(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 590 902 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **93307617.6**

(22) Date of filing : **24.09.93**

(51) Int. Cl.[5] : **B65D 90/20**

(30) Priority : **26.09.92 GB 9220450**
19.02.93 GB 9303383
09.06.93 GB 9311919

(43) Date of publication of application :
06.04.94 Bulletin 94/14

(84) Designated Contracting States :
BE DE FR NL

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(54) Transport system.

(57) A stand for a flexible bag (52) of flowable material, such as thixotropic material, has a base (10), upright struts (12), transverse bars (14) and a flexible receptacle (18) for the bag (52). The struts (12) are received in tubular seams (42) of the receptacle (18) and the bars (14) are received in tubular seams (44) before the frame is completely assembled. An outlet (54) from the bag extends downwardly through an opening (48) at the lower end of the receptacle.

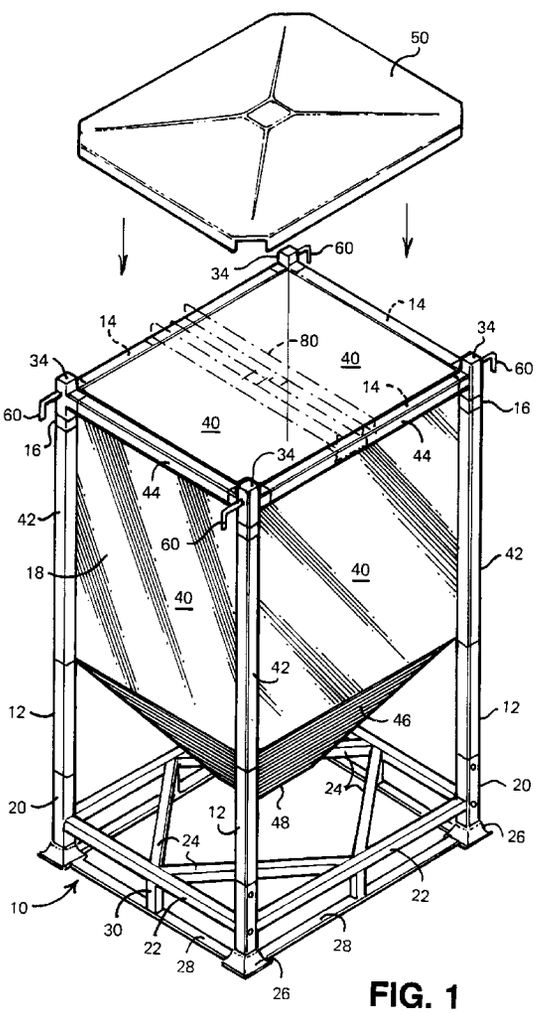

FIG. 1

EP 0 590 902 A1

The present invention relates to transport systems for flowable materials, such as viscous and/or thixotropic and/or semi-fluids and granular materials. The invention is more particularly concerned with a transportable stand for a container for storing and dispensing flowable materials.

A conventional means of transporting fluids is with the use of steel drums. When the liquids are highly viscous and possibly also thixotropic, emptying of the drums is a problem. Hitherto, this problem has been solved by using a dispenser which comprises a large piston or follower plate matching the interior of the drum. A compressed air system depresses the piston to effect a priming action at the inlet of a pump mounted on the piston. When the container is empty, there then remains the problem of disposing of the drum bearing in mind in particular the harm which the residue in the drum can cause to the environment. Attempts to line the drum with a plastics bag have not been successful for viscous fluids, such as printing inks, because it is necessary to apply suction to the lower outlet from the bag to extract the viscous contents at a reasonable rate and such suction causes the bag to fold up and block the outlet.

According to one aspect of the present invention, a stand for a flexible bag for a flowable material comprises a framework having a base, upright struts detachably mounted on the base and transverse bars detachably connected by respective ends to the upper ends of the upright struts, and a flexible receptacle for the bag, the receptacle having a sidewall with spaced apart upright tubular seams or the equivalent thereon and with transverse upper tubular seams or the equivalent about an upper edge of the receptacle, the arrangement being such that the upright tubular seams or their equivalents can be threaded on to the upright struts upstanding from the base and the transverse bars can be inserted into the transverse seams or their equivalents and then secured to the upright struts, whereby the receptacle is suspended in the stand.

Preferably, the flexible receptacle has an opening at its lower end, which may be pyramidal, so that an outlet of the flexible bag, whose contents are to be dispersed, can extend through such opening. To prevent the regions of the flexible bag adjacent its outlet from extruding through the opening at the lower end of the flexible receptacle, an apertured disc can be placed between the flexible receptacle and the flexible bag so that it surrounds the outlet of the latter. Preferably, the disc is of flexible material.

According to another aspect of the invention, a support for a flexible bag for a flowable material comprises a receptacle for the bag, the receptacle having at its lower end an opening through which an outlet of the flexible bag can extend, and an apertured disc which can be placed between the flexible support and the flexible bag so as to surround the outlet of the latter to prevent the regions of the flexible bag adjacent its outlet from extruding through the lower opening in the receptacle.

When the bag contains a viscous fluid which must be extracted by applying suction to the bag outlet, the upper end of the bag is restrained to prevent the bag from folding over the outlet and blocking it. However, the stand or support of the invention is also useful for supporting bags of flowable granular material, such as granules of plastics material to be used in a moulder.

The base of the stand can be designed to the standard dimensions of a pallet to enable a fork-lift truck to be used to lift the stand and the filled bag supported thereby.

The upright struts and transverse bars are preferably of tubular material, such as square section tube. The upright struts can then be fitted to the base by means of spigots. Also connector pieces can be provided for connecting the transverse bars to the uprights, each connector piece comprising three spigots and/or sockets, two for receiving adjoining tubular transverse bars and a third at right angles to the other two for receipt in or over the upper end of a tubular upright.

The flexible receptacle is advantageously made of strong plastics material to enable it to be assembled over the joints during erection of the stand.

GB-A-2250976A discloses a framework supporting a flexible receptacle but does not disclose a bag in the receptacle nor a flexible receptacle having a lower opening.

A lid can be provided for closing off the upper end of the receptacle. The stand can be provided with bolts, preferably one at each upper corner, so that they engage over the edge of the lid to hold it in place.

According to a further aspect of the invention, a support for a flexible bag for a flowable material comprises a receptacle for the bag, the receptacle having at its lower end an opening through which an outlet of the flexible bag can extend, and a lid adapted to be placed over the upper end of the receptacle to close off the latter, bolts being provided about the periphery of the upper end of the receptacle so as to engage over the edge of the lid and hold it in place. Preferably, the bolts are provided one at each corner of the receptacle, which is substantially square or rectangular in section.

According to yet another feature of the invention a support for a flexible bag for a flowable material comprising a receptacle for the bag, the receptacle having at its lower end an opening through which a tubular outlet spigot of the flexible bag can extend, such spigot being closed at its upper end by a membrane, in which a coupling is provided for connecting a discharge pipe to the tubular spigot, the coupling including an adapter bush releasably connectable to the spigot, and a tube piece sealingly slidable in the

adapter bush and attachable or attached to the discharge pipe and having at its upper end a cutting edge, means being provided for advancing the tube piece in the adapter bush to cause the cutting edge to pierce the membrane.

Preferably, the adapter brush has an external screw thread for receipt in the tubular spigot. The advancing means having a ring nut engaging a collar on the tube piece and screw-threadedly received on the adapter bush.

The invention is further described, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of an erected bag support according to the invention;

Fig. 2 is an elevation of a base of the support;

Fig. 3 is an elevation of one of four connecting pieces of the support;

Fig.4 is a perspective view of the flexible bag in conjunction with an "anti-extrusion" disc;

Fig.5 is a sectional detail, showing the "anti-extrusion" disc in place;

Fig.6 is a plan view of the "anti-extrusion" disc;

Fig.7 is a fragmentary detail, partially sectioned, of the upper end of the stand, showing a lid-securing bolt;

Fig. 8 is a plan view of the detail of Fig. 7.

Fig. 9 is a plan view of a brace which may be used for restraining the upper end of the bag;

Fig. 10 is a side elevation of a tensioner support for the bag;

Fig. 11 is a front elevation of the tensioner support;

Fig. 12 is an elevation of a bag outlet system associated with the bag support;

Fig. 13 is an elevation of another bag outlet system in which a means is provided for piercing the bag;

Fig. 14 is a sectional view of the bag piercing means before operation; and

Fig. 15 is a similar view but showing the bag pierced.

Referring to Fig. 1, a stand according to the invention comprises a rectangular or square base 10, four upright struts 12 upstanding from the corners of the base 10 and four cross bars 14 interconnecting the upper ends 16 of the upright struts 12. The stand includes a flexible receptacle 18 to receive a flexible bag 52 (see Fig.4) to be supported.

The base 10, as shown in Figs. 1 and 2, comprises a welded steel structure having four corner uprights 20, four cross-pieces 22 interconnecting the uprights 20, four braces 24 interconnecting the cross-pieces 22, four feet 26 attached to the lower ends of the uprights 20, four straps 28 interconnecting the feet 26 and struts 30 connecting the centres of the cross-pieces 22 to the centres of the straps 28. Preferably, the base 10 is dimensioned in accordance with standard pallet dimensions so that it can be engaged and lifted by means of a fork-lift truck. Thus, the overall dimensions of the base 10, as seen in plan, are preferably 1200 mm by 1000mm with the feet 26 projecting an additional 50mm and the space between the cross-pieces 22 and the straps 28 preferably measures 120 mm vertically. The uprights 20, the cross-pieces 22, the braces 24 and the struts 30 are preferably made from square section tube.

The four upright struts 12 are preferably of square section steel tube, each being provided at its lower end with a square spigot 32 which can be removably inserted in a respective base upright 20, as shown in Fig.2.

As shown in Figs. 1 and 3, each of four connector pieces 34 connects the upper end 16 of a respective upright strut 12 to the adjacent ends 36 of adjoining cross-bars 14. To this end, each connector piece 34 comprises an upright square section tubular body 35 with a vertical square spigot 37 received in its lower end and two horizontal square spigots 38 welded to adjoining sides of the body 35. The vertical spigot 37 can be removably inserted in the upper end 16 of the respective upright strut 16 and the horizontal spigots 38 can be removably inserted in the ends 36 of the cross-bars 14, as shown in Fig.3. In an alternative shown in Figs. 7 and 8, the spigots 38 are replaced by sockets 37a which receive spigots 39 on the ends of the cross-bars 14.

The flexible receptacle 18 is itself bag-like. It comprises four integral side wall portions 40 adjoining one another at four upright tubular seams 42 through which the upright struts 12 are removably threaded or inserted. The upper edges of the four sidewall portions 40 have transverse tubular seams 44 through which the cross-bars 14 are removably threaded or inserted.

To assemble the stand, the upright struts 12 are placed on the base 10 and the receptacle 18 is threaded by its upright tubular seams 42 over the struts 12. The cross-pieces 14 are then threaded through the transverse seams 44 and are interconnected thereafter by the connector pieces 34, it being possible to slide the receptacle 18 up and down on the upright struts 12 at this time to facilitate assembly. Also, the material of the receptacle 18 has sufficient flexibility to enable the horizontal spigots 38 of the connector pieces 34 to be inserted in the cross-bars 14 or the spigots 39 of the cross-bars to be inserted in the sockets 37a. The connector pieces 34 are then lowered by their vertical spigots 37 into the upper ends 16 of the upright struts 12. The stand is then ready for use.

In the illustrated embodiment, the receptacle 18, which is preferably of strong, possibly re-inforced, plastics material, has a funnel-shaped or inverted frusto-pyramidal lower end 46. The receptacle 18 can thus receive a bag 52 of flowable material to be trans-

ported and dispensed, with a lower outlet spigot or gland 54 (see Figs.5 and 12) of the bag 52 extending through the lower opening 48 formed by the funnel-shaped lower end 46. For transport, the upper end of the receptacle 18 can be closed by a lid 50.

There is a risk of the portions of the flexible bag 52 adjacent the gland 54 extruding through the receptacle opening 48, particularly during transport. To minimize this risk, an "anti-extrusion" disc 56 (Figs. 4, 5 and 6) is disposed at the bottom of the receptacle 18. The disc 56 has a central aperture 58 which registers with the receptacle opening 48. The gland 54 passes through the disc aperture 58 and the receptacle opening 48 so that the "anti-extrusion" disc lies between the receptacle 18 and the bag 52 to provide additional support for the regions of the flexible bag 52 adjacent its gland 54. The disc 56 is made of flexible material, such as a polyester, so that it can conform to the frusto-pyramidal shape of the lower end 46 of the receptacle.

The lid 50 can be secured in place by four bolts 60, one of which is shown in detail in Figs. 7 and 8. Each bolt 60 comprises a rod 62 having a cranked outer end or handle 64. It passes through aligned holes 66,68 (see also Fig.3) in the respective connector piece 34 so that the bolt can be pushed in as shown in Figs. 7 and 8 to overlie the adjacent corner of the lid 50. The bolts 60 can be pulled out as shown in Fig.1 to enable the lid 50 to be removed.

A drive rivet 70 is inserted in the rod 62 adjacent the handle 64. Its head 72 engages the edge of the hole 66 to prevent the bolt 60 from being withdrawn when the handle 64 is turned downwardly as shown. The hole 66 is keyhole shaped so that, by turning the handle 64 through 180° to point upwardly, the head 72 of the rivet 70 can pass through the hole 66. To hold the bolt 60 captive on the connector piece 34, another drive rivet 74 is inserted in the free end of the rod 62. The head of the drive rivet 74 cannot pass through the hole 68.

A hole 76 is formed in the rod 62 so as to lie adjacent the connector piece 34 when the bolt 60 is pushed in as shown in Figs. 7 and 8. A security tag can be attached to the bolt by means of a wire (not shown) or the like passed through the hole 76. The bolt cannot be released without breaking the security tag and removing the wire.

As can be seen from Fig.1, the four bolts 60 are at the corners of the upper end of the stand.

To facilitate the dispensing of a viscous liquid, such as printing ink, which must be sucked out of the bag 52, a suitable support structure, such as is described below with reference to Figs. 9 to 11, can be mounted on the cross bars 14 or on the connector pieces 34 and can be attached to the upper end of the bag to inhibit folding of the lower end of the bag over the inlet end of the outlet tube.

After the bag supported by the stand has been emptied, the bag and its residues can be removed and sent for disposal. The stand can then be dismantled and returned for re-use.

For different capacity stands, the upright struts 12 and the receptacles 18 can be supplied in various lengths, the remaining dimensions of the stand, particularly of its base 10 being unaltered.

Fig. 9 shows a cross brace 80 which may be used to hold the upper end of the bag 52. The cross brace comprises two spaced-apart longitudinal bars 82 joined at their ends by cross bars 84 welded thereto. The longitudinal bars 82 are of angle-section, each with a flange directed upwardly whilst the cross bars 84 are of angle-section each with a flange directed downwardly. The brace 80 can thereby be laid across the upper end of the support structure as indicated by chain-dotted lines in Fig. 1. Support strips 86 are welded to the longitudinal bars 82 at the mid points of the latter and a third support strip 88 stretches between the bars 82 adjacent the strips 86. A fourth support strip 90 is pivoted by a spring-loaded bolt 92 to one of the bars 82 and can be swung into its position shown in Fig. 9 so that a hole 94 is received over a bolt 96 upstanding from the other bar 82 to secure the fourth strip 90 in place. The upper end of the flexible bag 52 has a top connection 98 (Fig. 4) provided with a collar 100. With the fourth strip 90 swung out of the way, the brace 80 can be fitted on the support structure so that the strips 86, 88 are received beneath the collar 100. The strip 90 can then be swung back to lie beneath the collar 100 and lock the top connector 98 in position. This holds the flexible bag 52 open for filling through the top connector 98 or the bottom gland 54 or for emptying through the latter.

To further facilitate emptying of the bag 52 by preventing the bag folding upon itself, the tensioner support 104 of Figs. 10 and 11 may be used instead of the cross brace 80. The tensioner support 104 comprises an A-frame 106 with lower spigots 108 that can be fitted into the upper ends of the square-section bodies 35 of two of the connector pieces 34. A cantilever 110 at the upper corner of the A-frame 106 supports a tensioner 112. A clip 114 on the free end of the rope 116 from the tensioner 112 can be fastened beneath the collar 100 of the bag top connector 98. The tensioner 112 can be set to apply a suitable tensile force to the upper end of the bag 52 to prevent it from folding over its outlet when applying suction to the latter to speed up emptying.

Referring to Fig. 12, one embodiment of discharge system for use with the stand or support for the flexible bag 52 comprises a gate valve 120 and a discharge or elbow pipe 122 connected to the gate valve and joined by a coupling 124 to the spigot 54 . A straight portion 126 of the elbow pipe 122 rests on a mounting bracket 128 which, in turn rests on the base 10 (Fig. 1) of the stand. The gate valve 120 is provided with a coupling part 130 to which a hose or

the like (not shown) can be attached as required.

The coupling 124 comprises an adapter bush 132 screwed into the spigot 54 and a ring nut 134 screwed on to the bush 132 to clamp a flange 136 on the end of the elbow pipe 122 against the bush 132. Sealing rings 138 and 140 seal the bush 132 to the spigot 54 and the pipe flange 136 to the bush 132, respectively. The gate valve 120 could be replaced by a butterfly valve 142, as shown in Fig. 13.

In the embodiment of discharge system shown in Fig. 13, the coupling 124 is replaced by a coupling 144 which is adapted to pierce a membrane 146, by which the outlet opening of the bag 52 is closed, as shown in Figs. 14 and 15. An adapter bush 132a, which is screwed into the spigot 54, axially slidably receives a tube piece 148 whose lower end is attached by the ring nut 134 to the elbow pipe 122, as shown in Fig. 13. The upper end 158 is oblique as shown in Fig. 14. A further ring nut 150 is screw threaded on to the bush 132a and engages a collar 152 on the tube piece 148. A stop ring 154 holds the ring nut 150 captive on the bush 132a and thereby normally prevents complete removal of the tube piece 148 from the bush 132a. Sealing rings 156 seal the tube piece 148 to the bush 132a.

The discharge system of Fig. 13 is coupled to the flexible bag with the coupling 144 in the state shown in Fig. 14, in which the ring nut 150 is fully unscrewed so that the oblique upper end 158 of the tube piece is fully retracted within the spigot 54 and the adapter bush 132a. To rupture the membrane 146 which closes off the bag, the ring nut 150 is screwed along the adapter piece 132a, to cause the tip 160 of the oblique upper end 158 of the tube piece to pierce the membrane 146 and cut the membrane around most of its periphery so that the central portion 146a of the membrane hangs down within the tube piece 148, as shown in Fig. 15. The valve 142 can then be used to control flow of the contents out of the bag.

Claims

1. A stand for a flexible bag (52) for a flowable material characterised in that the stand comprises a framework having a base (10), upright struts (12) detachably mounted on the base (10) and transverse bars (14) detachably connected by respective ends (36) to the upper ends (16) of the upright struts (12), and a flexible receptacle (18) for the bag (52), the receptacle (18) having a sidewall (40) with spaced apart upright tubular seams (42) or the equivalent thereon and with transverse upper tubular seams (44) or the equivalent about an upper edge of the receptacle (18), the arrangement being such that the upright tubular seams (42) or their equivalents can be threaded on to the upright struts (12) upstanding from the base (10) and the transverse bars (14) can be inserted into the transverse seams (44) or their equivalents and then secured to the upright struts (12), whereby the receptacle (18) is suspended in the stand.

2. A stand as claimed in claim 1, in which the base (10) of the stand is designed to the standard dimensions of a pallet to enable a fork-lift truck to be used to lift the stand and the filled bag (52) supported thereby.

3. A stand as claimed in claim 1 or 2, in which the upright struts (12) and transverse bars (14) are of tubular material.

4. A stand as claimed in claim 3, in which the upright struts (12) and transverse bars (14) are of square section tube.

5. A stand as claimed in claim 3 or 4, in which spigots (32), receivable in the tubular material, are provided for connecting the struts (12) to the base (10).

6. A stand as claimed in any preceding claim, in which connector pieces (34) provided for connecting the transverse bars (14) to the uprights (12), each connector piece (34) comprising three spigots and/or sockets, two for receiving adjoining tubular transverse bars (14) and a third at right angles to the other two for receipt in or over the upper end of a tubular upright (12).

7. A stand as claimed in any preceding claim, in which the flexible receptacle (18) is made of strong plastics material enabling it to be assembled over the joints during erection of the stand.

8. A stand as claimed in any preceding claim, in which the flexible receptacle (18) has an opening at its lower end so that an outlet (54) of the flexible bag (52), whose contents are to be dispersed, can extend through such opening.

9. A stand as claimed in claim 8, in which the lower end of the flexible bag (52) is pyramidal.

10. A stand as claimed in claim 8 or 9, in which an apertured disc (56) is placed between the flexible receptacle (18) and the flexible bag (52) so that it surrounds the outlet (54) of the letter to prevent the regions of the flexible bag (52) adjacent its outlet (54) from extruding through the opening at the lower end of the flexible receptacle (18).

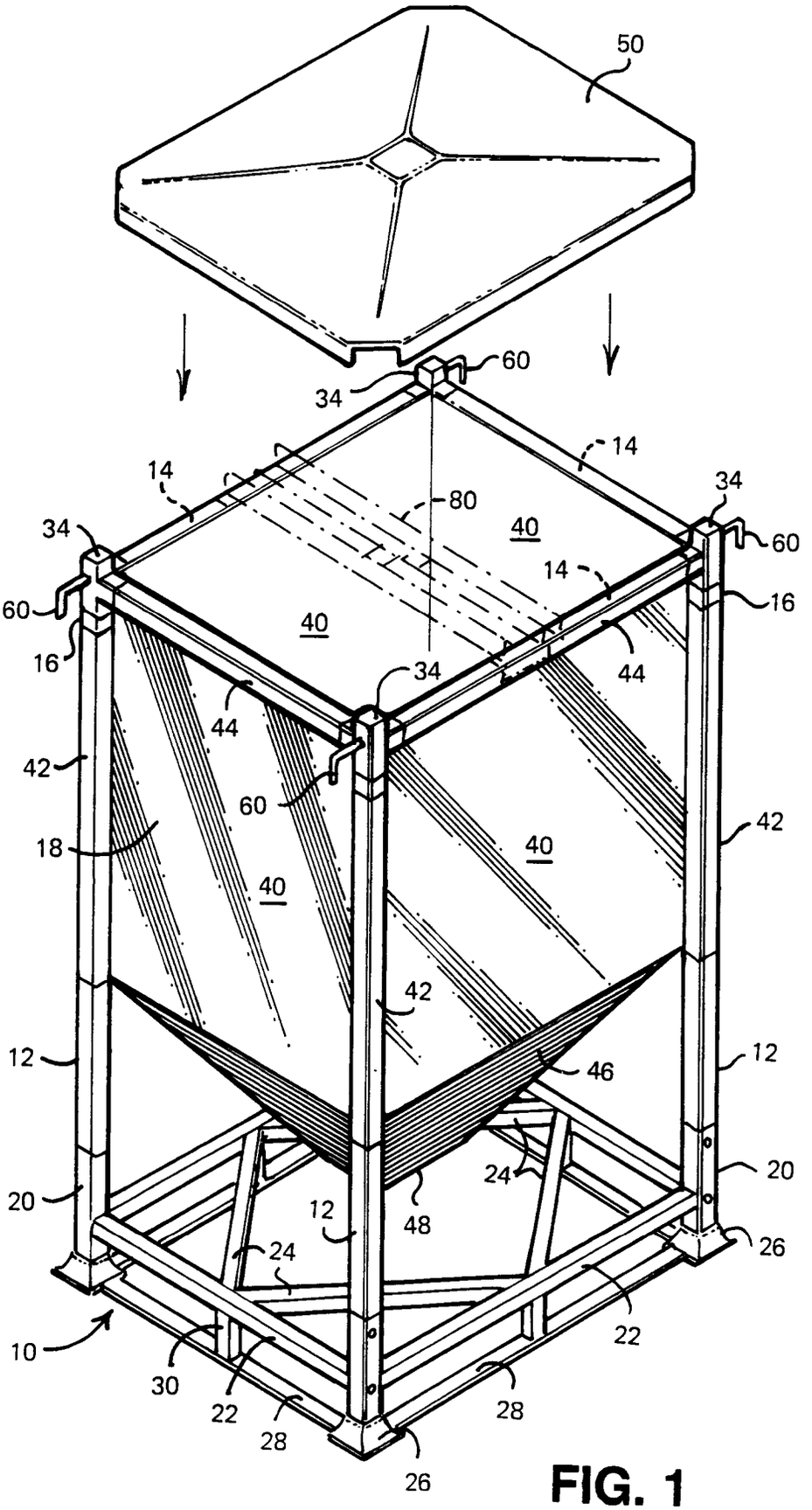
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FIG. 1

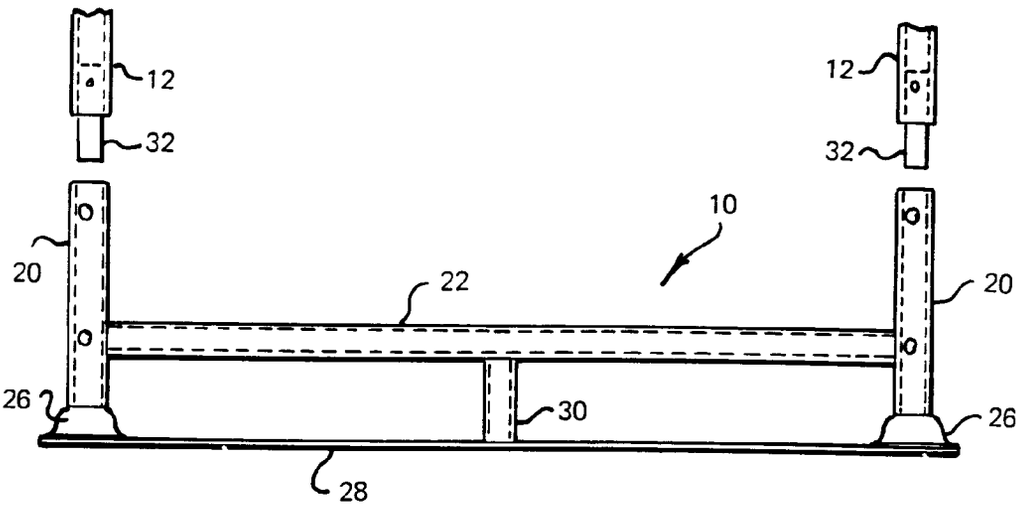


FIG. 2

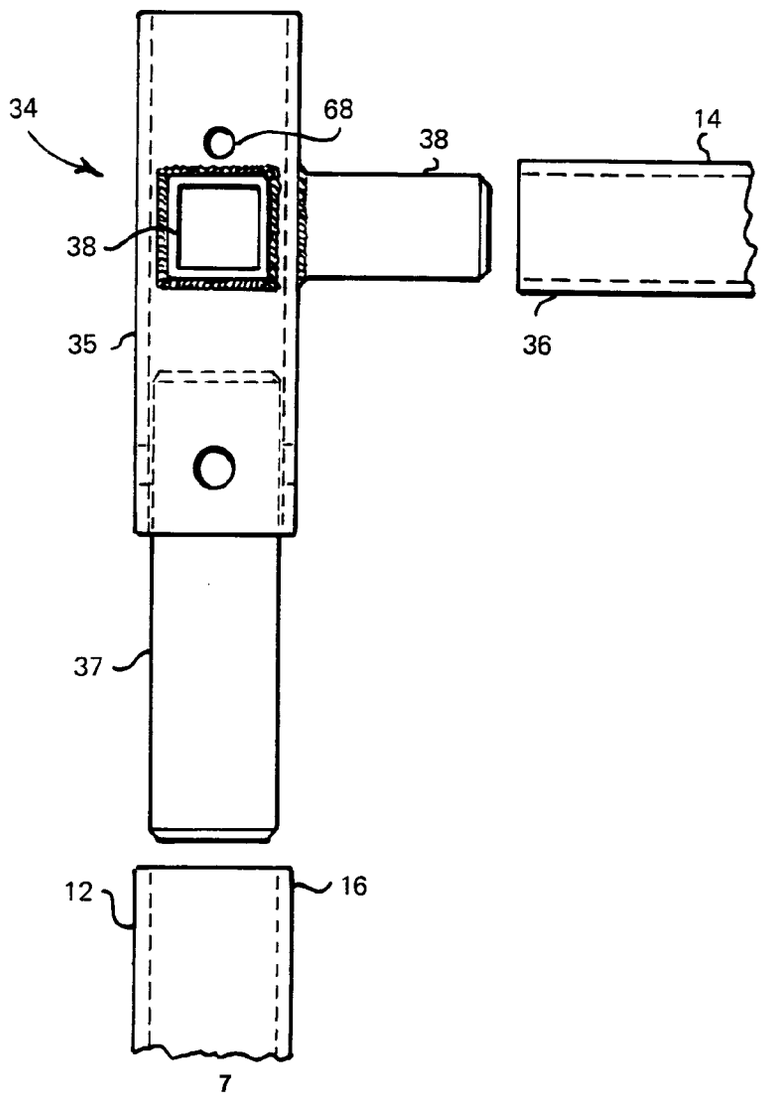


FIG. 3

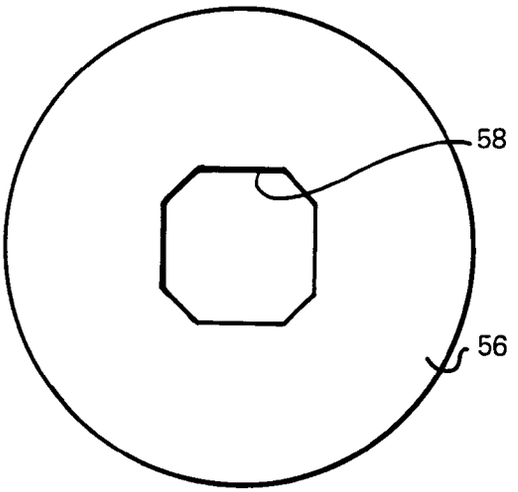


FIG. 6

FIG. 4

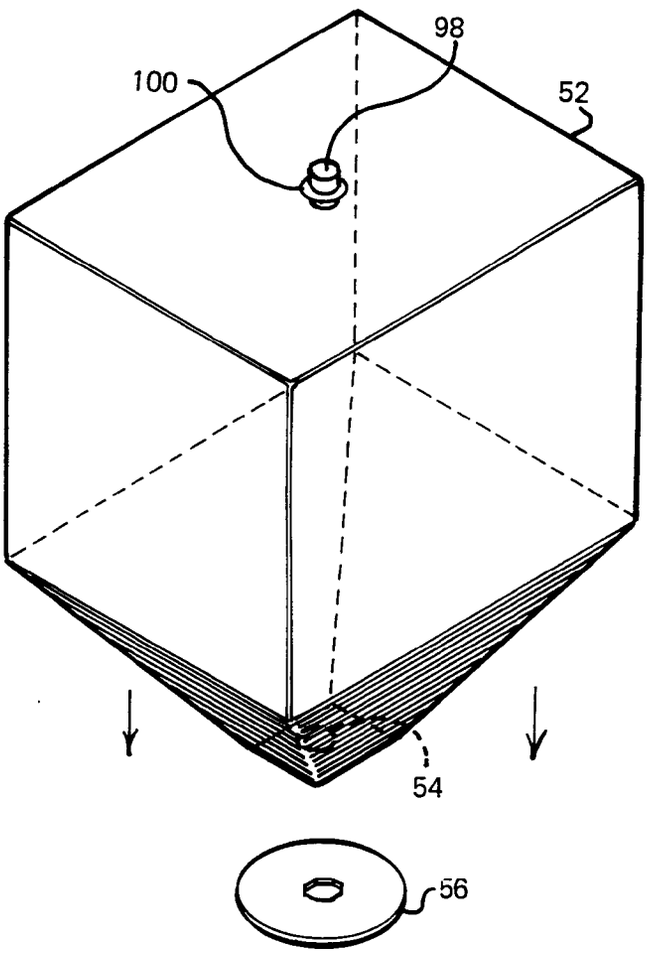
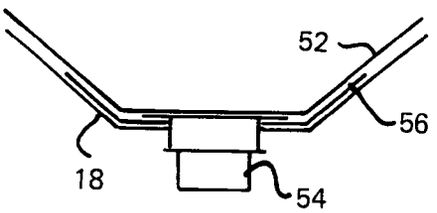


FIG. 5



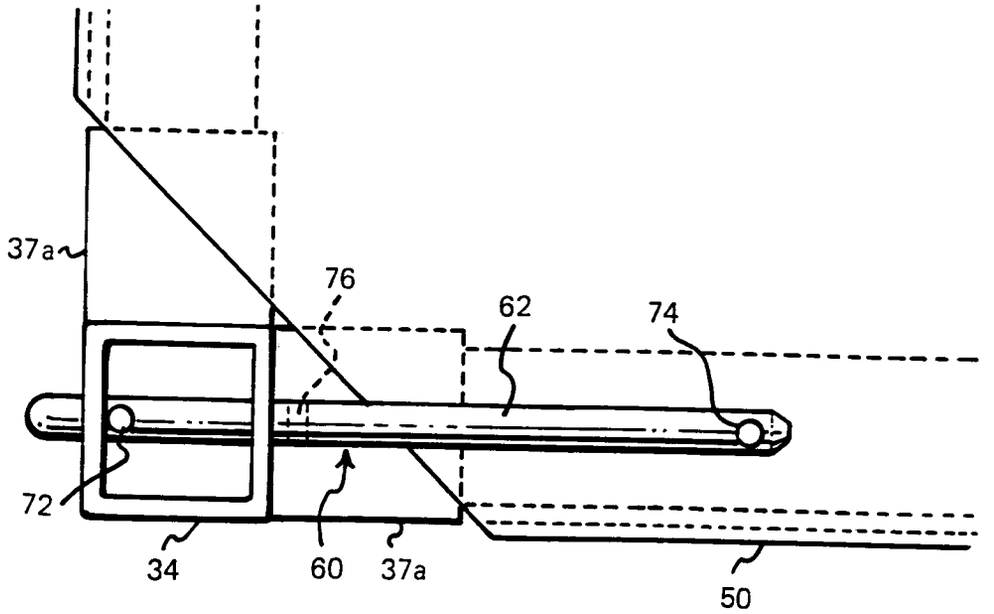


FIG. 8

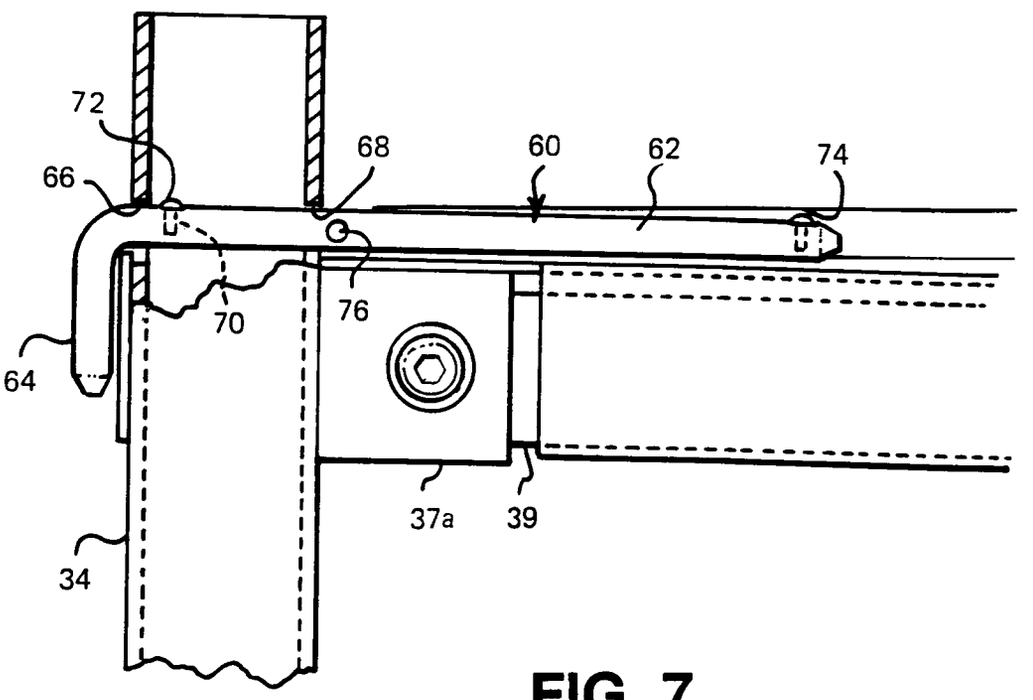


FIG. 7

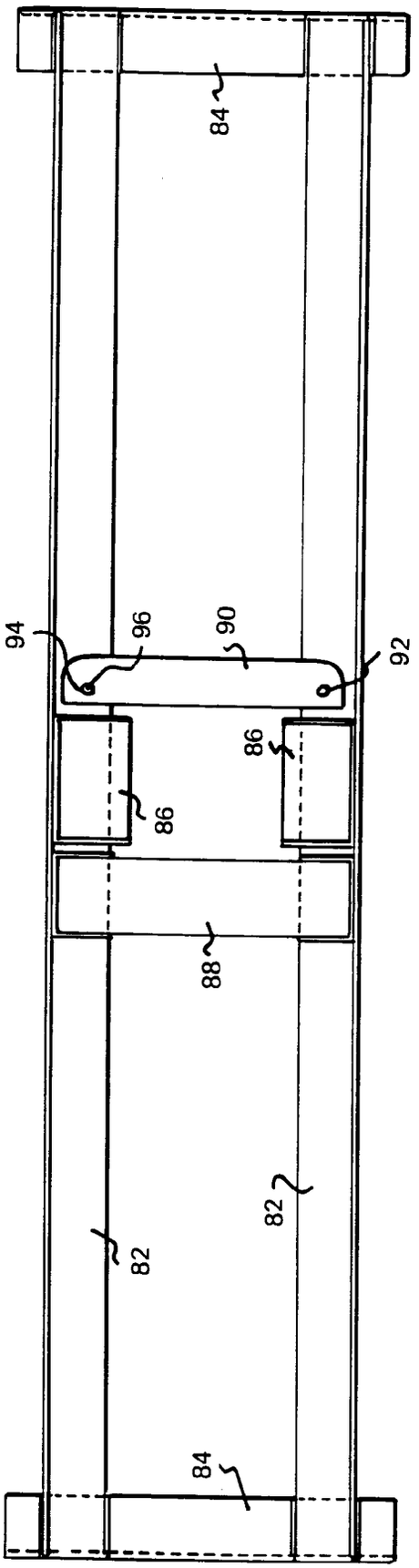


FIG. 9

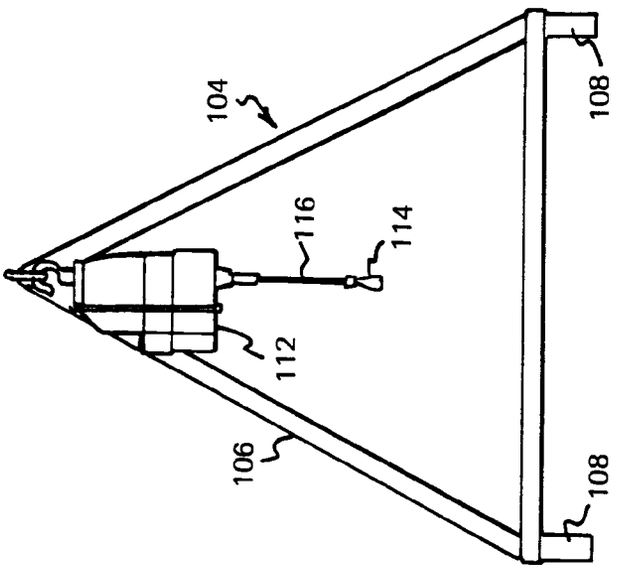


FIG. 11

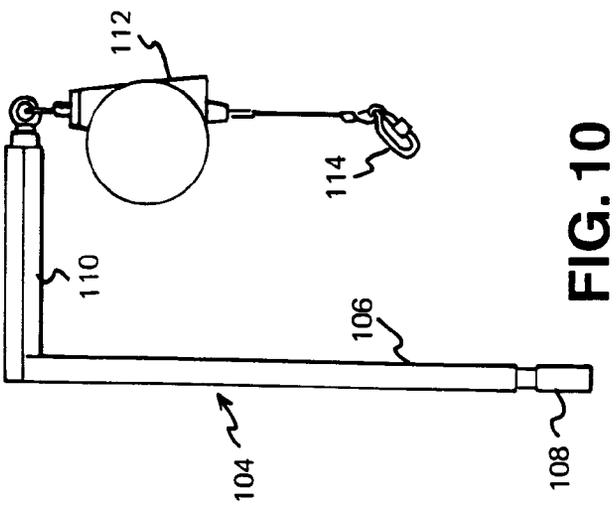


FIG. 10

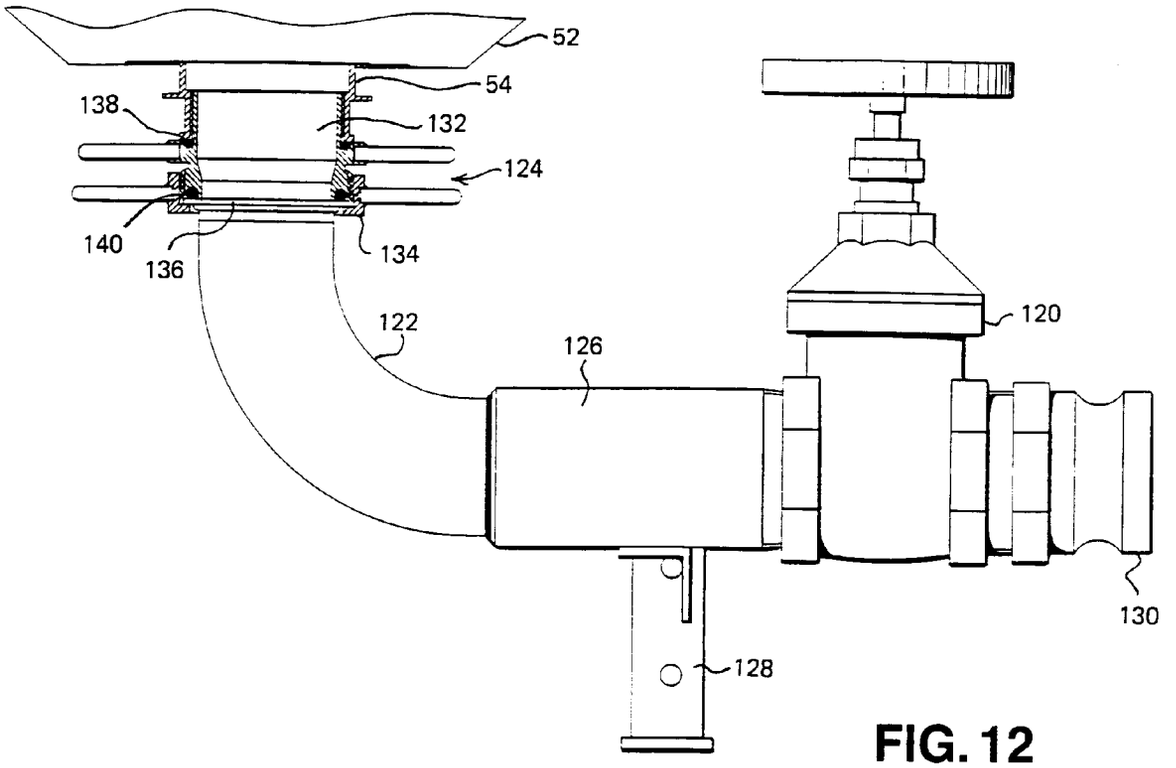

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FIG. 12

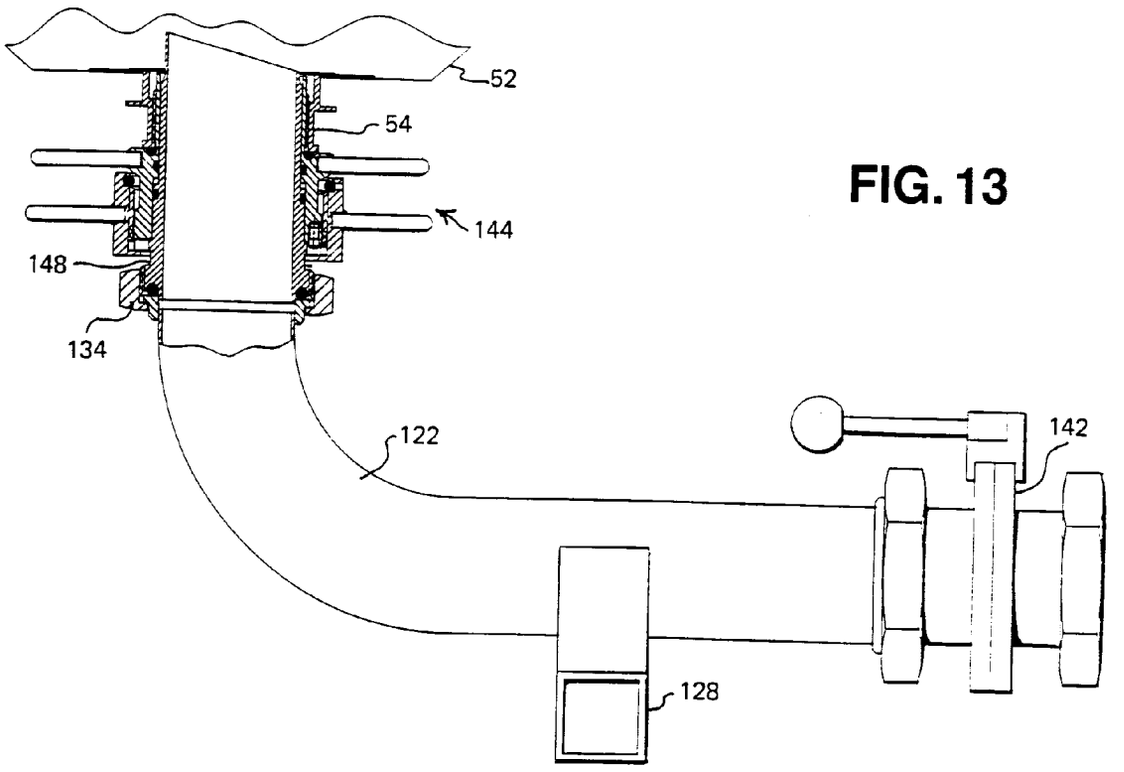
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FIG. 13

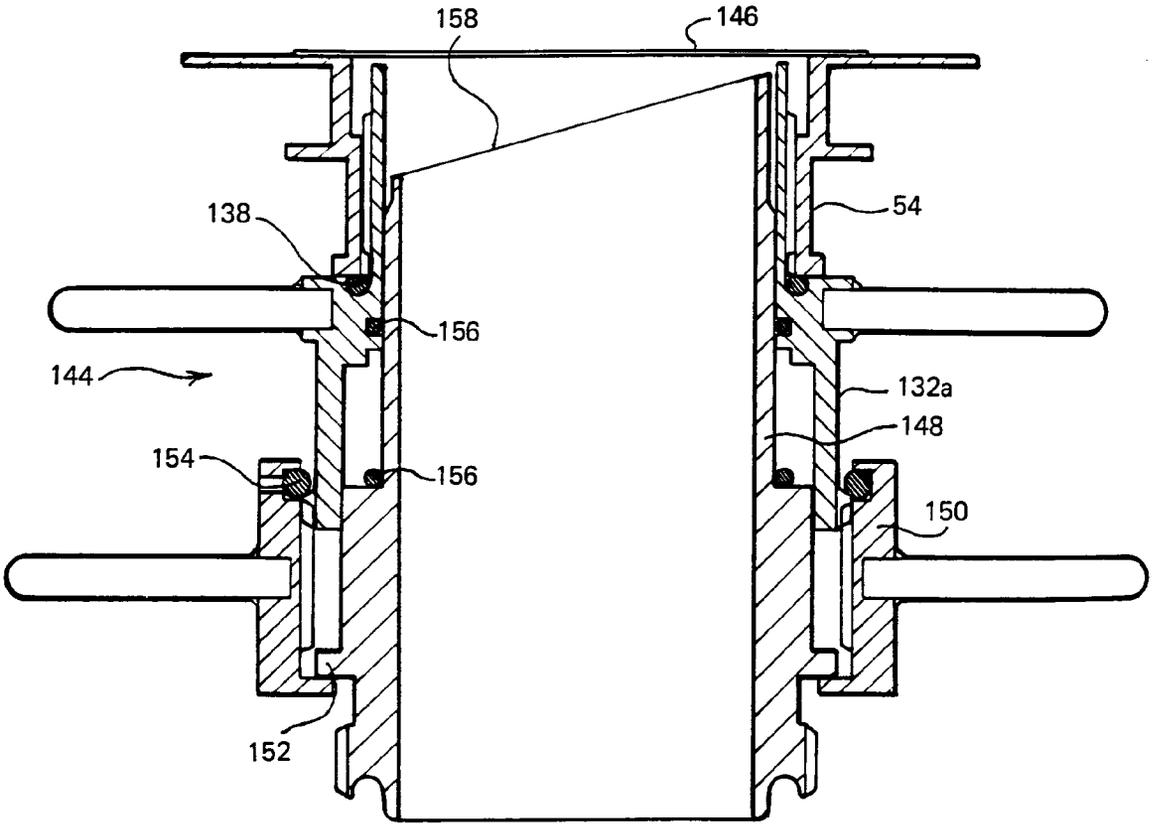
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FIG. 14

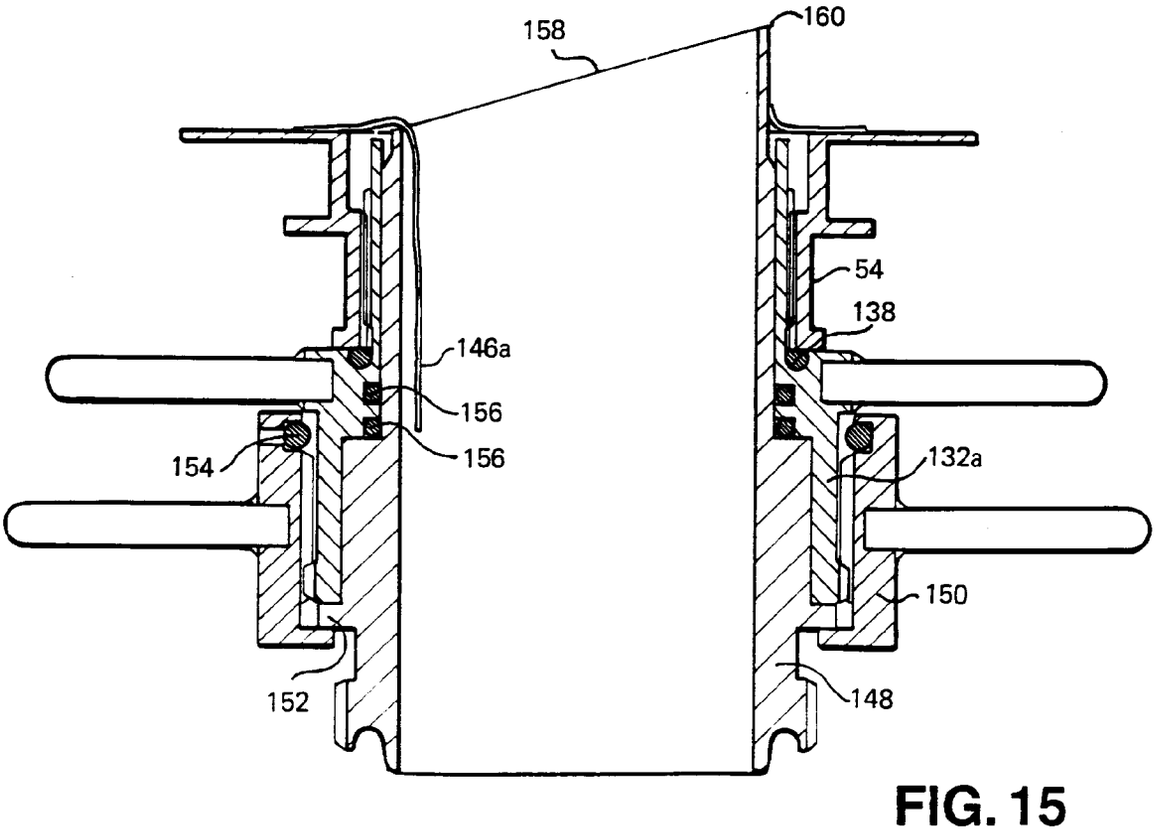
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FIG. 15

European Patent Office

EUROPEAN SEARCH REPORT

Application Number EP 93307617.6

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	FR - A - 2 634 469 (SOCIETE DE FABRICATION DE MATERIEL D'EMBALLGAE) * Fig. * --	1-5,8	B 65 D 90/20
D,Y	GB - A - 2 250 976 (PALLETOWER (G.B.) LIMITED) * Abstract; fig. * --	1-5,8	
A	EP - A - 0 373 506 (SARIG) * Fig. 1,3,4 * --	1-5,7, 8	
A	GB - A - 1 293 750 (RFD-GO LIMITED) * Fig. 1-3 * ----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 65 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	27-12-1993	WIDHALM

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)