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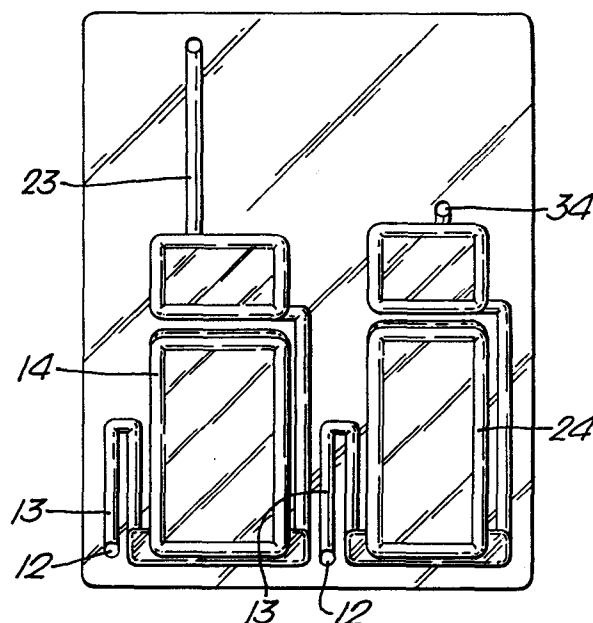
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Lavatory cistern dispenser.

A double dispenser is disclosed for dispensing disinfectant solution and a second solution containing detergent, colourant or perfume or a mixture thereof into a lavatory cistern. The dispenser is formed from two sheets welded together, one being planar and the other vacuum formed. On each side of the dispenser is formed a compartment for a substance to be dispensed and a reservoir for water, water from the reservoirs flowing through the compartments to dispense the substances on flushing of the lavatory. Air is permitted to enter the compartments to prolong the life of the active substances, and a vertical air passage within the compartments assists in avoiding the substances blocking the water-outlet apertures, as shown in figure 9.



LAVATORY CISTERN DISPENSER

This invention relates to a dispenser for partial immersion in a lavatory cistern.

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Devices for colouring and perfuming the flush water of lavatories are becoming increasingly popular. They are generally of two types: those which are designed to clip inside the rim of the lavatory bowl itself and those
10 which are intended to be at least partly immersed in the flush water in the cistern. This invention relates to the latter type.

There have been a large number of proposals for
15 making dispensers intended for complete or partial immersion in lavatory cisterns, and some of the problems are now recognised in the art. One major problem is that dispensers having moving parts are unreliable and expensive to manufacture. Another is that modern
20 cisterns are of very low volume and there is consequently very little space available inside them for dispensers. This problem is normally approached by designing the dispenser so that one side is planar and so can lie against the wall of the tank, the other side being formed

with the various compartments and pipes which are required for its function. This type of arrangement is shown in British patent No 1 219 200 (Reckitt & Colman).

5 If it is desired to make the substance dispensed functional rather than merely cosmetic, then it is almost an essential that a chlorine bleach should be present in the dispenser, which introduces the possibility of undesirable chemical interactions between the
10 chlorine-containing component and any cosmetic or cleaning component, as well as with components in the cistern. One of the solutions to interaction of chlorine bleach with cosmetic components such as colorant or perfume or with surfactants in a cleaning component is to separate
15 these components into two compartments. Dispensers of this type having twin compartments so that two different materials can be dispensed simultaneously are described in British patent No 1 219 200 referred to above and also in US patent No 3 504 384 (Russell Laboratories). European
20 patent Nos '1671, '4990 and '4991 (Procter & Gamble) also describe dispensers of this type. A further feature which is said to be of importance in the latter patents is that the bleach component is isolated from detergent/dyestuff and from the cistern water until the
25 moment the cistern is flushed. The dispensers required for this are relatively sophisticated in two respects. First of all, they require careful positioning in the cistern, relative to the upper level of flush water. Secondly, they are designed to operate at least partially
30 by means of siphonic action rather than by direct displacement of the solution to be dispensed into the flush water.

 We have now designed a type of dispenser which avoids
35 the disadvantages referred to above, which operates on a simple displacement principle, which is tolerant to

positioning relative to the level of flush water in the cistern, and which is susceptible to simple modification during manufacture to take account of different market requirements.

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Accordingly, in a first aspect the present invention provides a dispenser for dispensing one or more substances into flush water in a lavatory cistern comprising

- 10 (a) a compartment (14,24) holding a solid
water-soluble or water dispersible substance
(16,29) to be dispensed
- 15 (b) at least one aperture (12) in the compartment
permitting ingress of water or dilute solution
for dissolving the substance and permitting
egress of a solution or suspension of the
substance.
- 20 (c) a reservoir (19) communicating with the
compartment, located to permit water or solution
in the reservoir to drain into the compartment
when flush water in the lavatory cistern falls
from an upper, storage level to a lower, flushed
25 level, and
- (d) means for adjustably locating the dispenser in
the cistern.

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In one embodiment the dispenser is designed so that the reservoir is provided with an upwardly extending air bleed which, when the dispenser is located in the

lavatory cistern, extends above the surface of the flush water.

It will be appreciated that the existence of the
5 vertically extending air bleed allows the dispenser to be
positioned with wide tolerance relative to the surface of
the flush water in the cistern. This is advantageous
since it is our experience that cisterns do not fill
consistently to the same level owing to the crude nature
10 of domestic ball valves and to variations in water
pressure. Alternatively, the opening of the air bleed
may be positioned below the surface if desired.

In one embodiment of the invention, the upper end of
15 the air bleed is sealable, for example with a floating
ball which seals a circular aperture of smaller diameter
than the ball itself. With this arrangement, and other
mechanically equivalent arrangements, the tolerance of the
dispenser to vertical positioning within the cistern is
20 retained, but the overall height of the dispenser is
reduced, which can be advantageous for small cisterns.

The arrangement of the reservoir upstream of the
compartment holding the substance to be dispensed has the
25 consequence that water in the compartment, which is
converted to a solution during the periods between
flushes, is displaced by water in the reservoir as the
cistern water falls during the flush, and a positive
hydrostatic pressure ensures that problems produced by
30 viscous solution in the compartment, or by break-up of the
block of substance, are minimised. The volume of the
reservoir controls the volume of solution displaced from
the dispenser on flushing. If the reservoir volume is
smaller than the volume of solution in the compartment,
35 then that ensures that some relatively concentrated
solution is always left in the dispenser so that even if

the lavatory is flushed and re-flushed in rapid succession, some of the substance in the compartment will always be dispensed.

5 A convenient arrangement is that the reservoir communicates with the compartment (14,24) by way of a conduit extending vertically from the bottom of the compartment to the bottom of the reservoir. Furthermore, as is explained later, good control over diffusion of the
10 substances to be dispensed into the cistern water is possible if the aperture to the compartment is at one end of an inverted 'U' shaped conduit, the other end communicating with the bottom of the compartment. In that case, or with any other arrangement, it is preferred
15 that the diameter of the aperture end of the conduit is sufficient to permit air to pass into the compartment while flush water in the cistern is close to its minimum level, to fill the vacuum left in the compartment by partial dissolution of the substance being dispensed.
20 The question of ingress of air is important since unless it is arranged the partial vacuum formed in the substance compartment can assist the block of substance to stick to the walls of the compartment. For that reason it is preferred that the compartment is formed with a vertically
25 extending channel on one or both sides, permitting passage of air into the upper part of the compartment, the substance to be dispensed being presented from contacting the side of the compartment by the formation of defining the edge of the channel.

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As has been suggested, there is very little spare space inside a modern cistern. We have found that the best way of using what little space there is is to provide a backing sheet which is planar and to form the structure
35 of the dispenser in a formed sheet attached thereto. Accordingly, in a preferred aspect of the invention the

compartment(s) and the associated resevoir(s) are formed on the same side of the backing sheet.

5 It is highly preferred that the dispenser is formed with two compartments with associated reservoirs that is to say that the dispenser is doubled. One compartment can then contain a solid disinfectant block capable of delivering chlorine and the other a detergent cake, a solid colorant or a perfume sorbed on a solid substance,
10 or any combination of these substances. However, given that active chlorine-containing compounds are so chemically reactive careful formulation will be required before organic materials can be combined with them.

15 The solid disinfectant block may be either cast or formed from granules. Suitable substances for forming such blocks are calcium hypochlorite or various sodium salts of di- or tri-chlorocyanuric acid.

20 The water ingress/egress aperture(s) preferably communicate with the compartment(s) via vertically extending conduits, and one of the advantages of the dispenser is that it is possible to pre-determine the extent to which the substances in the compartments diffuse
25 into the flush water in the cistern by choice of length of the conduit. In particular in the case of a doubled dispenser, the compartments of which contain dyestuff and disinfectant, it is possible to ensure that the dyestuff diffuses to a greater extent than the disinfectant by
30 extending the conduit communicating with the disinfectant compartment to a level closer to that defined by the flush water surface than the conduit communicating with the dyestuff compartment. In other words to arrange that there is a greater hydrostatic pressure at the dyestuff
35 aperture than there is at the disinfectant one.

While the dispenser of the invention may be manufactured from any inert, water-impermeable material it is preferred that it is made from a thermoplastic material such as polyvinylchloride or polyethylene. Desirably
5 this can be done by vacuum forming and the attachments between the backing sheet and the formed sheet can be made by thermal or high-frequency welding.

The invention will be further described with
10 reference to the accompanying drawings in which -

Figure 1 is a front elevation of a double dispenser according to the invention;

15 Figure 2 is a plan view of the dispenser;

Figures 3, 4 and 5 are front elevations of the dispenser installed in a cistern, respectively with water at the minimum level, at an intermediate level and at a
20 maximum level.

Figure 6 is a front elevation of a single dispenser containing a sealed air bleed.

25 Figure 7 is a front elevation of another double dispenser according to the invention.

Figure 8 is a front elevation of yet another double dispenser according to the invention.

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Figure 9 is a front elevation of further double dispenser according to the invention.

Referring first to Figure 1 the dispenser consists of
35 two sheets of plastics material, a backing sheet (10), not shown, and a formed sheet (11), welded together along their outer edges. The backing sheet (10) is laminar.

The formed sheet (11) is formed, for example by vacuum moulding with a number of depressions, channels and apertures which will be described in more detail later, and the edges of each of these features are continuously welded to the backing sheet (10) so as to form a number of compartments and conduits.

From the left-hand side in Figure 1 the formed sheet (11) is formed with a water inlet/outlet aperture (12) which constitutes the end of a vertically extending inlet/outlet conduit (13). The conduit (13) leads to, and communicates with, an opening (15) to a generally rectangular disinfectant block compartment (14) which contains a solid block of a granular, water-soluble chlorine-containing disinfectant (16). The disinfectant block compartment (14) is provided with a second opening (17) at a lower level than opening (15), which communicates with vertically extending reservoir conduit (18). This conduit leads to a reservoir (19) located at a higher level than the disinfectant block compartment, which is a generally rectangular compartment of similar volume to the compartment (14). The reservoir conduit (18) communicates with the reservoir opening (20). The upper face (21) of the reservoir (19) is formed with an opening (22) which communicates with a narrow, vertically extending open-ended capillary air bleed (23).

At this point one half of the apparatus has been described. The other half is a mirror image of the first half and will not be described, except to say that in the place of the disinfectant block compartment (14) containing a disinfectant block (16) there is a detergent block compartment (24) containing a block (25) of granular detergent admixed with a water-soluble or water-dispersible pigment.

Referring now to Figure 2 it can be seen how the compartment and conduits described are formed between the backing sheet (10) and the formed sheet (11), this being the general manner of construction of all the devices shown in figures 1 to 9. In particular, starting from the left-hand side the water inlet/outlet aperture (12) forming the end of inlet/outlet conduit (13) can be seen in plan. The upper face (21) of reservoir (19) partly masks disinfectant block compartment (14), but reservoir conduit (18) is visible. Welds between the backing sheet (10) and the formed sheet (11) are shown.

The operation of the dispenser shown in Figures 1 and 2 will be described with reference to Figures 3, 4 and 5.

Referring to Figure 3, the apparatus is shown in a condition which would subsist immediately after the lavatory has been flushed and the apparatus has been in use for a short period. That is to say the apparatus is not in a new condition. It can be seen that in this condition each pair of inlet/outlet conduits (13), each pair of compartments (14), (24) and each pair of reservoir conduits (18) is filled either with water or with a more or less concentrated solution of disinfectant or of the detergent and dyestuff mixtures. The cistern is at this minimum level for only a short period, as it immediately begins to fill, and as soon as it reaches the level of the water inlet/outlet apertures (12) as shown in Figure 4, it begins to displace the solution already in the apparatus and push it through the system. In fact, fresh water enters the inlet/outlet apertures (12) and displaces the solution originally there into compartment (14) or (24), which in turn displaces solution in the reservoir conduits (18) into the reservoirs (19) and so into the capillary air bleed (23). When the cistern is full, as shown in Figure 5, the level of water/solution inside the apparatus

is the same as that in the cistern, ignoring any capillary effects, since the air bleed (23) is both open to the atmosphere and above the maximum level to which the water rises. The cistern will often remain at this level for
5 some period of time, during which water in compartments (14) and (24), in contact with either a disinfectant block or a detergent/dyestuff block will be converted into a relatively concentrated solution. When the lavatory is flushed, the water level in the cistern will begin to
10 fall, and as it falls from the level shown in Figure 5 to that shown in Figure 4 a volume of solution equivalent to the volume in the air bleeds (23) and in the reservoir (19) will be displaced from compartments (14) and (24) and from inlet/outlet conduits (13). This is a relatively
15 concentrated solution which will mix with the remaining flush water in the cistern as the water level falls further.

Referring now to Figure 6, the dispenser shown is
20 designed to dispense only one substance or a single mixture of substances. As in the embodiments described above, it consists of a planar backing sheet (not shown) and a formed sheet (11) which between them define a compartment (14), a reservoir (19) and associated
25 apertures and pipework. A vertically extending conduit (13), in communication with the bottom of compartment (14), has a side-branch (26) which is returned to the bottom of the dispenser by means of open-ended down-pipe (27).

30

The right hand lower corner of the compartment (14) as shown in Figure 6 is in communication with reservoir conduit (18) which leads to the lower right hand corner of reservoir (19). The reservoir (19) is formed with a
35 cylindrical air bleed (23) containing a buoyant ball, free to rise and fall within the bleed.

In use, and considering the dispenser in a lavatory cistern in the newly flushed state with the flush water at its minimum level, the water rises in the cistern until it meets aperture (28) of down-pipe (27) which will then fill up to the level of side-branch (26). Water then fills compartment (14) containing a pigmented and perfumed detergent block (29) and rises up reservoir conduit (18). As it rises further it fills reservoir (19) until buoyant ball (30) seals against aperture (31) in the air bleed (23). The dispenser is then full.

During the interval between the cistern filling and being re-flushed the surfactant cake (29) is exposed to water in compartment (14) and a solution containing surfactant, pigment and perfume is formed.

When the lavatory is flushed the flush water in the cistern begins to fall, and as it does so water in reservoir (19) begins to draw into compartment (14), displacing the surfactant solution already in the compartment through conduit (13), down-pipe (27) and aperture (28) into the cistern.

Because buoyant ball (30) seals against aperture (31) in air bleed (23), this dispenser can be totally immersed in the cistern water.

Referring now to Figure 7, there are a number of similarities between the dispenser shown in this figure and that shown in Figures 1 and 2 which will not be re-described. There are also, however, a large number of differences. The first of these is that although the dispenser is doubled, in that it comprises disinfectant solution and detergent solution dispensing sub-assemblies, these are not mirror images of each other, but of a different design. The detergent solution dispensing

sub-assembly (32) is of a similar design to the dispenser shown in Figure 6, except that in place of the air bleed fitted with a ball-valve arrangement, the sub-assembly is provided with a capillary air bleed (23) similar to that of the dispenser shown in Figure 1. Similarly, the disinfectant solution dispensing sub-assembly (33) also differs from the dispenser of Figure 6 in the same way, but has the additional difference that the upper portion (34) of the inlet/outlet conduit (13) is joined with the capillary air bleed (23). The other difference between the device shown in Figure 7 is in the design of the openings (15 and 17) to the disinfectant block compartment (14) and the detergent block compartment (24). In the devices shown in Figures 1 to 6 these openings are of small diameter. In the device shown in Figure 7 the openings are larger, the diameter being great enough to allow air to bubble into the disinfectant and detergent compartments (14) and (24) during dispensing.

The significance of this difference lies in this: in the devices shown in Figures 1 to 6 air cannot enter the bleach or detergent compartments. The result of that is that as the disinfectant block or detergent block dissolves away, it is not replaced by anything and so a partial vacuum is formed sucking successively more and more water into the compartments each time the cistern is flushed until at the end of the life of the device the compartments are completely full. Clearly, where a small amount of solid is contacted by a large volume of water more rapid dissolution will take place which unnecessarily shortens the life of the product. In the device shown in Figure 7, in contrast, the amount of water which enters the compartments is roughly constant, since the volume released on dissolution of disinfectant or detergent cake is taken up by air entering through the specially designed

openings (15 and 17). Consequently, dissolution of the solid substance does not accelerate as the device ages.

Referring now to Figure 8 the embodiment of the dispenser shown in this figure is quite similar to that shown in Figure 7, but has been somewhat simplified. The most obvious difference is that whereas in Figure 7 the device is provided with two capillary air bleeds, that shown in Figure 8 has one extended bleed (23) and one fore-shortened one (34).

The second difference between the two dispensers concerns the design and positioning of the water inlet/outlet apertures and conduits. In the dispenser shown in Figure 8, the water inlet/outlet conduit (13) in both halves of the apparatus is in the form of an inverted U, the inlet/outlet apertures (12) being flush with the bottom of the disinfectant block and detergent block compartments (14) and (24).

Referring now to figure 9 the embodiment shown is generally similar to that shown in figure 8, except that the left hand dispenser is a mirror image of that in figure 8, and except that the upwardly extending capillary air bleed (23) has been removed so that both halves of the double dispenser are mechanically equivalent.

Two features of the double dispenser are shown in figure 9 which are not shown in the other figures. The first of these is a vertically extending retainer (37). This is in the form of an open ended tube formed between the backing sheet (10) and the formed sheet (11), only the latter being visible in figure 9. This retainer is intended to retain the elongated portion of a hanger (not shown) for hanging the double dispenser within a lavatory cistern. The vertical location of the device in the cistern can then be adjusted by sliding the hanger within

the retainer (37). This arrangement is one which is adopted by lavatory cistern dispensers of the prior art.

5 The second feature shown in figure 9 is a detail of a side of compartments (14) and (24). Considering the left hand side wall of the dispensers on the left of the device, the formed sheet (11) is welded to the back sheet (10) along the line of formation (36), leaving a channel (37) between the side wall and the formation communicating at
10 each end with the compartment through which air can freely pass. The purpose of this channel is to ensure that there exists a passage by which air can reach the upper part of the compartment, experience having shown that if the substance to be dispensed occupies the whole width of
15 the lower part of the compartment the block can swell and join within it. A free passage for air helps to prevent this, and in any event reduces the area of contact between the block and the compartment wall.

20 Similar formations (36) and channels (35) are provided in the other compartment side walls shown in figure 9.

Each of the embodiments described is designed so that
25 modifications can be made simply to the inlet and outlet conduits (13) to produce different dispensing characteristics. For example in the embodiment shown in Figures 1 to 5 shortening of the inlet/outlet conduit (13) of the bleach block compartment (14) can result in
30 disinfectant solution slowly leaking into the cistern. This can be advantageous since according to some schools of thought it is necessary to start with a hygienic cistern before it can truly be claimed that a lavatory is hygienically clean. Such modifications can be simply
35 carried out, since it is anticipated that the dispensers

will be vacuum formed from thermoplastics material and consequently simple changes can be made to the mould.

CLAIMS

1. A dispenser for dispensing one or more substances into flush water in a lavatory cistern comprising

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(a) a compartment (14,24) holding a solid water-soluble or water dispersible substance (16,29) to be dispensed

10

(b) at least one aperture (12) in the compartment permitting ingress of water or dilute solution for dissolving the substance and permitting egress of a solution or suspension of the substance.

15

(c) a reservoir (19) communicating with the compartment, located to permit water or solution in the reservoir to drain into the compartment when flush water in the lavatory cistern falls from an upper, storage level to a lower, flushed level, and

20

(d) means for adjustably locating the dispenser in the cistern.

25

2. A dispersion according to Claim 1 wherein the reservoir is provided with an upwardly extending air bleed (23) which, when the dispenser is located in the lavatory cistern, extends above the surface of the flush water.

30

3. A dispenser according to Claim 1 or Claim 2 wherein the reservoir communicates with the compartment by way of a conduit (18) extending vertically from the bottom of the compartment to the bottom of the reservoir.

35

4. A dispenser according to any one of the preceding claims wherein the aperture (12) in the compartment is at one end of an inverted 'U' shaped conduit (B) the other end communicating with the bottom of the compartment.

5

5. A dispenser according to any one of the preceding claims wherein the diameter of the aperture of the 'U' shaped conduit is sufficient to permit air to pass into the compartment while flush water in the cistern is close to its minimum level, to fill the vacuum left in the compartment by partial dissolution of the substance being dispersed.

6. A dispenser according to Claim 5 wherein the compartment is formed with a vertically extending channel (35) on one side, permitting passage of air, the substance to be dispensed being prevented from contacting the side of the compartment by the formation (36) defining the edge of the channel.

20

7. A dispenser according to Claim 6 wherein the compartment is formed with a vertically extending channel on both sides.

8. A dispenser according to any one of the preceding claims wherein the substance to be dispensed comprises a disinfectant.

9. A dispenser according to any one of Claims 1 to 7 wherein the substance to be dispensed comprises a colourant or a perfume.

10. A double dispenser comprising a pair of dispensers in accordance with Claim 1, one containing a disinfectant and the other a detergent, a colourant, a perfume or any of these materials in combination.

Fig. 1.

Fig. 3.

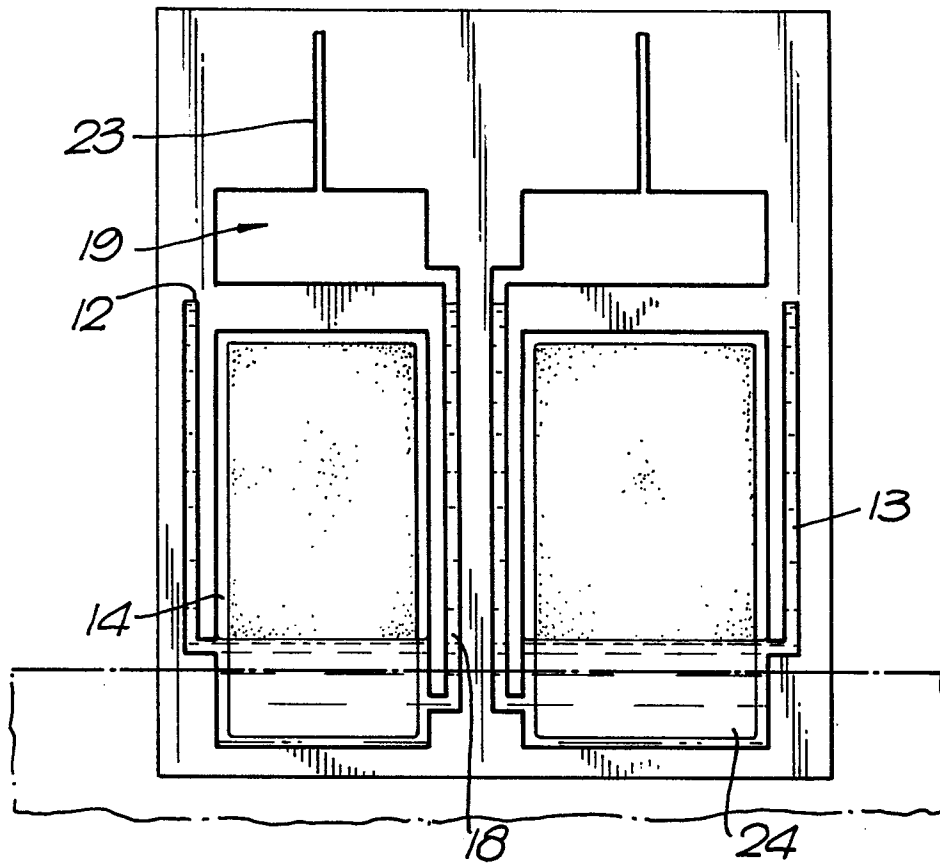
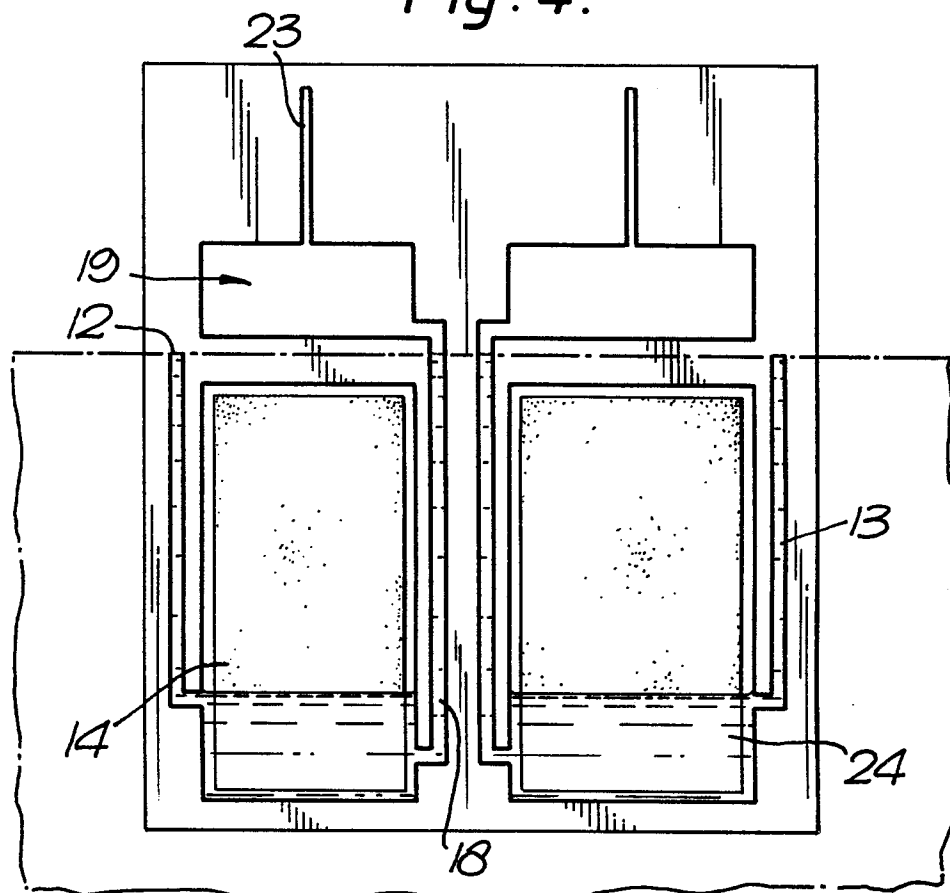


Fig. 4.



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Fig. 5.

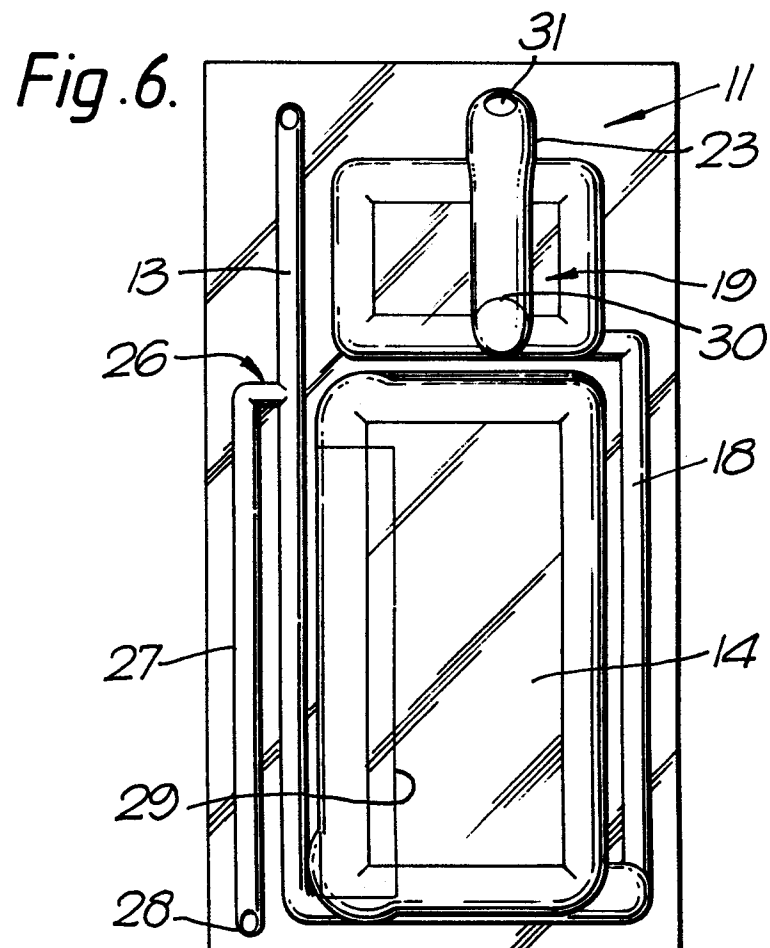
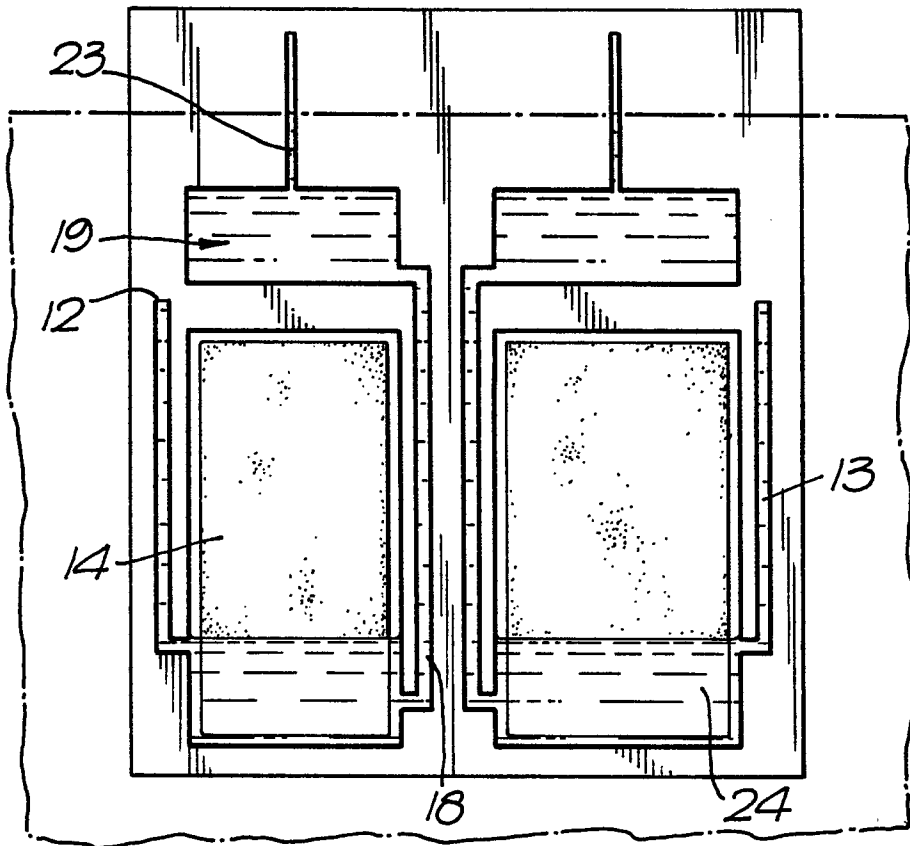


Fig. 7.

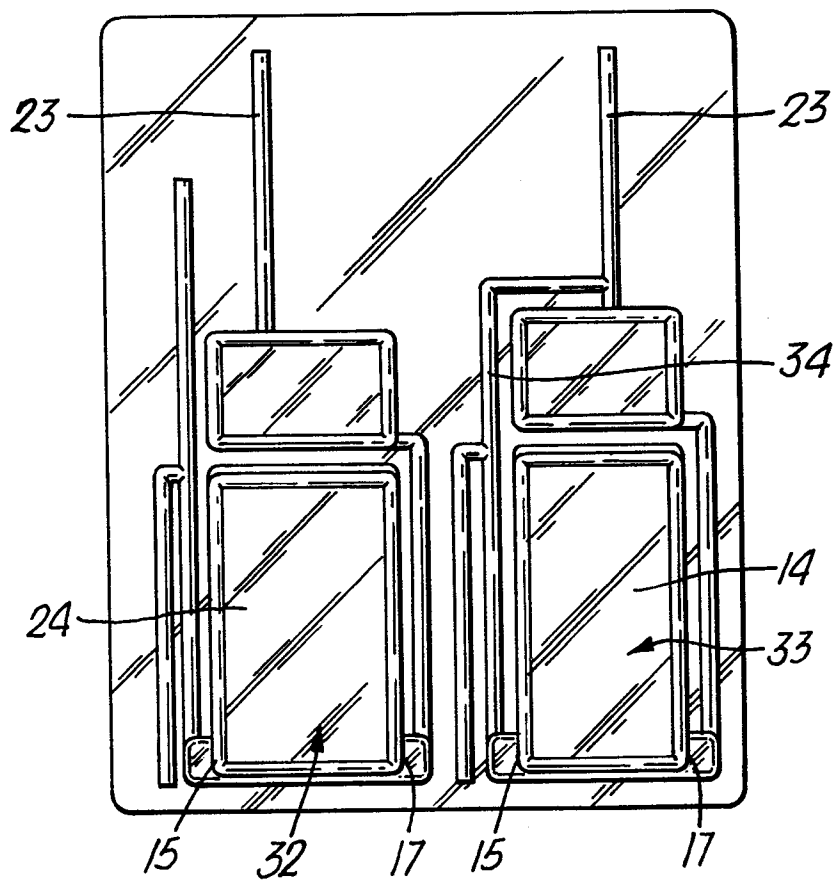


Fig. 8.

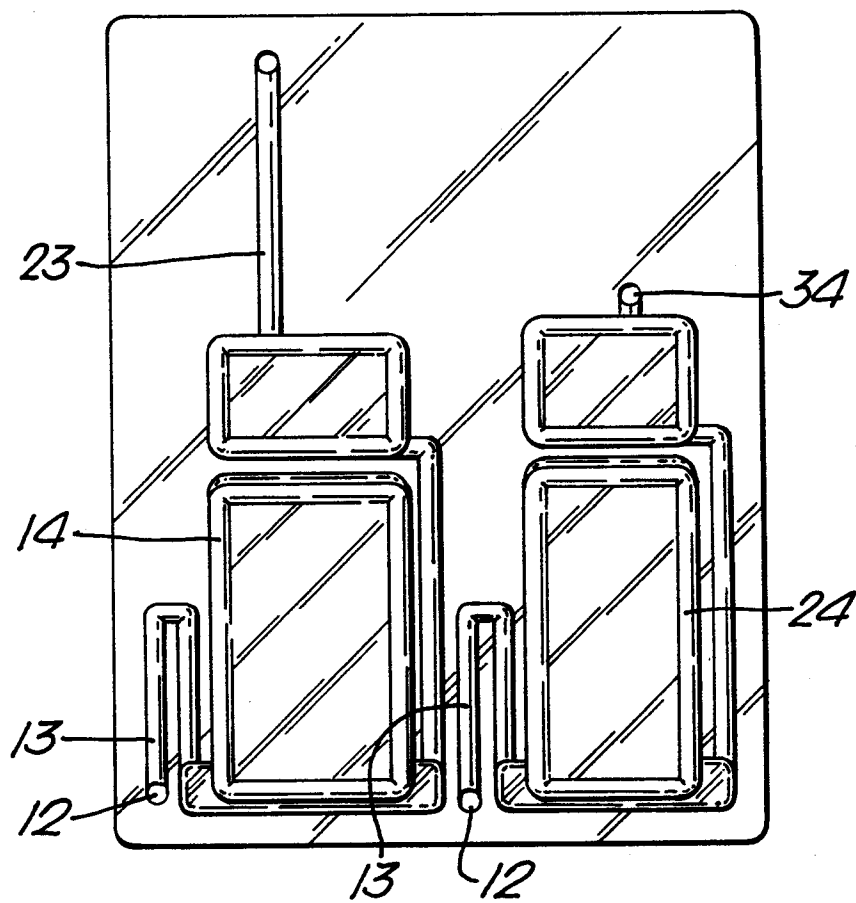


Fig. 9.

