DRAIN PIPE FLUSHING DEVICE

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ABSTRACT

A drain pipe flushing device including an expansible chamber, a hose coupler attached to the inlet end of the chamber, and a valve at the outlet end of the chamber. Water supplied under pressure through the hose coupler causes the valve to close, then causes the chamber to expand into a sealing engagement with the pipe wall, and the valve then reopens in order to apply water under pressure to the clogged portion of the drain on the outlet side of the expansible chamber.

9 Claims, 4 Drawing Figures
DRAIN PIPE FLUSHING DEVICE

BACKGROUND OF THE INVENTION

Included among the prior art devices for flushing a drain pipe is the hose attachment disclosed in my U.S. Pat. No. 3,595,255 issued July 27, 1971. Based upon my experience with the previous device, and after exploring numerous avenues to the problem, I have now discovered that it is possible to provide a comparable type of device which has an improved performance and yet a lower production cost.

DRAWING SUMMARY

FIG. 1 is a perspective view of the device of the present invention;
FIG. 2 is a cross-sectional view of the output end of the device in position in a drain pipe;
FIG. 3 is a longitudinal cross-sectional view of the device, taken on the line 3–3 of FIG. 2; and
FIG. 4 is a view like FIG. 3 showing a different operating position of the device.

PREFERRED EMBODIMENT

Reference is now made to the drawing and particularly to FIG. 1 which is a perspective view of the drain pipe flushing device D. FIG. 3 shows the device D in operative position inside a horizontal drain pipe P, and having a water hose H (dotted lines) coupled to it. In FIG. 4 a different operative position of device D is shown, and a vertical drain pipe P2 is also shown in dotted lines.

The device D of the present invention includes three principal component parts: a hose coupler 20, a valve member 25, and an extensible member 30.

The hose coupler 20, as best seen in FIG. 3, includes a generally cylindrical inner piece 21 made of rigid metal, a female connection member 22, which is rotatably attached to the outer end of the piece 21, and a retaining ring 23. The purpose of hose coupler 20 is to couple the hose H to the open end of extensible member 30 for supplying water under pressure thereto.

The valve member 25 is in the form of a ball or sphere, made of a rigid and non-distortable material, and preferably glass since this is less expensive than metal. The function of valve member 25 is to control, in conjunction with and in response to the turning on or turning off of the water supply, the various valve actions accomplished by the extensible member 30.

Since the size and shape of the extensible member 30 are a function of the applied water pressure, it should be pointed out that FIG. 3 shows the device when no water pressure is being applied while FIG. 4 shows the device in a state in which the extensible member 30 is filled with water under pressure.

The extensible member 30 in its central portion provides an elongated cylindrical chamber 35 having a peripheral wall 36. Member 30 has an open extension end 40 to which the hose coupler 20 is attached. Specifically, the open end 40 of member 30 extends over the outer surface of the inner piece 21 of the hose coupler, and is clamped securely in place by the retaining ring 23 of the hose coupler.

Member 30 also has a closed extension end 50. An output passageway 52 is formed in the inner end of the extension end 50 and communicates with chamber 35. At the juncture of chamber 35 and output passageway 52 there is a sloping internal circumferential shoulder which forms a valve seat. Within the outer end portion of the closed extension 50 there is a web structure 56, which will be explained subsequently. The closed extension end 50 provides a number of outlet ports for the pressurized water, as will later be described.

The ball valve member 25 normally sits rather tightly within the circumferential wall 36 of chamber 35, as best seen in FIG. 3. When the hose is connected and the water is turned on, the water pressure drives the ball toward the other end of chamber 35 until it seats upon the valve seat 45. This position of the ball is shown in FIG. 4 by the dotted lines 25'. Output passageway 52 is then closed, and of course the various outlet ports associated with the output passageway are also closed. The result is that chamber 35 expands to the position shown by dotted lines 35' in FIG. 3, in which it grips the inner wall surface 11 of drain pipe P. The cylinder 35 makes a sealing engagement with the drain pipe, and consequently any water discharged through the outlet ports will be effectively directed toward clogged material 12 in the drain pipe P and will not flow back toward the open end of the pipe (through which the hose has been inserted).

The next step of the operation, although not fully shown in the drawing, is as follows. When further expansion of chamber 35 is prevented by the drain pipe P the continued application of water pressure causes the material of extensible member 30 to expand in the area of the valve seat 45, distorting the valve seat until it falls away from the valve member 25. Pressurized water then flows around the valve member 25, through and out passage 52, and through the associated outlet ports and into the drain pipe P where it engages clogged material 12.

The web structure 56 will not be described. Four identical outlet ports 57 are formed in the web structure (see FIG. 2). Each of the outlet ports 57 has a cross section corresponding to a quarter-circle which has been narrowed on its radius sides. The remaining solid material of the web structure 56, therefore, has the cross-sectional configuration of a cross. It will be seen that all of the ports 57 extend in a direction parallel to the longitudinal axis of the chamber 35.

After the initial closing of the end of the valve has taken place, as previously described, and chamber 35 can expand no more, the valve seat 45 distorts outward as previously mentioned. The valve seat does not distort earlier because its supporting wall 46 is significantly thicker than the outer wall 36 of chamber 35. At the same time the outer end portion of the closed extension end 50 expands only a very little, because the web structure 56 having the cross-sectional configuration of a cross ties the opposite side walls of the extension end 50 together, thereby substantially inhibiting any radial expansion. As the valve seat 45 continues to open, valve member 25 moves on until it strikes the inner end of web structure 56, when it can move no further. Water is then continuously supplied at high pressure through the outlet ports 57.

There is a third valving operation which occurs after the flushing of the drain pipe has been completed. When the faucet has been turned off and the hose perhaps disconnected from the faucet, there may, in some situations, be a tendency for device D to siphon dirty liquid material out of the drain pipe P and into the hose H. The present device, however, prevents such siphoning action. Valve member 25 is driven back to a posi-
tion at the other end of cylinder 35, as shown in FIG. 3. It will be noted that in the hose coupler 20 the extreme inner end of the inner piece 21 is turned upward or outward at 21a. The circumferential flange 21a cooperates with retaining ring 23 to firmly secure the open end 40 of extensible member 30 upon the inner piece 21 of the hose coupler. This is a secure fastening arrangement which resists the water pressure that builds up inside chamber 35. Furthermore, circumferential flange 21a provides an alternate valve seat for the ball 25. Thus, flange 21a and ball 25 together provide an anti-siphon valve.

FIG. 4 illustrates another type of operation which occurs when a horizontal drain pipe P intersects with a vertical pipe P2. The outer end portion of extension 50 including the web structure 56 constitutes a feeder for the device D. When the feeder engages the outer wall 13 of vertical pipe P2 it is not possible to insert hose H any further in the horizontal pipe P. The outlet ports 57 are at least partially closed off by the wall 13, or their effectiveness is reduced. However, the extension end 50 also includes a pair of outlet ports 58 provided in one side of the passageway 52. The ports 58 are perpendicular to the longitudinal axis of chamber 35 and hence are aligned with the longitudinal axis of the vertical pipe P2. The action is the same as described previously except that after valve seat 45 is distorted away from its normal position to permit water to flow past the valve member 25, the main thrust of the water is then downward through the ports 58 in the direction shown by arrow 60. A dotted line 61 in FIG. 4 shows how the upper wall of the extensible member 30 will be bulged upward, to partially occupy the upwardly extending portion of pipe P2, but a similar deformation does not occur on the lower wall because the water is being exhausted there through the ports 58.

An economic advantage of the present invention is that the extensible member 30 may be integrally formed from a single piece of rubber material. The normal (unstressed) configuration of member 30 is such that it can conveniently be formed in a single molding operation.

As will be understood by those skilled in the art, what has been described are preferred embodiments in which modifications and changes may be made without departing from the spirit and scope of the accompanying claims.

1. A drain pipe flushing device usable in conjunction with a water hose for applying water under pressure to the point where a drain is clogged, comprising:
   means providing an expansible chamber having inlet and outlet ends and being insertable into the drain pipe;
   a valve at said chamber outlet end including a distortable valve seat defining an output passageway and a non-distortable valve member adapted to engage said valve seat for closing said passageway; and means for coupling a water hose to said chamber inlet end so as to supply pressurized water thereto in order to close said valve and expand said chamber-providing means into sealing engagement with the drain pipe wall;
   said valve seat being then responsive to the static water pressure to deform and permit the pressurized water to flow around said valve member and out said passageway.

2. The device of claim 1 wherein said valve member is also cooperable with said hose coupling means to provide an anti-siphon valve.

3. The device of claim 1 which further includes a feeder attached to the outlet end of said chamber and having at least one outlet port communicating with said passageway.

4. The device of claim 3 which includes at least one outlet port extending parallel to the longitudinal axis of said chamber, and at least one additional outlet port extending perpendicular to said axis.

5. The device of claim 3 wherein said chamber, valve seat, and feeder are provided by a single member which is integrally formed of a rubber material.

6. A device insertable into one end of a clogged drain pipe to aid in the flushing thereof, comprising:
   an elongated generally tubular member made of stretchable material and forming an elongated cylindrical chamber in its central portion, said member also having an open extension at one end of said chamber and a closed extension at the other end of said chamber;
   a rigid ball disposed within said chamber in a normally tight engagement with the chamber wall;
   a hose coupler attached to said open extension end of said tubular member and having a passageway therethrough which is too small to permit the escape of said ball;
   said member having a circumferential valve seat formed therein at the juncture of said chamber with said closed extension whereby the flow of pressurized water through said hose coupler will force said ball along said chamber into engagement with said valve seat, the central portion of said tubular member then expanding so as to frictionally grip the inner wall surface of the drain pipe;
   said closed extension end of said tubular member having at least one port therein for the escape of water into the drain pipe; and
   the portion of said tubular member forming said valve seat being also extensible in response to applied water pressure, after said central portion thereof has expanded and gripped the drain pipe, for permitting pressurized water to flow around said ball and escape through said port.

7. The device of claim 6 wherein said tubular member is integrally formed from a rubber material.

8. The device of claim 6 wherein said closed extension end of said tubular member is provided with a thicker wall than said central portion thereof, making it less stretchable than said central portion, and in which the outer portion of said closed extension end also contains a web structure within which a plurality of escape ports are formed, said web structure serving to make said outer portion of said closed extension end relatively less stretchable than the inner portion of said closed extension end adjacent said valve seat.

9. The device of claim 6 wherein the inner end of said hose coupler forms an alternate valve seat for said ball, whereby when the water pressure is turned off said ball and said alternate valve seat together provide an anti-siphon valve action.