A drain apparatus includes an entry section for being coupled to a source of fluid, an exit section for being coupled to a drain, a cleanout section for receiving pressure, and a valve system. In a first mode of the valve system, a first path between the entry system and the exit section is open. In a second mode, a second path between the cleanout section and the exit section is open while the first path is blocked.
FIG. 1
FIG. 3
FIG. 5
PRIOR ART
FIG. 6
PRIOR ART
DRAIN APPARATUS AND METHOD FOR USE THEREWITH

FIELD OF THE INVENTION

[0001] The present invention relates to drains and more particularly to drains for which the remediation of a clog is desirable. Specifically, a clog in a drain is removed in a desirable manner.

BACKGROUND OF THE INVENTION

[0002] FIG. 5 is a side view of a drain apparatus in accordance with the prior art. Such a drain apparatus typically includes drain cleanout unit 160. Drain cleanout unit 160 is coupled to an apparatus from which a fluid (i.e. water) flows. As an example, condensate may drain out of an air conditioning unit in the form of water. Such water enters drain cleaning unit 160 at entry section 162. As shown, the water flows into entry section 162 and then flows downward into exit section 164. Exit section 164 is coupled to P-trap 105 by way of entry coupler 130. The water flows into the P-trap 105 and then out of the P-trap and into a main drain. P-trap 105 is coupled to the main drain (not shown) by way of exit coupler 120.

[0003] The water flowing into P-trap 105 is typically not clean water. Bacteria, virus, and other materials are found in the water flowing through P-trap 105. Over time, the various materials included in the water adhere to the walls of P-trap 105. Thus, bacteria adhering to the walls of P-trap 105 is able to thrive in a location which is particularly desirable for the growth of bacteria. The interior of P-trap 105 is dark, moist, and enclosed (which thus makes it difficult to clean). Therefore, over time a clog will form. Such a clog 110 is shown in FIG. 5. As clog 110 becomes more and more substantial (e.g. as the bacteria in P-trap 105 continues to grow and grow), the ability for water to drain from a drain outlet and through drain cleanout unit 160 becomes more and more impaired. This may cause an undesirable accumulation of bacteria laden water in P-trap 105, and possibly in drain cleanout unit 160, as well. In such a circumstance, it is desirable to remove clog 110.

[0004] For purposes of removing clog 110, and as also illustrated in FIG. 6, drain cleanout unit 160 is included with various cleanouts. Thus, on an end of cleanout section 166, cleanout cap 145 is included. Cleanout cap 145 may be a threaded member which screws onto a corresponding threaded area of cleanout section 166. Cleanout cap 145 includes cleanout opening 150. Cleanout opening 150 is normally sealed by cleanout plug 140.

[0005] Typically, in order to remove clog 110, cleanout plug 140 is removed and a source of pressurized gas (not shown) is coupled to cleanout opening 150. By blowing pressurized gas into cleanout section 166, the pressurized gas flows into P-trap 105 with the intention of pushing clog 110 into the main drain (not shown). Unfortunately, the pressurized gas also blows into entry section 162, into the drain outlet (not shown), and into the apparatus (i.e. the air conditioning unit) from which the fluid drains. Thus the use of pressurized gas will push bacteria laden water accumulating in P-trap 105 (and cleanout unit 160) into the air conditioning unit. In some cases, the pressurized gas may be enough that the bacteria laden water comes out of such an air conditioning unit and into the room that the air conditioning unit is cooling. If the air conditioning unit is above the ceiling, then the bacteria laden water will drip onto the ceiling. This can readily lead to the growth of mold in the ceiling. As will be well appreciated, this is a very unhealthy situation.

[0006] FIG. 7 illustrates a configuration where a plurality of heat pumps 700 drain water. The water from each heat pump 700 drains into each respective P-trap 105. From P-trap 105, the water drains into transverse drain section 730, and then into descending drain section 750. Traverse drain section 730 is, for example, above ceiling tile 720. As was discussed previously with regards to FIG. 5 and FIG. 6, it is very possible that clog 740 will form. To clear the clog, cleanout 710 is removed and pressurized gas is blown into traverse drain section 730. While this may have the effect of pushing clog 740 out of the drain, this again may also have the effect of causing bacteria or mold laden water to be blown into any heat pump 700. Again, from there, the unhealthy water may be blown into living or working quarters.

SUMMARY OF THE INVENTION

[0007] A drain apparatus includes a first pipe end for being coupled to a source of fluid, a second pipe end for being coupled to a drain, a cleanout for receiving pressure, and a valve system. In a first mode of the valve system, a first path between the first pipe end and the second pipe end is open. In a second mode, a second path between the cleanout and the second pipe end is open while the first path is blocked.

BRIEF DESCRIPTION OF THE DRAWING

[0008] FIG. 1 is a side view and partial perspective view of a drain apparatus and a clogged drain in accordance with an exemplary embodiment of the present invention. Some internal features of the drain apparatus are shown. In FIG. 1, a ball valve is oriented to permit draining of a liquid.

[0009] FIG. 2 is a side view and partial perspective view of a drain apparatus and a clogged drain in accordance with the exemplary embodiment of the present invention. In FIG. 2, the ball valve is oriented to permit clean out of a clogged drain.

[0010] FIG. 3 is a perspective view of a ball valve in accordance with an exemplary embodiment of the present invention.

[0011] FIG. 4a is a top view of a drain apparatus in accordance with an exemplary embodiment of the present invention.

[0012] FIG. 4b is a sectional view of the drain apparatus shown in FIG. 4a taken along section line 4b-4b.

[0013] FIG. 5 is a side view of a drain apparatus and a clogged drain in accordance with the prior art.

[0014] FIG. 6 is a side view of a drain apparatus and a clogged drain in accordance with the prior art. In this drawing, cleanout procedures are illustrated.

[0015] FIG. 7 is a side view of multiple heat pumps which are connected to a drain system in accordance with the prior art.

DETAILED DESCRIPTION OF THE INVENTION

[0016] An exemplary embodiment of the present invention is shown with reference to FIG. 1. In FIG. 1, a source (not shown) of drain fluid has a drain outlet which is connected to the open end of entry section 162 of drain cleanout unit 160. The fluid (i.e. water), flows into entry section 162 and down exit section 164. Exit section 164 is coupled to P-trap 105 by way of entry coupler 130. The fluid
flows through P-trap 105 and into a main drain (not shown). P-trap 105 is coupled to the main drain by way of exit coupler 120.

As previously discussed with regards to the prior art, the fluid flowing through P-trap 105 is often contaminated with various substances (e.g., bacteria, mold, sludge, etc.). Thus, over time, clog 110 forms. Again, P-trap 105 is a very desirable place for the formation of clog 110 because of the darkness, moisture, and lack of accessibility for cleaning purposes. Thus, as clog 110 becomes more and more pronounced, the ability of fluid to drain through P-trap 105 becomes more and more impaired.

Drain cleanout unit 160 includes cleanout section 166. Situated within cleanout section 166 is ball valve 300. A perspective view of ball valve 300 is shown in FIG. 3. Ball valve 300 includes channels 306, 308 and 310 which all intersect at a location interior to ball 300. In an exemplary embodiment of the present invention, entry shaft 306 and cleanout shaft 308 are situated at 90 degrees relative to each other. Furthermore, exit shaft 310 is situated at 90 degrees relative to both entry shaft 306 and cleanout shaft 308. Thus, if it is assumed that the opening of cleanout shaft 308 is situated at the front of ball valve 300 and the opening of entry shaft 306 is situated on the left side of ball valve 300, then the opening of exit shaft 310 is situated at the bottom of ball valve 300.

Ball valve 300 includes handle 302 which is used for rotating ball valve 300 into various positions. Handle 302 is coupled to the top (as illustrated) location of ball valve 300 by way of shaft 304.

Referring again to FIG. 1, during normal draining operation, ball valve 300 is situated in a first position (or first mode). In this first position, the opening of entry shaft 306 faces towards entry section 162. Furthermore, the opening of exit shaft 310 faces towards exit section 164. Finally, the opening of cleanout shaft 308 faces towards an interior wall of cleanout section 166. Thus, as fluid is draining out of the drain outlet (not shown), the fluid flows through entry section 162, through entry shaft 306, through exit shaft 310, through exit section 164 and into P-trap 105. As previously discussed, over time, clog 110 forms.

FIG. 2 illustrates how clog 110 in P-trap 105 is removed. As shown in FIG. 2, ball valve 300 has been rotated, for example, 90 degrees. In the illustration shown for illustrative purposes only, ball valve 300 has been rotated 90 degrees counterclockwise (when looked at from above). Thus, in the second orientation (or second mode) shown in FIG. 2, the opening of cleanout shaft 308 is now facing cleanout opening 160. Now, as well, the opening of entry shaft 306 is facing an interior wall of cleanout section 166. As before, the opening of exit shaft 310 is facing exit section 164.

In order to remove clog 110, a source of pressurized gas (i.e. pressurized nitrogen) is used. Cleanout plug 140 is removed from cleanout cap 145, thus exposing the interior of cleanout section 166 via cleanout opening 150. A hose from the source of pressurized gas is inserted into cleanout opening 150 and the pressurized gas is applied. Because ball valve 300 is in the second orientation, the pressurized gas will flow through cleanout section 166, through cleanout shaft 308, through exit shaft 310, through exit section 164, and into P-trap 105. Thus, the pressurized gas exerts pressure against clog 110 in order to push clog 110 into the main drain (not shown). What is important to note in FIG. 2 is that the opening of entry shaft 306 no longer permits gas to flow into entry section 162. Thus, bacteria laden water and pressurized gas are prevented from being pushed towards the source of the draining fluid (i.e. the air conditioner, heat pump) etc.

After clog 110 has been pushed into the main drain (not shown), the pressurized gas is removed, cleanout plug 140 is inserted into cleanout opening 150, and ball valve 300 is rotated back into the first orientation. In this manner, draining fluid again flows from entry section 162 into P-trap 105.

A top view of drain cleanout unit 160 is shown with reference to FIG. 4a. In FIG. 4a, ball valve 300 is in the first orientation so that draining fluid flows from entry section 162 into P-trap 105.

FIG. 4b is a cross sectional view of drain cleanout unit 160 taken along section line 4b-4b. As shown in FIG. 4b, gaskets 201, 202, 203 and 204 are included. Gasket 201 is situated about shaft 304. Furthermore, gasket 201 is situated between ball valve 300 and cleanout section 166. Gasket 201 prevents liquid flowing within drain cleanout unit 160 from escaping through the opening by which shaft 304 is coupled to ball valve 300.

Gasket 202 is located substantially below ball valve 300 and between ball valve 300 and cleanout section 166. Thus, ball valve 300 rests on gasket 202 and rotates coincidentally with the circular shape of gasket 202. Gasket 204 is situated between ball valve 300 and an inner side wall of cleanout section 166. In FIG. 1, the opening of cleanout shaft 308 is facing gasket 204. In FIG. 2, the opening of entry shaft 306 is facing gasket 204. Gasket 204 may be, for example, a solid piece of rubber that is affixed to the inner wall of cleanout section 166. Thus, in FIG. 1, gasket 204 prevents draining fluid from leaking out through cleanout shaft 308. Furthermore, in FIG. 2, gasket 204 prevents compressed air from leaking out of entry shaft 306.

Gasket 203 is also included. Gasket 203 is desirably placed opposite to gasket 204. Gasket 203 helps maintain the position of ball valve 300 within cleanout section 166.

In FIGS. 1 and 2, cleanout section 166 has a wider diameter than entry section 162. The respective diameters of the two sections are merely exemplary. Each section can have other diameters. Also, as is shown in FIG. 1 and FIG. 2, a portion of cleanout section 166 is rounded to coincide with the shape of ball valve 300. Again, this shape is merely exemplary.

Furthermore, in FIG. 3, entry shaft 306 and cleanout shaft 308 are shown with different diameters. These different diameters are merely exemplary.

The drawings have been shown with components having other various relationships relative to each other. It is understood that the drawings are not drawn to scale, and the relative dimensions of various parts that appear in the drawings are merely exemplary.

By thus rotating ball valve 300 while pressurized gas is blown into drain cleanout unit 160, the pressurized gas is isolated from the source of the drain fluid (e.g. air conditioner, heat pump, etc.). Thus, simply turning handle 302 blocks the path towards the apparatus which is producing the drain fluid. In this manner, gas or fluid is prevented from being pushed into the apparatus. The propelling of dirty water into the unit, or, in some circumstances, the leaking of such dirty water into living space is prevented.

Although the invention is illustrated and described herein with reference to specific embodiments, the invention
is not intended to be limited to the details shown. Rather, various modifications may be made in the details within the scope and range of equivalents of the claims and without departing from the invention.

1. A drain apparatus, comprising:
   an entry section for being coupled to a source of fluid
   an exit section for being coupled to a drain
   a cleanout section for receiving pressure
   a valve system having:
   a) a first mode, in which a first path between said entry section and said exit section is open; and
   b) a second mode, in which a second path between said cleanout section and said exit section is open and said first path is blocked.

2. A drain apparatus according to claim 1, said valve system having a valve which includes three channels that intersect in said valve, wherein
   in said first mode, said first path extends along a first channel and a second channel of said three channels and an opening of a third channel of said three channels is blocked, and
   in said second mode, said second path extends along said second channel and said third channel and an opening of said first channel is blocked.

3. A drain apparatus according to claim 2, further including a pivot member for turning said valve between said first mode and said second mode.

4. A drain apparatus according to claim 1, wherein said source of fluid is a condensate water drain outlet.

5. A method of cleaning a drain, said method comprising the steps of:
   a) adjusting a valve system so that a first path between a source of fluid and a drain is blocked and a second path between a clean out and a drain is open.
   b) applying pressure at said clean out while the second path is open.
   c) adjusting said valve system after said pressure has been applied so that said first path is open.

6. A method of cleaning a drain according to claim 5 wherein steps a) and c) include the steps of moving a valve having three channels that intersect therein so that in a first mode said first path extends along a first channel and a second channel of said three channels and an opening of a third channel of said three channels is blocked; and in a second mode, said second path extends along said second channel and said third channel and an opening of said first channel is blocked.

7. A method of cleaning a drain according to claim 6, wherein steps a) and c) each include the step of rotating a pivot member to rotate said valve between said first mode and said second mode.

8. A method of cleaning a drain according to claim 5, wherein said source of fluid is a condensate water drain outlet.

9. A drain apparatus, comprising:
   a first pipe end;
   a second pipe end;
   a clean out end;
   a ball valve situated between said first end and said second end;
   said ball valve including three channels that intersect therein;
   said ball valve rotated in a first orientation to establish a first path between said first end and said second end;
   said ball valve rotated in a second orientation to establish a second path between said clean out end and said first end so that said first path is blocked.

10. A drain apparatus according to claim 9, wherein, in said first orientation, said first path extends along a first channel and a second channel of said three channels and an opening of a third channel of said three channels is blocked, and
    in said second orientation, said second path extends along said second channel and said third channel and an opening of said first channel is blocked.

11. A method of cleaning a drain, said method comprising the steps of:
   a) rotating a ball valve into an orientation to establish a path between a clean out and one end of a pipe system while blocking a further path between said clean out and another end of said pipe system.
   b) applying pressure along said path.
   c) after applying the pressure, rotating said ball valve into a further orientation to establish said further path.

12. A method of cleaning a drain according to claim 11 wherein, prior to step a), condensate water flows from said another end of said pipe system to said one end of said pipe system.

13. A ball valve, comprising:
   a ball member;
   a pivot member for rotating said ball member about an axis,
   said ball member including three channels extending from an outside surface of said ball member to an intersection within said ball member.

14. A drain apparatus according to claim 1, wherein said entry section and said exit section substantially form a right angle.

15. A drain apparatus according to claim 1, wherein said cleanout section and said exit section substantially form a right angle.

16. A drain apparatus according to claim 14, wherein said cleanout section and said exit section substantially form a right angle.

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