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Greywater diversion vessell assembly

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ABSTRACT

Greywater Diverter Vessel Assembly

The disclosed greywater diverter vessel assembly comprises a cylindrical vessel 4 and valve diversion assembly 1, 2, 16, to be engaged with a vertical wastewater pipe 9. An operator can, by means of manually opening or closing 10 a valve 1, selectively choose whether greywater flowing down through a vertical wastewater pipe 9 is, by closing 10 the valve 1, diverted to upflow into a cylindrical vessel 4 wherein it can pass through a removable greywater mesh filter 5 and out through the cylindrical vessel's 4 outflow point 7 as filtered greywater to be reused for irrigation or other similar reuse, or alternatively, by opening 10 the valve 1, allow the greywater to flow downward through the vertical wastewater pipe 9 and valve diversion assembly 1, 2. 16 to the sewer or onsite wastewater system. The cylindrical vessel 4 has an over-flow outlet 8 which allows greywater to overflow back to a valve diversion assembly connection point16 located below the closed valve 1 and to the sewer or onsite wastewater system should the free outflow of greywater through or out of the cylindrical vessel 4 be restricted due to clogging of the removable greywater mesh filter 5 or other fault in the irrigation or other reuse system, without limiting the continued free in-flow of greywater water into the cylindrical vessel's 4 in-flow point 3.

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PATENTS ACT 1990

COMPLETE SPECIFICATION

INNOVATION PATENT

GREYWATER DIVERTER VESSELL ASSEMBLY

The following statement is a full description of this invention, including the best method of performing it known to me:

Greywater Diverter Vessel Assembly

There is support for conservation of quality water resources, whilst disposal of society's wastewater requires the provision of wastewater treatment and disposal systems that are operated by water utilities as communal sewers or individuals as onsite wastewater systems serving individual properties. The size and cost to construct, maintain and operate such systems is affected by a number of factors including the need to remove suspended organic waste material from the wastewater and the volume of wastewater to be treated and disposed of. Reuse of wastewater for uses that would otherwise require use of quality water supplies whilst reducing the volume of wastewater requiring treatment and disposal is therefore supported.

Wastewater from the laundry, bathroom and handbasins contributes significantly to the total domestic wastewater volume, yet generally it contributes the least amount of suspended organic waste material contained within domestic wastewater. Because of this, bathroom, laundry and handbasin greywater requires least treatment for irrigation purposes. However, to be successful it must be done in a way acceptable to health authorities, accepted plumbing standards, be economically viable and not be a burden to users.

This invention the greywater diverter vessel assembly was developed with a view of providing a greywater reuse system that would successfully satisfy all of these requirements.

A greywater diverter vessel assembly in accordance with this invention, comprises a cylindrical vessel and valve diversion assembly, wherein the valve diversion assembly consists of a gate or similar valve fitted between two three-way wastewater pipe junctions providing vertical inlet and outlet connection sockets so the valve diversion assembly can be connected into a vertical wastewater pipe, and have two remaining side wastewater pipe connection sockets for connection to the accompanying cylindrical vessel, vertically located at its side, and wherein the cylindrical vessel has a removable gas tight access lid being its cylinder top, a removable greywater mesh filter, a closed base that is sloped and three wastewater pipe connection point openings protruding out the sides of the cylindrical vessel that include, a greywater in-flow wastewater pipe connection point connected into the valve diversion assembly's upper side wastewater pipe connection socket, and two out-flow wastewater pipe connection points being a greywater over-flow point that is connected back to the valve diversion assembly's lower side wastewater pipe connection socket by way of suitable wastewater pipe and elbow connections and a filtered greywater outlet for the filtered greywater to flow out of the cylindrical vessel for irrigation or other reuse.

A greywater diverter vessel assembly, wherein the valve diversion assembly's upper side branch wastewater pipe connection socket is angled upwards at forty five degrees for connection to the cylindrical vessel's in-flow wastewater pipe connection point, angled downward at forty five degrees, such that greywater will not flow upwards through the connection when greywater reuse is not required and the valve is opened for greywater to flow to sewer or onsite wastewater system, and wherein the cylindrical vessel's greywater over-flow wastewater pipe connection point is positioned just below the level of and to

the side of the wastewater inflow pipe connection point such that it is set away from the influence of greywater flowing into the cylindrical vessel, when greywater reuse is required and the valve is closed.

The valve can be manually set to either the open or closed position. When open, greywater flowing downward through the vertical wastewater pipe and valve diverter assembly will flow directly to the sewer or onsite wastewater system, and when closed the greywater is diverted to up-flow around the valve diversion assembly's upper three way junction into the cylindrical vessel to be filtered for reuse. Should the valve be closed for greywater reuse and the free flow of filtered greywater from the cylindrical vessel is restricted, because either the removable greywater mesh filter is clogged or other failure in the reuse system, the greywater level within the cylindrical vessel will rise and overflow to sewer or the onsite wastewater system, without inhibiting the continued free flow of greywater from the building into the cylindrical vessel.

To facilitate a better understanding of the nature of the invention the "Greywater diverter vessel assembly " the invention will be described in more detail with reference to the accompanying drawings, in which;

Fig.1 is a top view of the greywater diverter vessel assembly.

Fig.2 is a front view of the greywater diverter vessel assembly on a vertical wastewater pipe with vessel base and mesh filter shown in broken line.

Fig.3 is a sliced through view from within at the front section of the greywater diverter vessel assembly as presented in Fig.2.

Fig.4 is a side view of the removable greywater mesh filter.

Fig.5 is a schematic plan showing an example of how the greywater diverter vessel assembly can be fitted onto the outside wall of a building.

The greywater diverter vessel assembly incorporates a manually operated push-pull 10 gate valve 1 to open or close the free flow of greywater through a vertical wastewater pipe 9. It operates such that when the valve is pulled open, greywater will flow directly downwards through the vertical wastewater pipe 9, the upper three-way wastewater pipe junction 2, the gate valve 1, the lower three-way wastewater pipe junction 16, the lower section of the vertical wastewater pipe 9 and to sewer or onsite wastewater system. When the gate valve 1 is pushed closed vertical flow of the greywater is blocked causing it to flow from the vertical wastewater pipe 9 around and up the 45 degree bend of the diverter valve assembly's three way junction 2 to enter the cylindrical vessel 4 via the in-flow pipe connection point 3. Greywater then falls into the cylindrical vessel 4 wherein it passes by gravity through a removable greywater mesh filter 5, which said removable greywater mesh filter 5 is held in place by a bracket 12, and the filtered greywater passes down onto the cylindrical vessel's sloped base 6 from where it flows out of the cylindrical vessel 4 via the filtered greywater out-flow pipe connector point 7 for irrigation or similar reuse 15.

Should the free low of greywater through and out of the cylindrical vessel 4 be blocked or restricted, by either clogging of the removable greywater mesh filter 5 or blockage or failure within the irrigation or similar reuse 15 such that filtered greywater can not freely exit the cylindrical vessel 4 via the filtered greywater out-flow pipe connector point 7, the continued in-flow of greywater through the in-flow pipe connector point 3 will cause the greywater level within the cylindrical vessel 4 to rise until that level reaches the level of the over-flow pipe connection point 8 from where any additional in-flow of greywater through the in-flow pipe connection point 3 shall immediately overflow back

to sewer or the onsite wastewater system, via an over-flow return wastewater pipe 17 and wastewater pipe elbow connections 18, 19, three-way wastewater pipe junction 16 and the lower section of the vertical wastewater pipe 9.

A greywater diverter vessel assembly is designed to be installed into a vertical wastewater pipe 9 in a position so the greywater in-flow point 3 and greywater over-flow point 8, of the cylindrical vessel 4, are set at a level lower than the lowest plumbing fixture water trap 14 connected to the greywater diverter vessel assembly and at a height above the sewer or onsite wastewater system plumbing's overflow relief gully or disconnector trap 13 as prescribed by the statutory requirements of the relevant health authority, water service utility or other plumbing authority in a particular location.

A greywater diverter vessel assembly has, cylindrical vessel body 4, three wastewater pipe connection points 8, 3, 7, closed base 6, mesh filter bracket 12 and access lid 11 preferably manufactured from suitably moulded ultra-violet resistant PVC plastic components that are glued, screwed or welded together, and has a removable greywater mesh filter 5 preferably manufactured from stainless steel or other suitable corrosion resistant material, and has two seals manufactured from rubber or similar material for use as the access lid's 11 gas seal and the removable mesh filter's 5 outer rim water seal, whereas, the remainder of components used to assemble the greywater diverter vessel assembly, including three-way wastewater pipe junctions 2, 16 and elbows 18, 19, and gate valve 1 are readily available from approved wastewater plumbing component suppliers and manufactured preferably and predominantly of ultra-violet resistant PVC plastic components, so they may be readily screwed and

or glued together with the cylindrical vessel 4 to construct the greywater diverter vessel assembly.

The above described greywater diverter vessel assembly device can be easily fitted to new or existing plumbing installations, as shown in Figure 5, by cutting out a section of the existing vertical wastewater pipe 9 and inserting the greywater diverter vessel assembly, and may be install inside or outside a building.

The foregoing only describes one embodiment of the greywater diverter vessel assembly and modifications that are obvious to those skilled in the art may be made thereto without departing from the scope of the invention. For example:

- the greywater diverter vessel assembly device's cylindrical vessel 4 can be constructed in a modular form to allow installers the option to vary which side of the diversion valve assembly 2, 1, 16 the cylindrical vessel 4 will assume and to the direction that the filtered greywater out-flow connection point 7 will assume.
- the removable greywater mesh filter can be varied with use of a different filter medium or have a different mesh aperture, such as to provide a larger size for passive or mechanical sub-soil trench irrigation or a very small aperture size for irrigation by a mechanically pressurised micro drip irrigation system, or alternatively provide no filter so it might be used simply as a greywater diverter to an external filtration or other treatment and irrigation method.
- the device may be manufactured to any size to suit specific vertical wastewater pipes or flows or used only as a greywater diverter.

- the valve in the diversion valve assembly may take the form of gate, ball or other suitable valve approved for use on wastewater pipework.
- the circular vessel need not be cylindrical and may take any suitable shape consistent with its function described herein.

The claims defining the invention are as follows:

1. A greywater diverter vessel assembly in accordance with this invention, comprises a cylindrical vessel and valve diversion assembly, wherein the valve diversion assembly consists of a gate or similar valve fitted between two three-way wastewater pipe junctions providing vertical inlet and outlet connection sockets so the valve diversion assembly can be connected into a vertical wastewater pipe, and have two remaining side wastewater pipe connection sockets for connection to the accompanying cylindrical vessel, vertically located at its side, and wherein the cylindrical vessel has a removable gas tight access lid being its cylinder top, a removable greywater mesh filter, a closed base that is sloped and three wastewater pipe connection point openings protruding out the sides of the cylindrical vessel that includes, a greywater in-flow connection point connected into the valve diversion assembly's upper side wastewater pipe connection socket, and two out-flow wastewater pipe connection points being a greywater over-flow point that is connected back to the valve diversion assembly's lower side wastewater pipe connection socket by way of suitable wastewater pipe and elbow connections and a filtered greywater outlet for the filtered greywater to flow out of the cylindrical vessel for irrigation or other reuse.

2. A greywater diverter vessel assembly as claimed in claim1, wherein the valve diversion assembly's upper side branch wastewater pipe connection socket is angled upwards at forty five degrees for connection to the cylindrical vessel's in-flow wastewater pipe connection point, angled downward at forty five degrees, such that greywater will not flow upwards through the connection when greywater reuse is not required and the valve is opened for greywater to

flow to sewer or onsite wastewater system, and wherein the cylindrical vessel's greywater over-flow wastewater pipe connection point is positioned just below the level of and to the side of the wastewater inflow pipe connection point such that it is set away from the influence of greywater flowing into the cylindrical vessel, when greywater reuse is required and the valve is closed.

3. A greywater diverter vessel assembly as claimed in claims 1 and 2, wherein it is installed into a vertical wastewater pipe in a position so the greywater in-flow and over-flow connection points of the cylindrical vessel are set at a level lower than the lowest plumbing fixture water trap connected to the greywater diverter vessel assembly device and at a height above the sewer or onsite wastewater system plumbing's overflow relief gully or disconnector trap as prescribed by the statutory requirements of health authorities, water service utilities or other plumbing authority in a particular location.

4. A greywater diverter vessel assembly as claimed in claims 1-3 wherein it has, cylindrical vessel body, three wastewater pipe connection points, closed base, mesh filter bracket and access lid preferably manufactured from suitably moulded ultra-violet resistant PVC plastic components that are glued, screwed or welded together, and has a removable greywater mesh filter preferably manufactured from stainless steel or other suitable corrosion resistant material, and has two seals manufactured from rubber or similar material for use as the access lid's gas seal and the removable greywater mesh filter's outer rim water seal, whereas, the remainder of components used to assemble the greywater diverter vessel assembly, including three-way wastewater pipe junctions, elbows, and gate valve are readily available from approved wastewater plumbing component suppliers and manufactured preferably and

predominantly of ultra-violet resistant PVC plastic components, so they may be readily screwed and or glued together with the cylindrical vessel to construct the greywater diverter vessel assembly.

5. A greywater diverter vessel assembly substantially as herein described with reference to the accompanying drawings.

JIM BERTRAM 22 AUGUST 2002

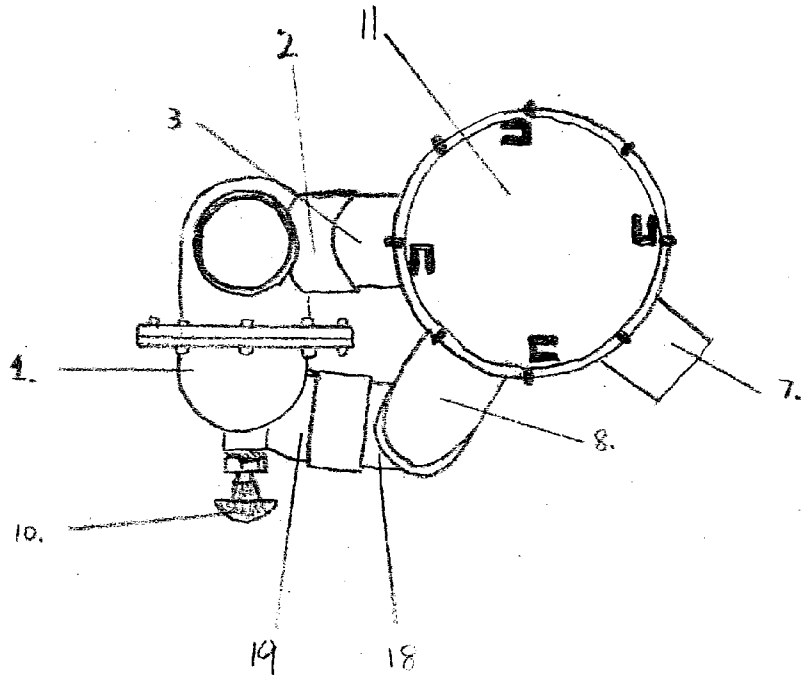

fig. 1

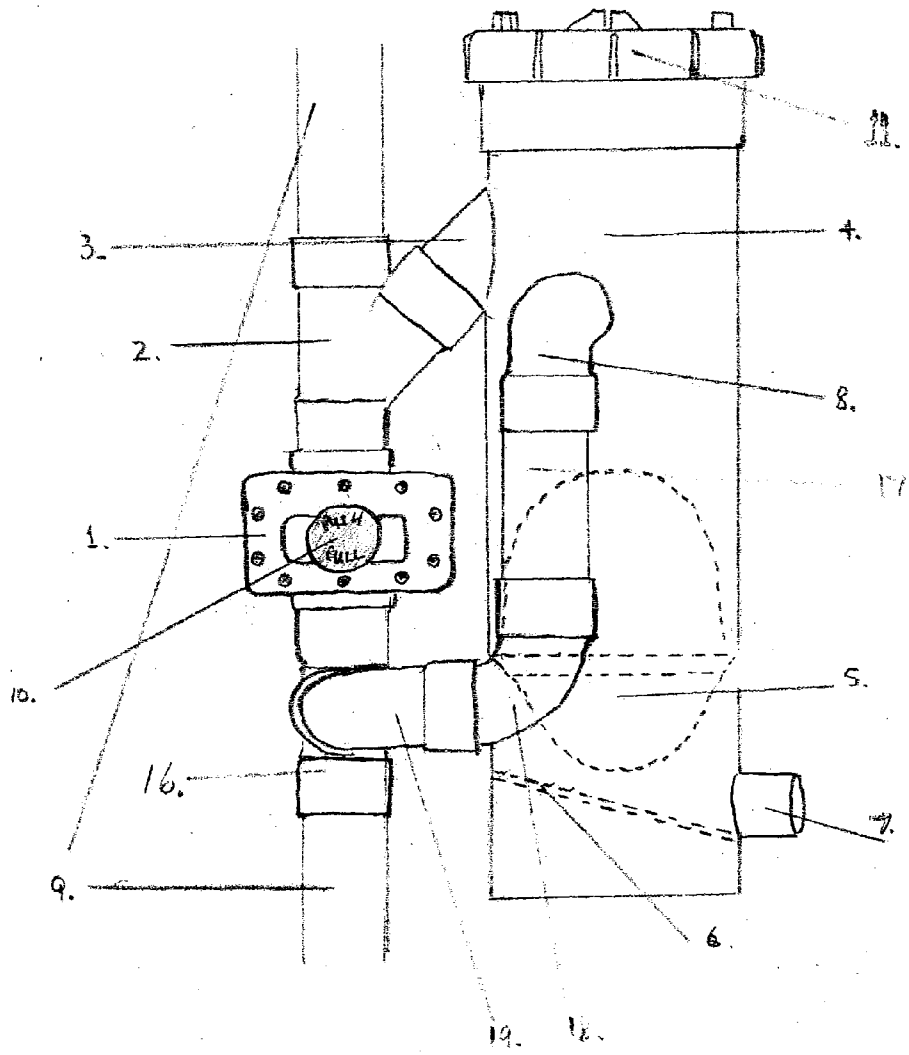

fig. 2

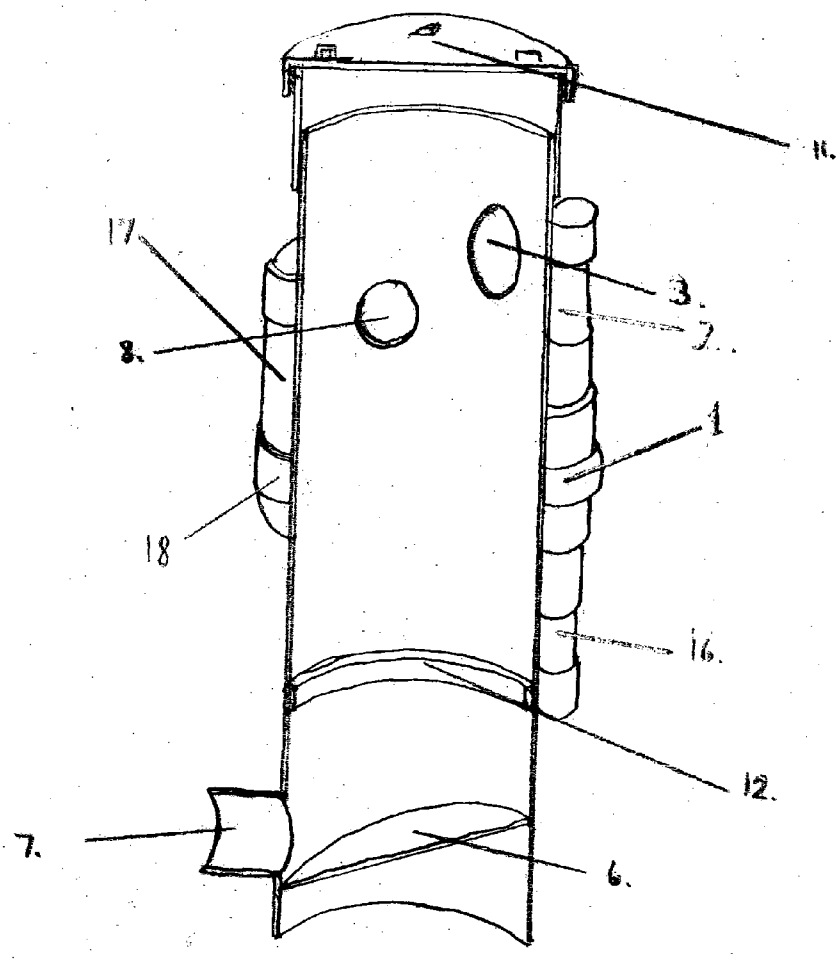

fig. 3

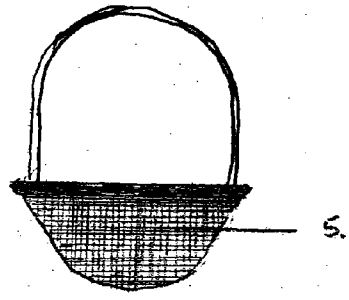

fig. 4

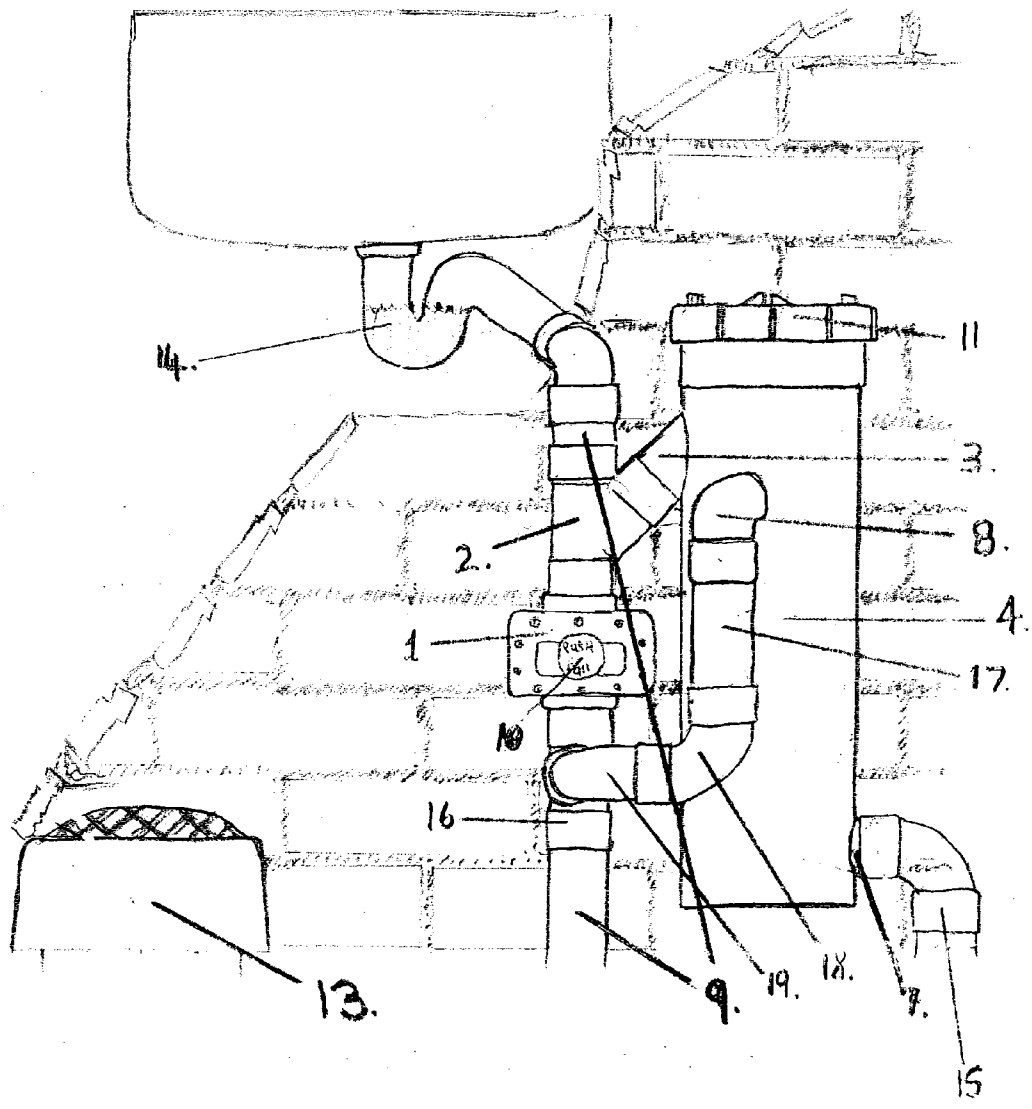

fig. 5