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(12) (19) (CA) **Demande-Application**

(21) (A1) **2,307,934**
(22) 2000/05/09
(43) 2000/11/10

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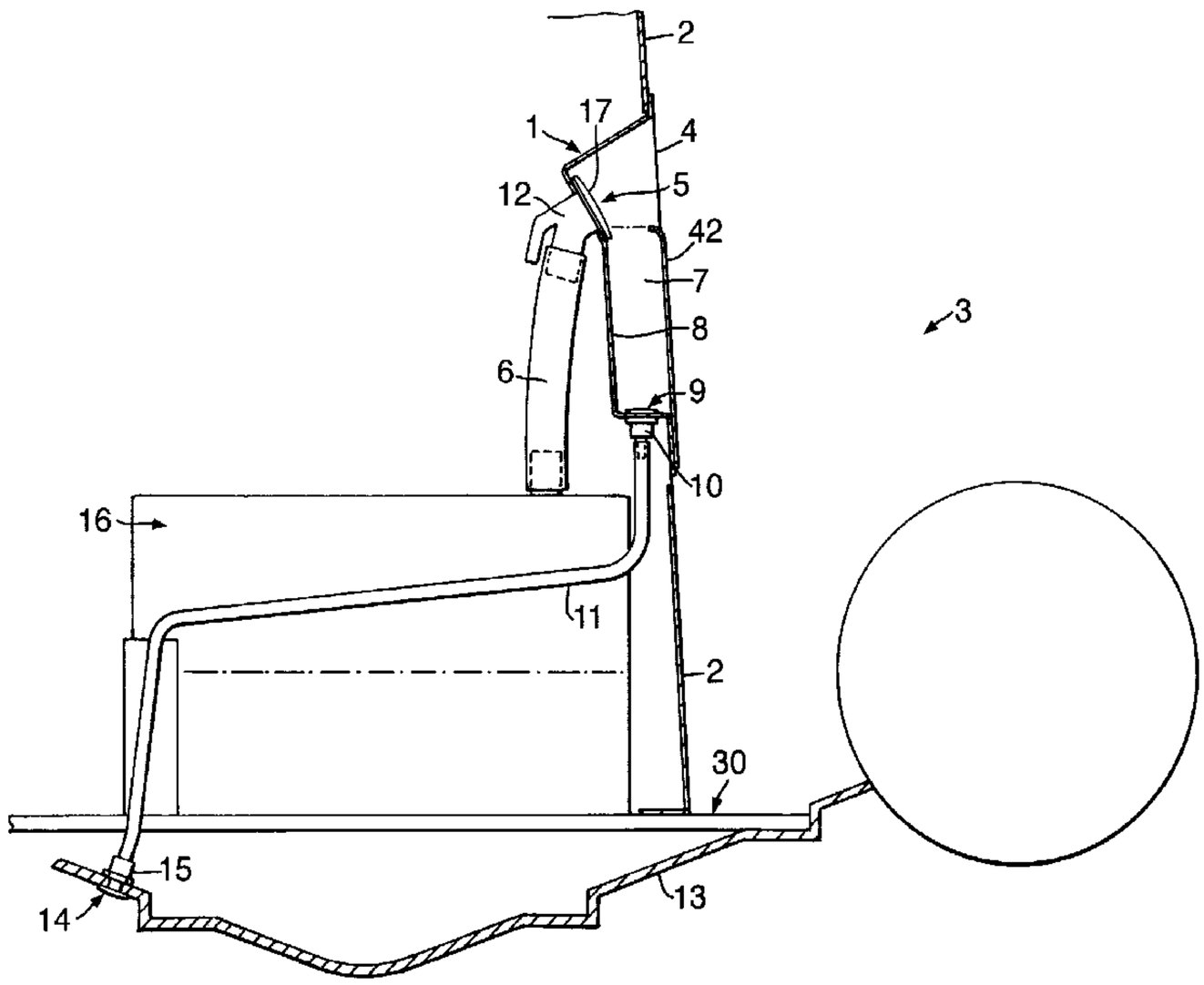
(51) Int.Cl.[7] B63H 21/38
(30) 1999/05/10 (9910827.6) GB

(54) **POINT D'AVITAILLEMENT AMELIORE**
(54) **IMPROVED FUEL FILLING POINT**



(57) A fuel filling point arrangement is provided which is particularly suitable for marine vessels. The arrangement has a fuelling aperture connected via a fuelling conduit to a fuel tank of a marine craft, with an overflow pocket provided below the aperture so as to collect fuel overflow. A draining aperture is provided at the bottom of the overflow pocket for draining accumulated fuel to the outside of the craft or to an overflow tank.

ABSTRACT

A fuel filling point arrangement is provided which is particularly suitable for marine vessels. The arrangement has a fuelling aperture connected via a fuelling conduit to a fuel tank of a marine craft, with an overflow pocket provided below the aperture so as to collect fuel overflow. A draining aperture is provided at the bottom of the overflow pocket for draining accumulated fuel to the outside of the craft or to an overflow tank.

IMPROVED FUEL FILLING POINT

This invention relates to fuel filling points for engine driven marine craft and marine craft including fuel filling points. It particularly relates to fuel filling points for rigid hull inflatable marine craft.

Internal fuel tanks are standard components of craft powered by combustion engines. A refuelling point is consequently required through which the internal fuel tank can be refilled. Commonly the refuelling point consists of an aperture which can be closed by a cap.

A potential problem with refuelling via an external aperture occurs when the tank becomes full. Because the level of fuel in the tank cannot be visually monitored, additional fuel may be inadvertently added, which backs up and then overflows from the refuelling aperture. Because the rate of such overflow will be equivalent to the rate at which fuel is being pumped, a considerable amount of overflowing fuel may accumulate very quickly.

One solution to this problem is to position sensors in the fuel pump to cut the flow when the tank is full. However it is not always appropriate to supply fuel to some types of vehicle, for example marine craft, using this type of fuel pump.

The problem of fuel overflow is particularly acute when the position of the refuelling aperture is such that any overflow accumulates within a vehicle, rather than draining away outside the vehicle. This

is a particular problem in boats and ships and most particularly in inflatable marine craft where there is a limited choice of positions for the refuelling aperture.

The inboard accumulation of fuel represents a major safety hazard and overflow from refuelling can be a significant cause of such an accumulation.

The present invention relates to a fuel filling point arrangement for marine craft (waterborne craft) that minimises the inboard accumulation of overflow fuel.

One aspect of the present invention provides a fuel filling point arrangement for an marine craft, including a fuelling aperture for connection via a fuelling conduit to a fuel tank of the marine craft, characterised in that an overflow pocket for positioning below the fuelling aperture in use is provided so as to collect fuel overflow from the fuelling aperture, the overflow pocket including a means for draining fuel out of the pocket.

In another aspect of the present invention, marine craft including a fuel filling arrangement of the present invention is provided.

In one embodiment, the draining means is arranged such that accumulated fuel is drained directly out of the marine craft, for example into the surrounding water, thus enabling safe removal of the fuel. However, the disposal of fuel into rivers and seas is known to be environmentally damaging. Therefore, in an alternative preferred embodiment, the draining means is connected to a waste storage tank, which can

be intermittently emptied in order to dispose of the waste in a more environmentally acceptable way.

The fuel filling point may be used in any type of vehicle, but is particularly suitable for marine craft such as a rigid hull inflatable marine craft. All the components described below must be fuel resistant and all joints must prevent leakage.

The pocket may be formed in any convenient manner using any rigid material, conveniently metal or plastic. It is preferably formed from a single moulding, for ease of assembly. The single moulding may define the complete pocket or may define only part of the pocket with additional surfaces joined to the moulding to form the overflow pocket. The moulding may comprise the fuelling aperture and a draining aperture and may be shaped to define at least one side of the overflow pocket, preferably at least two, more preferably at least three and most preferably at least three sides and a floor. The three sides may comprise a rear wall and two side walls at lateral sides of the floor. In such an embodiment, a fourth wall (front wall) may be formed from a second moulding, the first and second moulding together defining the pocket. The first and second moulding may be joined together by any convenient means , e.g. glue or resin. In preferred embodiments, the first and second mouldings together form a discrete entity which can be mounted on a casing of the craft.

Alternatively, the second moulding may be a wall of the casing on which the first moulding is mounted in use. For example, the interior of the external

surface to which the single (first) moulding is attached may complete the pocket by providing a fourth wall. An opening in the external surface, for example at the top (or lip) of the fourth wall then allows access to the fuelling aperture.

In embodiments in which the fully formed pocket is a discrete entity, the pocket moulding may be inserted into an external surface of the craft such that it is fixed to the exterior of the external surface but projects backwards through the surface into the interior. The opening allowing access to the fuelling aperture is then formed by the pocket moulding itself.

Clearly other alternative embodiments are equally possible and would be apparent to a skilled person.

The pocket may be attached to an internal or an external surface of the vehicle by any convenient means to provide a fuel-tight seal. In preferred embodiments, glue or resin is used.

The fuelling aperture may be at any convenient angle to facilitate access to it via an opening in the external surface. This can be achieved through the shape of the recess created by the moulding(s). The angle of the fuelling aperture is preferably such that fuel can easily run down a fuelling conduit connected to it under gravity. The aperture may be closed when refuelling is not taking place by any convenient means, for example, using a closure or fuel cap. A fitting may be inserted into the aperture to facilitate the attachment of the fuelling conduit and prevent leakage. This fitting holds the conduit in

place and aligns the bore of the conduit with the aperture. The size of the fuelling aperture is preferably sufficient to receive standard size fuel pump nozzles.

The fuelling conduit runs directly from the fuelling aperture to the fuel tank. Preferably it is steeply angled so fuel in the conduit drains rapidly into the fuel tank. The fuelling conduit may be of any fuel resistant material and is preferably flexible.

The overflow pocket is located below the fuelling aperture so as to form a sink to which overflowing fuel from the fuelling aperture drains under gravity. The pocket may be of any shape, but some preferred embodiments are substantially rectangular in cross section. It is desirable that the shape of the pocket should allow fuel accumulated in the pocket to drain through a draining aperture, which may be located at the lowest point of the pocket. Any swaying movement of the craft during travel will facilitate drainage through this aperture. The pocket may be of any suitable construction but is preferably formed by the attachment of the pocket to the interior of the external surface.

The overflow pocket may have any capacity sufficient to contain a fuel overflow. Preferably, therefore, the fuel receiving volume of the pocket is greater than 1 litre and more preferably greater than 1.66 litres. Preferred embodiments have a capacity of about 1.7 litres. There is no particular maximum volume of the pocket and this may be dictated by the

size of the craft. 10 litres or less, preferably 5 litres or less and most preferably 3 litres or less is suitable for most types.

The draining means may take the form of an aperture located at the bottom of the overflow pocket such that fuel accumulated in the pocket will drain through it. In the event of overflow occurring, the pocket will fill up at about the same rate as that at which the fuel is being pumped. The rate of fuel draining through the draining aperture under gravity will be considerably less than the high rate of overflow, so fuel will rapidly accumulate in the pocket. This arrangement has the advantage over a pocket from which fuel is drained at substantially the same rate as it is added that it may facilitate earlier recognition that fuel is overflowing, enabling the operator to stop the input of fuel before too much is wasted and/or deposited to the environment. Although the rate of overflow is high, it is generally accidental and therefore of short duration and once the flow into the pocket has stopped, the pocket may slowly empty through the draining aperture.

Any accumulation of water in the overflow pocket will also drain out through the draining aperture, ensuring that the pocket remains substantially empty and capable of receiving overflow fuel during refuelling.

Fuel passing through the draining aperture enters an overflow conduit. The overflow conduit is preferably a flexible tube. The flow through this conduit is preferably driven by gravity, but

conventional pumping means may also be used. In preferred embodiments, the overflow conduit leads to an outflow aperture in an external surface of the craft through which the fuel can flow away outside the craft, preventing the dangerous uncontrolled accumulation of fuel inside the craft. The external surface containing the outflow aperture may be the hull of a marine craft. In this case, the drainage of fuel from the overflow pocket through the overflow conduit may be assisted by the Venturi effect when the craft is in motion and water flows past the external aperture. It is important that the joint between the aperture and the conduit is sealed to prevent water entering the hull. This sealing is preferably done using additional fittings.

Alternatively, fuel filling points of the present invention may be used to prevent overflow fuels escaping into the environment. In such embodiments, the overflow conduit feeds the overflow fuel into a storage tank.

In the drawings:

Fig 1 shows a cross section of a rigid hull inflatable craft containing a fuel filling point embodying the invention;

Fig 2 shows an exploded diagram of the fuel filling point arrangement;

Fig 3 shows a cross section of the fuel filling point arrangement

A fuel filling point 1 is positioned in the wall of the console housing 2 of a rigid hull inflatable craft 3. A fuelling aperture 5 in the fuel filling

point 1 allows fluid access to the fuel tank 16 via a fuelling conduit 6. The fuelling aperture 5 is recessed from the opening 4 in the housing 2. The angle of the surface containing the fuelling aperture 5 is about 45° from vertical. This allows easy access by fuel pump nozzles and ensures that fuel can flow easily down the fuelling conduit into the tank.

Below the fuelling aperture 5 is an overflow pocket 7. The pocket 7 is positioned so as to act as a sink for fluids overflowing from the fuelling aperture 5. The recess 8 containing the fuelling aperture 5 and the overflow pocket 7 is constructed from a first moulding. The walls of the overflow pocket 7 are defined on three sides by the moulding and on the fourth side by a second moulding 42, the second moulding being bonded to the side walls 44 and floor 45 of the first moulding to prevent any leakage of fuel.

A draining aperture 9 is positioned at the lowermost point of the overflow pocket 7. An overflow fitting 10 connects an overflow conduit 11 to the draining aperture 9. The overflow conduit passes through some trunking 19 in the deck 30. Alternatively, a deck seal 13 secures the overflow conduit 11 as it passes through the deck 30 to the hull 13. The overflow conduit 11 is connected to an outflow aperture 14 in the hull 3 by an overflow hull fitting 15, which prevents the ingress of water into the hull 13.

During fuelling, the nozzle of a fuel pump can be inserted through opening 4 into the fuelling aperture

5. Fuel is then pumped into the fuel tank 16 via the fuelling conduit 6. Overflow from the fuel tank 16 backs up along the fuelling conduit 6 and emerges from the fuelling aperture 5. Because the fuelling aperture 5 is situated in the recess 8, overflowing fuel will not pass through the opening 4 in the console housing and accumulate on the deck 30, but will instead run into the overflow pocket 7 which is located in the recess 8 beneath the fuelling aperture 5. The rate of flow of fuel into the pocket will be about the same as the rate of pumping. This rate is considerably faster than the rate of drainage through the draining aperture 9 so fuel rapidly accumulates in the pocket 7. The overflow pocket 7 is therefore of sufficient volume to contain all the overflow fuel. The fuel-receiving volume of the pocket 7 is about 1.7 litres. When the fuel stops overflowing, the amount of fuel in the overflow pocket 7 will slowly decrease as fuel drains away.

The overflow fuel that has collected in the overflow pocket 7 drains out of the pocket 7 through the draining aperture 9 into the overflow conduit 11 under gravity. The fuel then flows through the overflow conduit 11, passing through the level of the deck 30, to the outflow aperture 14 in the hull 13. The fuel flows out of the outflow aperture 14 and thereby out of the inflatable craft 3 and into the surrounding water. The drainage of fuel from the overflow pocket through the overflow conduit 11 is assisted by the Venturi effect when the craft is in motion and water flows past the outflow aperture 14.

Figure 3 illustrates in plan view the construction of the pocket of the filling point arrangement. The pocket is defined by a rear wall 43, two side walls 44, a floor 45 and a front wall 42. The rear wall 43, side walls 44 and floor 45 are formed from a first moulding, the first moulding also defining the draining aperture 9 and the fuelling aperture 5. The fourth wall 42 at the front of the pocket is formed by a second moulding bonded to the edges of the side walls 44 and floor 45 of the first moulding. The shaded area within the pocket 7 represents the fuel receiving volume of the pocket 7, which in this embodiment is approximately 1.7 litres.

Claims

1. A fuel filling point arrangement for a marine craft, including a fuelling aperture (5) for connection via a fuelling conduit (6) to a fuel tank (16) of the marine craft,

characterised in that

an overflow pocket (7) for positioning below the fuelling aperture (5) in use is provided so as to collect fuel overflow from the fuelling aperture (5), the overflow pocket (7) including a means (9) for draining fuel out of the pocket (7).

2. The arrangement according to claim 1 wherein the fuel receiving volume of the pocket (7) is greater than 1 litre.

3. The arrangement according to claim 2 wherein the fuel receiving volume of the pocket (7) is greater than 1.66 litres.

4. The arrangement according to any one of claims 1,2 or 3 wherein the fuel receiving volume of the pocket (7) is less than 10 litres.

5. The arrangement according to any one of the preceding claims wherein the means for draining includes a draining aperture (9) located at a portion of the pocket (7) lowermost in use.

6. The arrangement according to claim 5 wherein an

overflow conduit (11) is provided for connection of the draining aperture (9) to an outer surface of the marine craft (3) in which the arrangement is mounted in use, the outer surface being a water contacting surface when the craft is in use.

7. The arrangement according to claim 5 wherein an overflow conduit (11) is provided for connection of the draining aperture (9) to a storage tank of the craft in which the arrangement is mounted in use.

8. The arrangement according to claim 6 or claim 7 wherein a pumping means is connected to the overflow conduit (11) for assisting flow through the overflow conduit (11).

9. The arrangement according to any one of claims 5 to 8 wherein the draining aperture (9) is arranged such that, in use, the rate of flow of fuel out of the pocket (7) through the draining aperture (9) is less than the expected rate of flow of fuel from a fuel pump into the fuelling conduit (6).

10. The arrangement according to any one of the preceding claims wherein a first moulding defines the pocket (7).

11. The arrangement according to any one of claims 1 to 9 wherein a first moulding defines a floor (45), rear wall (43) and two side walls (44) on each lateral side of the floor (45) of the pocket (7).

12. The arrangement according to claim 10 wherein a front wall (42) of the pocket (7) is defined by a second moulding, the first moulding and the second moulding together defining the pocket (7).

13. The arrangement according to claim 12 wherein the first and second mouldings form a discrete entity mountable in a casing of a marine craft.

14. The arrangement according to claim 13 wherein the second moulding is a wall of the casing on which the first moulding is mounted in use.

15. The arrangement according to any one of claims 10 to 14 dependent on any one of claims 5 to 9 wherein the first moulding also defines the draining aperture (9) and the fuelling aperture (5).

16. A marine craft including the arrangement according to any one of the preceding claims.

17. The marine craft according to claim 16, wherein the marine craft is a rigid hull inflatable marine craft.

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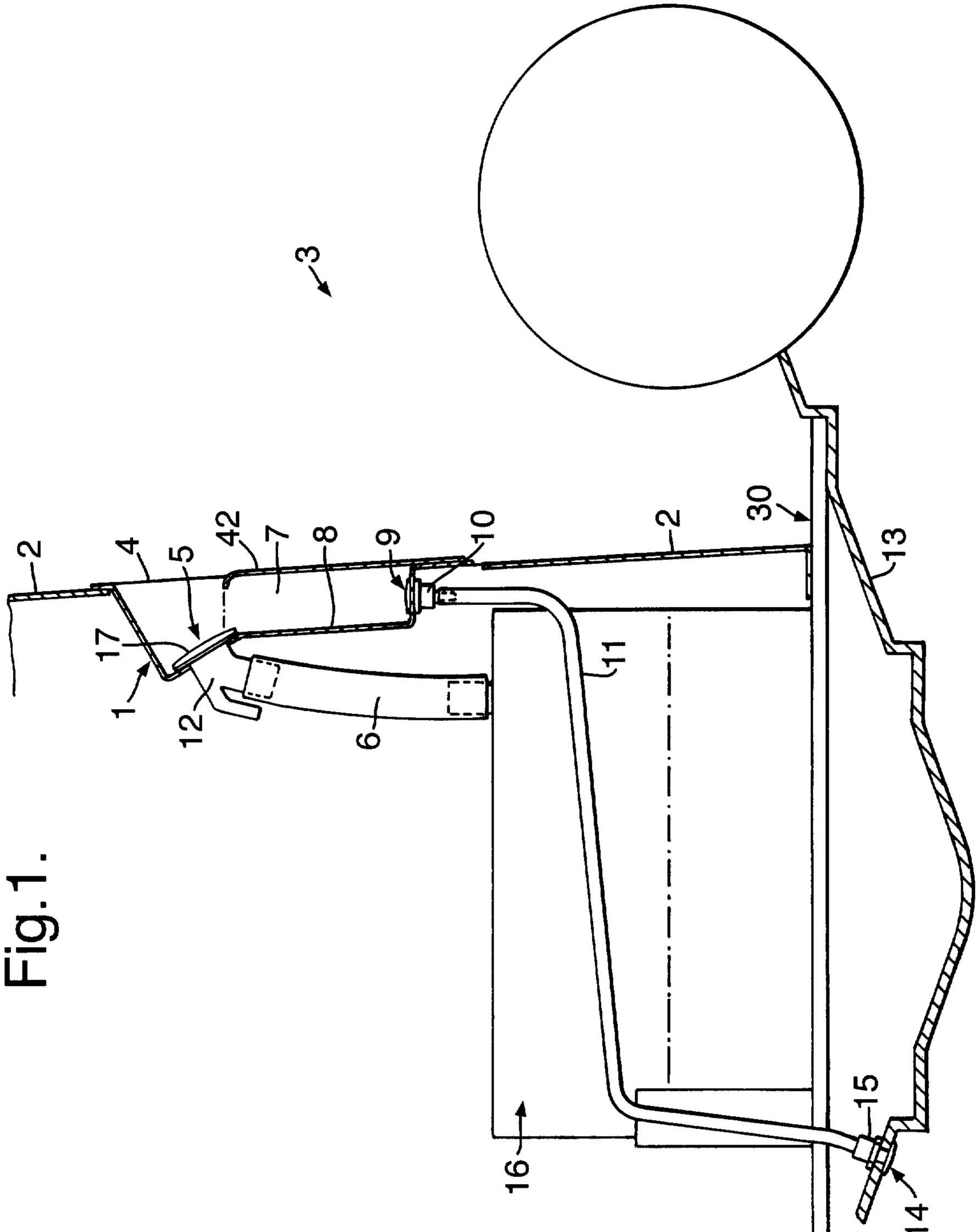


Fig.1.

Fig.2.

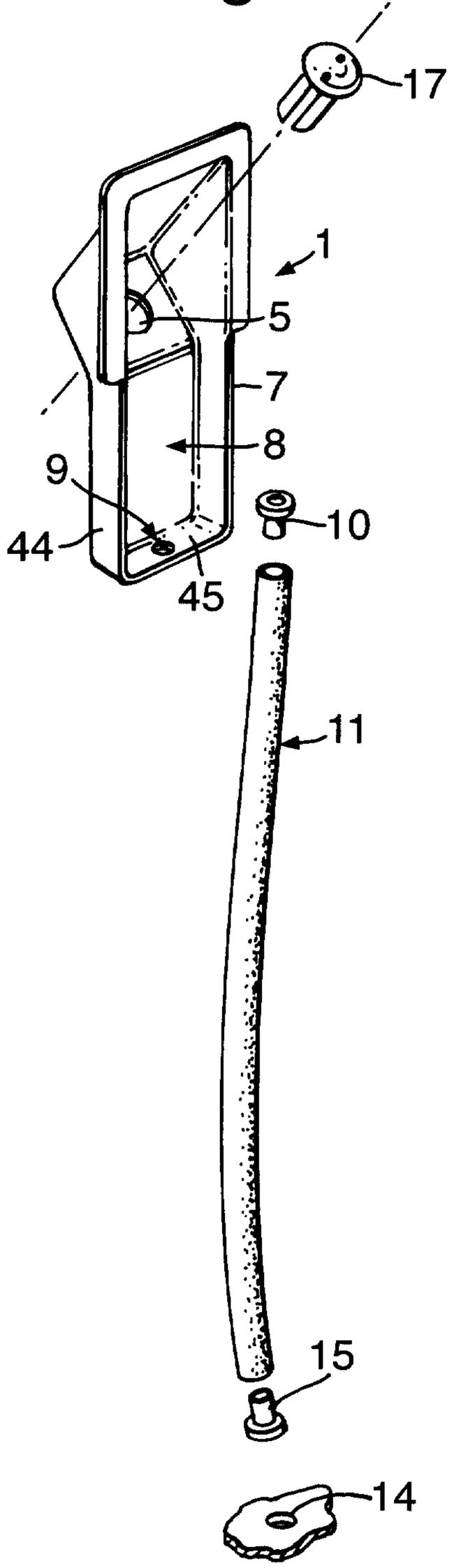
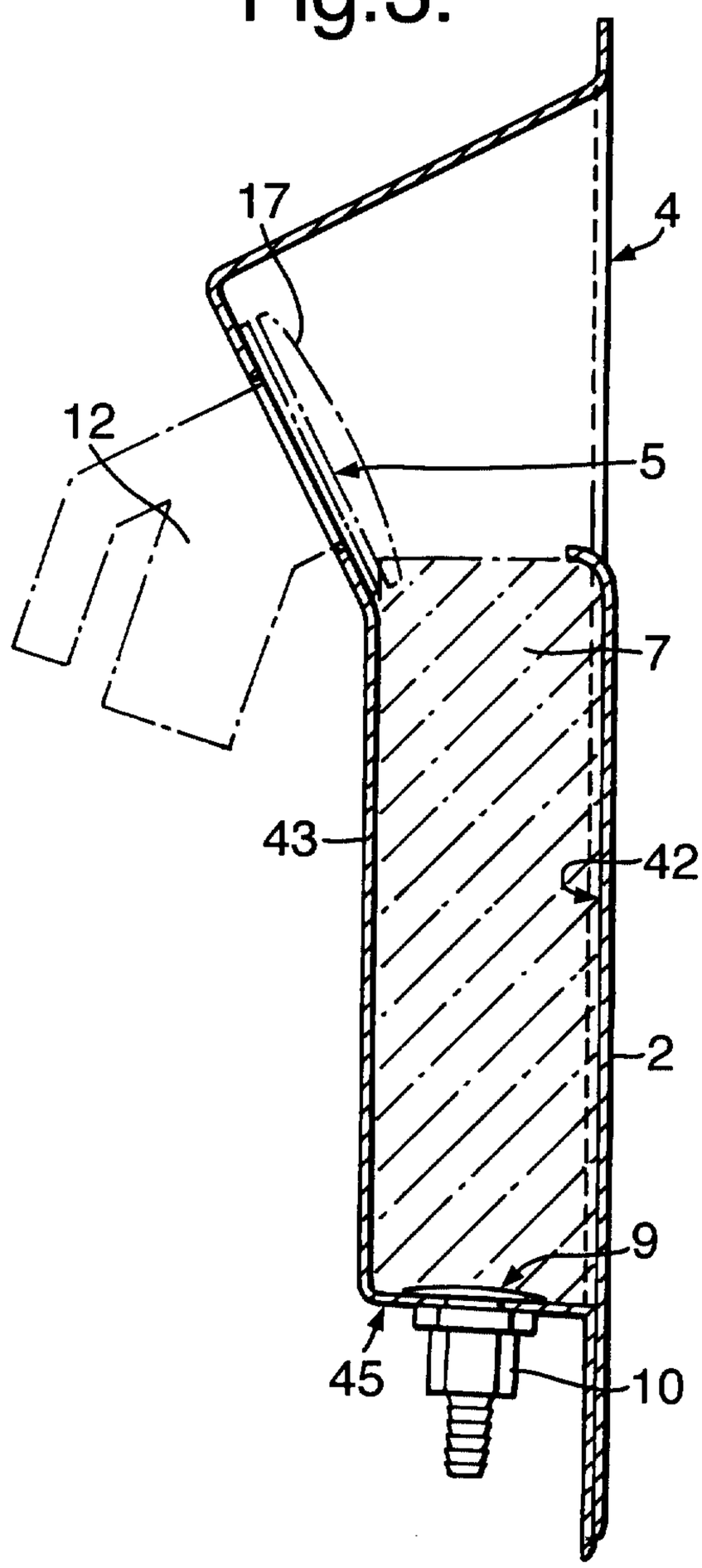
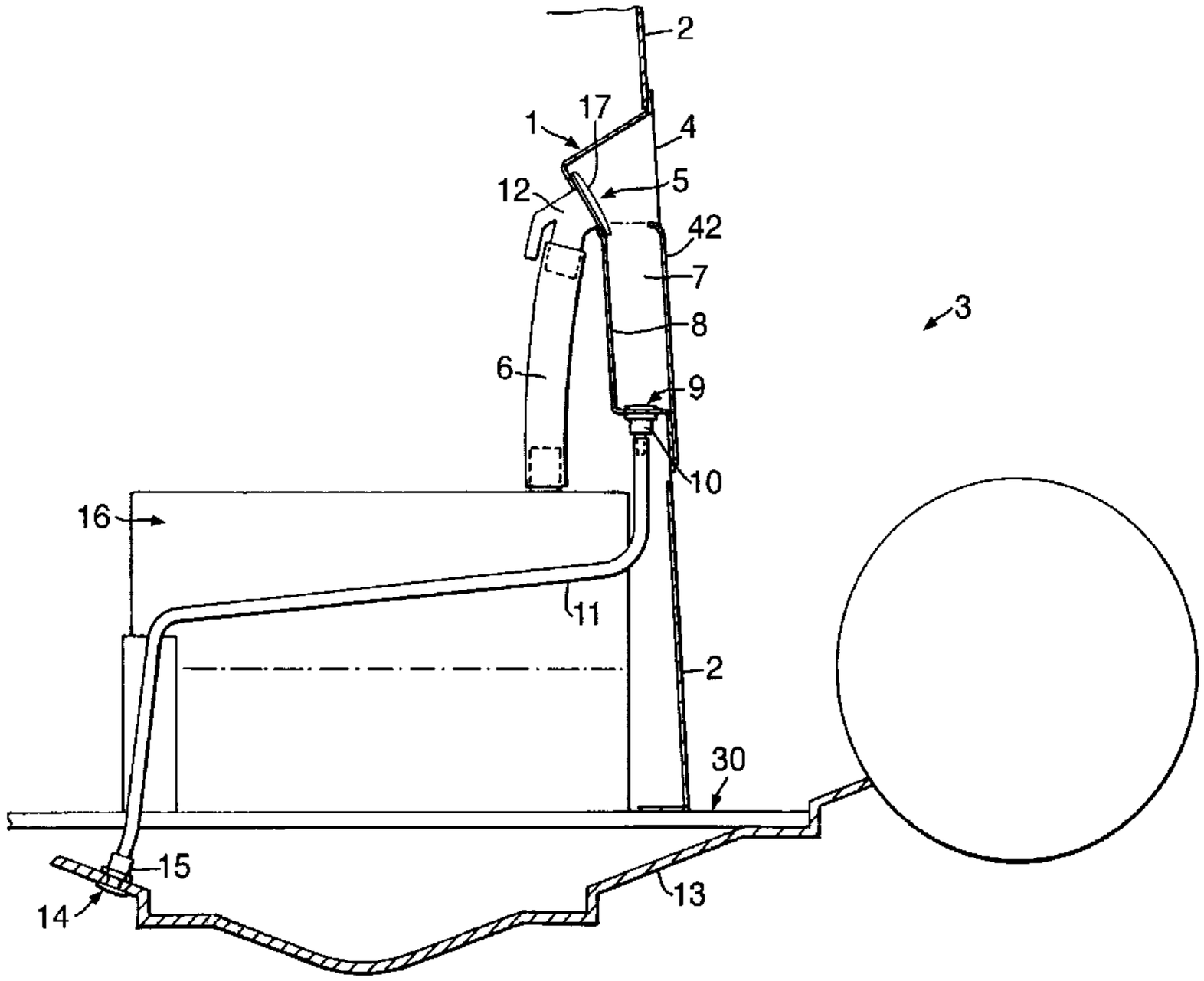


Fig.3.

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