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(54) **Titre : AUGE**
(54) **Title: FEED BOX**

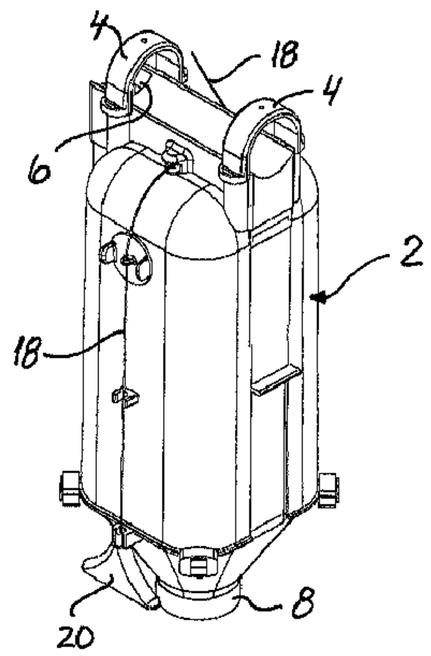

Fig. 1

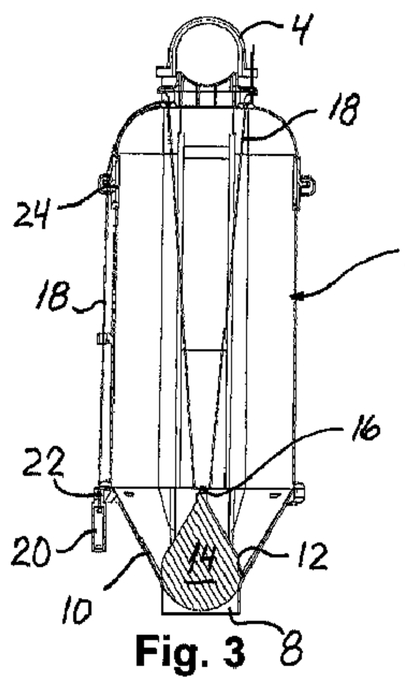

Fig. 3

(57) **Abrégé/Abstract:**
A feed box (2, 26) of the kind that e.g. via one or more supply openings (6) supply feed portions from a feed central via an endless tube conveyor serving a plurality of preferably uniform feed boxes in a livestock stable, the feed box (2, 26) being provided with a

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(57) **Abrégé(suite)/Abstract(continued):**
lower discharge valve (8, 38) which via one or more down pipes is connected to a feeding position of one or more livestock, preferably pigs, the discharge valve (8, 38) including a valve body (14, 28) which is operatively connected to a common control wire running along an upper end of the feed box (2, 26), wherein the feed box (2, 26) is further provided with a control device adapted for either allowing the operative connection with the common control wire to open the discharge valve (8, 38) by lifting the valve body (14, 28), or to prevent the operative connection with the common control wire from opening the discharge valve (8, 38) by lifting the valve body (14, 28).

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(54) Title: FEED BOX

(57) Abstract: A feed box (2, 26) of the kind that e.g. via one or more supply openings (6) supply feed portions from a feed central via an endless tube conveyor serving a plurality of preferably uniform feed boxes in a livestock stable, the feed box (2, 26) being provided with a lower discharge valve (8, 38) which via one or more down pipes is connected to a feeding position of one or more livestock, preferably pigs, the discharge valve (8, 38) including a valve body (14, 28) which is operatively connected to a common control wire running along an upper end of the feed box (2, 26), wherein the feed box (2, 26) is further provided with a control device adapted for either allowing the operative connection with the common control wire to open the discharge valve (8, 38) by lifting the valve body (14, 28), or to prevent the operative connection with the common control wire from opening the discharge valve (8, 38) by lifting the valve body (14, 28).

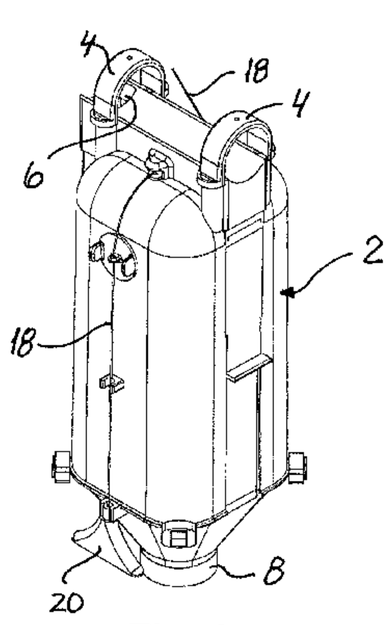

Fig. 1

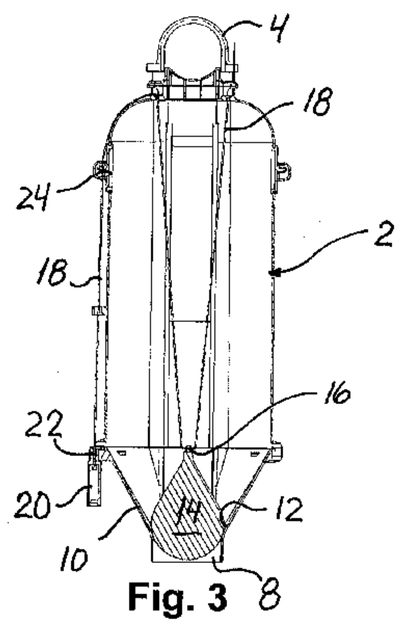

Fig. 3

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Feed Box

Field of the Invention

The present invention concerns a feed box of the kind indicated in the preamble of claim 1.

Background of the Invention

Many prior art feed boxes of this kind are designed with a predominantly cylindrical container part that often includes a transparent container part - if the container is not made entirely of transparent material – such that the actual amount of feed content in the actual feed box/feed position always can readily be ascertained.

The container part is usually connected upwardly with an endless tube conveyor supplying feed to the feed box from a feed station. The container part is downwards designed with a funnel-shaped part with a discharge valve which e.g. includes a spherical valve body.

The spherical valve body is frequently operatively connected with a common control wire running along the tube conveyor such that the common control wire can operate one or more rows of feed boxes/feed positions.

Object of the Invention

It is the object of the invention to indicate an improved feed box of this type, and which by means of very simple technical means can provide a significantly improved operation of feed boxes of this type.

Description of the Invention

The feed box according to the invention is peculiar in that the feed box is further provided with a control device adapted for either allowing the operative connection with the common control wire to open the discharge valve by lifting the valve body, or to prevent the operative connection with the common control wire from opening the discharge valve by lifting the valve body.

By simple technical means is hereby achieved an improved feed box of the type indicated in the introduction, with very significant improvements in use.

The indicated control device enables, apart from the described control between active and inactive coupling between the common control wire and the valve body by normal operation, that the feed box according to the invention may provide the daily operation in a pig stable with several useful advantages by very simple additional measures, as it will appear from the following.

By the feed box according to the invention, the control device can advantageously be constituted by a cord or wire, one end of which being connected with the common control wire, and the other end of which extending through an eyelet at the top of the valve body and out through an upper aperture at a side of the feed box, such that an outermost end part of the other end of the cord or wire is adapted to be fixed in an upper position corresponding to the operative connection between the common control wire and the valve body being inactive, or in a lower position corresponding to the operative connection between the common control wire and the valve body being active.

By an alternative embodiment of the feed box according to the invention, the control device can be constituted by a cord or wire, one end of which being connected with the common control wire, and the other end of which extending through an eyelet at the top of the valve body and out through an upper aperture at a side of the feed box, such that an outermost end part of the other end of the cord or wire is adapted to be fastened to an external endless control cord or wire which at the outer side of the feed box is running around an upper and a lower reversing wheel such that by pulling one side of the endless control cord or wire, the fastening of the outermost end part of the other end of the cord or wire can be displaced between an upper position corresponding to the operative connection between the common control wire and the valve body being inactive, and a lower position corresponding to the operative connection between the common control wire and the valve body being active.

With the object of manual operation of the feed box according to the invention, it may be advantageous that the outermost end part of the other end of the cord or wire is provided with a handle capable of being fixed in an upper position corresponding to the operative connection between the common control wire and the valve body being

inactive, or in a lower position corresponding to the operative connection between the common control wire and the valve body being active.

Alternatively, the feed box according to the invention can be designed such that the fastening of the outermost end part of the other end of the cord or wire by motorised rotation of at least one of the reversing wheels can be displaced between an upper position corresponding to the operative connection between the common control wire and the valve body being inactive, and a lower position corresponding to the operative connection between the common control wire and the valve body being active.

Moreover, in the case where the sow is to be persuaded into the box it may be an advantage that the feed box according to the invention is designed such that the actuation handle furthermore is arranged such as to be released from the lower position in order to release a small portion of feed by manually moving the handle downwards, thereby lifting the valve body off its associated valve seat.

The feed box according to the invention can be designed in a simple way such that the valve body is spherical or has a spherical lower part, interacting with a complementarily shaped valve seat.

With the object of actively counteracting obstructing bridge formations in the feed at the bottom of the feed box, it may advantageously be designed such that the valve seat is constituted by a plate-shaped valve seat which is foldable about one or more horizontal axes, and which is arranged to interact with complementary valve seat members at opposing sides of a lower part of the feed box.

An alternative feed box according to the invention may advantageously be designed such that the actuation handle consist of a wheel-shaped actuation handle arranged to be released from the lower active position and to be moved to an upper inactive position for signalling clearly that the feed box in question is in fact in the inactive mode, where a pull in the common actuation wire or cord will not cause discharge of a portion of feedstuff to the below feeding position.

Preferably, the feed box according to the invention is designed such that said wheel-shaped actuation handle is made from plastic having a diverging signal colour and at a rear side comprises a drum adapted to wind up an end part of the actuation wire or cord.

Description of the Drawing

The invention is explained more closely in the following with reference to the drawing, on which:

Fig. 1 shows a perspective view of an embodiment of a feed box according to the invention;

Fig. 2 shows a plan view of the feed box shown in Fig. 1, as seen from a side;

Fig. 3 shows a plan view, partly in section, of the feed box shown in Fig. 1;

Fig. 4 shows a perspective view of a second embodiment of a feed box according to the invention;

Fig. 5 shows a plan view of the feed box shown in Fig. 4, as seen from a side;

Fig. 6 shows a plan view, partly in section, of the feed box shown in Fig. 4;

Fig. 7 shows a plan view, partly in section, of the feed box shown in Fig. 4;

Fig. 8A shows a schematic drawing of an actuation device with external handle for a feed box according to the invention, cf. e.g. Figs. 1 or 4;

Fig. 8B shows a schematic drawing of an alternative embodiment of an actuation device for a feed box according to the invention;

Fig. 9 shows a perspective view of a third embodiment of a feed box according to the invention;

Fig. 10 shows a further perspective view of the embodiment according to the invention, cf. Fig. 9;

Fig. 11 shows a still further plane view of the embodiment according to the invention, cf. Fig. 9 - where a wheel-shaped handle is positioned in an upper position;

Fig. 12A shows a plane top view of the embodiment according to the invention, cf. Fig. 9

Fig. 12B shows a plane sectional view as seen along the section line A-A in Fig. 12A;

Fig. 13A shows a plane top view of the embodiment according to the invention, cf. Fig. 9 and turned some 45° in relation to Fig. 12A;

Fig.13b shows a plane sectional view as seen along the section line B-B in Fig. 13A;

Fig. 14A shows a plane front view of an embodiment of a wheel-shaped handle for a feed box according to the invention, cf. Figs. 9-13B;

Fig. 14B shows a plane edge view of the handle wheel cf. Fig. 14A;

Fig. 14C shows a perspective view of the handle wheel cf. Figs. 14A and 14B;

Fig. 15A shows a perspective view of a valve member according the invention, cf. e.g. Figs. 12B and 13B; and

Fig. 15B shows a plane side view of the valve member shown in Fig. 15A.

Detailed Description of Embodiments of the Invention

The feed box 2 shown in Figs. 1-3 is adapted upwardly for being connected to an endless tube conveyor by means of brackets 4 such that the feed box 2 is suspended under the tube conveyor and is supplied with feed from the tube conveyor via an upper supply opening 6.

At the bottom, the feed box 2 is connected with a feed position by a not shown down pipe connected with a lower discharge opening 8 which is formed in a lower funnel-shaped part 10 of the feed box such that a valve seat 12 for a downwardly spherical valve body 14 is formed at the transition between the funnel-shaped part 10 and the discharge opening 8.

The valve body 14 is upwardly provided with an eyelet 16 through which a flexible release wire or cord 18 is extending, of which one end is running upwards and connected with a common control wire running through the stable along the tube conveyor and operating one or more rows of feed boxes 2.

The opposite free end of the release wire or cord 18 is connected with an actuation handle 20 outside at one side of the feed box 2 and arranged to assume two positions,

namely a lower position 22 corresponding to the valve body 14 being actively connected with the common control wire, and an upper positon 24 corresponding to the valve body 14 not being in active connection with the common control wire, i.e. an actuation pull in the common control wire will not act on the thus uncoupled valve body 14. The feed box 2 in question is thus disconnected from the common control wire as the connection between the former and the valve body 14 is extended in that the actuation handle 20 is disposed in the upper position 24.

The actuation handle 20 thus has an alternative function as the handle 20 can be released from the lower position 22 and moved manually downwards in order to lift the valve body 14, whereby an amount of feed can be dosed to a certain feed position, e.g. with the object of calming the animal or animals in the actual feed position.

Figs. 4-7 show an alternative embodiment of a feed box 26 which upwardly has the same design as the feed box 2 cf. Figs 1-3, but which downwardly is provided with a foldable valve body 28 interacting with complimentarily shaped guide edges 30 inside opposing sides of the feed box 26.

The valve body 28 is upwardly provided with an eyelet 32 through which a slightly flexible release wire or cord 18 is extending, of which one end is running upwards and connected with a common control wire running through the stable along the tube conveyor, operating one or more rows of feed boxes 26. The opposing free end of the release wire or cord 18 is connected in the same way as described above with an actuation handle 20 that has the same function as described above.

When exerting a pull in the release wire or cord 18, either by means of the common control wire or by a downward pull in the actuation handle 20, the valve body 28 will be lifted upwards causing the valve body 28 to collapse under the action of gravitational force, since the valve body 28 consists of several plate members 34 that are interconnected by means of hinges 36. When the valve body 28 is folded, the content of the feed box 26 will therefore be discharged downwardly through a lower discharge opening 38.

When the valve body 28 subsequently is moved downwards again, the valve body 28 will again unfold and come into position along the complementary guide edges 30 at opposing inner sides of the feed box 26 such that the latter is closed again at the bottom.

Fig. 8A shows a schematic drawing of the described actuation system with an actuation handle 20, whereas Fig. 8B shows an alternative actuation mechanism 40 consisting of the two reversing wheels 42, 44 and an endless wire or cord 46 running there around. A release wire or cord 48 is fastened to the left run of the wire or cord 46 at a connecting point 50 which by rotation of the reversing wheels 42, 44 can be displaced between the lower active position 52 shown by a solid line and an upper inactive position 54 shown by a broken line.

The actuation mechanism 40 can e.g. be motor powered by means of an electric motor built together with one of the reversing wheels 42 or 44. This will furthermore enable the actuation mechanism 40 to be arranged for remote control, e.g. by means of wireless remote control.

Figs. 9 - 13B show a third embodiment of a feed box 56 according to the invention by which a feed box body 58 generally has a circular cross section and comprises a funnel-shaped lower part 60 with an outlet 62 adapted to be connected to a not shown tube leding downwards to a feeding position.

The feed box 56 also comprises a wheel-shaped actuation handle 64 being adapted to be positioned in an active lower position as shown in Figs. 9, 10, 12A, 13A and 13B and an upper inactive position 66 as shown in Fig. 11 where an activation cord or wire 68 is slack such that a pull in the common activation cord or wire 18 will not cause emptying out of a feed portion to the feeding position.

Preferably, the wheel-shaped actuation handle 64 is made from plastic having a diverging colour in order to signal very clearly that the feed box 56 cf. Fig. 11 takes in an inactive situation where a pull in the common activation wire 18 will not cause emptying out of a feed portion at all, and that the feed box 56 cf. Figs. 9, 10 and 12A-

13B takes in an active situation where a pull in the common activation wire or cord 18 will cause emptying out of a feed portion to the below feeding position.

The sectional views of Figs. 12A-13B show a projecting regulating handle 70 positioned at a lower end of a bendable, narrow plate-shaped valve member 72 which at opposite longitudinal side edges 74 is guided in an upper guiding arch 76 between vertical guiding parts 78, 80.

The position of an end part 82 of the plate-shaped valve member 72 determine the amount of feedstuff feed into the interior feedstuff chamber 84 of the actual feed box 56 through an upper supply opening 86 of a vertical inlet channel 88 communicating with said interior feedstuff chamber 84.

Fig. 13B shows among others an alternative configuration of a discharge valve body 90 (Figs. 15A-15B) comprising a cone-shaped top part 92 with an upper eyelet 94 and a lower convex part 96 having an arched bottom part 98.

Figs.14A-14C show the details of the wheel-shaped actuation handle 64 which as shown in Fig. 14B at the rear side which comprises a drum 100 adapted to wind up an end part of the release wire or cord 67. An end part of the release wire or cord 67 is lead through a fixating hole 102 in the body of the wheel-shaped actuation handle 64 and fixated by means of a knot at the outer side of the wheel-shaped actuation handle 64.

Reference numbers of the drawing:

2	feed box
4	brackets
6	supply opening
8	discharge opening
10	funnel-shaped part
12	valve seat
14	valve body
16	eyelet
18	release wire or cord
20	actuation handle
22	lower active position
24	upper inactive position
26	feed box with plate valve
28	foldable valve body
30	guide edges
32	eyelet
34	plate members
36	hinges
38	discharge opening
40	actuation mechanism
42, 44	reversing wheel
46	endless wire or cord
48	release wire or cord
50	connecting point
52	lower active position
54	upper inactive position
56	feed box
58	feed box body
60	funnel-shaped lower part
62	outlet
64	wheel-shaped actuation handle
66	inactive position
67	release wire or cord

68 slack activation wire or cord
70 regulating handle
72 plate-shaped valve member
74 longitudinal side edges
76 upper guiding arch
78, 80 vertical guiding parts
82 end part of plate-shaped valve member
84 interior feedstuff chamber
86 upper supply opening
88 vertical inlet channel
90 discharge valve body
92 cone-shaped top part
94 upper eyelet
96 convex part
98 arched bottom part
100 drum
102 fixating hole

CLAIMS

1. A feed box (2, 26, 56) of the kind that e.g. via one or more supply openings (6, 86) supply feedstuff portions from a feedstuff station via an endless tube conveyor serving a plurality of preferably uniform feed boxes in a livestock stable, the feed box (2, 26) being provided with a lower discharge valve (8, 38) which via one or more down pipes is connected to a feeding position of one or more livestock, preferably pigs, the discharge valve (8, 38) including a valve body (14, 28) which is operatively connected with a common control wire running along an upper end of the feed box (2, 26), **characterised in** that the feed box (2, 26) is further provided with a control device adapted for either allowing the operative connection with the common control wire to open the discharge valve (8, 38) by lifting the valve body (14, 28), or to prevent the operative connection with the common control wire from opening the discharge valve (8, 38) by lifting the valve body (14, 28).

2. A feed box according to claim 1, **characterised in** that the control device is constituted by a cord or wire, one end of which being connected with the common control wire, and the other end of which extending through an eyelet (16, 32) at the top of the valve body (14, 28) and out through an upper aperture at a side of the feed box (2, 26), such that an outermost end part of the other end of the cord or wire is adapted to be fixed in an upper position (24, 54) corresponding to the operative connection between the common control wire and the valve body being inactive, or in a lower position (22, 52) corresponding to the operative connection between the common control wire and the valve body being active.

3. A feed box according to claim 1, **characterised in** that the control device is constituted by a cord or wire, one end of which being connected with the common control wire, and the other end of which extending through an eyelet (16, 32) at the top of the valve body (14, 28) and out through an upper aperture at a side of the feed box (2, 26), such that an outermost end part of the other end of the cord or wire is adapted to be fastened to an external endless control cord or wire (48) which at the outer side of the feed box (2, 26) is running around an upper and a lower reversing wheel (42, 44) such that by pulling one side of the endless control cord or wire (48), the fastening of the outermost end part of the other end of the cord or wire can be

displaced between an upper position (54) corresponding to the operative connection between the common control wire and the valve body being inactive, and a lower position (52) corresponding to the operative connection between the common control wire and the valve body (14, 28) being active.

4. A feed box according to claim 1 and 2, **characterised in** that the outermost end part of the other end of the cord or wire is provided with an actuating handle (20) capable of being fixed in an upper position (24) corresponding to the operative connection between the common control wire and the valve body being inactive, or in a lower position (22) corresponding to the operative connection between the common control wire and the valve body being active.

5. A feed box according to claim 1 and 3, **characterised in** that the fastening of the outermost end part of the other end of the cord or wire by motorised rotation of at least one of the reversing wheels (42, 44) can be displaced between an upper position (54) corresponding to the operative connection between the common control wire and the valve body (14, 28) being inactive, and a lower position (52) corresponding to the operative connection between the common control wire and the valve body (14, 28) being active.

6. A feed box according to claim 1, 2 and 4, **characterised in** that the actuation handle (20) furthermore is arranged such as to be released from the lower position (22, 52) in order to release a small portion of feed by manually moving the handle downwards, thereby lifting the valve body (14, 28) off its associated valve seat.

7. A feed box according to claim 1, **characterised in** that the valve body (14) is spherical or has a spherical lower part, interacting with a complementarily shaped valve seat.

8. A feed box according to claim 1, **characterised in** that the valve seat is constituted by a plate-shaped valve seat (28) which is foldable about one or more horizontal axes, and which is arranged to interact with complementary valve seat members (30) at opposing sides of a lower part of the feed box.

9. A feed box (56) according to claim 1, 2 and 4, **characterised in** that the actuation handle consist of a wheel-shaped actuation handle (64) arranged to be released from the lower active position and to be moved to an upper inactive position (66) for signalling clearly that the feed box (56) in question is in fact in the inactive mode, where a pull in the common actuation wire or cord (18) will not cause discharge of a portion of feedstuff to the below feeding position.

10. A feed box (56) according to claim 9, **characterised in** that the wheel-shaped actuation handle (64) is made from plastic having a diverging signal colour and at a rear side comprises a drum (100) adapted to wind up an end part of the actuation wire or cord.

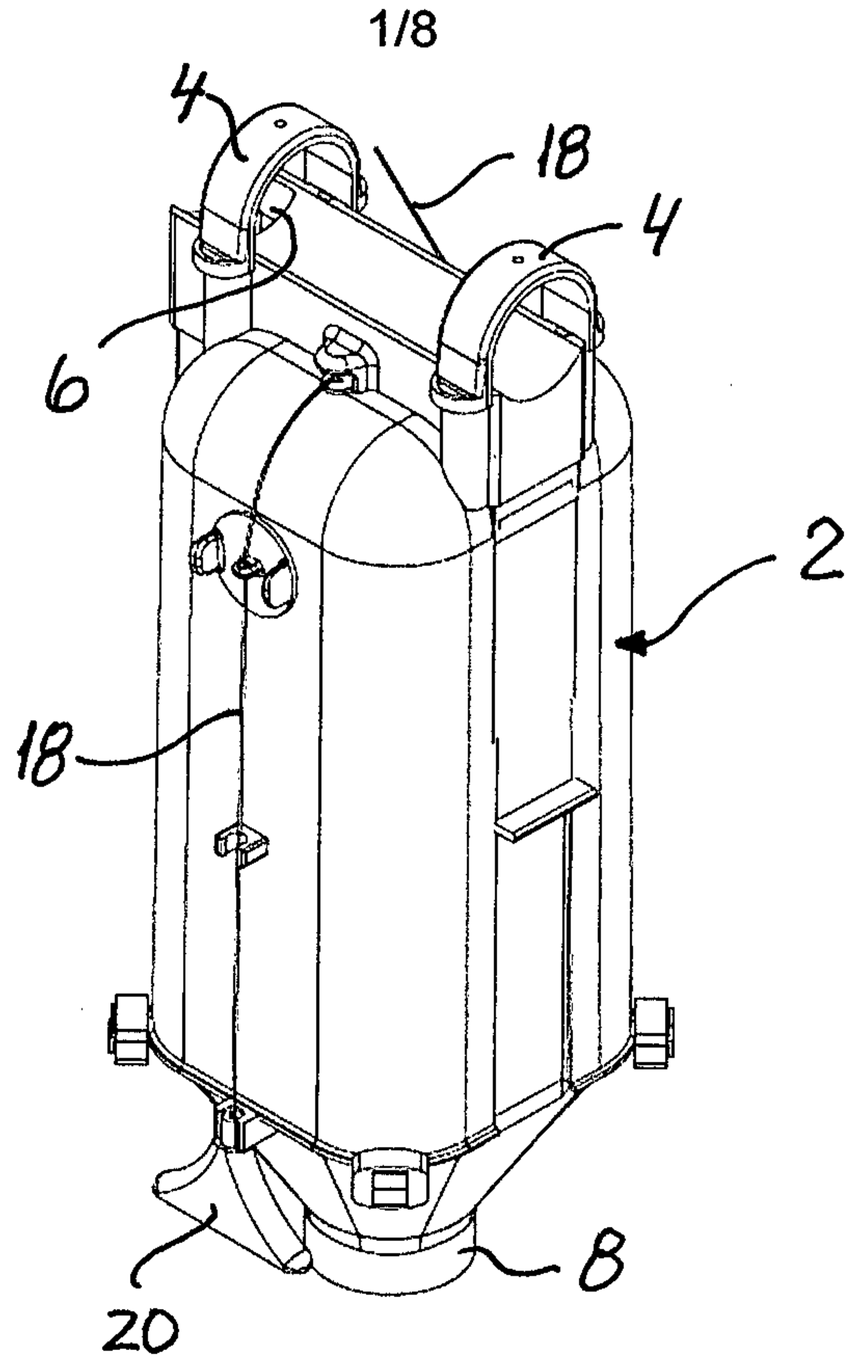


Fig. 1

Fig. 2

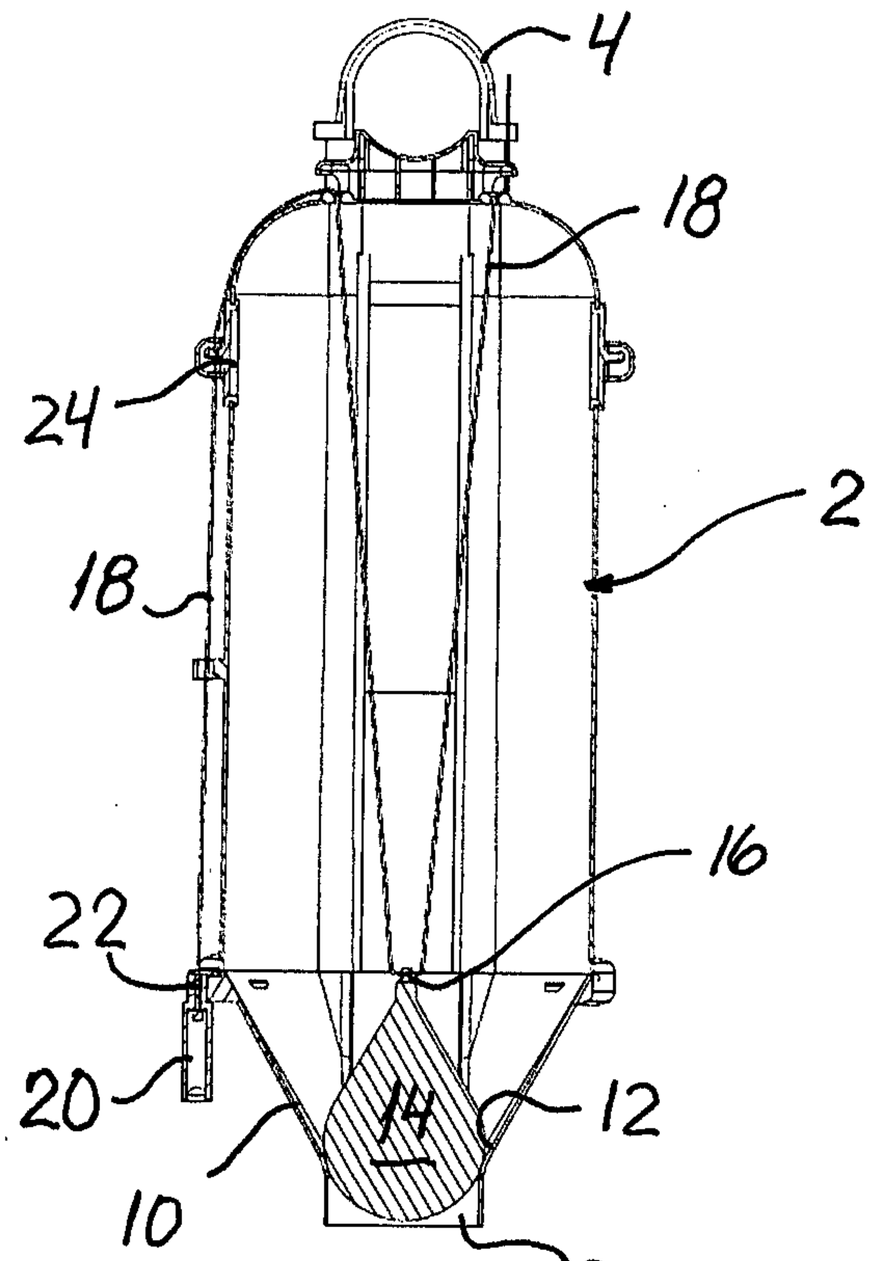


Fig. 3

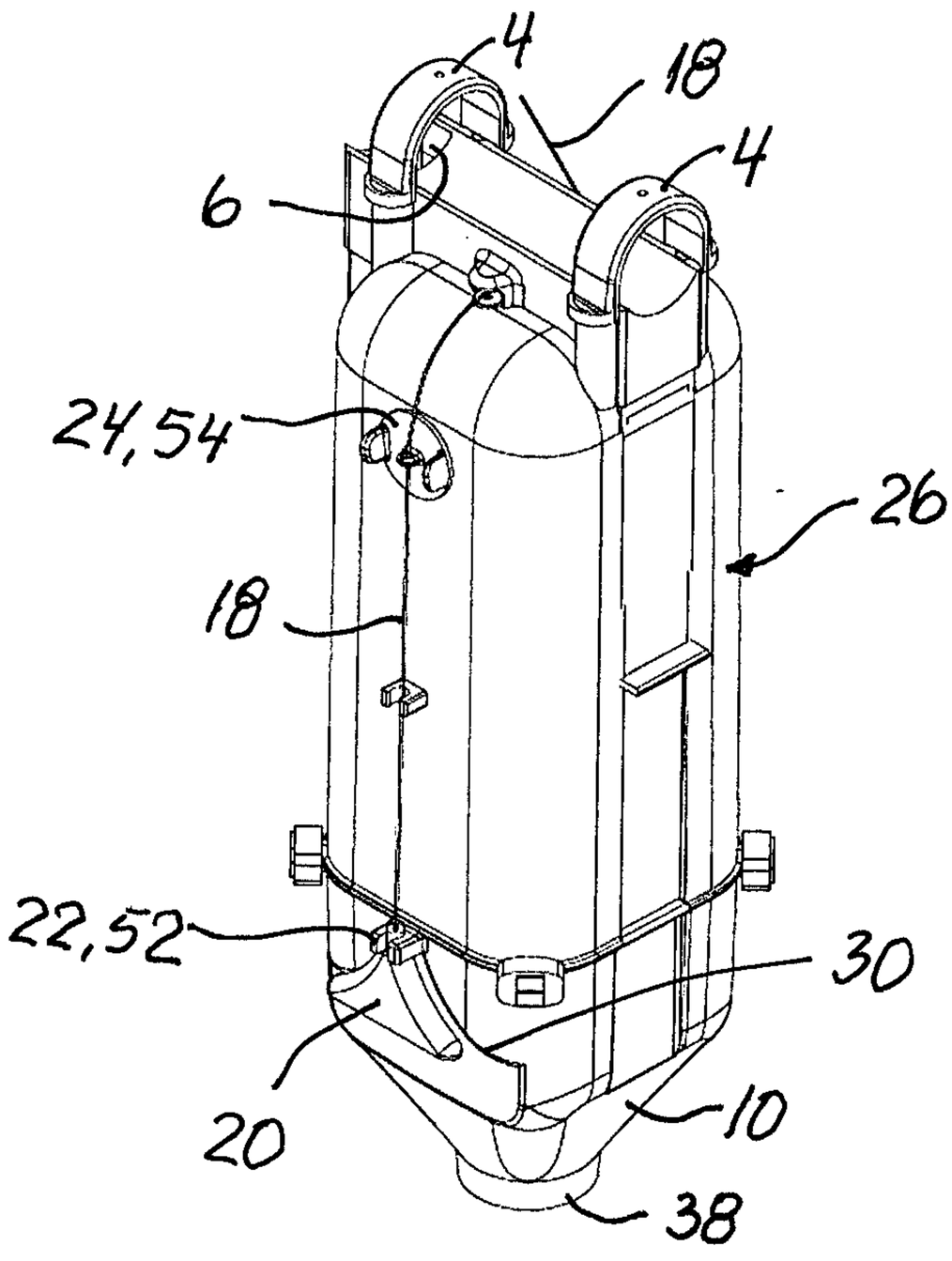


Fig. 4

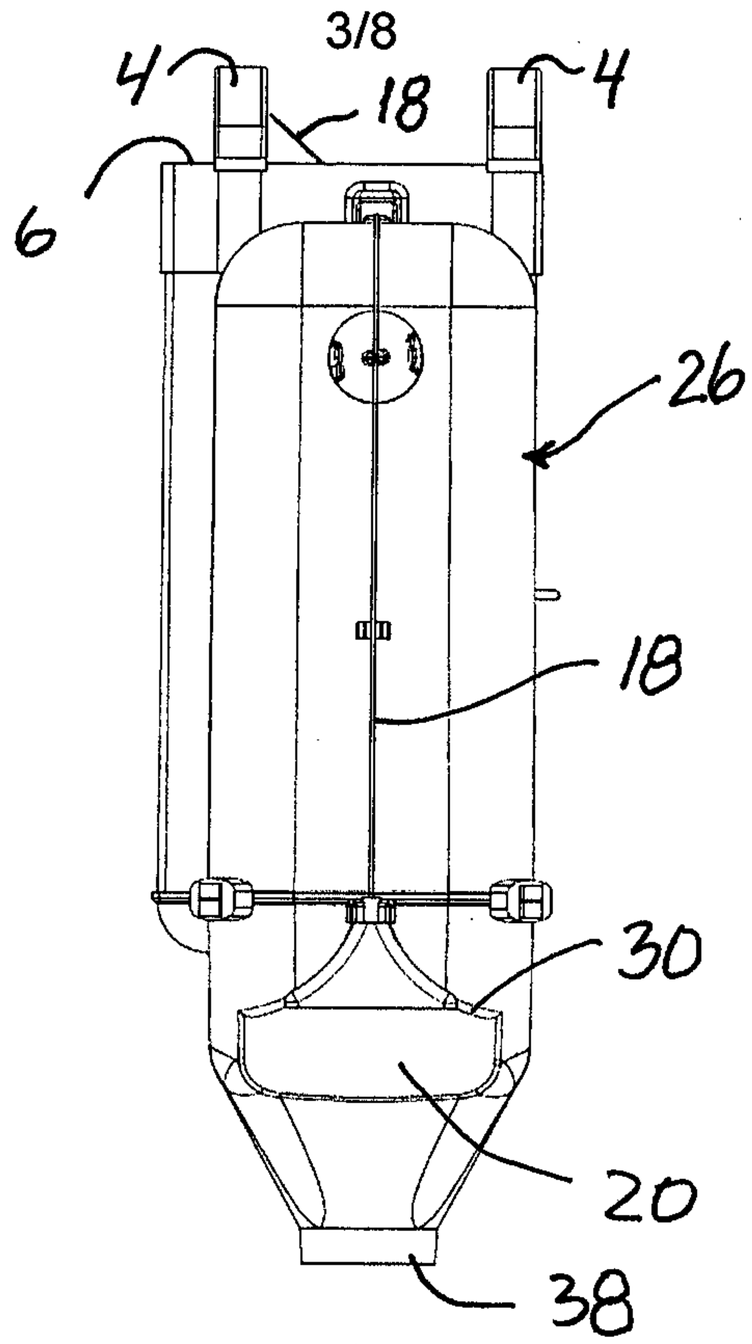


Fig. 5

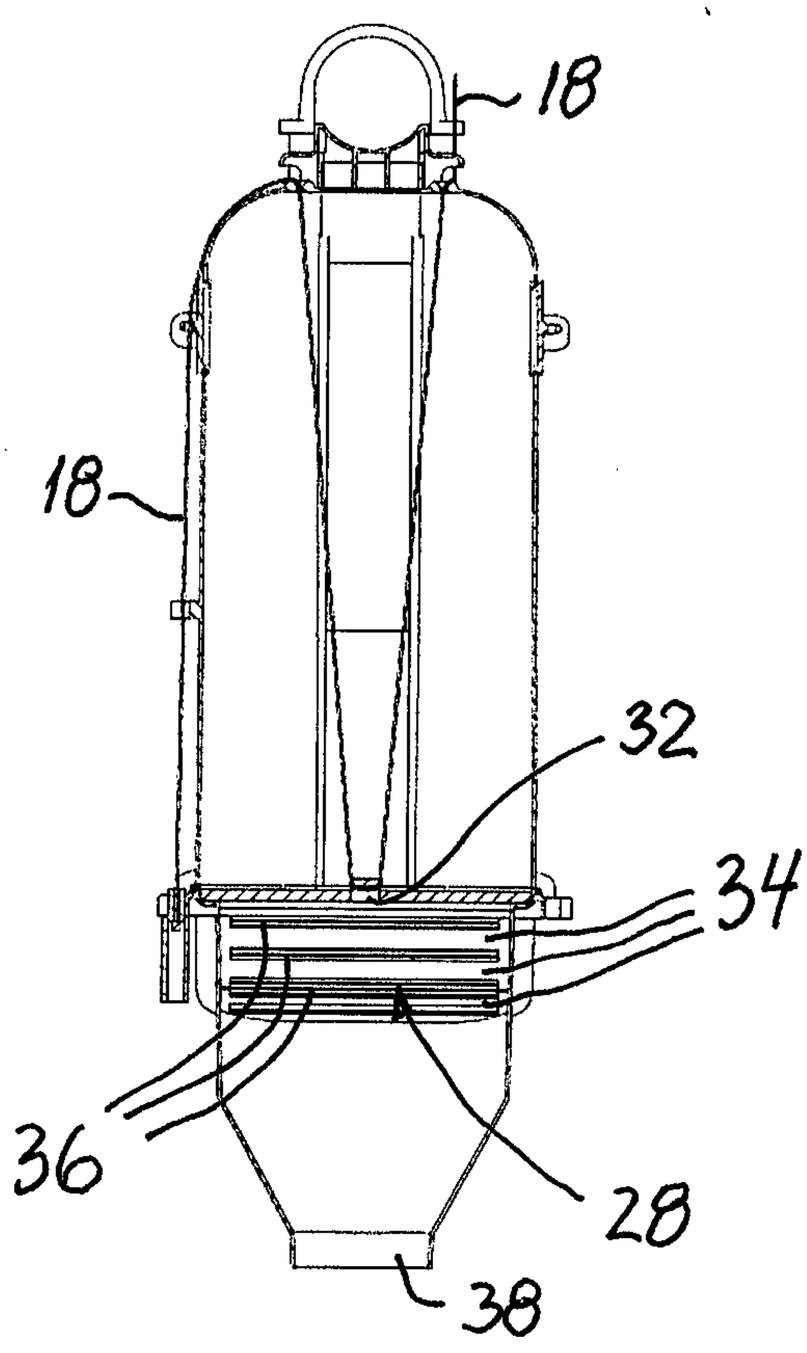


Fig. 6

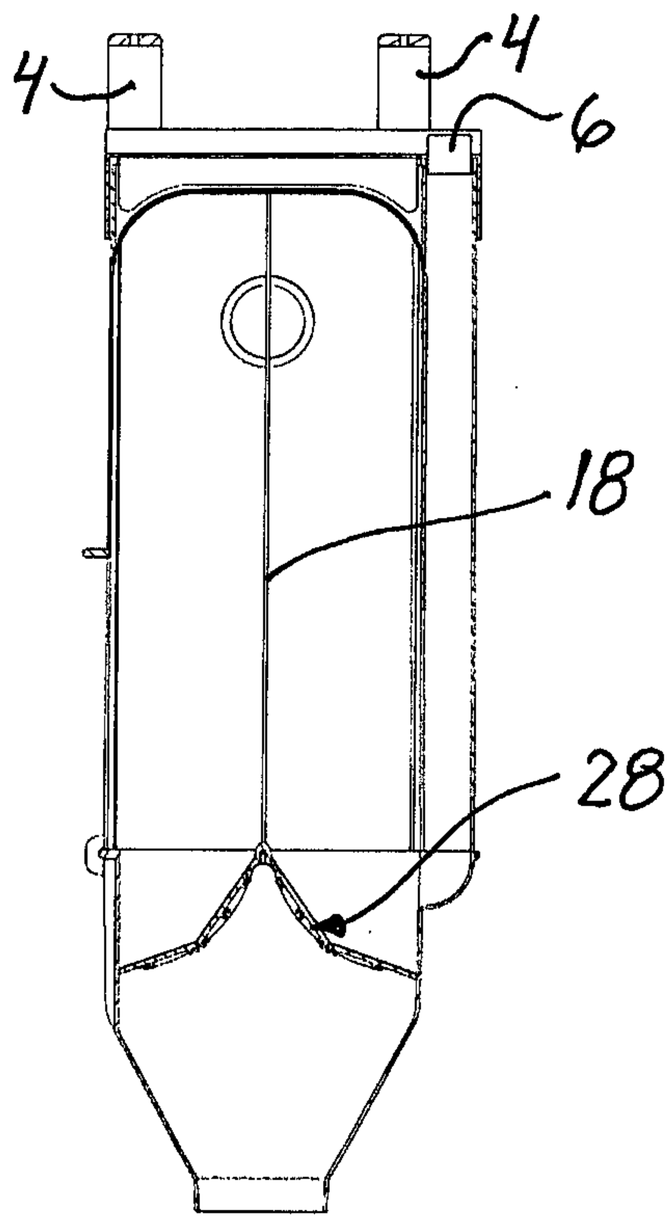


Fig. 7

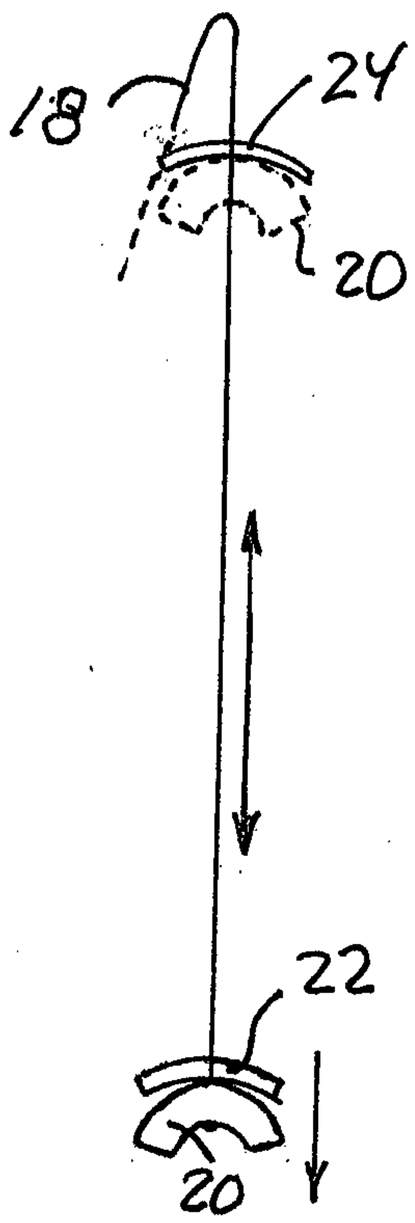


Fig. 8A

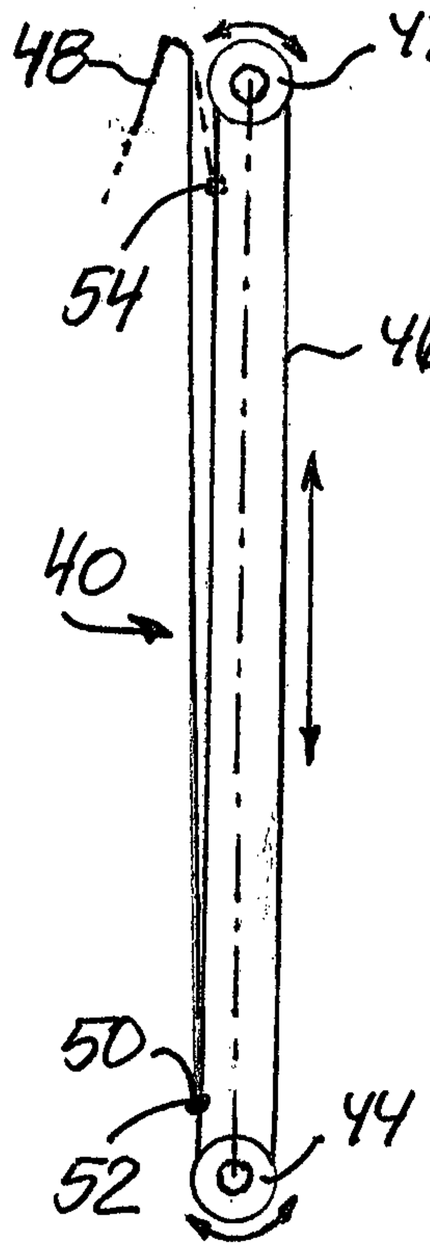


Fig. 8B

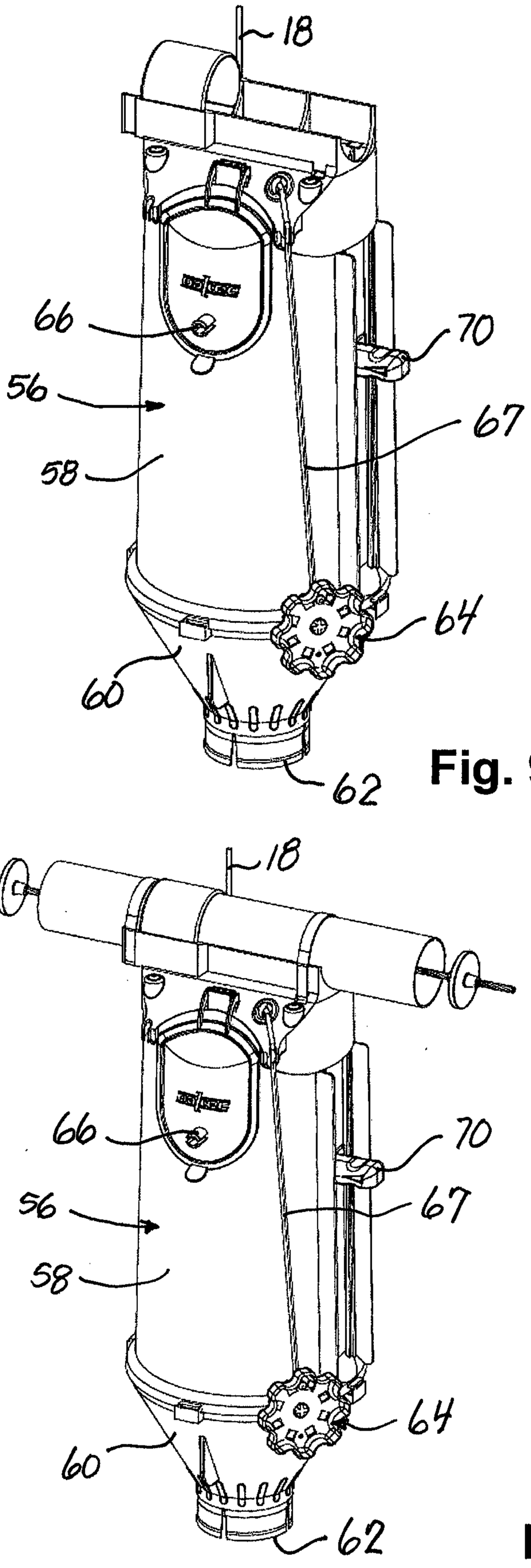


Fig. 9

Fig. 10

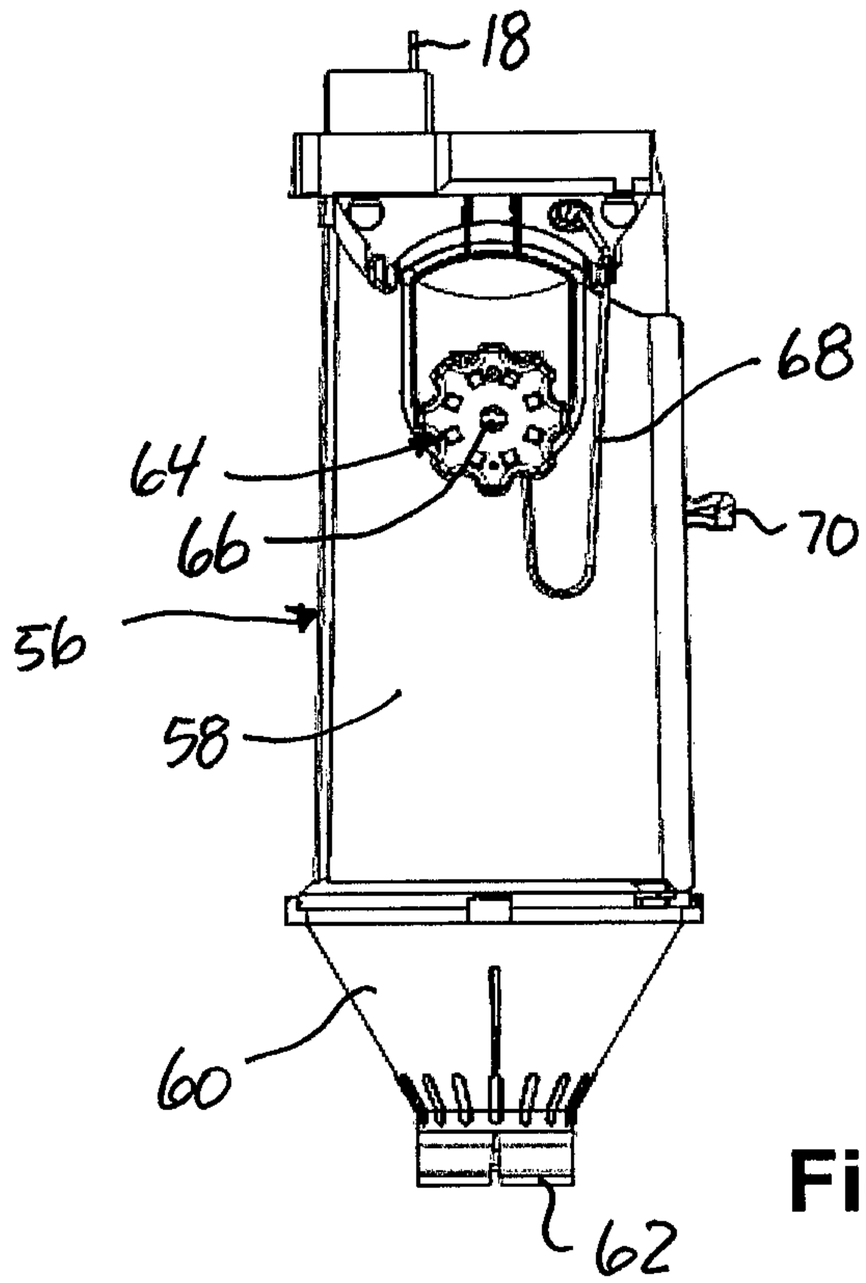
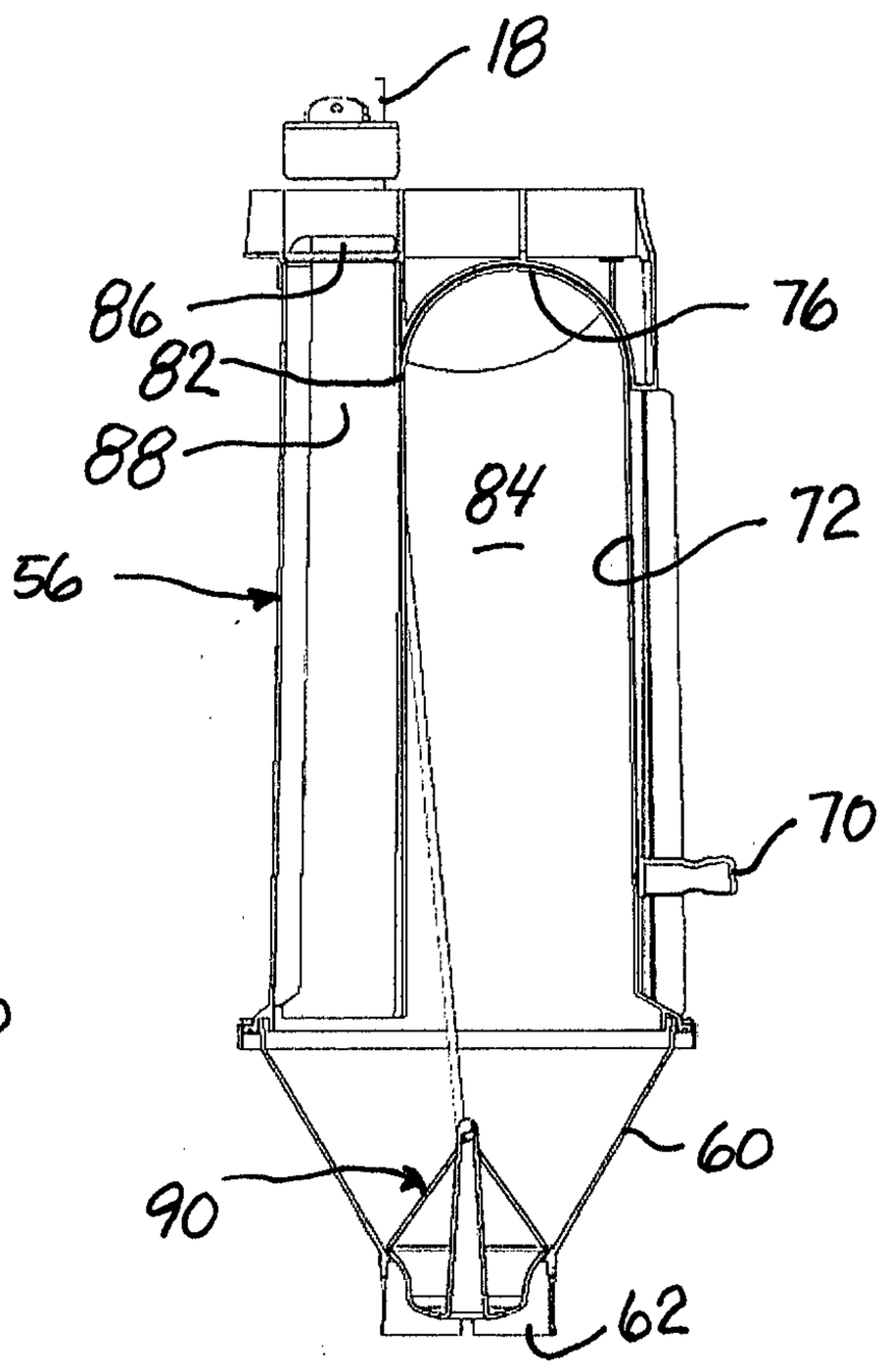


Fig. 11



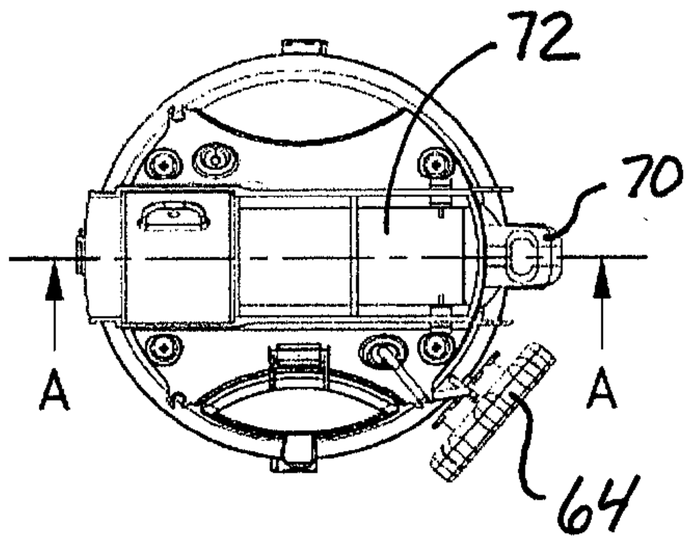


Fig. 12A

Fig. 12B

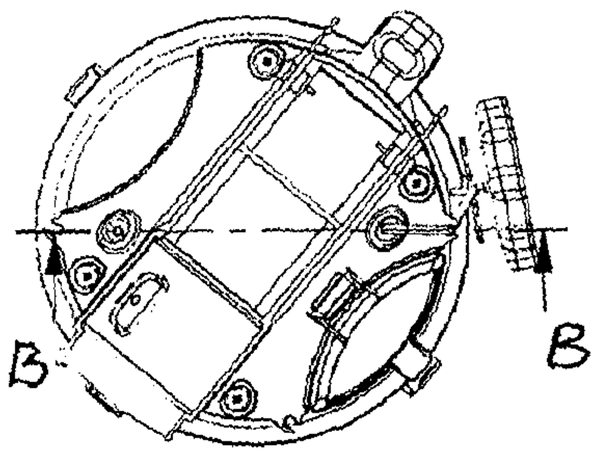


Fig. 13A

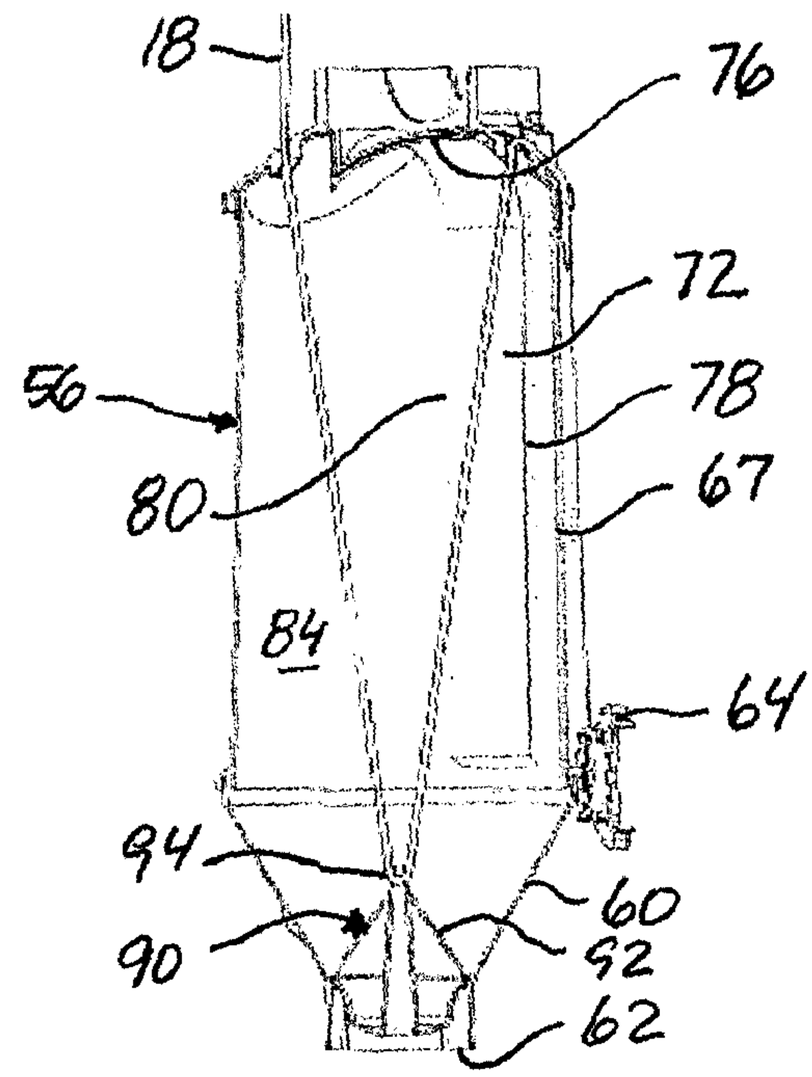


Fig. 13B

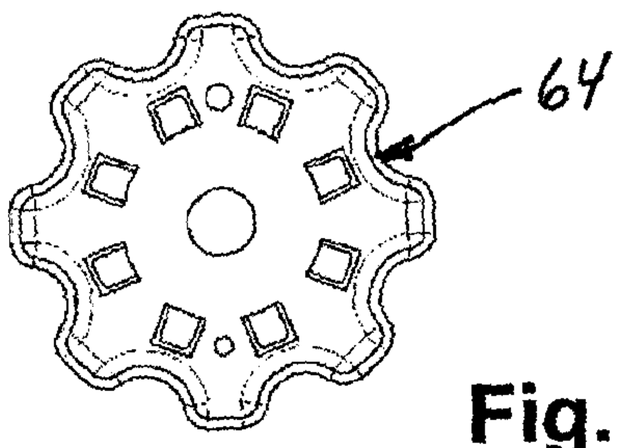


Fig. 14A

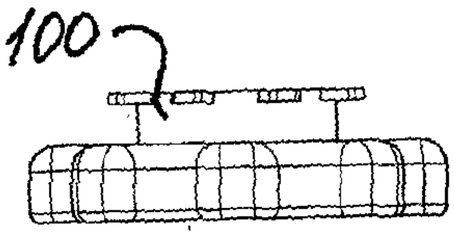


Fig. 14B

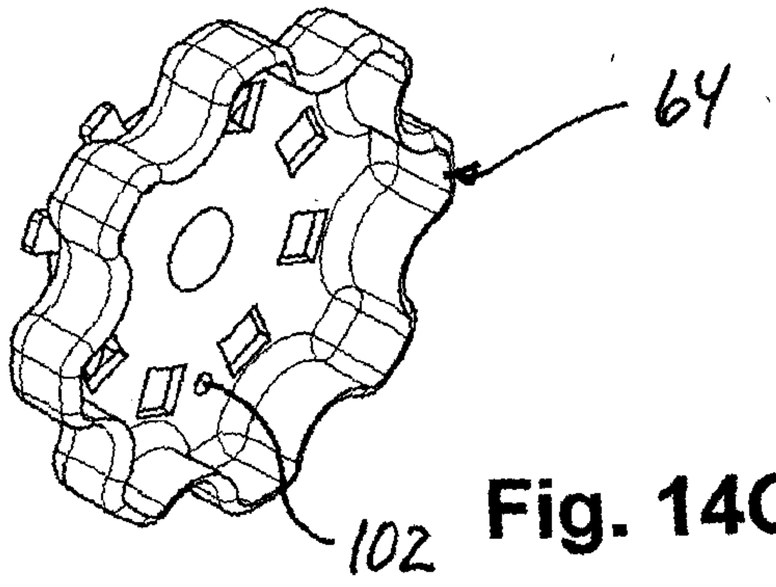


Fig. 14C

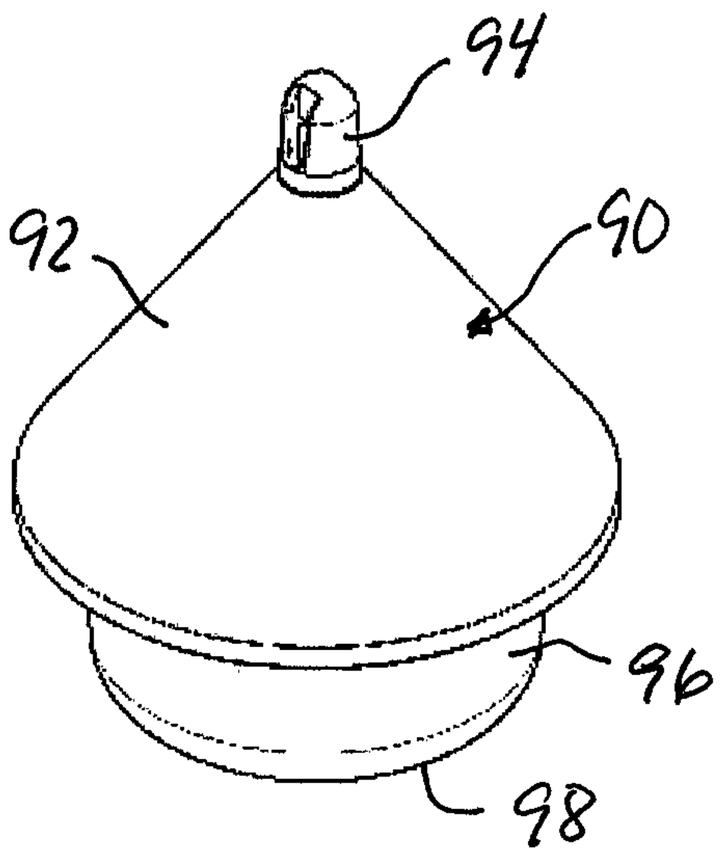


Fig. 15A

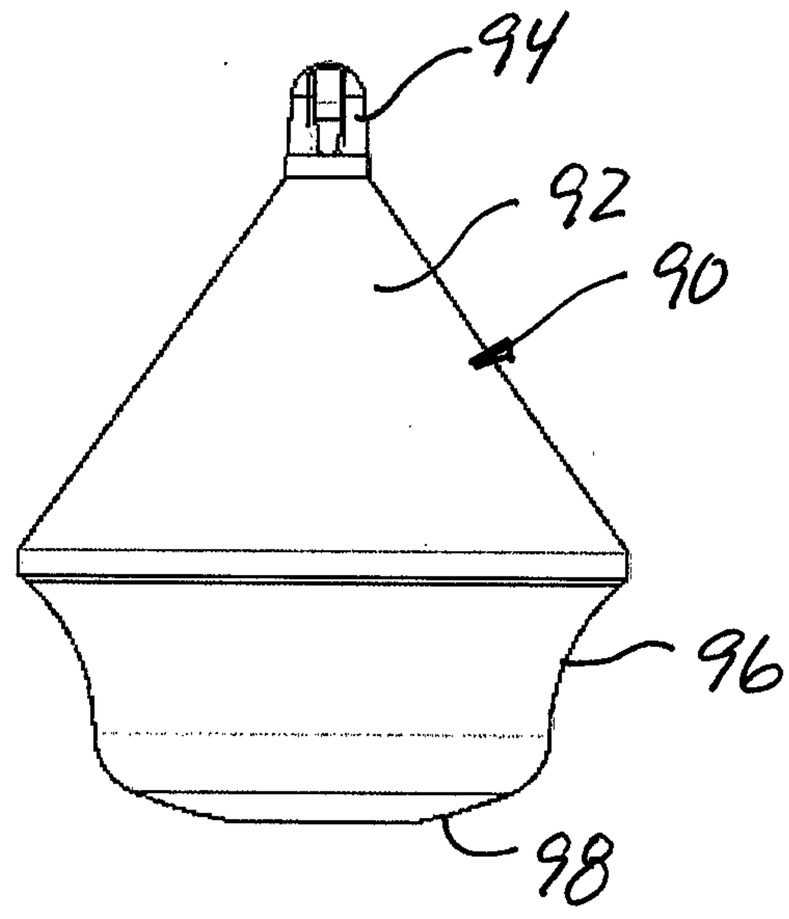


Fig. 15B

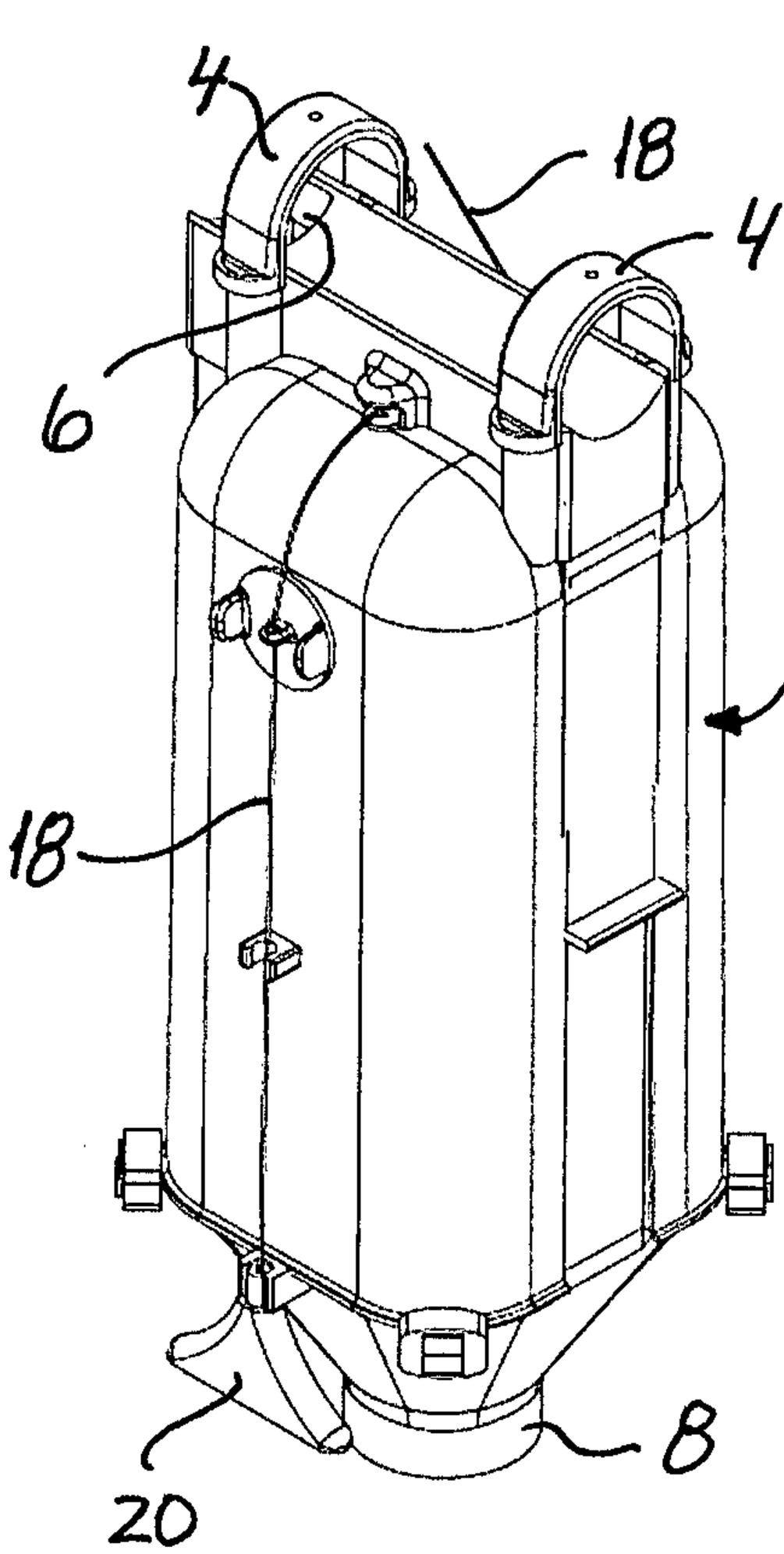


Fig. 1

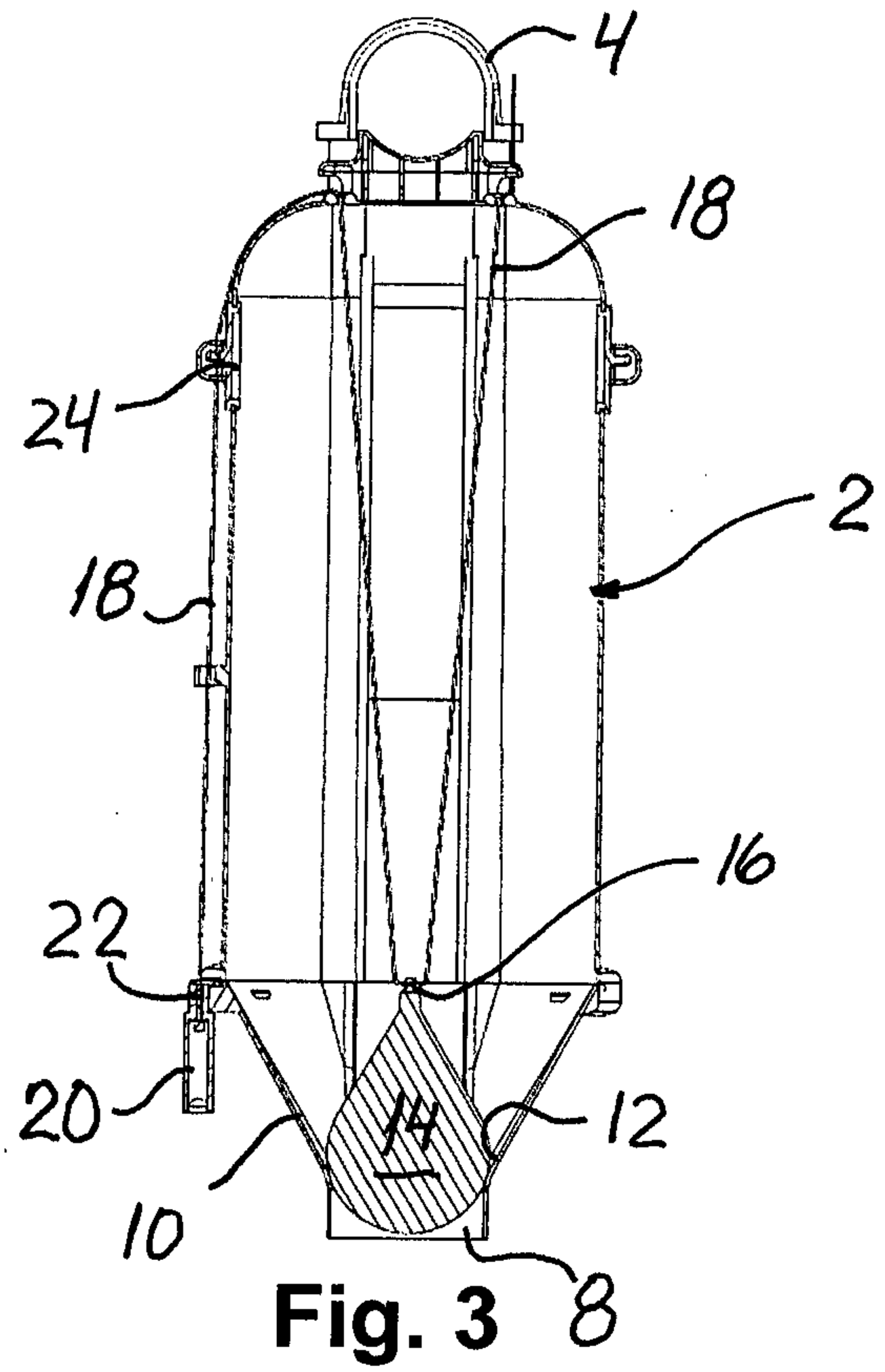


Fig. 3