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(54) Pump.

(57) A pump (32; 32') comprises a flexible member (52; 52') defining at least part of a variable volume pumping chamber, an inlet valve (31a; 71) to permit of liquid to enter the chamber thereby and an outlet valve (37; 37') to permit of liquid to leave the chamber thereby, and operating means (10; 10') to deform the flexible member to vary the volume of the pumping chamber to pump liquid into and out of the chamber.

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Title: Pump

This invention relates to a pump particularly, but not exclusively, for pumping liquid to flush a sanitary pan or for pumping water to a discharge means associated with a sink for hand washing purposes or to a shower head. The invention also relates to a reservoir and a pump in combination to provide a self-contained liquid or water supply and pumping capability. The invention also relates to cabins, huts and like accommodation units housing at least one sanitary pan and/or sink and/or shower head for use on building sites, exhibition grounds, camp site car parks and the like, i.e. in all manner of circumstances where sanitary facilities of a permanently installed nature are not available but where such facilities must nevertheless be provided for use of site workers and others, and provided with a pump for pumping liquid to flush the sanitary pan or to pump water to a discharge means associated with the sink, or to the shower head.

According to the invention we provide a pump comprising a flexible member defining at least part of a variable volume pumping chamber, an inlet valve to permit of liquid to enter the chamber thereby and an outlet valve to permit of liquid to leave the chamber thereby, and operating means to deform the flexible member to vary the volume of the pumping chamber to pump liquid into and out of the chamber.

In one more specific aspect of the invention the pumping chamber may be disposed within a receptacle, the receptacle including a wall through which the operating means passes so that an operating member is disposed externally of the receptacle and the pumping chamber internally of the receptacle, and the receptacle is adapted to be positioned at least partly within a reservoir for liquid to be pumped and the receptacle is adapted to permit passage of liquid to the interior thereof from such reservoir.

The reservoir may be provided with an opening through which said

receptacle extends and the opening being closed by the wall of the receptacle through which the operating means passes.

The receptacle may be replaceably mounted at least partly within said reservoir.

Accordingly it is simple to remove the pump, for example, for repair or servicing simply by removing the receptacle from the container.

The pump may be operatively connected to a sanitary pan to flush the pan with liquid withdrawn from a region of said reservoir which is separated by a filter screen from another region thereof into which the sanitary pan discharges.

Alternatively the pump may be connected to a discharge outlet associated with a sink for hand washing purposes to pump water to the discharge outlet. Further, alternatively, the pump may be connected to a shower head so as to pump water to the shower head.

The invention provides a self-contained liquid pumping facility which may be used in a wide variety of applications such as to flush a w.c. or "head" in a boat or a w.c. in a coach, train, aeroplane or the like or to provide a water supply to a wash basin or shower in a boat, coach, train or aeroplane or the like. If desired the reservoir may comprise two reservoirs, the contents of which are kept separate and there being two pumps, one to pump liquid for w.c. sanitary pan flushing and the other to pump clean water for washing or showering.

The pump may be disposed in said reservoir so as to be at least partially immersed in the liquid, in use.

In a second more specific aspect of the invention the flexible member may define at least a majority of the variable volume pumping chamber and the pump may be operatively connected to a sanitary pan so as to pump liquid to flush the pan.

In both of the more specific aspects of the invention the sanitary pan may be housed in a cabin, hut or like accommodation unit, the unit having a wall structure mounted on a base structure, the base structure defining the, or a, reservoir, the reservoir being for the reception of a suitable chemical liquid, and the sanitary pan being arranged to discharge into the liquid in use.

The receptacle may be provided with an imperforate wall on the side thereof adjacent to the discharge of the sanitary pan to the reservoir and is

provided with a perforate wall, which comprises said filter screen, on the other side thereof.

Said filter screen may be arranged only to surround the inlet to the pump, the sanitary pan being arranged to discharge to a region external to said screen, which may be regarded as being on the "soil side" of the filter screen, whilst the inlet to the pump is disposed internally of filter screen and may be regarded as being on the "clear side" thereof.

Alternatively, said filter screen may be arranged to divide said chamber into two regions of comparatively large volume, the sanitary pan being arranged to discharge into one such region, which may be regarded as being on the "soil side" of the filter screen, whilst the inlet to the pump is disposed on the other side of the filter screen and may be regarded as being on the "clear side" therof.

In either case, upon each operation of the pump to draw chemical liquid from the "clear side" of the reservoir such liquid will be replaced by liquid drawn through the filter screen from the "soil side" thereof.

The pump of the present invention, by virtue of being disposed so that it is at least partially immersed in the liquid in the tank and by arranging that the fluid level in the tank is at an appropriate level, an adequate amount of liquid to flush the sanitary pan can be achieved with one or, at most, two strokes of the operating member. Moreover, because the pump does not have a piston slidable within a cylinder, no problems arise due to jamming of the piston or of leakage due to wear or failure of a seal between the piston and cylinder. The pump is, therefore, extremely reliable and effective in use.

The reservoir for the chemical liquid forms part of the structure of the unit rather than being a separate fitting as when a conventional chemical closet is mounted in the structure in which it is to be employed; such an arrangement makes for simpler and thus cheaper construction.

A unit according to the invention may house more than one sanitary pan, in separate cubicles; in these circumstances each pan could, if desired, be associated with its own individual reservoir for chemical liquid or alternatively two or more pans could be associated with the same reservoir but in either case each pan would have its own pump.

In one embodiment of the invention which is a unit housing only one sanitary pan, the whole base structure of the unit is in the form of a hollow box defining said reservoir for the chemical liquid, the top closure of such

box forming the floor within the unit and being provided with an opening through which said receptacle extends. The box as a whole constitutes a plinth-like base structure on which the wall structure of the unit is mounted. However, in larger units according to the invention housing two or more sanitary pans, and possibly other sanitary fittings such as urinals and wash basins in addition, the reservoir or reservoir into which such pans discharge need not necessarily occupy the whole of the base structure of the unit but rather may extend only between the cubicles containing the sanitary pans. Where the unit has only one sanitary pan it may be provided with a wash basin or urinal and a pump according to the invention may be provided to pump appropriate liquid thereto.

Means are provided for emptying the chamber at suitable intervals and such means may, if desired, comprise a discharge opening enclosed by a suitable valve mechanism within the chamber. An overflow pipe may be provided in said chamber having its inlet on the clear side of the filter screen and its outlet connected directly to the chamber emptying outlet. Means may be provided for heating the interior of the chamber to prevent freezing of the chemical liquid such as an electrical heater or a calor gas or paraffin fuel heater.

The sanitary pan may be provided with a liquid seal in its discharge, for example, by providing a conventional U-bend in which liquid is trapped.

The pump of the present invention pumps sufficient liquid to permit of breaking of the seal provided by the U-bend so that a conventional flushing and sewage discharge operation is provided.

Alternatively, the sanitory pan may be provided with a flap valve in its discharge which flap valve is operable by the liquid pumped by the pump.

A suitable chemical liquid for use in units according to the invention is one such as is conventionally used in chemical closets, which functions both as a disinfectant and to breakdown solid excreta.

The pumping chamber may also be defined by a fixed volume rigid body on which the flexible member is mounted so as together to define the pumping chamber.

The inlet and outlet valves may be provided on the rigid body.

The inlet valve may comprise a flexible diaphragm movable into and out of sealing engagement with an inlet opening in a part of the body.

The outlet valve may comprise a valve member, such as a ball, movable into and out of sealing engagement with a valve seat surrounding an outlet opening in a part of the body.

The flexible member may be generally cylindrical having a generally cylindrical wall which may be closed at one end and open at the other where it is connected to the body.

The generally cylindrical wall may have a corrugated configuration to provide a collapsible bellows.

The flexible member may be operatively connected to an operating member by an operating link whereby movement of the operating member causes movement of the flexible member to increase or decrease its volume.

The operating member may be arranged to move rectilinearly and be directly connected, by a rigid operating link, to the flexible member.

A resilient biasing means may be provided to return the flexible member to an initial condition after being deformed by the operating member to reduce the volume of the pumping chamber.

The resilient biasing means may act on the operating member or operating link.

Alternatively, the resilient biasing means may act on the flexible member and may comprise a coil compression spring disposed within the flexible member to act between the pump body and the flexible member.

The resilient biasing means, which conveniently comprises a coil compression spring, may be disposed in encircling relationship with the operating link and be disposed between the operating member and the wall of the receptacle.

The rigid link and resilient biasing means may be within a flexible sleeve.

Two embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which:-

FIGURE 1 is a perspective view of a unit according to the invention, in the form of a portable cabin;

FIGURE 2 is a plan view partly cut away to show part of the interior of the cabin of Figure 1;

FIGURE 3 is a cross-section on the line 3-3 of Figure 1, and

FIGURE 4 is a cross-sectional view similar to that of Figure 3 but

showing a modification of the embodiment described with reference to Figures 1 to 3.

Referring first particularly to Figures 1 and 2 of the drawings, there is shown a unit according to the invention comprising a cabin about 2.3 metres high and 1.2 metres square having side walls 1, a rear wall 2 and a front wall 3 containing a door 4. The wall structure is mounted on a plinth-like base structure 5. The roof 6 of the unit is of a cup-like construction and is a one-piece moulding of plastics material which is sufficiently translucent for natural light to illuminate the interior of the cabin when the door is closed. The cabin is provided with lifting means in the form of eye bolts 7 provided at opposite sides of the base.

The cabin houses a sanitary pan 8 mounted above a floor 9. Flushing of the sanitary pan is effected by operation of a foot pedal 10 to actuate a pump to be described below.

Referring now to Figures 2 and 3 in particular, the plinth-like base structure 5 of the unit is in the form of a watertight box moulded in thermo setting plastics material such as reinforced polyester resin and providing an enclosed chamber or reservoir 11 capable of receiving a suitable chemical liquid which will receive the discharge from the sanitary pan 8 and will also be used to flush the pan. The floor 9 of the unit is provided by separate floor panels above the top of the reservoir 11 and the foot pedal 10 for operating the pump is mounted for vertical sliding movement as hereinafter to be described. The pump is provided within a receptacle 20 made as a fabrication in steel. The receptacle may be made in other material such as a suitable plastics material.

The receptacle is of generally rectangular box configuration having a bottom wall 21, opposed side walls 22, 23, opposed end walls 24, 25 and a top wall 26. The top wall 26 projects outwardly of the side walls 22, 23 to provide flanges 27 which overlie two opposite sides of an opening 27a provided in the top wall 11a of the reservoir 11 to which the flanges are secured by fasteners 28. The receptacle is thereby replaceably mounted with a majority thereof within the reservoir and can therefore be quickly and easily removed from the reservoir 11 simply by undoing the fasteners 28 and lifting the receptacle and a pump associated therewith, hereinafter to be described, therefrom.

The side wall 23 and two opposed end walls 24, 25 are made of a suitable filter mesh material whilst the base wall 21 and other side wall 22 are imperforate.

Fixed to the base wall 21 is an outwardly extending flange 30 of a rigid body part 31 of a pump 32. The body part 31 is made as a moulding in a suitable synthetic plastics material such as polyethylene.

A rectangular opening is formed in the side wall of the body 31 as shown at 31a which provides a liquid entry opening and a perforated plate 33 extends across the interior of the pump body part 31 at an angle of approximately 18° to the horizontal and is provided with a circular diaphragm 34 of P.V.C. which is provided with a permanent bias away from openings 35 in the plate 33 and is secured to the plate 33 by a rivet 36. The diaphragm 34 is such that it can be deformed into sealing engagement with the plate around the opening 35 by the application of pressure to the diaphragm, as hereinafter to be described.

The pump body part 31 is provided with an outlet opening 37 in which a ball seat insert 37 made of polypropylene, maintained by engagement of a rib 38 formed thereon in a groove 39. A valve member 40 in the form of a ball is provided which is movable into sealing engagement with a seat 41 provided on the insert 37. The ball 40 is maintained in position by a housing 42 provided with an outlet pipe 43 which is connected to a flush pipe 44 of the sanitary pan 8.

The pump body part 31 is provided with a generally cylindrical portion 50 to which is clamped, by a clamp ring 51, a flexible bellows 52 made of P.V.C. The bellows 52 is of generally cylindrical configuration having a generally cylindrical wall 53 of corrugated configuration to provide a collapsible bellows and a closed top wall 54 which is connected to a plate 55 from which an operating rod or link 56 extends vertically upwardly through an opening 57 in the top wall 26 of the receptacle 20. The top wall 26 is provided with a bearing 58 to guide the rod 56 for vertical sliding movement. The bellows 52 provides a majority of variable volume pumping chamber the remainder of which is defined by the pump body part 31. A coil compression spring 59 encircles the rod 56 and is engaged between the plate 26 and foot pedal 10 so as resiliently to bias the foot pedal 10 upwardly and hence to return the bellows 52 to an original position of greater volume after compression of the bellows to a smaller volume by pressing of the foot pedal

10. A flexible rod cover is provided around the rod 56 and spring 59 between the foot pedal 10 and the floor plate 9 which is apertured as shown at 61 to receive the rod 56 and spring 59.

In use, the valve body part 31 and at least a part of the bellows 52 will be immersed in a chemical liquid within the reservoir 11. Pressing of the foot pedal 10 by a user with his foot will urge the rod 56 downwardly and hence compress the bellows to cause the diaphragm 34 to close the inlet opening 35 and to lift the ball 40 away from the seat 41 and thus to force the liquid contents of the pump chamber through the feed pipe 44 to flush the sanitary pan 8. The pump mechanism is dimensioned in relation to the usual level of liquid in the reservoir 11 so that one or two operations of the foot pedal 10 will be sufficient to cleanse the pan in normal circumstances. When the user lifts his foot from the pedal the spring 59 returns the pedal, and hence the bellows, to its original position to cause the ball valve 40 to move into sealing engagement with the seat 41 and the diaphragm 34 to move away from the inlet opening 35 so that liquid is drawn into the pump chamber through the opening 35 and entry opening 32.

So as to ensure that only chemical liquid free of solid matter is supplied to the sanitary pan 8 for flushing the latter, the hereinbefore mentioned filter mesh is provided on the sides 23, 24 and 25 of the receptacle 20 and the receptacle 20 is orientated so that the imperforate side 22 is adjacent to the waste discharge of the sanitary pan 8. As a result liquid delivered via the pump mechanism will be free of solid matter. If desired, an additional screen or screens may be provided externally of the receptacle 20 to divide the reservoir 11 into two regions, one of which contains the receptacle 20 and the other of which contains the outlet of the discharge pipe of the sanitary pan 8.

The reservoir 11 is provided with a means for emptying the chamber comprising a valve member associated with a discharge tube at the bottom rear of the reservoir 11. The valve mechanism may be of any convenient type and is not illustrated herein.

Similarly the reservoir is provided with an overflow pipe, the inlet end of which is positioned adjacent the top of the chamber and is connected to the hereinbefore mentioned discharge tube at its other end.

The unit incorporates heating means for use in cold weather to prevent freezing of the liquid in the reservoir 11. The heating means takes the form of an immersion heater (not shown) whose head is housed in a compartment

connected to the rear wall of the base structure having an exit door, not shown. The heating element of the immersion heater passes through the inner wall of the compartment so as to be immersed in the liquid. The compartment remains sufficiently large to accommodate alternative heating means, such as a calor gas burner or paraffin lamp.

The sanitary pan 8 can be a standard vitreous china flushing pan with bottom outlet which discharges directly through an aperture in the floor 9 of the unit into the reservoir 11. The sanitary pan 8 has a conventional U-bend so as to provide a liquid seal between the flushing pan and the reservoir 11. The unit may be arranged to house further fittings such as a storage tank for the supply of water to a wash basin if fitted and a hand dryer or container for paper towels. If a wash basin is fitted a pump similar but, if desired, of smaller size to the pump hereinbefore described may be provided to pump water from the storage tank to a discharge outlet associated with the sink for hand washing purposes.

The unit may be arranged to house a shower and again a pump similar to that described hereinbefore may be used to pump water from a storage tank to a shower head.

Referring now to Figure 4 there is illustrated a modification of the pump using the embodiment described with reference to Figures 1 to 3. In this modification the unit according to the invention is as described with reference to Figures 1 and 2 of the drawings except that the floor 9 is provided by an upper polyester resin wall of the reservoir 11. In Figure 4 the same reference numerals have been used for the same parts as were used in Figures 1 to 3, but with the addition of a prime sign.

In this modification a pump 32' is provided within a receptacle 20' made as a moulding in medium density polyethylene perforated as shown at 20a. In this embodiment the function of the perforated plate 33 shown in Figure 3 is afforded by a correspondingly inclined part 33' moulded integrally with the remainder of the receptacle 20' and a circular diaphragm 34' of P.V.C. which is provided with a permanent bias away from openings 35' provided in the part 33' and is secured to the part 33' by a rivet 36'. As in the first embodiment the diaphragm 34' is such that it can be deformed into sealing engagement with the part 33' around the openings 35' by application of pressure to the diaphragm. The part of the receptacle 20' which provides a part cylindrical

wall 70 depending downwardly from the part 33' is provided with openings 71 for the same function as the opening 31a of the first embodiment.

A pump body part 31' essentially as described in connection with the first embodiment is mounted in the receptacle 20' in engagement with an up-stand provided by the wall 70 and part 33'. The pump body 31' is made as a moulding in medium density polythene and is secured to the receptacle 20' by suitable screws. In this embodiment the valve seat 41' is of the configuration shown in Figure 4 and is provided on an insert 37' which is a generally channel shaped moulding of ABS. The valve member 40' is made of medium density polyethylene and is filled with sand to provide the desired mass.

The top of the receptacle 20' is closed by a top wall part 26' having a downwardly depending peripheral flange 26a' which flange is secured, for example by self tapping screws, to the overlapped part of the side wall of the receptacle 20'.

In this embodiment the receptacle 20' rests on the base wall 11'a of the reservoir 11 and the walls of the opening 27'a serve to hold the receptacle 20' from lateral movement. Thus pumping loads are transmitted to the base wall 11'a.

Secured by suitable means such as rivets or screws to the underside of the wall 26' is a bearing retaining plate 72 having a pocket 73 which co-operates with a similar but upturned pocket 74 provided in the top wall 26' between which is received a nylon bearing bush 58' which guides an operating rod 56' in a similar manner to the bearing 58' of the embodiment described with reference to Figures 1 to 3. In this embodiment no coil compression spring corresponding to the coil compression spring 59 is provided to encircle the rod 56 and the flexible rod cover 60' merely rests against the upper surface of the top wall 26' due to its inherent resilience.

In place of the coil compression spring 59 encircling the rod 56 is provided a larger diameter coil compression spring 59' which is disposed within the bellows 52' and acts between the valve body 31', being located around an upstanding circular flange 74 thereof, and a bottom bellows plate 75 which co-operates with a top bellows plate 76 to clamp the top part 77 of the bellows 52' therebetween by virtue of engagement of the top bellows plate 76 with a shoulder 78 provided on the rod 56 as a result of clamping action provided by a nut 79 and washer 80 threadedly engaged with the end of

the rod 56. The bellows and bellows plate 75, 76 are formed to provide a frustoconical downwardly depending part 81 engaged within the upper end of the spring 59' to retain the spring in position. The spring 59' is preferably made of stainless steel to resist corrosion.

The top and bottom plate 75, 76 are made of ABS and the bellows 52' and the rod cover 60' are made of plasticised PVC.

In this embodiment the outlet pipe 43' of the housing 42 extends through the top walls 26' of the receptacle 20' and is available for connection to a flush pipe of the sanitary pan 8 similarly to the flush pipe 44 described with reference to Figures 1 to 3.

In all other respects the pump is as described with reference to Figures 1 to 3 as is its mode of operation. The above described differences facilitate manufacture of the pump particularly moulding of the enclosure in medium density polyethylene and the positioning of the spring 59' within the bellows 52' permits of the use of the larger diameter spring so that a greater restoring force can be achieved whilst retaining a spring rate which is acceptable to a user. It has been found in practice that it is not necessary to gain access to the spring for servicing frequently and if access is necessary it can be relatively easily gained simply by releasing the clamp ring 5'. It should be appreciated that the enclosure 20' and pump 32' mounted therein provide a sub-assembly which can be easily and conveniently removed from the reservoir 11.

If desired instead of a water trap provided in the U-bend of a conventional sanitary pan the sanitary pan may be provided with a flap valve operable by the water pumped by the pump.

Although in both illustrated embodiments the top wall 26, 26' of the receptacle effectively closes the top of the receptacle, except for a passage just large enough for the operating means to pass therethrough, if desired the top wall may be of lesser extent and may only comprise the top edge of the side wall of the receptacle. In this case other means such as the floor of the unit or a seperate member may obturate the top of the receptacle, suitable means being provided for guiding the operating member.

It is particularly envisaged that the pump be provided in combination with a container to provide a reservoir for liquid to be pumped. The reservoir and pump combination may be provided to pump sanitary liquid to flush a sanitary pan such as a w.c. or "heads" in a boat or a w.c. in a coach, plane

train or the like. In such applications the builder of the boat, train, coach, plane or the like would provide the sanitary pan and all the other fittings required in the relevant part of the boat etc, and a pump and reservoir combination according to the present invention would be connected in position. Alternatively, if desired, the sanitary pan may be supplied in combination with the pump and reservoir combination to provide a self-contained unit to be received by suitable prepared area of the boat etc.

Alternatively, the reservoir may, in use, be connected to a wash basin or shower or the like to supply clean water thereto.

Further alternatively, the reservoir may be divided into two separate reservoirs, one providing liquid for flushing a sanitory pan with one pump according to the first aspect of the invention and the other reservoir containing clean water and a second pump according to the first aspect of the invention to provide water for washing or showering or the like.

Although in the embodiment described with reference to Figures 1 and 3 and the modification described with reference to Figure 4 the reservoir has been described as being provided as part of the base plinth of the unit if desired the reservoir may be provided as an upstand on the floor of the unit or other area in which the combination is provided.

A pump embodying the present invention has the following advantages:-

there are fewer moving parts, thereby extending the life between services; servicing is simplified since the pump assembly can be easily remove and replaced simply by removing and replacing the receptacle as described above. Therefore all the components are more easily accessible for service and test, there is no need to drain the contents of the chamber in order to service the pump, because the whole of the pump can be removed for servicing and then replaced from the top of the chamber. This avoids loss of fairly expensive sanitary fluid, which is particularly important when the tank has been recently recharged and little used.

If desired the flexible member which defines a majority of the variable volume pumping chamber may be of other configuration to the gnerally cylindrical bellows configuration described herein so long as it pumps a sufficient volume of liquid as described hereinbefore.

The features disclosed in the foregoing description, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the

disclosed result, or a class or group of substances or compositions, as appropriate, may, separately or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

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CLAIMS.

1. A pump (32; 32') comprising a flexible member (52; 52') defining at least part of a variable volume pumping chamber, an inlet valve (31a; 71) to permit of liquid to enter the chamber thereby and an outlet valve (37; 37') to permit of liquid to leave the chamber thereby, and operating means (10; 10') to deform the flexible member (52; 52') to vary the volume of the pumping chamber to pump liquid into and out of the chamber.

2. A pump according to Claim 1 characterised in that the pumping chamber is disposed within a receptacle (20; 20'), the receptacle including a wall (26; 26') through which the operating means (10; 10') passes so that an operating member is disposed externally of the receptacle (20; 20') and the pumping chamber internally of the receptacle, and the receptacle is adapted to be positioned at least partly within a reservoir (11; 11') for liquid to be pumped and the receptacle (20; 20') is adapted to permit passage of liquid to the interior thereof from such reservoir (11; 11').

3. A pump according to Claim 2 characterised in that the reservoir (11; 11') is provided with an opening (27a; 28a') through which said receptacle (20; 20') extends and the opening (27a; 27a') being closed by the wall (26; 26') of the receptacle through which the operating means (10; 10') passes.

4. A pump according to Claims 2 or Claim 3 characterised in that the receptacle (20; 20') is replaceably mounted at least partly within said reservoir (11; 11').

5. A pump according to any one of Claims 2 to 4 characterised in that the pump (32; 32') is operatively connected to a sanitary pan (8) to flush the pan with liquid withdrawn from a region of said reservoir which is separated by a filter screen (23; 24; 25; 20a) from another region thereof into which the sanitary pan (8) discharges.

6. A pump according to Claim 1 characterised in that the flexible member (52; 52') defines at least a majority of the variable volume pumping chamber and the pump (32; 32') is operatively connected to a sanitary pan (8) so as to pump liquid to flush the pan.

7. A pump according to Claim 5 or Claim 6 characterised in that the sanitary pan (8) is housed in a cabin, hut or like accommodation unit, the unit having a wall structure(1) mounted on a base structure (5), the base structure (5) defining the, or a, reservoir (11; 11'), the reservoir being for the reception of a suitable chemical liquid, and the sanitary pan (8) being arranged to discharge into the liquid in use.

8. A pump according to Claim 5 or Claim 7 when dependent on Claim 5 characterised in that the receptacle (20; 20') is provided with an imperforate wall (22; 22') on the side thereof adjacent to the discharge of the sanitary pan (8) to the reservoir (11; 11') and is provided with a perforate wall (23; 23'), which comprises said filter screen, on the other side thereof.

9. A pump according to Claim 7 or Claim 8 characterised in that the unit houses only one sanitary pan (8) and the whole base (5) structure of the unit is in the form of a hollow box defining said reservoir (11; 11') for the chemical liquid, the top closure of such box forming the floor within the unit and being provided with an opening through which said receptacle (20; 20') extends, the box as a whole constituting a plinth-like base structure (5) on which the wall structure (1) of the unit is mounted.

10. A pump according to Claim 5 or any one of Claims 7 to 9 characterised in that the pump (32; 32') is disposed in said reservoir (11; 11') so as to be at least partially immersed in the liquid, in use.

11. A pump according to any one of the Claims 5 to 10 characterised in that the sanitary pan (8) is provided with a liquid seal in its discharge for a conventional U-bend in which liquid is trapped, and the pump (32; 32') is adapted to pump sufficient liquid to permit of breaking of the seal provided by the U-bend so that a conventional flushing and sewage discharge operation is provided.

12. A pump according to any one of Claims 5 to 10 characterised in that the sanitary pan (8) is provided with a flap valve in its discharge which flap valve is operable by the liquid pumped by the pump (32; 32').

13. A pump according to any one of the preceding claims characterised in that, the flexible member (32; 52') is generally cylindrical, having a generally cylindrical wall which is closd at one end and open at the other where it is connected to a body (31; 31').

14. A pump according to any one of the preceding Claims characterised in that the flexible member (52; 52') has a corrugated configuration to provide a collapsible bellows.

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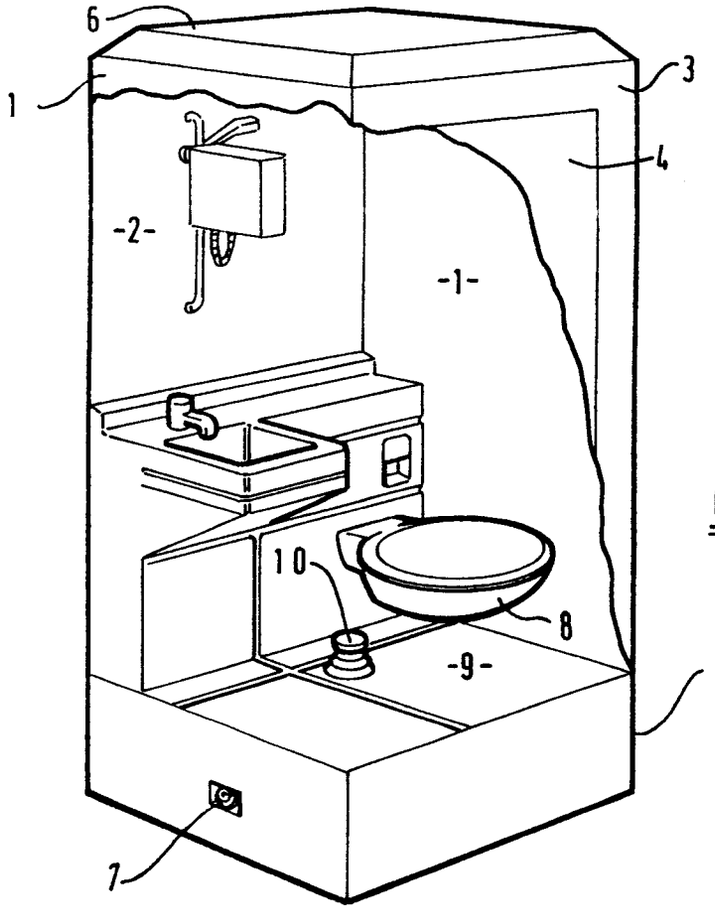

FIG 1

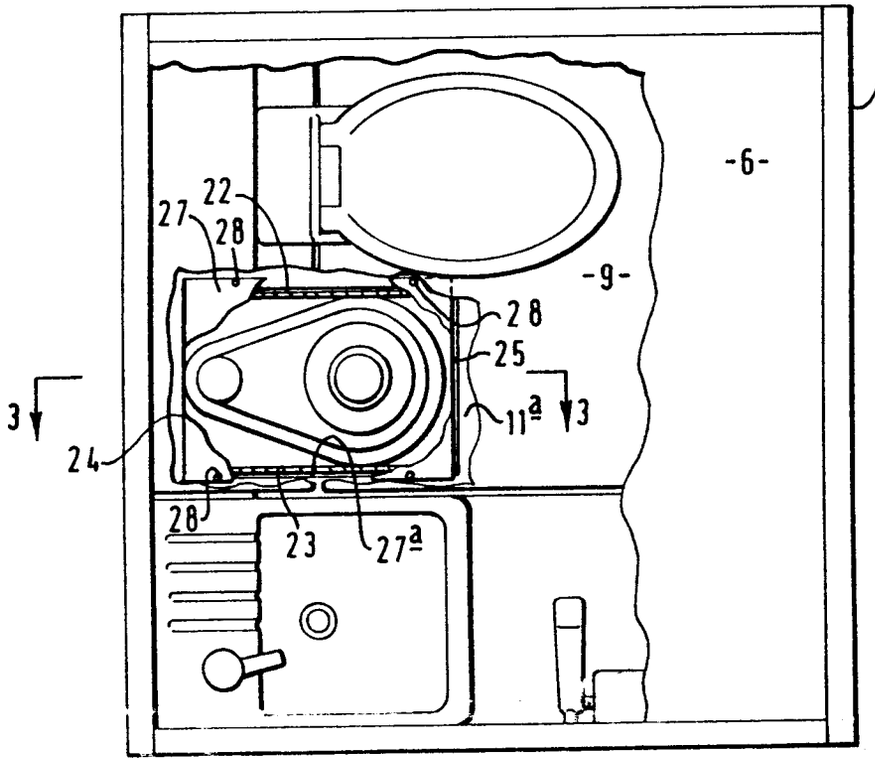

FIG 2

FIG 3

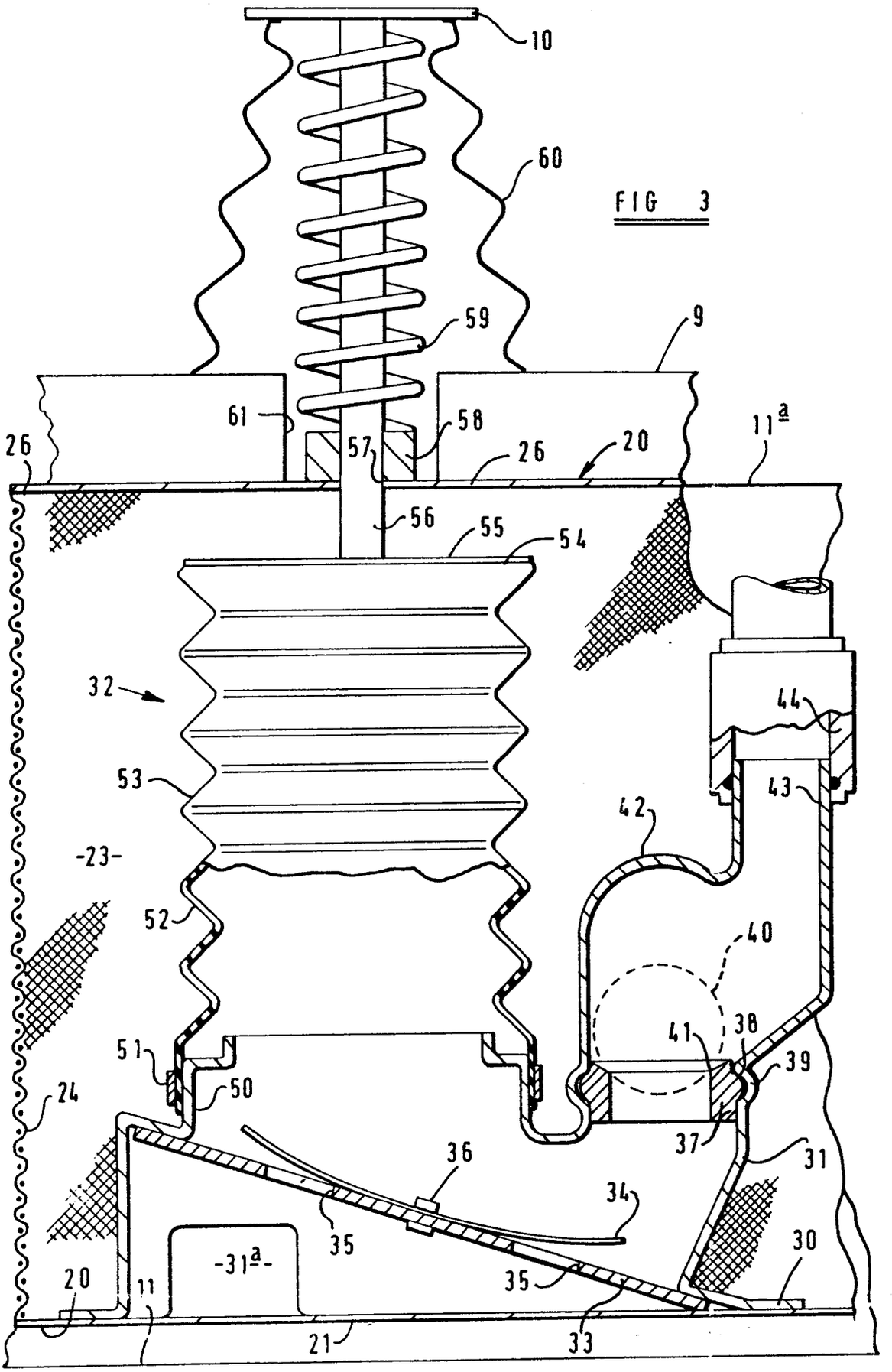
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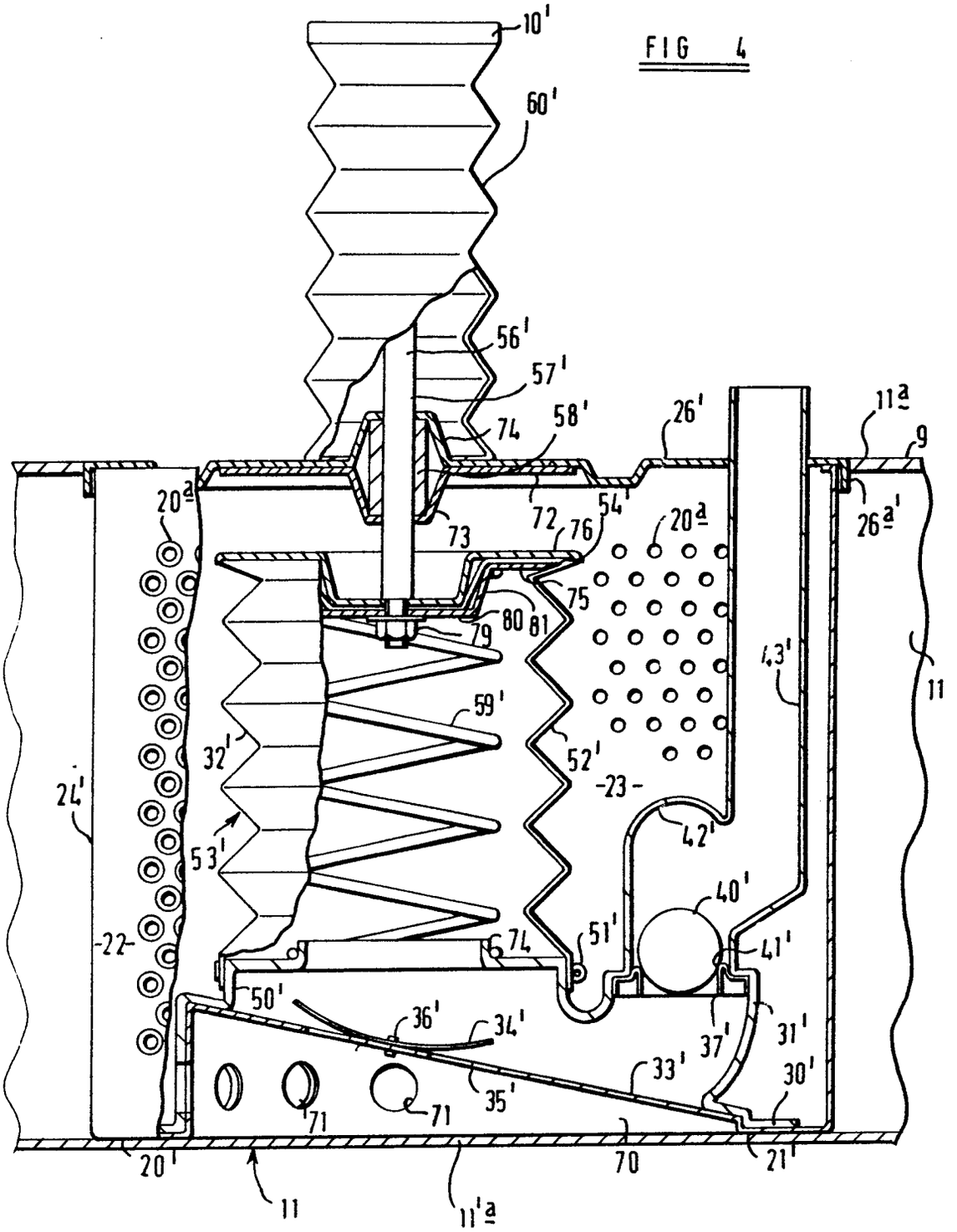
FIG 4



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European Patent Office

Application number

EP 86 30 7792

EUROPEAN SEARCH REPORT

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.4)
X	GB-A- 939 529 (KIGASS) * Page 1, lines 8-11,35-53; page 1, line 88 - page 4, line 68; figures 1-3 *	1,13, 14	F 04 B 43/08 F 04 B 23/02 E 03 D 5/01 E 03 D 5/016
Y		2,5,6, 10	

Y	FR-A-1 219 122 (GALLAY) * Page 1, left-hand column, last line *	2,5,6, 10	
A		1	
	---		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
X	GB-A- 4 941 (LEMAN)(A.D. 1915) * Whole document *	1,13, 14	F 04 B E 03 D E 03 F B 61 D B 63 B B 64 D B 60 R

Y	GB-A-1 383 767 (ELSAN) * Page 1, line 40 - page 2, line 13; page 2, lines 62,63 *	2,5,6, 10	
A		1,3,4, 12	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20-01-1987	VON ARX H.P.

CATEGORY OF CITED DOCUMENTS

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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.4)
A	GB-A-1 302 532 (PORTASILO) * Page 3, lines 3-75 *	1,2,5,7,9	
A	GB-A-1 591 701 (MASABE HOLDINGS) * Page 1, line 73 - page 2, line 37 *	1,5-7,9,10	
A	FR-A-1 555 177 (KOEHLER-DAYTON) * Page 2, right-hand column, paragraph 3 *	1-6	
A	US-A-4 028 747 (NEWTON) * Column 3, line 51 - column 4, line 6 *	11	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)

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