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(54) **FLUSHING CISTERNS**

SPÜLBECKEN

RESERVOIRS DE CHASSES D'EAU

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(56) References cited:
EP-A- 0 183 337 **NL-C- 52 923**
US-A- 3 851 338

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Description

[0001] This invention relates to flushing cisterns for WC's and other sanitary installations and to the incorporation of flushing syphon assemblies therein and the conversion of cisterns having valved discharge to siphonic operation.

[0002] It is common practice outside the United Kingdom for flushing cisterns to be provided with valve controlled discharge, usually a fairly simple plunger or flap valve in the base of the cistern operated by a pull rod push button or lever to, in effect, simply dump the contents of the cistern to the inlet duct formation of the WC pan or other appliance and the valve seating or other outflow aperture or spigot in the cistern base is somewhat larger in diameter than that commonly employed for siphonic discharge arrangements, e.g. of the order of 50 cm (2 inches) nominal.

[0003] While valve discharge is very simple in construction and hence cheap to provide it has serious disadvantages. Any leakage past the valve due to poor assembly, wear, and/or dirt or foreign bodies such as grit lodging on the valve seat, will cause continuous discharge from the cistern and as this passes directly into the WC pan or the like it often goes unnoticed or is left unattended to. As well as the consequent wastage of water this gives rise to problems or overloading the associated drainage and sewage disposal systems. Thus it is often desirable, and may even be made compulsory, for valve discharge cisterns to be converted to siphonic operation where leakage is impossible because the discharge duct extends above cistern water level so that there is no outflow except during siphonic operation.

[0004] The object of the invention is to provide a siphon assembly and/or components for said assemblies which enable or facilitate ready installation and provide effective operation in cisterns formerly having valved flushing discharge; and a method of conversion of the latter cistern to siphonic discharge.

[0005] According to one aspect of the invention there is provided a siphon assembly for a flushing cistern as defined by claim 3 of the appended claims.

[0006] The invention further resides in a downleg component for a siphon assembly as defined by claim 1 thereof.

[0007] According to a further aspect the invention provides a method of converting a flushing cistern from valve operating flushing discharge to siphonic flushing discharge as defined by claim 6 thereof.

[0008] The invention may conveniently be used with or embodied in siphon assemblies of the kind formed in at least two portions which are releasably connected, said connection including some form of coupling between the downleg portion and the upflow duct and siphonic flow inducing means. Examples of siphon assemblies which are formed in two releasably connected portions are described in our Patent specifications GB-A-2083851 and EP-A-0183337. As well as two-part

siphon assemblies of that type multi-part assemblies separable into three or more portions are known. Such arrangements enable the operative parts of the assembly to be removed from the cistern for easy maintenance, repair or replacement leaving the downleg portion in place so that there is no need to block the water supply to the cistern or drain it or disturb the fluid tight mounting of the downleg in the cistern base when effecting these operations. It will be appreciated that in the case of such two-part or multi-part siphon assemblies a downleg portion incorporating the features of the invention can be readily substituted for other types of downleg portion, so adapting an otherwise standard siphon assembly for use in conversion of valve type flushing cisterns in a particularly economical and adaptable manner.

[0009] An example of the invention is now more particularly described with reference to the accompanying drawing being a vertical sectional view of a flushing cistern with siphon assembly installed therein.

[0010] The cistern 10 includes a conventional water supply infeed 12 including a ballcock 14 automatically replenishing the volume of water held in the cistern up to a predetermined maximum level indicated at 16.

[0011] As originally installed this cistern was fitted with valve controlled flushing discharge (not shown) located in a circular opening 18 centred in the base 20 of the cistern. An externally threaded spigot of the valve assembly would be located in opening 18 to extend there through and project below base 20 to receive a nut securing the valve assembly in fluid tight engagement in the base opening. Typically the external diameter of said threaded part is approximately 60 mm overall, the nominal bore of the spigot being 51 mm (2 inches). The lower end of the valve assembly outlet duct defined by said spigot would open into an inlet duct formation 22 of the WC pan or the like in this example in which the cistern is in close-coupled relationship to said pan as a low level installation.

[0012] The low level installation means that there is not a great head of water in the cistern in relation to the WC pan, thus, for effective "dump" flushing under valve operated discharge, the discharge passage from the cistern has to be of quite substantial cross-sectional area.

[0013] In order to convert cistern 10 from valve operated flushing discharge to siphonic discharge a siphon assembly 24 is installed therein as shown in the drawing.

[0014] In this example assembly 24 is the two-part type described in our said specification EP-A-0183337, thus its construction and operation is not here described in detail except so far as necessary for the understanding of the invention. The assembly comprises a downleg portion 26 which will be described in greater detail hereafter and an upleg portion 28 comprising a siphonic piston chamber 30 at its lower end operating in conventional fashion by means of a flushing lever or handle and

serving as the means for inducing siphonic flow from the open lowermost mouth 32 positioned when assembled near base 20. The upper part of portion 28 defines an upflow duct 29 leading from chamber 30 extending above water level 16 with the upper termination part of portion 28 shaped as an inverted "U" leading to a spigot and socket connection 34 with the upper end of downleg portion 26, also above water level 16 and providing fluid tight connection conducting the continued siphonic flow, once induced, to the downflow duct defined by portion 26. As before mentioned the upleg portion 28 can be disconnected and bodily removed from cistern 10 leaving downleg portion 26 in position.

[0015] Siphon assembly 24 is dimensioned to operate with maximum efficiency in connection with cisterns commonly used in the UK in which the base opening is sized to receive 38 mm (1.5 inches) nominal internal diameter threaded spigot and, for a siphon assembly for installation in such GB pattern of cistern, the internal bore of downleg portion 26 would have a corresponding uniform bore throughout its length including the end part which projects through and below cistern base 20.

[0016] The flushing action is very much affected by the diameter and length of drop of the waterflow within downleg portion 26 for it is the fall of that volume of water and its velocity which sustains the effective siphonic action and which provide adequate speed of discharge for effective flushing of the WC pan or other appliance. It also has an effect on the initiation of the siphonic flushing action, this should be started positively and without need for repeated attempts or application of excessive force to the flushing lever or the like and whether the lever is operated rapidly or more slowly.

[0017] In order to ensure effective flushing action where the siphon assembly 24 is being substituted for a discharge valve as in the present cistern the lower end of portion 26 is specially formed, it comprises an externally threaded spigot portion 36 sized to fit in base opening 18 and secured in fluid-tight engagement in conventional manner by means of a nut 38 abutting the lower face of base 20 which draws a flange 40 against a sealing washer 42 within the system. This also serves to mount the assembly 24 in the cistern.

[0018] Within the lower part of portion 26 and, in this example, moulded integrally therewith, is an internal sleeve 44 of lesser diameter than spigot portion 36 and continuing almost the full length of the latter. The bore of sleeve 44 corresponds to that of the upper parts of portion 26 so that a continuous downflow duct is provided having the required cross-sectional area throughout the full length of portion 26 to provide optimum flushing action.

[0019] In some constructions instead of an internal sleeve 44 the wall of spigot portion 36 could be thickened along its length to provide the required continuous internal bore. However, as the components of siphon assembly 24 are commonly plastics mouldings, the sleeve arrangement is preferred for ease of manufacture. The

sleeve may have a quite thin wall as it is protected from damage during transport and installation by the thicker spigot portion 36.

[0020] In one example the length of downleg portion 26 within the cistern 10 is approximately 230mm (9 inches) and the length of spigot portion 36 which extends below base 20 is approximately 40mm (1.1/2 inches). Providing sleeve 44 within spigot portion 36 adds almost 40mm or about 18% to the effective length of the downflow duct having the optimum internal diameter. The percentage is even greater in relation to the length of downleg portion 26 which is within the maximum water level 16 of the cistern, typically a water depth of around 165mm (6 1/2 inches), the additional length of optimum bore provided by sleeve 44 being around 25% of that length.

Claims

1. A down leg component (26) for a siphon assembly (24) for a flushing cistern (10), said assembly including an upflow duct (28) open below the operating water level of the cistern when filled and in communication at its upper end above said level with a downflow duct (26) operatively mounted in and opening through the base (20) of the cistern in use, and selectively operable means (30) for inducing siphonic flow through the connected ducts to effect flushing discharge from the cistern, the downflow duct being defined by a downleg portion of said assembly having a lower end part (36) dimensioned to be secured in a base opening (18) of the cistern to seal said opening against leakage in use and mount said assembly in the cistern **characterised in that** the down flow duct is further defined by an integral interior sleeve and/or wall structure (44) extending the full length of said downleg portion including said lower end part, the bore of said sleeve or wall structure being sized for optimum siphonic flushing action.
2. A component as in claim 1 **characterised in that** the external diameter of said lower end part (36) is approximately 60mm and the bore of said sleeve or wall structure (44) is approximately 38mm.
3. A siphon assembly (24) for a flushing cistern (10), said assembly including an upflow duct (28) open below the operating water level of the cistern when filled and in communication at its upper end above said level with a downflow duct (26) operatively mounted in and opening through the base (20) of the cistern in use, and selectively operable means (30) for inducing siphonic flow through the connected ducts to effect flushing discharge from the cistern, the downflow duct being defined by a downleg portion of said assembly having a lower end part

(36) dimensioned to be secured in a base opening (18) of the cistern to seal said opening against leakage in use and mount said assembly in the cistern **characterised in that** the down flow duct is further defined by an integral interior sleeve and/or wall structure (44) extending the full length of said downleg portion including said lower end part, the bore of said sleeve or wall structure being sized for optimum siphonic flushing action.

4. An assembly as in claim 3 **characterised in that** the external diameter of said lower end part (36) is approximately 60mm and the bore of said sleeve or wall structure (44) is approximately 38mm.
5. An assembly as in claim 3 or 4 **characterised in that** it is formed in at least two portions (26, 28) which are releasably connected to couple the downleg portion to the upflow duct and siphonic flow inducing means.
6. A method of converting a flushing cistern (10) from valve operated flushing discharge to siphonic discharge including the steps of providing a siphon assembly (24) according to claim 3, or a downleg component (26) according to claim 1 to be connected to an upflow duct (28) and siphonic flow inducing means (30) to form a siphon assembly, removing a flushing valve assembly from a base opening (18) of the cistern, and securing the lower end part (36) of said downleg portion or component in said opening.

Patentansprüche

1. Nach unten gerichteter Bestandteil (26) für eine Siphoneinrichtung (24) für ein Spülbecken (10), wobei die Einrichtung umfaßt: ein Aufwärtsströmungsrohr (28), das unterhalb des Betriebswasserstandes des Beckens offen ist, wenn es gefüllt ist, und an seinem oberen Ende oberhalb des Wasserstandes mit einem Abwärtsströmungsrohr (26) verbunden ist, das funktionstüchtig eingebaut ist und sich in Gebrauch durch den Boden (20) des Beckens öffnet, und selektiv zu betätigende Mittel (30) zum Hervorrufen der Siphonströmung durch die angeschlossenen Rohre, um die Spülentleerung aus dem Becken zu bewirken, wobei das Abwärtsströmungsrohr durch einen nach unten gerichteten Abschnitt der Einrichtung definiert ist, der ein unteres Ende (36) aufweist, das für die Befestigung in einer Bodenöffnung (18) des Beckens so dimensioniert ist, um die Öffnung gegen Undichtigkeit in Gebrauch abzudichten und die Einrichtung im Becken anzubringen, **dadurch gekennzeichnet, daß** das Abwärtsströmungsrohr ferner durch eine einstückige innere Buchse und/oder Wandkonstruktion (44)

definiert ist, die sich über die gesamte Länge des nach unten gerichteten Abschnittes, einschließlich des unteren Endteils, erstreckt, wobei die Bohrung der Buchse oder Wandkonstruktion für die optimale Siphonspülwirkung bemessen ist.

2. Bestandteil nach Anspruch 1, **dadurch gekennzeichnet, daß** der Außendurchmesser des unteren Endteils (36) ungefähr 60 mm und der Bohrung der Buchse oder der Wandkonstruktion (44) ungefähr 38 mm beträgt.
3. Siphoneinrichtung (24) für ein Spülbecken (10), wobei die Einrichtung umfaßt: ein Aufwärtsströmungsrohr (28), das unterhalb des Betriebswasserstandes des Beckens offen ist, wenn es gefüllt ist, und an seinem oberen Ende oberhalb des Wasserstandes mit einem Abwärtsströmungsrohr (26) verbunden ist, das funktionstüchtig eingebaut ist und sich in Gebrauch durch den Boden (20) des Beckens öffnet, und selektiv zu betätigende Mittel (30) zum Hervorrufen der Siphonströmung durch die angeschlossenen Rohre, um die Spülentleerung aus dem Becken zu bewirken, wobei das Abwärtsströmungsrohr durch einen nach unten gerichteten Abschnitt der Einrichtung definiert ist, der ein unteres Ende (36) aufweist, das für die Befestigung in einer Bodenöffnung (18) des Beckens so dimensioniert ist, um die Öffnung gegen Undichtigkeit in Gebrauch abzudichten und die Einrichtung im Becken anzubringen, **dadurch gekennzeichnet, daß** das Abwärtsströmungsrohr ferner durch eine einstückige innere Buchse und/oder Wandkonstruktion (44) definiert ist, die sich über die gesamte Länge des nach unten gerichteten Abschnittes, einschließlich des unteren Endteils, erstreckt, wobei die Bohrung der Buchse oder Wandkonstruktion für die optimale Siphonspülwirkung bemessen ist.
4. Einrichtung nach Anspruch 3 **dadurch gekennzeichnet, daß** der Außendurchmesser des unteren Endteils (36) ungefähr 60 mm und der Bohrung der Buchse oder der Wandkonstruktion (44) ungefähr 38 mm beträgt.
5. Einrichtung nach Anspruch 3 oder 4 **dadurch gekennzeichnet, daß** sie in mindestens zwei Abschnitten (26, 28) gebildet wird, die lösbar verbunden sind, um den nach unten gerichteten Abschnitt mit dem Aufwärtsströmungsrohr und den die Siphonströmung hervorrufenden Mitteln zu verbinden.
6. Verfahren des Umbauens eines Spülbeckens (10) von ventilbetätigter Spülentleerung in Siphonentleerung, umfassend die Schritte: Bereitstellen einer Siphoneinrichtung nach Anspruch 3 oder eines nach unten gerichteten Bestandteils (26) nach An-

spruch 1, das an das Aufwärtsströmungsrohr (28) und die die Siphonströmung hervorruhenden Mittel (30) anzuschließen ist, um eine Siphoneinrichtung zu bilden, Entfernen einer Spülventileinrichtung von einer Bodenöffnung (18) des Beckens und Befestigen des unteren Endteils (36) des nach unten gerichteten Abschnittes oder Bestandteils in der Öffnung.

Revendications

1. Composant de branche descendante (26) pour ensemble à siphon (24) destiné à un réservoir de chassé d'eau (10), ledit ensemble comprenant une conduite d'écoulement ascendant (28) ouverte en dessous du niveau d'eau en service du réservoir lorsque rempli et en communication par son extrémité supérieure au-dessus dudit niveau avec une conduite d'écoulement descendant (26) montée de manière fonctionnelle dans l'ouverture à travers la base (20) du réservoir en service, et des moyens d'actionnement de façon sélective (30) pour créer un écoulement de type siphon à travers les conduites raccordées et réaliser une décharge de chasse d'eau depuis le réservoir, la conduite d'écoulement descendant étant définie par une branche descendante dudit ensemble présentant une pièce d'extrémité inférieure (36) calibrée pour être immobilisée dans une ouverture de la base (18) du réservoir afin de fermer en fonctionnement ladite ouverture de manière étanche aux fuites et ledit ensemble étant monté dans le réservoir, **caractérisé en ce que** la conduite d'écoulement descendant est en outre délimitée par une manchette interne d'une seule pièce et/ou une structure de paroi (44) se prolongeant sur la totalité de la longueur de ladite branche descendante comprenant ladite pièce d'extrémité, l'orifice de cette manchette ou de la structure de paroi étant calibrée pour une action optimale de décharge de type siphon.
2. Dispositif selon la revendication 1, **caractérisé en ce que** le diamètre externe de la partie d'extrémité inférieure (36) est sensiblement égal à 60 mm et **en ce que** l'orifice de la manchette ou de la structure de paroi (44) est sensiblement de 38 mm.
3. Ensemble à siphon (24) pour réservoir de chasse d'eau (10), ledit ensemble comprenant une conduite d'écoulement ascendant (28) ouverte en dessous du niveau d'eau en service du réservoir lorsque rempli et en communication par son extrémité supérieure au-dessus dudit niveau avec une conduite d'écoulement descendant (26) montée de manière fonctionnelle dans l'ouverture à travers la base (20) du réservoir en utilisation, et des moyens d'actionnement de façon sélective (30) pour créer

un écoulement de type siphon à travers les conduites raccordées et réaliser une décharge de chasse d'eau depuis le réservoir, la conduite d'écoulement descendant étant définie par une branche descendante dudit ensemble présentant une pièce d'extrémité inférieure (36) calibrée pour être immobilisée dans une ouverture de la base (18) du réservoir afin de fermer en fonctionnement ladite ouverture de manière étanche aux fuites et ledit ensemble étant monté dans le réservoir, **caractérisé en ce que** la conduite d'écoulement descendant est en outre délimitée par une manchette interne d'une seule pièce et/ou une structure de paroi (44) se prolongeant sur la totalité de la longueur de ladite partie de branche descendante comprenant ladite pièce d'extrémité, l'orifice de cette manchette ou de la structure de paroi étant calibrée pour une action optimale de décharge de type siphon.

4. Dispositif selon la revendication 3, **caractérisé en ce que** le diamètre externe de la partie d'extrémité inférieure (36) est sensiblement égal à 60 mm et **en ce que** l'orifice de la manchette ou de la structure de paroi (44) est sensiblement de 38 mm.
5. Dispositif selon la revendication 3 ou 4, **caractérisé en ce qu'il** est formé d'au moins deux pièces (26, 28) raccordées de manière amovible pour joindre la conduite d'écoulement descendant à la conduite d'écoulement ascendant et aux moyens pour créer un écoulement de type siphon.
6. Procédé de conversion d'un réservoir de chasse d'eau (10) d'une décharge de chasse d'eau actionnée par clapet en une décharge de type siphon comprenant les étapes de :
 - . fourniture d'un ensemble à siphon (24) selon la revendication 3, ou un composant à branche descendante (26) selon la revendication 1 destiné à être raccordé à une conduite d'écoulement ascendant (28) et à des moyens pour créer un écoulement de type siphon (30) afin de former un ensemble à siphon,
 - . enlèvement d'un ensemble à clapet pour chasse d'eau d'une ouverture de la base (18) du réservoir, et
 - . fixation de la pièce d'extrémité inférieure (36) de cette branche ou composant descendant dans ladite ouverture.

