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Description

[0001] The present invention relates to a cistern assembly and a cistern. More particularly, the present invention relates to a cistern assembly for a toilet comprising a cistern and a non-siphonic type valve.

[0002] In modern bathrooms and office toilets, it has become increasingly prevalent to conceal toilet cisterns either within fitted furniture or behind false walls. In order to achieve this kind of concealed firmment, it is desirable that the cistern is capable of installation and operation at a relatively low level relative to the toilet bowl in order that, for example, the upper surface of the cistern is lower than the top of an adjacent sink unit, thereby enabling a cabinet or shelf housing the cistern to have a surface arranged at sink height, for example, for storage purposes. As such, this means that a lower head of water is available to achieve effective flushing.

[0003] Furthermore, with the increased needs to minimise water usage, there has been a trend to provide a lower volume of water for flushing.

[0004] As such it has been increasingly difficult to ensure correct functioning of a toilet with reduced flush head and also with reduced flush volume.

[0005] The present invention seeks to overcome, or at least mitigate the problems of the prior art.

[0006] One aspect of the present invention provides a cistern for a toilet, for use with a dual flush valve enabling a user to select a relatively high volume of flush water or a relatively low volume of flush water; the cistern comprising a lower portion having a relatively small cross section area and an upper portion having a relatively large cross section area wherein in use said relatively low volume of flush water is substantially equal to the volume of the upper portion and said relatively high volume of flush water is supplied from a combination of the upper and lower portions. Preferably, the cross section areas are substantially constant for each portion, thereby defining a step between the upper and lower portions. The lower and/or upper portion may have a non circular cross section which may be a substantially rectangular cross section. The upper and lower portions may be defined by substantially flat back and substantially flat front walls in a spaced apart relationship; they may be spaced apart by less than 150 millimetres, preferably less than 120 millimetres. The upper and lower portions may be defined by a first and second lower side wall and a first and second upper side wall, the step being defined between one of the first lower and first upper side walls, and/or between the second lower and second upper side walls. In this case, the step may be defined between the first lower and first upper side wall and being further defined between the second lower and second upper side walls. Preferably, the lower side walls are spaced apart less than 400 millimetres, preferably less than 350 millimetres, preferably less than 325 millimetres. Preferably, the upper side walls are spaced apart less than 500 millimetres, preferably less than 450

millimetres, preferably less than 430 millimetres. Preferably, the cistern has a top portion having a cross section area smaller than that of the upper portion; the top portion may include attachment features.

[0007] In another aspect, the invention comprises a cistern assembly including the above described cistern of the invention and an outlet valve secured to a base of the cistern, the valve having an operating mechanism, said operating mechanism being provided above the base of the cistern. The cistern assembly may comprise a valve of the dual flush type, enabling a user to select a relatively high volume of flush water or a relatively low volume of flush water. A relatively low volume of flush water may be substantially supplied from the upper portion and the relatively high volume of flush water may be supplied from a combination of the upper and lower portions. Preferably, the relatively high volume of flush water is approximately 6 litres and/or the relatively low volume of flush water is approximately 4 litres. The valve of the cistern assembly may be a non syphonic valve, such as a drop valve or a flap valve. The assembly may be arranged to be mounted at a low level relative to an associated toilet bowl. The assembly may be concealed within ducting, frames or behind false walls or may be suitable for being built into furniture. The assembly may be capable of being built into furniture having a substantially planar surface of substantially the same height as an upper edge of a sink unit of normal height.

[0008] In another aspect, the invention comprises a kit of parts having a cistern assembly, according to the invention as described above, and a flush pipe (32), the flush pipe having an arm of 500mm length or less.

[0009] In another aspect, the invention comprises a toilet assembly having a cistern or a cistern assembly, according to the invention as described above, a toilet bowl having an inlet, and a flush pipe (32) in which the height h_1 between the bottom of the cistern and the toilet bowl inlet is less than 500mm preferably less than 250mm and preferably less than 150mm.

[0010] In another aspect, the invention comprises a toilet assembly having a cistern assembly or a cistern, according to the invention as described above, in which the top of the cistern is positioned less than 1.1 metres above floor level.

[0011] Advantageously, when the cistern is filled to its normal level so as to contain a predetermined amount of water (say 6 litres) then a proportion of this water is held at a higher level (and hence has a higher water head) than when the same amount of water is held in a comparable cistern having said relatively large cross sectional area throughout its height.

[0012] Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which;

FIGURE 1 is a side view of a toilet incorporating a cistern assembly of the present invention shown in partial cross-section;

FIGURE 2 is a cross-sectional view on the plane X-X of Figure 1, and

FIGURE 3 is a view of the cistern assembly of figure 2 taken in the direction of arrow A, with the cistern having been sectioned at Y-Y for clarity.

[0013] Referring to Figure 1, a toilet 40 comprises a known toilet bowl 30, a cistern assembly 10 of the present invention and a flush pipe 32 interconnecting the assembly 10 and the bowl 30. Flush pipe 32 has a horizontal arm 32A and a vertical arm 32B. The cistern assembly comprises a cistern 12 and valve 14, in this case of the non-siphonic type as described in greater detail below.

[0014] It can be seen that the height h_1 , between the bottom 23 of the cistern 12 and the location at which pipe 32 enters bowl 30 is relatively small typically 100mm or 150mm. However when a cistern, valve, and flush pipe are provided as a kit, one leg of the flush pipe might be 500mm tall allowing for a distance h_1 of 500mm. However typically the flush pipe will be cut back by the plumber to a length suitable for the particular application.

[0015] In operation, the cistern is filled with water 15 to a level 20.

[0016] The height of pipe 32 is determined by the ergonomics of the bowl 30. The height of the bottom 23 of the cistern 12 is preferably as high as possible, since this allows the inlet pipe to have a smooth bend which therefore reduces pressure losses as flush water travels around the bend. When the cistern is fitted within bathroom furniture, the height of the top of the cistern is determined by the shelf level of the bathroom furniture, which in turn is typically at the level of an adjacent sink unit.

[0017] Turning now to Figure 2 in which the cistern assembly 10 is illustrated in greater detail, it can be seen that the cistern 12 is in this embodiment additionally fitted with an overflow pipe 16 (integral with the valve) and a float 24 connected to water inlet valve 22 (supplied by an inlet pipe 21) to enable the cistern to be refilled with water to level 20 once the toilet has been flushed.

[0018] The outlet valve 14 in this embodiment is of a known "drop valve" type comprising a hole (not shown) at the lower end thereof normally sealed by a resilient seal (not shown), the seal being connected to a mechanism (only part of which is shown) that enables a user to press a button or lever (not shown) to cause the seal to be lifted and the water 15 to pass through the hole and into the toilet bowl 30 so that flushing occurs. Once a predetermined amount of water has been used and the cistern is substantially empty, the seal returns to its rest position over the hole and the lowered position of float 24 causes inlet valve 22 to open and the cistern 12 to be refilled.

[0019] In a preferred embodiment, the valve 14 is a dual flush valve which in one mode of operation permits

a relatively large amount of water (e.g. six litres) to be used for the flush and in a second mode uses a relatively smaller amount of water (e.g. four litres). Various mechanisms are known for achieving a dual flush, examples being two mechanisms having separate buttons for each flush mode, mechanisms enabling a lever or button to be pressed for a longer period for a high volume flush and a shorter period for a low volume flush and conversely a short press for a high volume flush and a longer press for a low volume flush. In this embodiment, a two-button type dual flush valve 14 is used.

[0020] It can be seen from Figure 2 that the cistern 12 may broadly be separated into a top portion 34 (in this case 141mm in height) an upper portion 35 (in this case 99mm) and a lower portion 36 (in this case 105mm in height). The upper portion 35 has a relatively large cross-sectional area in the plane of the water surface 20 and the lower portion 36 has a relatively low cross-sectional area by comparison. As such, the upper portion preferably holds approximately four litres up to the surface of the water 20 when filled (as shown) whereas the lower portion 36 holds approximately two litres of water. It should be noted that both the upper and lower portions have a substantially rectangular cross-section in the plane of the water surface 20, thus optimising the volume of water that may be contained within the cistern 12 given the limitation on its external dimensions.

[0021] Both the upper and lower portions have a substantially uniform rectangular cross section thereby defining a step 50. In this case there are two steps, one on either side of the cistern when viewing figure 2.

[0022] Consideration of figure 3 shows that the back wall 52 is substantially flat. Furthermore, the front wall 53 is also substantially flat where it defines the upper and lower regions. In this case the front and back walls are spaced apart approximately slightly less than 113mm, though in further embodiments they could be spaced apart 150mm or 120mm.

[0023] Consideration of figure 2 shows that the lower portion 36 is defined by a first (left) lower side wall 54 and a second (right) lower side wall 55. The upper region 35 is defined by a first (left) upper side wall 56 and a second (right) upper side wall 57. In this case one step 50 is defined by side walls 54 and 56 and a second step 50 is defined by side walls 55 and 57. In this case the steps are symmetrical, though in further embodiments this need not be the case. Additionally, in further embodiments one side wall could be flat with the step being defined in the other side wall alone.

[0024] Top portion 34 is also defined by the front wall and back wall, being spaced apart in this region substantially at the same distance as the front and back walls are spaced apart at the lower and upper regions.

[0025] The top portion 34 has side walls 58 and 59 which are spaced apart less than the first and second upper side walls 55 and 56. As such the cross section area of the top portion is less than the cross section area of the upper portion. Top portion includes fixing features,

for example a hole for fixing pipe 21. Further holes would be provided to secure the cistern to the wall and also to secure the lid of the cistern. By providing a narrow top portion, any fixings can be kept within the 420 width as defined by the upper side walls.

[0026] It would be appreciated that modem outlet valves are arranged to be placed in the tank as secured thereto by fixing up the bottom. In such an arrangement the operating mechanism of the valve is provided above the base of the cistern. This allows for a single assembly process of the valve into the cistern.

[0027] In use, if a user selects the high volume flush, the valve 14 will open for a sufficient period to allow substantially all of the water 15 to be emptied from the cistern 12 meaning that the water drops a height h_2 . If however the user selects a lower volume flush, the water drops through a height h_3 to level 21.

[0028] In the case of the high volume flush, it will be appreciated that the greater cross-sectional area of the upper portion 34 means that a relatively large head of water (initially $h_1 + h_2$) is maintained for the first four litres of water being flushed. The relatively large cross-sectional area results in a relatively low rate at which the head drops. This means that the water is provided with sufficient kinetic energy for a sufficient period of time to clear waste matter (not shown) from the toilet bowl. The remaining two litres (i.e. approximately one third of the total flush volume) has a lower head, and being capable of replacing and renewing waste water present in the bowl after the initial four litres of water has been flushed.

[0029] If the user selects a lower volume flush, the entire four litres of flushing water is provided by the upper portion 34 and therefore has a relatively large head.

[0030] Thus, it can be appreciated that a cistern assembly of the present invention provides a sufficient head for an effective flush action, whilst saving on the materials required to manufacture the cistern by virtue of the lower portion 36 having a smaller cross-sectional area. Nevertheless, the lower portion still contributes to the head of water being supplied. The cistern 12 of the present invention, due to its compact size (typically 420mm wide, 345mm high and 113mm deep) is suitable for concealed installation either behind false walls and the like or within furniture. Advantageously, the upper surface of the cistern may have a height above the floor when installed of slightly less than 800mm and as such is lower than the top of a sink/basin unit when installed at a normal height. Thus, the cistern may be fitted within furniture having an upper surface that is approximately level with the tops of sinks/basins.

[0031] It should be understood that numerous changes may be made within the scope of the present invention. Additionally, the assembly 10 could operate with other known valves. In particular the assembly 10 could operate with known "flap valves", wherein a hinged resilient flap is used to seal the outlet. The flap is lifted by a chain or the like attached to a flush handle, and the flap remains in a lifted position (by virtue of a float) until

such time as the cistern is emptied and the flap recloses. Subsequent filling of the cistern causes water pressure on the top of the flap to ensure the flap remains shut, in spite of the float. Clearly depending upon local water regulation requirements, different flush volumes can be provided, by providing differing dimensions to the cistern.

10 Claims

1. A cistern for a toilet, for use with a dual flush valve enabling a user to select a relatively high volume of flush water or a relatively low volume of flush water; the cistern comprising a lower portion having a relatively small cross section area and an upper portion having a relatively large cross section area wherein in use said relatively low volume of flush water is substantially equal to the volume of the upper portion and said relatively high volume of flush water is supplied from a combination of the upper and lower portions.
2. A cistern as defined in claim 1 wherein said cross section areas are substantially constant for each portion, thereby defining a step between the upper and lower portions.
3. A cistern as defined in any preceding claim wherein the lower and/or upper portion has a non circular cross section
4. A cistern as defined in any preceding claim in which the upper and lower portions are defined by substantially flat back and substantially flat front walls in a spaced apart relationship.
5. A cistern as defined in any one of claims 2 to 4 in which the upper and lower portions are defined by a first and second lower side wall and a first and second upper side wall, a step being defined between one of the first lower and first upper side walls, and/or between the second lower and second upper side walls.
6. A cistern as defined in claim 5 in which the step is defined between the first lower and first upper side wall and being further defined between the second lower and second upper side walls.
7. A cistern as defined in any preceding claim having a top portion having a cross section area smaller than that of the upper portion.
8. A cistern assembly including a cistern as defined in any preceding claim and an outlet valve secured to a base of the cistern, the valve having an operating mechanism, said operating mechanism being pro-

vided above the base of the cistern.

9. A cistern assembly as defined in claim 8 when the valve is of the dual flush type, enabling a user to select a relatively high volume of flush water or a relatively low volume of flush water.
10. A cistern assembly as defined in any one of claims 8 or 9 in which the valve is a non syphonic valve, such as a drop valve or a flap valve.
11. A kit of parts comprising a cistern assembly as defined in any preceding claim and a flush pipe (32), the flush pipe having an arm of 500mm length or less.
12. A toilet assembly comprising a cistern or a cistern assembly as defined in any preceding claim, a toilet bowl having an inlet, and a flush pipe (32) in which the height h_1 between the bottom of the cistern and the toilet bowl inlet is less than 500mm preferably less than 250mm and preferably less than 150mm.
13. A toilet assembly comprising a cistern assembly as defined in any one of claims 8-10 or a cistern as defined in any one of claims 1 to 7 in which the top of the cistern is positioned less than 1.1 metres above floor level.
14. A bathroom suite comprising a toilet assembly as defined in claims 13 or 14 and a sink wherein the top of the cistern is lower than upper edge of sink.

Patentansprüche

1. Spülkasten für eine Toilette zur Verwendung mit einem dualen Spülventil, das es einem Anwender ermöglicht, ein relativ großes Volumen an Spülwasser oder ein relativ geringes Volumen an Spülwasser zu wählen; wobei der Spülkasten einen unteren Abschnitt umfasst, der eine relativ kleine Querschnittfläche aufweist, und ferner einen oberen Abschnitt, der eine relativ große Querschnittfläche aufweist, wobei das relativ geringe Volumen an Spülwasser bei Anwendung im Wesentlichen gleich dem Volumen des oberen Abschnitts ist und das relativ große Volumen an Spülwasser aus einer Kombination des oberen und unteren Abschnitts geliefert wird.
2. Spülkasten nach Anspruch 1, wobei die Querschnittflächen für jeden Abschnitt im Wesentlichen konstant sind, wodurch eine Stufe zwischen dem oberen und dem unteren Abschnitt abgegrenzt wird.
3. Spülkasten nach einem der vorherigen Ansprüche,

wobei der obere und/oder der untere Abschnitt einen nicht kreisrunden Querschnitt aufweist.

4. Spülkasten nach einem der vorherigen Ansprüche, wobei der obere und untere Abschnitt durch im Wesentlichen flache rückwärtige und im Wesentlichen flache vordere Wände in auf Abstand angeordneter Beziehung abgegrenzt werden.
5. Spülkasten nach einem der Ansprüche 2 bis 4, wobei der obere und untere Abschnitt durch eine erste und zweite Seitenwand und eine erste und zweite obere Seitenwand abgegrenzt werden, wobei zwischen der ersten unteren und der ersten oberen Seitenwand und/oder zwischen der zweiten unteren und der zweiten oberen Seitenwand eine Stufe abgegrenzt wird.
6. Spülkasten nach Anspruch 5, wobei die Stufe zwischen der ersten unteren und der ersten oberen Seitenwand abgegrenzt wird und darüber hinaus zwischen der zweiten unteren und der zweiten oberen Seitenwand abgegrenzt wird.
7. Spülkasten nach einem der vorherigen Ansprüche, der einen obersten Abschnitt aufweist, der eine Querschnittfläche aufweist, die kleiner ist als die des oberen Abschnitts.
8. Spülkastenordnung, beinhaltend einen Spülkasten nach einem der vorherigen Ansprüche und ein Auslassventil, das an einer Basis des Spülkastens befestigt ist, wobei das Ventil einen Betriebsmechanismus aufweist, wobei der Betriebsmechanismus oberhalb der Basis des Spülkastens vorgesehen ist.
9. Spülkastenordnung nach Anspruch 8, das es einem Anwender ermöglicht, wenn das Ventil vom Dualspültyp ist, ein relativ großes Volumen an Spülwasser oder ein relativ geringes Volumen an Spülwasser zu wählen.
10. Spülkastenordnung nach einem der Ansprüche 8 oder 9, wobei das Ventil vom Nicht-Siphon-Typ ist, wie etwa ein Fallventil oder ein Klappenventil.
11. Bausatz von Teilen, umfassend eine Spülkastenordnung nach einem der vorherigen Ansprüche und ein Spülrohr (32), wobei das Spülrohr einen Arm von 500 mm Länge oder weniger aufweist.
12. Toilettenanordnung, umfassend einen Spülkasten oder eine Spülkastenordnung nach einem der vorherigen Ansprüche, eine Toilettenschüssel, die einen Einlass aufweist, und ferner ein Spülrohr (32), wobei die Höhe h_1 zwischen dem Boden des Spülkastens und dem Toilettenschüsseleinlass geringer

als 500 mm, bevorzugt kleiner als 250 mm und bevorzugt geringer als 150 mm sind.

13. Toilettenanordnung, umfassend eine Spülkasten-anordnung nach einem der Ansprüche 8 bis 10 oder einen Spülkasten nach einem der Ansprüche 1 bis 7, wobei das Oberteil des Spülkastens weniger als 1.1 Meter oberhalb des Bodenniveaus positioniert ist.

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14. Badezimmer umfassend eine Toilettenanordnung nach einem der Ansprüche 13 oder 14 und ein Waschbecken, wobei das Oberteil des Spülkastens niedriger liegt als die Oberkante des Waschbeckens.

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Revendications

1. Réservoir de toilettes, destiné à être utilisé avec une soupape à double chasse permettant à un utilisateur de sélectionner un volume relativement élevé d'eau de chasse ou un volume relativement faible d'eau de chasse, le réservoir comprenant une partie inférieure de section relativement petite et une partie supérieure de section relativement grande telles que, pendant l'utilisation, le volume relativement petit d'eau de chasse est pratiquement égal au volume de la partie supérieure et le volume relativement grand d'eau de chasse est transmis par la combinaison des parties supérieure et inférieure.

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2. Réservoir selon la revendication 1, dans lequel les sections sont pratiquement constantes dans chaque partie et délimitent un gradin entre les parties supérieure et inférieure.

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3. Réservoir selon l'une des revendications précédentes, dans lequel la partie inférieure et/ou supérieure a une section non circulaire.

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4. Réservoir selon l'une des revendications précédentes, dans lequel les parties supérieure et inférieure sont délimitées par des parois arrière sensiblement plates et des parois avant sensiblement plates disposées à distance.

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5. Réservoir selon l'une quelconque des revendications 2 à 4, dans lequel les parties supérieure et inférieure sont délimitées par des première et seconde parois latérales inférieures et des première et seconde parois latérales supérieures, un gradin étant délimité entre l'une des premières parois latérales inférieures et des premières parois latérales supérieures et/ou entre les secondes parois latérales inférieures et les secondes parois latérales supérieures.

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6. Réservoir selon la revendication 5, dans lequel le gradin est délimité entre la première paroi latérale inférieure et la première paroi latérale supérieure et est en outre délimité entre les secondes parois latérales inférieure et supérieure.

7. Réservoir selon l'une quelconque des revendications précédentes, ayant une partie de tête dont la section est inférieure à celle de la partie supérieure.

8. Ensemble à réservoir comprenant un réservoir selon l'une quelconque des revendications précédentes et soupape de sortie fixée à une base du réservoir, la soupape ayant un mécanisme de manoeuvre, le mécanisme de manoeuvre étant disposé au-dessus de la base du réservoir.

9. Ensemble à réservoir selon la revendication 8, dans lequel la soupape est du type à double chasse, permettant à un utilisateur de sélectionner un volume relativement grand d'eau de chasse ou un volume relativement faible d'eau de chasse.

10. Ensemble à réservoir selon l'une des revendications 8 et 9, dans lequel la soupape est une soupape sans siphon, telle qu'une soupape descendante ou une soupape à clapet.

11. Kit d'éléments formant un ensemble à réservoir selon l'une quelconque des revendications précédentes, et un tube de chasse (32), le tube de chasse ayant une branche dont la longueur est inférieure ou égale à 500 mm.

12. Ensemble de toilettes comprenant un réservoir ou un ensemble à réservoir selon l'une quelconque des revendications précédentes, une cuvette de toilettes ayant une entrée, et un tube de chasse (32) tel que la hauteur hi comprise entre le fond du réservoir et l'entrée de la cuvette de toilettes est inférieure à 500 mm et de préférence inférieure à 250 mm et de préférence inférieure à 150 mm.

13. Ensemble de toilettes comprenant un ensemble à réservoir selon l'une quelconque des revendications 8 à 10 ou un réservoir selon l'une quelconque des revendications 1 à 7, dans lequel le haut du réservoir est disposé à une hauteur inférieure à 1,1 m au-dessus du niveau du sol.

14. Equipement de salle de bains comprenant un ensemble de toilettes selon la revendication 12 ou 13 et un lavabo tel que le haut du réservoir est plus bas qu'un bord supérieur du lavabo.

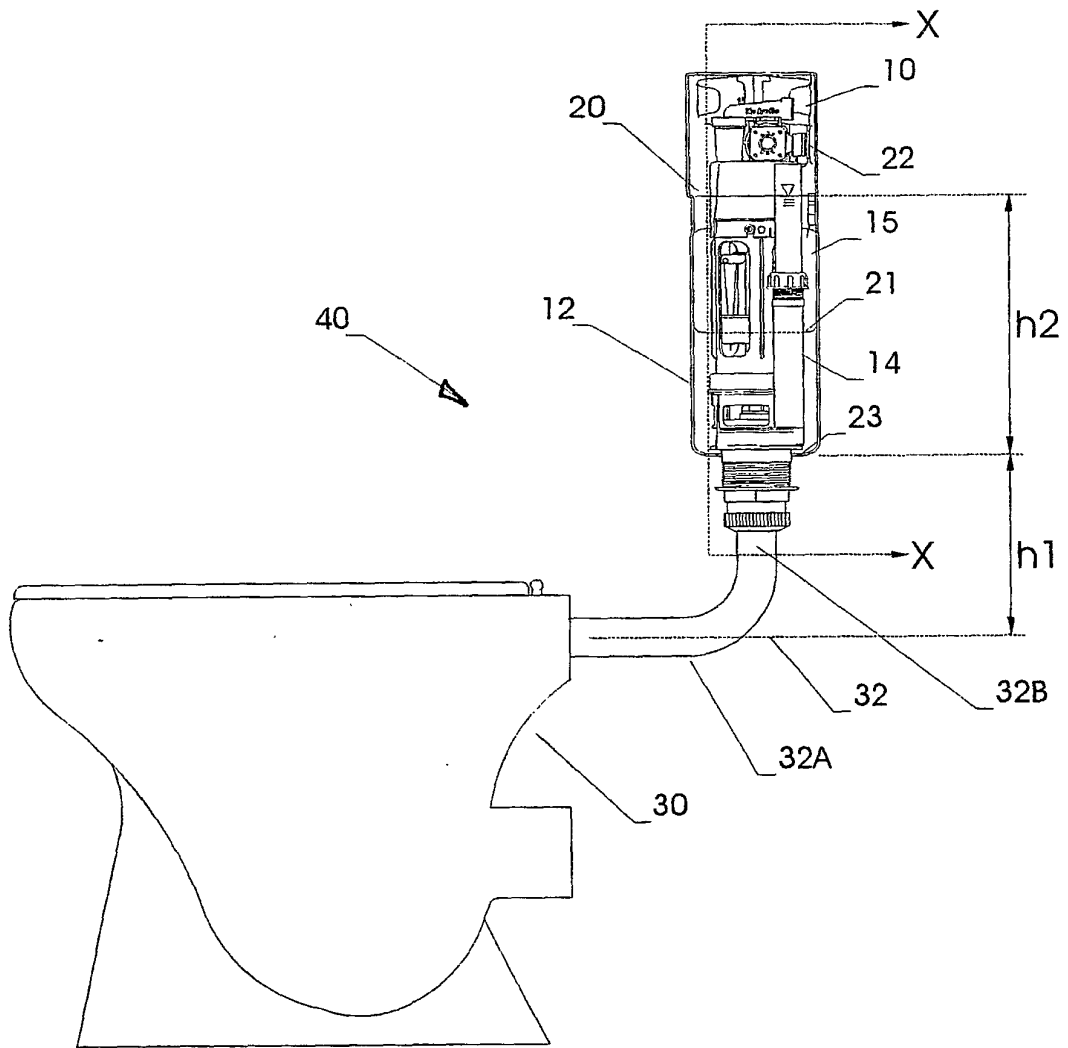


FIG 1

