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A CISTERN MECHANISM

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The present invention relates to dual flush cistern mechanisms and, in particular, to a dual flush cistern mechanism for an internally mounted cistern.

There has long been a desire for concealed cisterns in order that the aesthetics of bathrooms and toilets might be improved. Although such concealed cisterns are known, they have hitherto been mounted within a false wall built in front of a structural wall, for example, since the front-to-rear dimension of the cistern was very substantial and the cistern could not be accommodated between a conventional internal partition or dividing wall. In order to be so accommodated, the front-to-rear maximum dimension of the cistern must be less than or equal to the interior spacing available in the wall which is typically 90 mm. For non-load bearing partition stud walls the typical dimension is 70 mm.

Such a dimension is greatly exceeded by prior art dual flush cistern mechanisms which are relatively complicated and, in particular, include levers or actuating arms which are pivoted in substantially vertical planes which extend in the front-to-rear direction of the cistern. Australian Patent No. 597,438

granted to the present applicant, is an example of such a prior art dual flush mechanism. The minimum front-to-rear dimensions of this prior art mechanism are approximately 160 mm and therefore the mechanism could not be fitted into the desired internally mounted cistern.

It is the object of the present invention to provide a dual flush cistern mechanism which is able to be mounted within an internal cistern which is itself to be mounted between a pair of adjacent studs within a frame wall comprising a front and a rear layer spaced apart by, and secured to, a plurality of substantially vertical studs.

In accordance with one aspect of the present invention there is disclosed a dual flush cistern mechanism for an internal cistern to be mounted within a frame wall comprising a front and a rear layer spaced apart by, and secured to, a plurality of substantially vertical studs, the cistern being mounted between an adjacent pair of studs, having a maximum side-to-side dimension less than, or equal to, the spacing between said pair of studs, and having a maximum front-to-rear dimension less than, or equal to, the interior spacing between said front and rear layers, said mechanism comprising a flush tube with a flush valve at its lower end and being selectively liftable by either one of a pair of pivoted flush actuating levers, and a knock down float slidably mounted on said flush tube and latchable into an upper position by a pivotally mounted latch arm,

wherein said flush activating levers and latch arm are each pivotal within a substantially vertical plane which is substantially parallel to said front and rear layers and wherein the pivots for said actuating levers and latch arm have a pivot axis which is substantially normal to said vertical plane.

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An embodiment of the present invention will now be described with reference to the drawings in which:

Fig. 1 is a side elevational view of a lavatory pan and an internally mounted cistern, the frame wall within which the internally mounted cistern is positioned being
5 illustrated in cross-section;

Fig. 2 is an exploded perspective view illustrating the cistern, its pair of mounting brackets, and the pair of adjacent studs between which the cistern is mounted;

Fig. 3 is a perspective view of the dual flush mechanism of the preferred embodiment;

10 Fig. 4 is a front elevational view of the cistern mechanism with the front of the cistern removed;

Fig. 5 is a horizontal cross-sectional view through the cistern of Fig. 4; and

Fig. 6 is a vertical cross-sectional view through the cistern of Fig. 4.

As seen in Fig. 1, in a bathroom 1 which is separated from an adjacent room 2
15 by means of conventional frame wall 3, in accordance with the preferred embodiment it is now possible to internally mount a cistern 4 between the front layer 5 and rear layer 6 of the frame wall 3 which are spaced apart by only 70 mm. A lavatory pan 8 is mounted on the floor of the bathroom 1 abutting the front layer 5 and is connected to the cistern 4 by means of a flush pipe 9.

20 Fig. 2 illustrates in exploded perspective fashion how the cistern 4 is mounted between a pair of adjacent studs 10 by means of two mounting brackets 11. Full details of the mounting arrangement are disclosed in the present Applicant's co-pending UK Patent Application with the same filing date as this application, the disclosure of which is hereby incorporated by cross-reference.

25 The interior workings of the cistern 4 are as illustrated in Figs. 3-6. As best seen in Fig. 4, the cistern 4 has a substantially conventional float arm 14 from the free end of which depends a bell float 15. The position of the float arm with the cistern at its intended full level is indicated by solid lines in Fig. 4. Illustrated by dotted lines is the position of the float arm when the cistern 4 is at least partially empty. In the latter
30 position, the float arm 14 opens an inlet valve 16 of substantially conventional construction which permits water under mains pressure to enter into the interior of the cistern 4 via an outlet 17 for the inlet valve.

At the bottom of the cistern 4 is located a spigot 19 which connects to the flush pipe 9 (Fig. 1) and which is closed by a flush valve in the form of a flush tube 20 and
35 annular rubber sealing ring 21. The full details of the operation of the flush tube 20 are contained in the disclosure of AU 9454908-A, the contents of which are hereby incorporated by cross-reference.

Slidably mounted on the flush tube 20 is a knock down float 23 which is able to slide between an upper position as illustrated, and a lower position in which the knock down float 23 abuts against two stops 24 which extend to either side of the flush tube 20.

5 The knock down float 23 is latched into the upper position illustrated in Fig. 4 by means of pair of latch arms 25, only the front one of which is illustrated in Fig. 4. Each latch arm 25 includes a ramp 26 which leads to a rebate 27 which is able to engage with a corresponding lug 28 on the knock down float 23.

10 The latch arms 25 are interconnected by means of an integrally formed pair of striker plates 29. In addition, the latch arms 25 are pivoted by means of a pair of stub axles 30 which respectively extend to the front and to the rear of a collar 31 (Fig. 3) through which the flush tube 20 passes. The stub axles 30 extend between the collar 31 and the front and rear walls of the cistern 4. The latch arms 25 are snap engaged with, and pivotal about, the stub axles 30 by means of a keyhole shaped aperture 32.

15 Positioned above the flush tube 20 are two L-shaped supports 35. The upper, horizontal portion of each of the supports 35 has a hole 36 (Figs. 3 and 5) therethrough. The lower end of the vertical portion of the supports 35 terminates in a dual stub axle 37.

20 Each of the stub axles 37 pivotally supports a C-shaped flush actuating lever 38. As best seen in Fig. 5, the two flush actuating levers 38 have a pair of arms 39 and 40 respectively. It will be seen that the spacing between the arms 39 is slightly larger than the spacing between the arms 40 which fit within the arms 39. Both arms 39 and 40 are able to engage with oppositely extending projections 41 (Fig. 3) which extend in the front-to-rear direction from the flush tube 20.

25 Between the centre portion of each of the flush actuating levers 38, and the horizontal portion of each of the L-shaped supports 35, is compressed a hollow resilient bellows 43 formed from rubber or other resilient elastomeric material. Into the interior of each of the bellows 43 passes a corresponding air tube 44 which interconnects the corresponding flush actuating lever 38 with a corresponding one of two flush button air pumps 45. As best seen in Fig. 6, the flush button air pumps 45 are mounted on an
30 access cover 46 positioned over an access aperture in the front layer 5 of the frame wall 3.

35 As best seen in Fig. 4, pressing the right hand flush button air pump 45 forces air into the corresponding air tube 44 which extends the bellows 43. This pivots the corresponding flush actuating lever 38 so as to raise the arms 39. This action raises the projections 41 and therefore also raises the flush tube 20 so as to commence the flushing operation.

Since the right hand flush actuating lever 39 pushes the latch arms 25 in a direction to reinforce the engagement between the latch arm 25 and lug 28, the knock down float 23 remains retained in the upper position illustrated by solid lines in Fig. 4. As a consequence, a full flush is achieved and the flushing action ceases when the flush tube 20 drops under its own weight since it is no longer buoyantly supported by water leaving the cistern 4. Since the depression of the flush button 45 is of relatively short duration, the arms 39 have, by this time, returned to a substantially horizontal position.

If the left hand flush button 45 is momentarily depressed, then it is left hand flush actuating lever 38 which is pivoted thereby raising the arms 40 and lifting the flush tube 20. Simultaneously, the pivoting action of the left hand flush actuating lever 28 as seen in Fig. 4 pivots the latch arms 25 so that the knock down float 23 moves down the flush tube 20 with the falling level of water in the cistern. When sufficient water has left the cistern for the knock down float 23 to strike against the stops 24, the flush tube 20 is lowered prematurely thereby prematurely halting the flush procedure so as to deliver only a "half flush".

As the cistern re-fills, the knock down float 23 rises, the lugs 28 ride over the ramps 26 until the lug 28 is again latched into the rebate 27. This re-sets the latch arms 25 to retain the knock down float 23 in the upper position until the next operation of the left hand flush button 45.

It will be appreciated that the arms 39,40 of the flush actuating levers 38, and the latch arms 25 pivot in substantially vertical planes which are parallel to the front layer 5 and rear layer 6 of the frame wall 3. In addition, these levers and arms pivot about axes which are normal or perpendicular to these planes and therefore extend in the front-to-rear direction of the cistern. By arranging all the pivoting members in this fashion, a length sufficient to enable adequate moments and forces to be generated, can be achieved whilst still enabling the entire mechanism to be placed within the extremely small space available between the front layer 5 and rear layer 6.

Preferably the flush tube 20, being hollow, functions as an overflow tube. However, in some applications such as for use with septic tanks, a separate overflow tube 48 can be provided. The overflow tube 48 is inclined so as not to directly receive water entering the cistern via the inlet valve 16.

The foregoing describes only one embodiment of the present invention and modifications, obvious to those skilled in the art, can be made thereto without departing from the scope of the present invention.



CLAIMS

1. A dual flush cistern mechanism for an internal cistern to be mounted within a frame wall comprising a front and a rear layer spaced apart by, and secured to, a plurality of substantially vertical studs, the cistern being mounted between an adjacent pair of studs, having a maximum side-to-side dimension less than, or equal to, the spacing between said pair of studs, and having a maximum front-to-rear dimension less than, or equal to, the interior spacing between said front and rear layers, said mechanism comprising a flush tube with a flush valve at its lower end and being selectively liftable by either one of a pair of pivoted flush actuating levers, and a knock down float slidably mounted on said flush tube and latchable into an upper position by a pivotally mounted latch arm,

wherein said flush activating levers and latch arm are each pivotal within a substantially vertical plane which is substantially parallel to said front and rear layers and wherein the pivots for said actuating levers and latch arm have a pivot axis which is substantially normal to said vertical plane.

2. A mechanism as claimed in claim 1 wherein each of said flush actuating levers comprises a pair of arms each pivotable within a corresponding one of a pair of substantially vertical and substantially parallel planes each of which is substantially parallel to said front and rear layers.

3. A mechanism as claimed in claim 2 wherein each pair of arms is formed from a generally C-shaped member in which the pair of lever arms is spaced apart by a centre portion.

4. A mechanism as claimed in claim 2 or 3 wherein said latch arm comprises a pair of latch arms each pivotable within a corresponding one of a pair of substantially vertical and substantially parallel planes each of which is substantially parallel to said front and rear layers.

5. A mechanism as claimed in claim 4 wherein each of said latch arms extends from a common yoke having opposite ends which are shaped to form striker plates.

6. A mechanism as claimed in claim 5 wherein said yoke is pivotably mounted adjacent said flush actuating levers and is pivotable therewith.

7. A mechanism as claimed in claim 6 wherein one of said flush actuating levers is operable to pivot said latch arms to retain said float in said latched upper position and the other of said flush actuating levers is operable to pivot said latch arms to release said latched float.

8. A mechanism as claimed in any one of claims 1 to 7 wherein each actuating lever is operable via a corresponding interconnected flush button air pump, air tube and bellows.



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9. A dual flush cistern mechanism for an internal cistern, said mechanism being substantially as herein described with reference to the accompanying drawings.