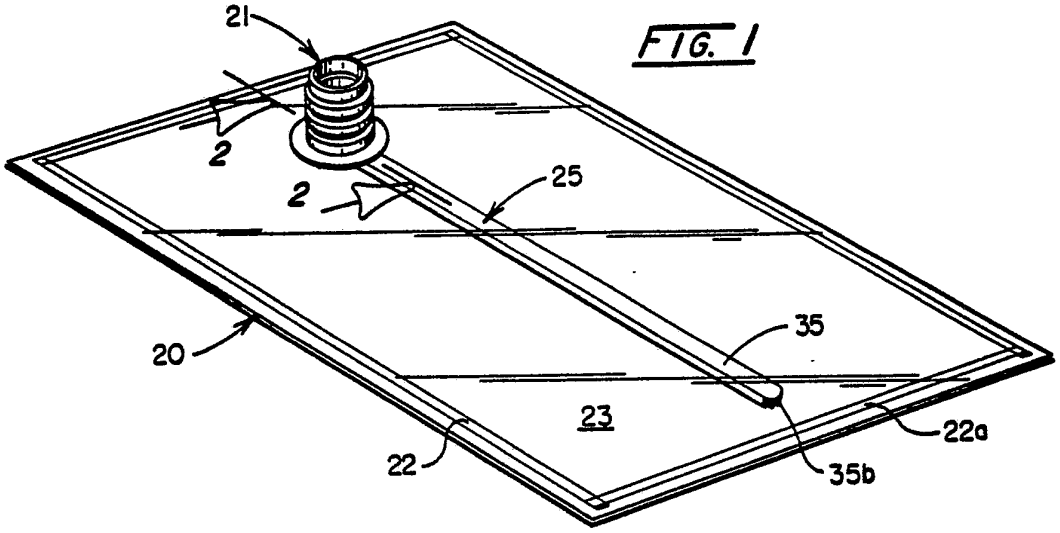
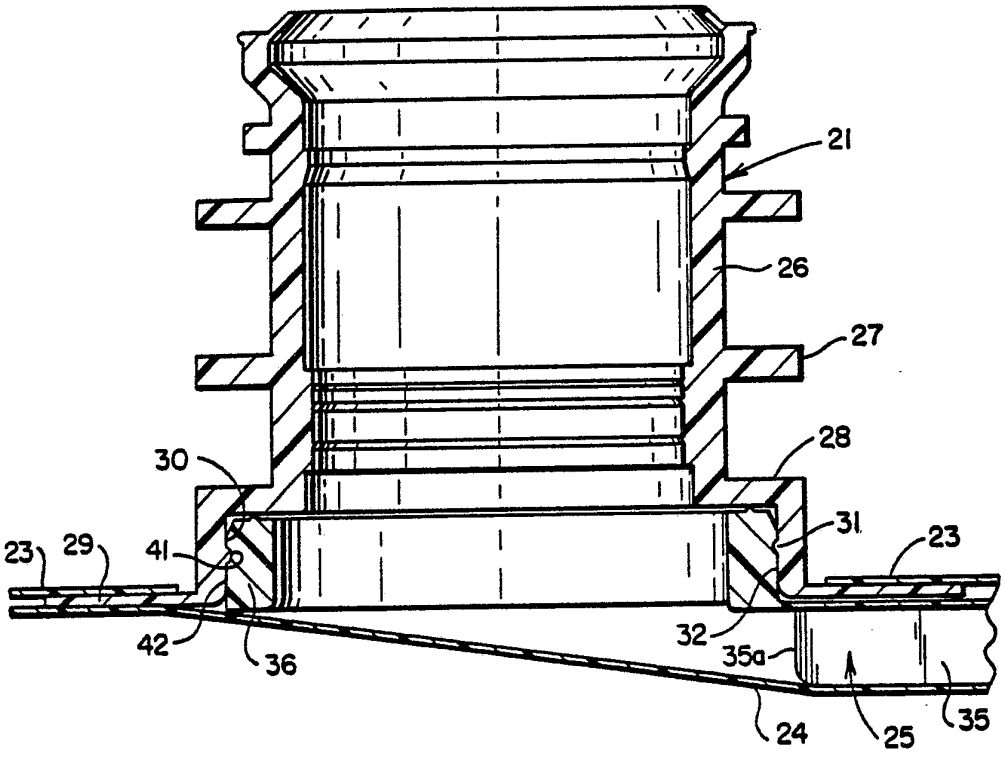

21
2
2
25
20
35
23
22a
22
35b

FIG. 2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30
31
23
23
29
41
32
42
36
35a
24
25
35

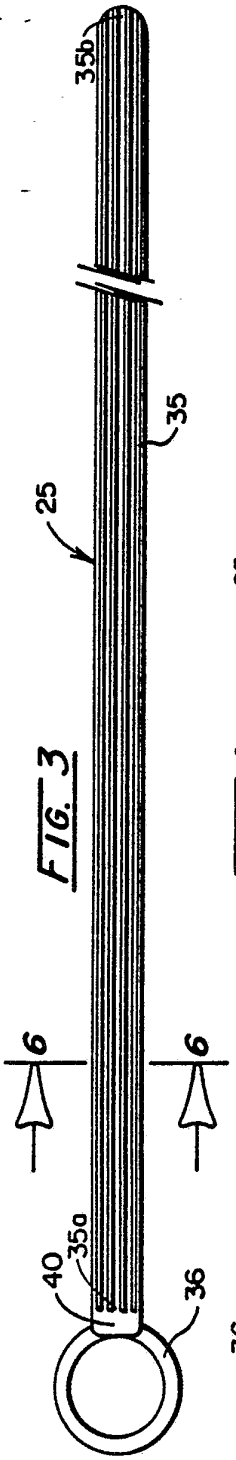


FIG. 3

FIG. 4

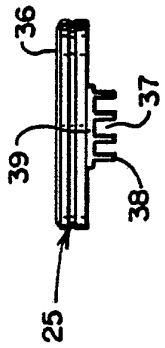


FIG. 5

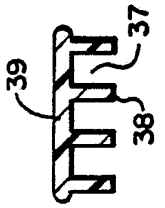


FIG. 6

FIG. 7

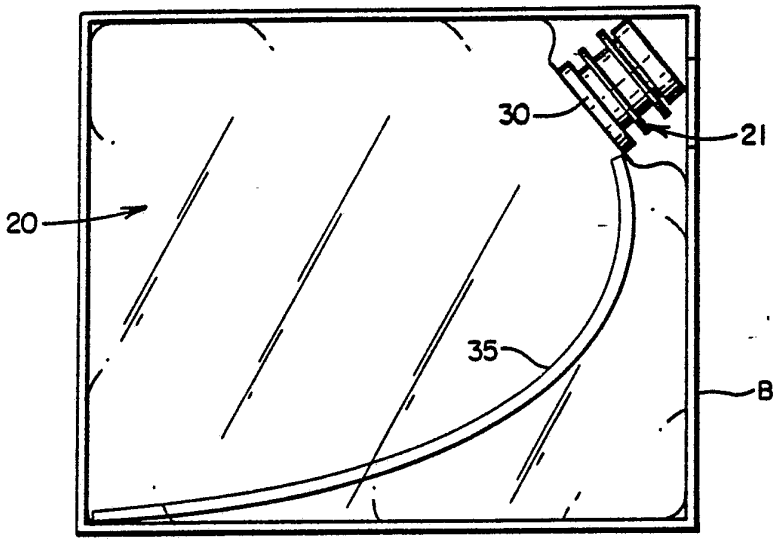


FIG. 8

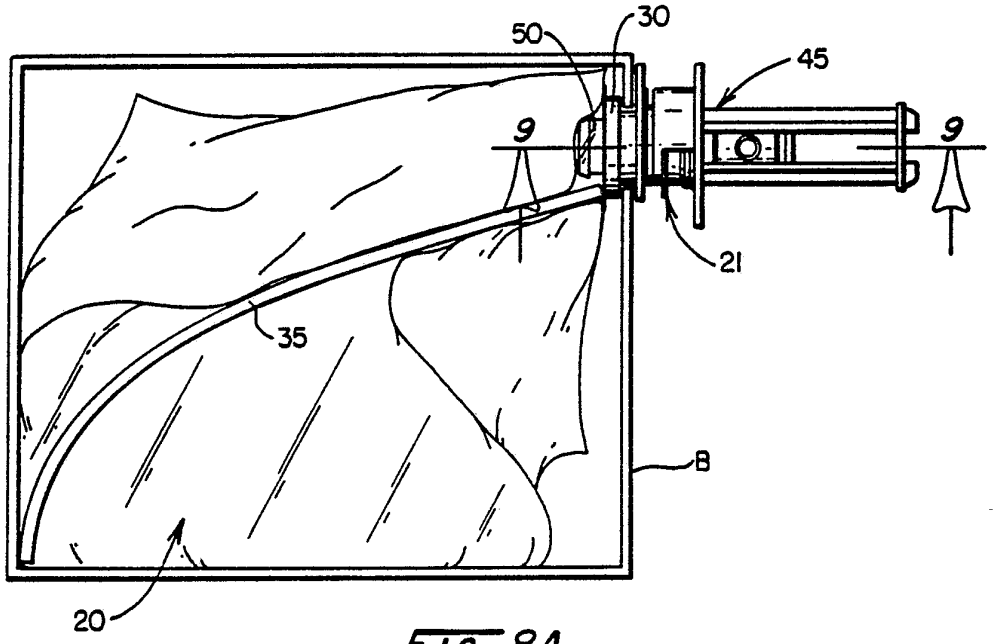


FIG. 8A

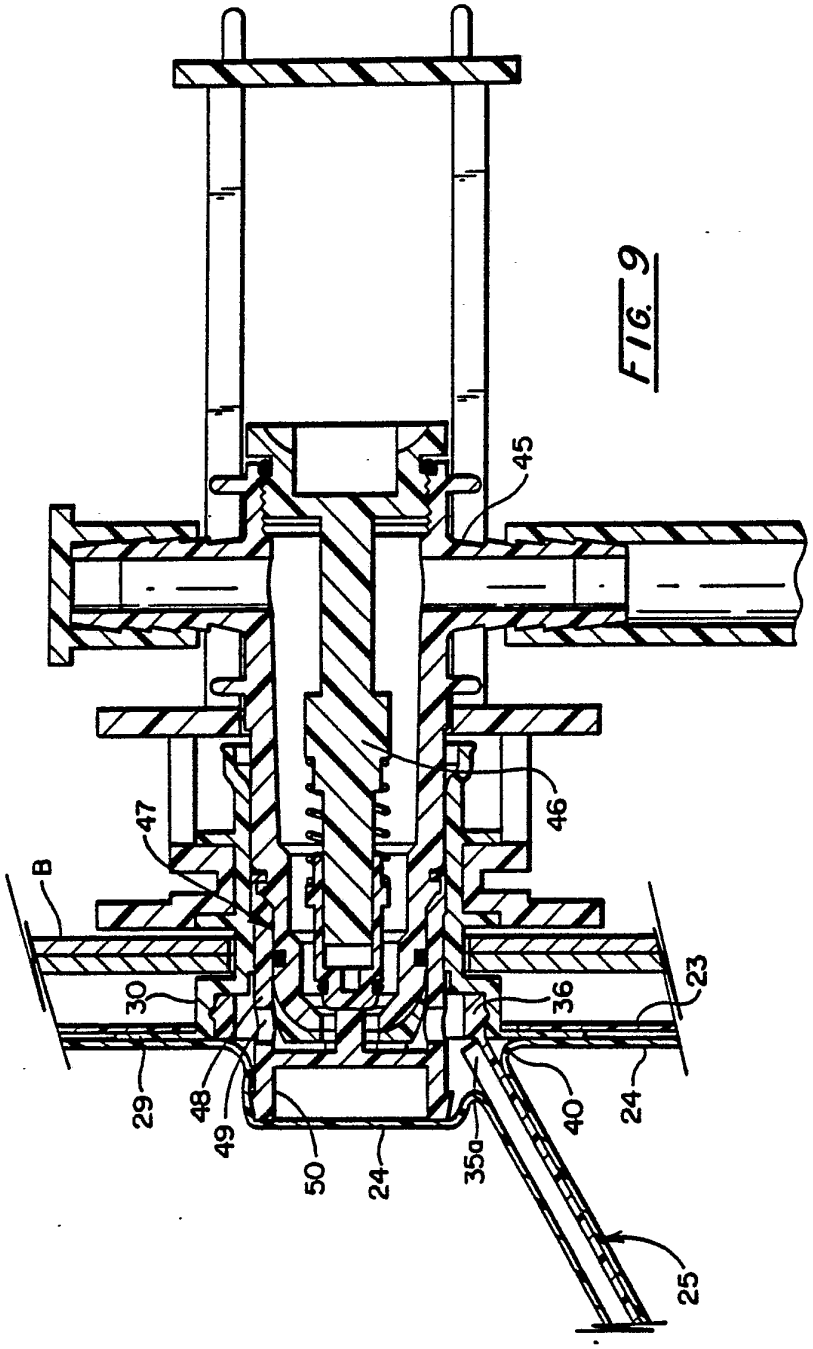


FIG. 9

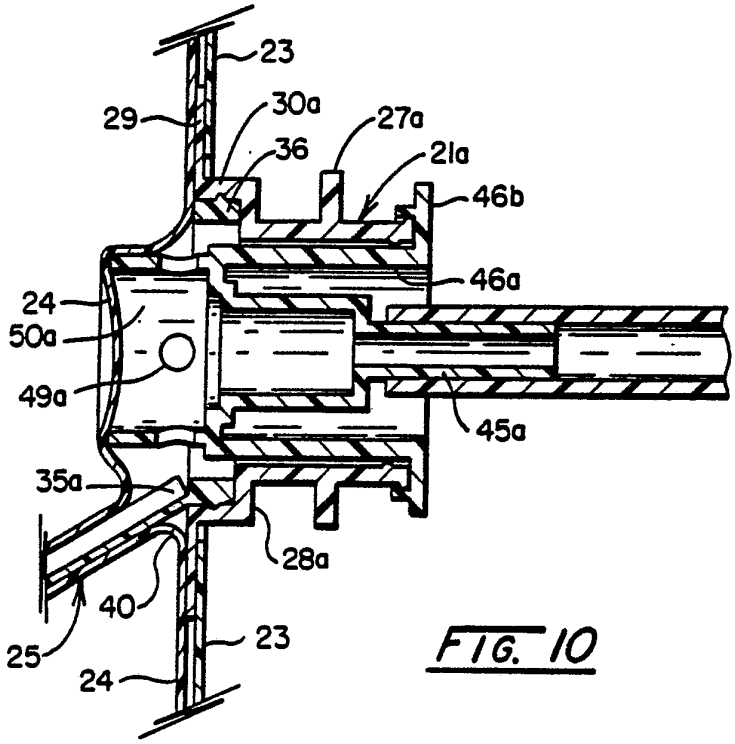

23
29
30a
27a
36
21a
46b
46a
24
50a
49a
45a
35a
28a
40
25
23
24

FIG. 10

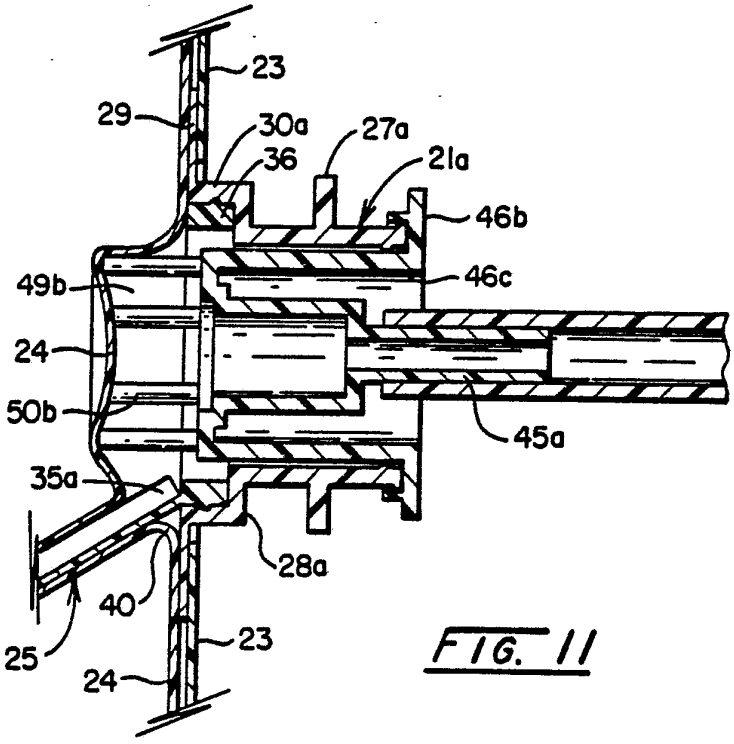

23
29
30a
27a
36
21a
46b
49b
46c
24
50b
45a
35a
28a
40
25
23
24

FIG. 11

FIG. 12

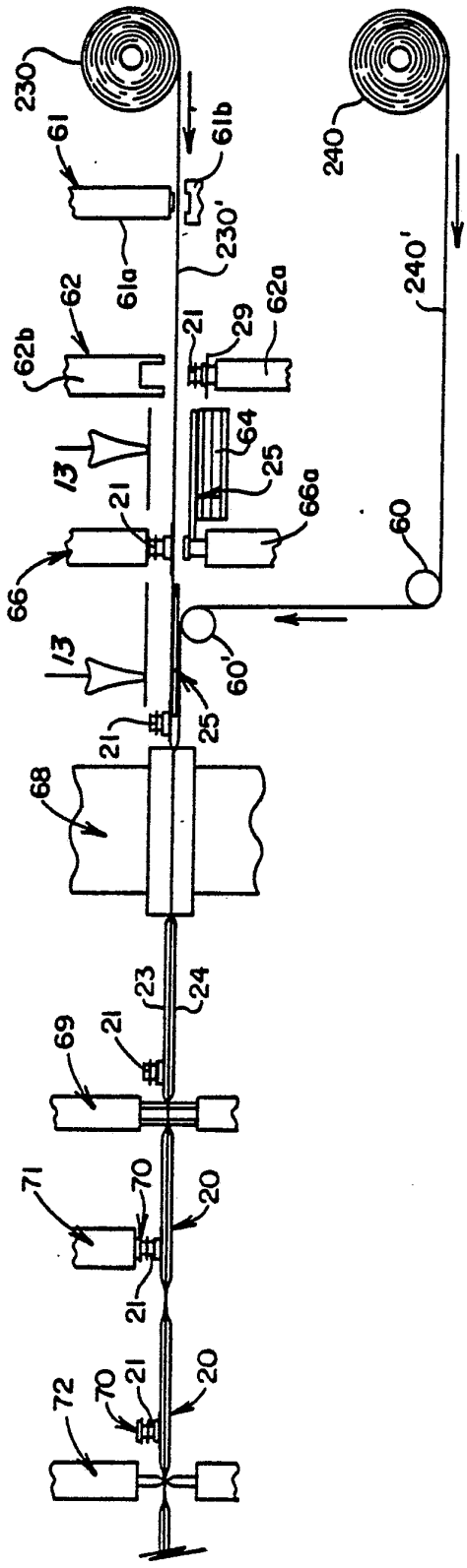
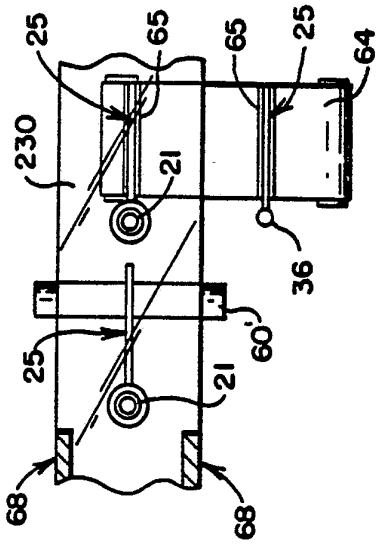

230
61
61b
230'
240
240'
61a
62
62a
62b
21
29
64
25
66a
13
66
60
60'
68
23
24
69
71
70
20
72

FIG. 13


25
65
64
230
21
36
60'
68

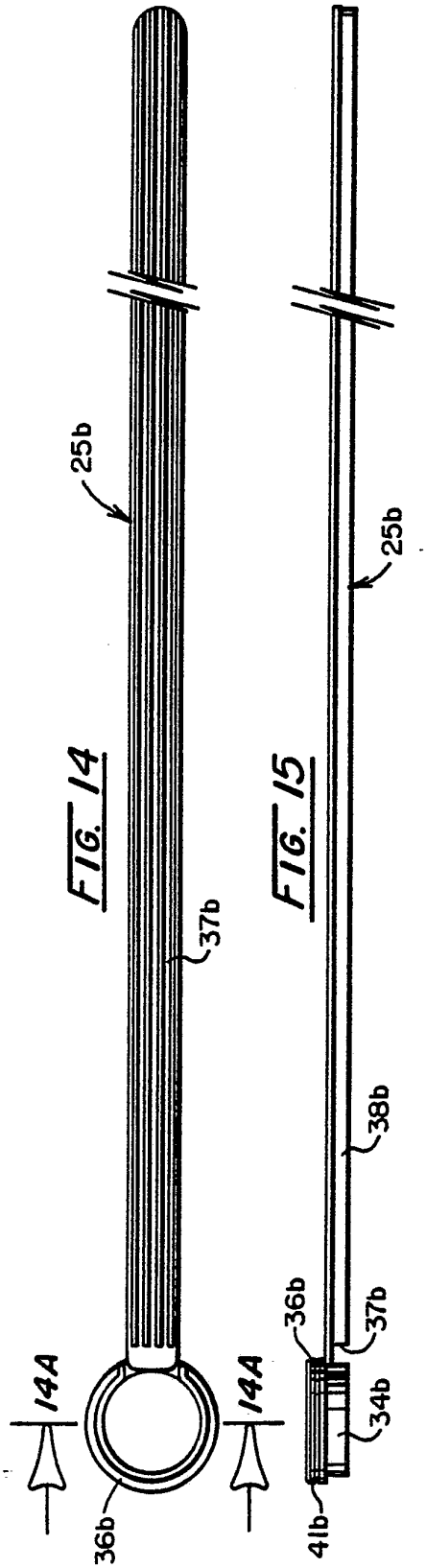


FIG. 14

FIG. 15

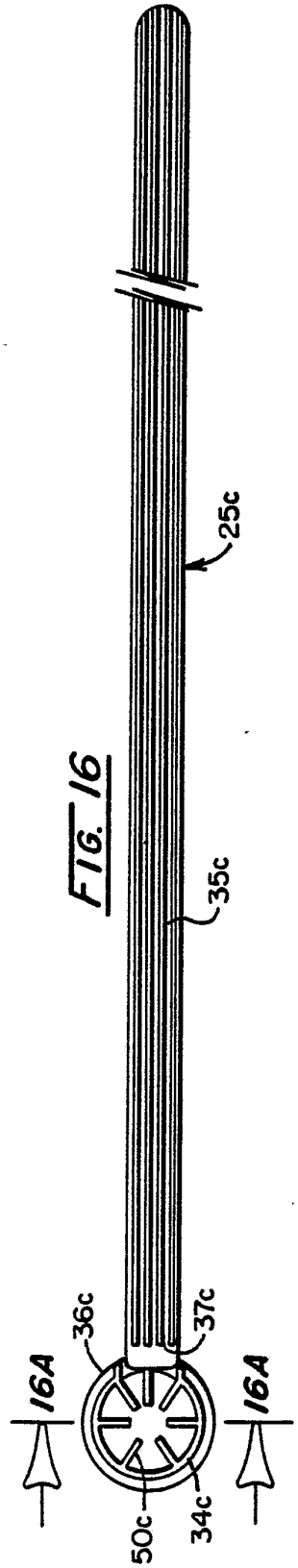


FIG. 16

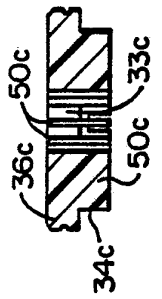


FIG. 16A

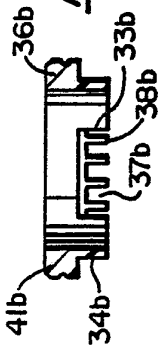


FIG. 14A

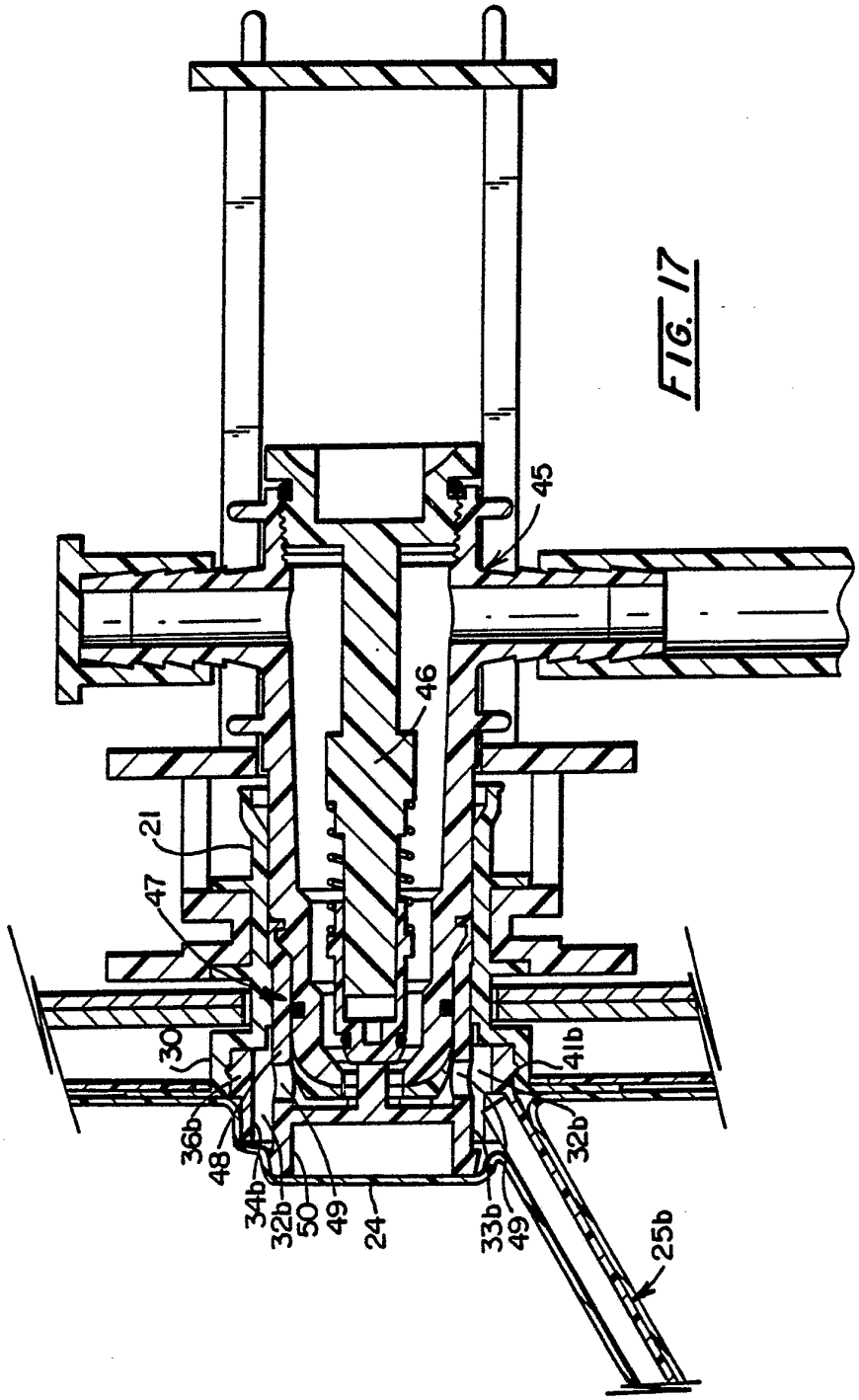


FIG. 17

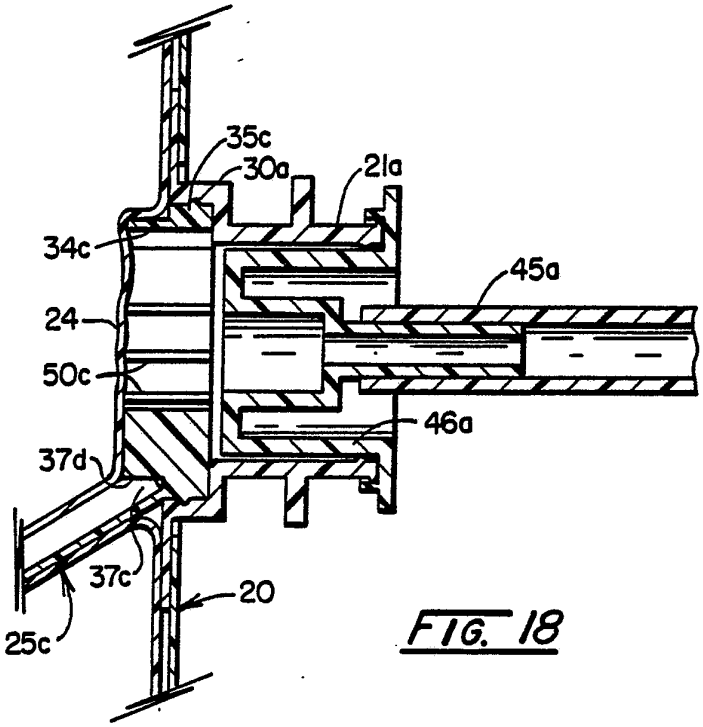

35c
30a
21a
34c
45a
24
50c
46a
37d
37c
20
25c

FIG. 18

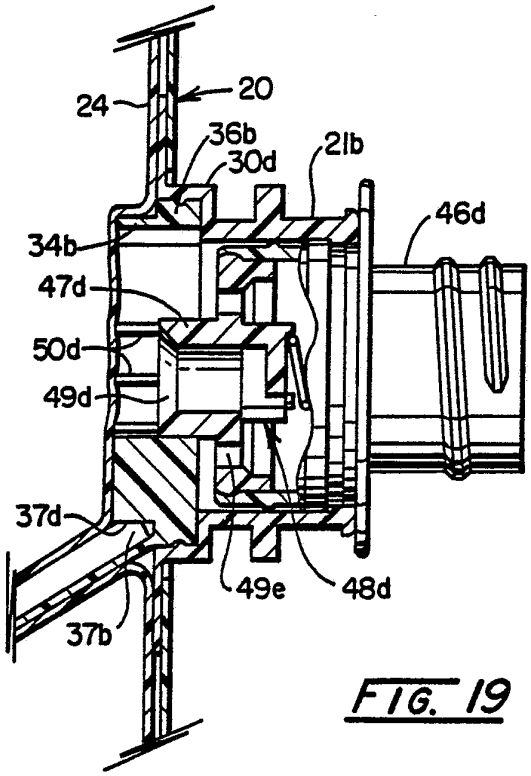

24
20
36b
30d
21b
46d
34b
47d
50d
49d
37d
49e
48d
37b

FIG. 19

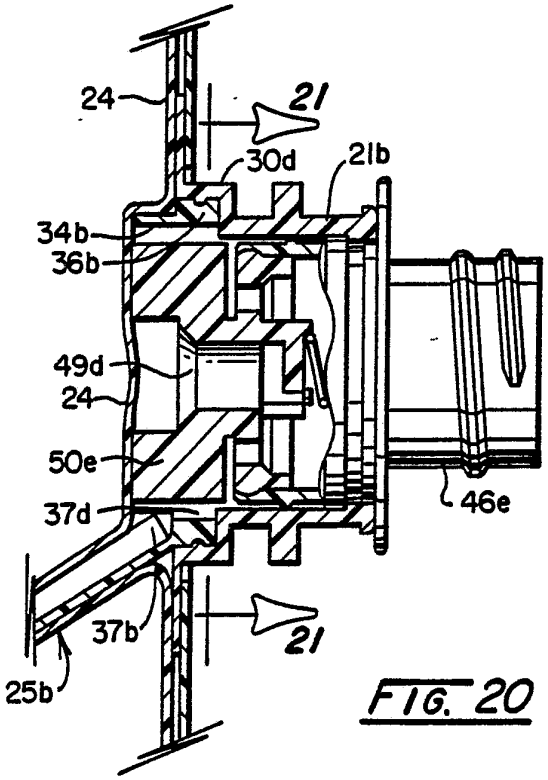

24
21
30d
21b
34b
36b
49d
24
50e
37d
46e
37b
21
25b

FIG. 20

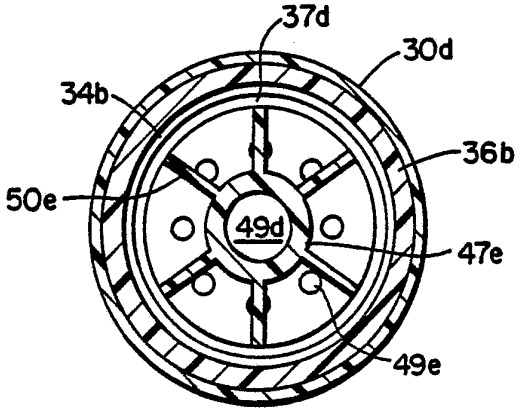

37d
30d
34b
36b
50e
49d
47e
49e

FIG. 21

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 85/00520

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[4]: B 65 D 77/06; B 67 D 3/04

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[4]	B 65 D; B 67 D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	GB, A, 1473524 (PLANT INDUSTRIES) 11 May 1977 see page 3, lines 31-46; figures 1-3	1
A	US, A, 4087026 (PETTERSON) 2 May 1978 see column 5, line 36 - column 6, line 15; figures 9-13	1
A	US, A, 4148416 (GUNN-SMITH) 10 April 1979 see column 3, line 33 - column 4, line 52; figures 1-11	1
A	US, A, 3081911 (SCHOLLE) 19 March 1963 see column 2, lines 26-44; figures 1-3	1,9,10
A	WO, A, 83/01605 (BOND) 11 May 1983 (cited in the application) & US, A, 4421146	

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* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
20th June 1985	10 JUIL. 1985
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	G.L.M. Kruydenberg

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/US 85/00520 (SA 9280)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 02/07/85

The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
GB-A- 1473524	11/05/77	None		
US-A- 4087026	02/05/78	None		
US-A- 4148416	10/04/79	CH-A-	617873	30/06/80
		GB-A-	1587731	08/04/81
US-A- 3081911		None		
WO-A- 8301605	11/05/83	AU-A-	1015383	18/05/83
		EP-A-	0093157	09/11/83
		US-A-	4421146	20/12/83
		US-A-	4445551	01/05/84
		CA-A-	1178988	04/12/84