

[54] WATER PRESSURE DRAIN CLEANING DEVICE

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[22] Filed: **Apr. 21, 1972**

[21] Appl. No.: **246,275**

[52] U.S. Cl. .... **134/167 C, 4/256**

[51] Int. Cl. .... **B08b 9/02**

[58] Field of Search.... **134/22 C, 24, 166 C, 167 C, 134/168 C, 169 C; 4/256, 255**

[56] **References Cited**

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[57] **ABSTRACT**

A unitary, tubular, resilient material body is generally cylindrical forwardly to a generally conical, forward nose portion with the nose portion having a restricted central opening therethrough surrounded by a thickened wall part. Thus, with a rearward portion of the body secured by a hose coupling to a water pressure hose and the assembly inserted into a drain pipe, the thickened wall part at the restricted opening of the body nose portion controls expansion of the body against the interior of the drain pipe sealing off water backflow and ejecting a stream of water to break up drain pipe blockage and debris and cause the same to flow down the drain pipe. Also, a further thickened body wall section immediately forwardly of the hose coupling and body material engagement rearwardly of an outer sleeve of the hose coupling may be included to prevent disengagement of the body during the water pressure expansion thereof.

**6 Claims, 3 Drawing Figures**

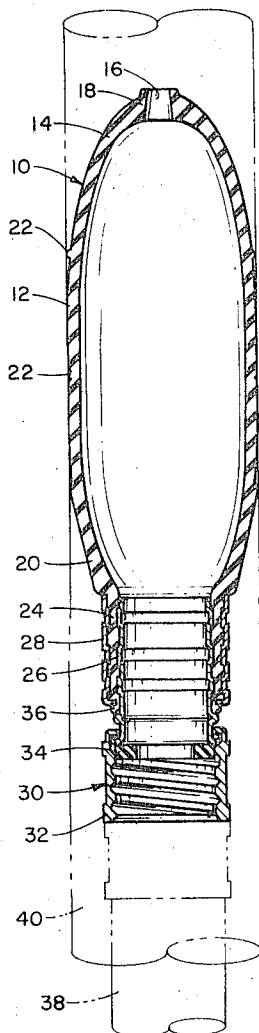


Fig. 1.

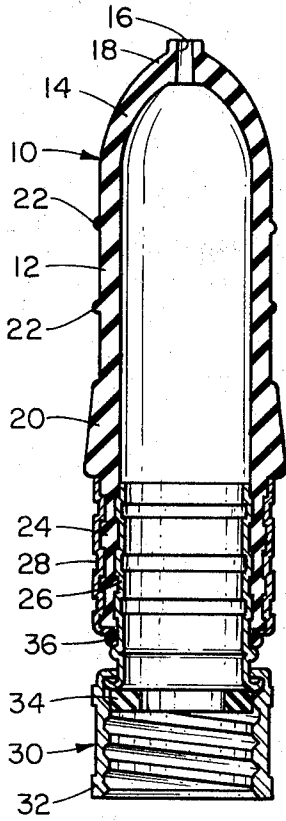


Fig. 2.

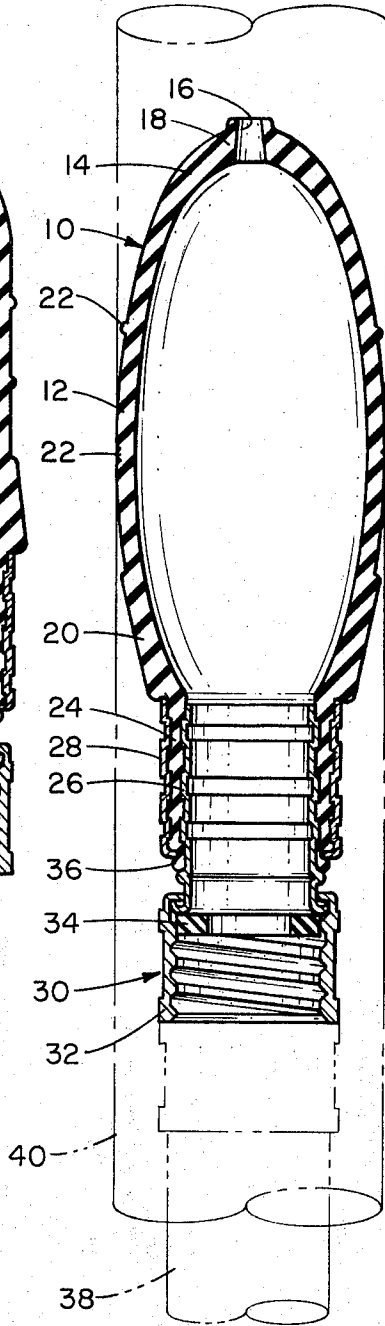
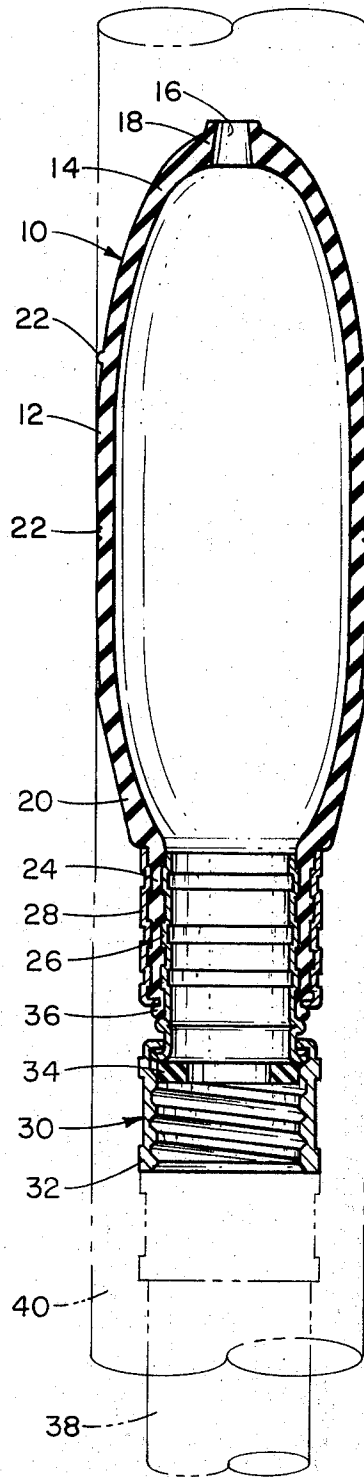


Fig. 3.



## WATER PRESSURE DRAIN CLEANING DEVICE

## BACKGROUND OF THE INVENTION

This invention relates to a water pressure drain cleaning device and more particularly, to such a device of the type including a unitary, resilient material body wherein water pressure is forced through a restricted opening at a forward nose portion thereof causing a pressure buildup internally of the body to expand the body and cause gripping thereof against an inner surface of a drain pipe to thereby prevent backflow of water around the body while a jet of pressurized water is ejected from the forward nose portion opening to break up blockage and debris within the drain pipe and cause the same to flow downwardly therethrough. More particularly, according to the principles of the present invention, the device includes a molded, unitary body of resilient material wherein expansion of the body caused by internal water pressure maintains the body tightly gripping the interior of the drain pipe and such expansion is totally controlled merely by a thickened part of the body forward nose portion immediately surrounding the nose portion opening, thereby eliminating the need for complicated and expensive valve constructions and attachments as has heretofore been required by the prior similar devices, yet perfect expansion control of the resilient body is provided adapting the device for use with a relatively wide range of drain pipe sizes.

Various prior constructions of water pressure drain cleaning devices have heretofore been provided, none of which have been completely satisfactory for various reasons. For instance, certain of the earlier forms of such water pressure drain cleaning devices included a bulbous form of body which extended inwardly at a forward portion thereof to a restricted forward opening, the entire body being formed of resilient material and uniform wall thickness throughout. With these prior bulbous forms, a slight degree of body expansion was obtained as a result of the restricted water flow through the forward restricted opening, but with this limited expansion, the devices were only usable with virtually a single drain pipe size to which the devices were specifically adapted and even then, the water pressure capabilities were extremely limited due to the lack of proper expansive gripping causing water backflow and pressure loss.

In an effort to improve the foregoing early forms of water pressure drain cleaning devices, it seemed obvious that it was necessary to more perfectly control the expansion of the resilient material bodies so that not only would a better pressure grip be obtained by the expanding body against the drain pipe interior to prevent water backflow under higher pressure conditions, but also to make the devices adaptable over a range of drain pipe sizes. These efforts at improvement resulted in various, relatively complex valves and other forms of attachment being installed within the resilient material bodies for more perfectly restricting the water pressure flow therethrough and cause an increased expansive force. In order to accommodate such internal valving control, the resilient bodies were provided with forward extremity rigid attachments having constant forward openings therein around or with which the internal valves could operate.

Still another later form has included a rigid forward attachment to the resilient material body to which is internally secured a rigid disc spaced rearwardly and within resilient portions of the body. In this case, internal water pressure causes the body to expand outwardly of the rigid disc and permit water flow through this annular opening forward from the device. At the same time, due to the water flow being restricted by the rigid disc, the resilient walls of the body expand outwardly and tightly internally grip the drain pipe.

Many of these latter forms of water pressure drain cleaning devices have operated relatively satisfactorily and have in certain cases, solved the problems of the earlier devices by providing much more accurate expansive control so that not only may higher water pressure be used, but the devices may be used with a reasonable range of drain pipe sizes. The principle difficulty, however, has been the fact that with the necessity of additional rigid attachments at the rigid body forward portions and the internal valve and disc attachments, both the material and assembly costs of the devices has increased to a restrictive level. Thus, there has been a long-felt want and need for a satisfactory water pressure drain cleaning device which is of simplified nature so as to be inexpensively produced and marketed, yet which solves the problems of the prior devices and permits a relatively high pressure of water to be used for maximum drain cleaning function with the devices still being properly functional over a relatively wide range of drain pipe sizes.

## OBJECTS AND SUMMARY OF THE INVENTION

It is, therefore, an object of this invention to provide a water pressure drain cleaning device of the foregoing general type which is formed with a unitary, resilient material body having a forward restricted opening therein, yet merely with a relatively simple wall thickening at an exact predicated location, expansion of the resilient material body can be perfectly controlled so as to make the device usable with high water pressures for tight internal drain pipe gripping over a wide range of drain pipe sizes. According to a preferred embodiment of the present invention, a tubular, resilient material body terminates forwardly in an inwardly extending nose portion with the nose portion having a restricted opening generally centrally thereof. Most important, the body nose portion is formed with a thickened wall part immediately surrounding the nose portion opening and this thickened wall part perfectly controls the water flow therethrough to in turn perfectly control the expansion of the main portion of the resilient material body and provide the high water pressure and tight drain pipe gripping features.

It is a further object of this invention to provide a water pressure drain cleaning device of the foregoing general type and satisfying the foregoing object wherein additional thickening and/or hose coupling engagement at the rearward portion of the resilient body results in a secure clamping of the resilient body in the attachment thereof to the water pressure hose so that despite the repeated expansion of the resilient material body against the interior of a varying size of drain pipes, the resilient body remains in such securely clamped condition over a long period of repeated uses. According to the preferred form of the present invention, the resilient body has a thickened rearward portion immediately forward of the clamping thereof be-

tween internal and external rigid sleeves of the hose coupling and this rearward thickened body portion controls the expansion of the body immediately forward of the hose coupling reducing the expansion incurred forces which would otherwise tend to loosen the resilient body from the hose coupling. In addition, a rearward terminal part of the resilient body may extend over the internal sleeve of the hose coupling and rearward of the external sleeve thereof so as to expand outwardly rearwardly of the external hose coupling sleeve and increase the retainment forces of the resilient body with the hose coupling sleeve.

It is still a further object of this invention to provide a water pressure drain cleaning device satisfying both of the foregoing objects, yet which is of maximum simplicity in construction and having a maximum of simplicity of assembly procedures so that the device may be manufactured and sold at a minimum of consumer cost. As hereinbefore pointed out, the resilient material body is a unitary body and may be molded using conventional high speed molding procedures. The hose coupling thereof may be virtually of standard form with the assembly operations being very near to those of standard form.

#### BRIEF DESCRIPTION OF THE DRAWING:

FIG. 1 is a vertical sectional view illustrating a preferred embodiment of the water pressure drain cleaning device of the present invention, the device being shown in normal, freestanding shape prior to any water pressure being applied thereto;

FIG. 2 is a view similar to FIG. 1 with the device of FIG. 1 connected to a water pressure hose (shown in phantom lines), the assembly inserted into a typical drain pipe (shown in phantom lines) and internal water pressure being applied to the device beginning expansion thereof against the interior of the drain pipe; and

FIG. 3 is a view similar to FIG. 2, but with the device more fully expanded against the drain pipe interior and in a proper drain cleaning configuration.

#### DESCRIPTION OF THE BEST EMBODIMENT CONTEMPLATED

Referring to the drawing, a preferred embodiment of the water pressure drain cleaning device of the present invention is illustrated therein and includes a unitary, resilient material, tubular body generally indicated at 10 having side walls 12 generally cylindrical over a major portion thereof forwardly to a forward, generally conical nose portion 14. The nose portion 14 has a restricted opening 16 formed generally axially and centrally therethrough, the major internal diameter of the body 10 within the side walls 12 being in a proportion in the order of between 8 and 10 to 1 relative to the average diameter of the nose portion opening 16. Furthermore, a thickened wall part 18 is formed in the body nose portion 14 immediately surrounding the nose portion opening 16, preferably by forward beading around the nose portion opening.

The body side walls 12 are preferably of generally uniform thickness throughout a major portion thereof, that is, from forwardly of a rearward thickened portion 20 thereof forwardly through the body nose portion 14 to the thickened wall part 18 of the nose portion, the only slight variation thereof being a pair of axially spaced, circumferential rings 22 projecting slightly out-

wardly for a purpose to be hereinafter described. Immediately rearwardly of the body rearward thickened portion 20, a rearward portion 24 of the body is compressed between a rigid internal sleeve 26 and a rigid external sleeve 28 of a somewhat conventional hose coupling generally indicated at 30, the hose coupling otherwise conventionally including an internally threaded collar 32 rotatably connected in usual manner to the internal sleeve 26 and a conventional internal washer 34. It should be noted, however, in the preferred form, the body 10 not only includes the side wall rearward thickened portion 20 previously mentioned and for a purpose to be hereinafter described, but a reduced rearward terminal portion 36 which protrudes rearwardly over the hose coupling internal sleeve 26 and rearward radially outwardly of the hose coupling external sleeve 28 forming a hooked engagement with the hose coupling 30,

The preferred embodiment of the water pressure drain cleaning device of the present invention is shown in freestanding condition in FIG. 1 and in this freestanding condition, as an example, the body 10 may have a uniform wall thickness forwardly of the side wall rearward thickened portion 20 of approximately fifteen to sixteen one-hundredths of an inch, a major internal diameter of eighty to ninety one-hundredths of an inch and the nose portion opening 16 of the body may have an average diameter of approximately nine to ten one-hundredths of an inch. The body 10 forwardly of the hose coupling 30 is approximately 2½ inches in axial length and the body is preferably molded from virgin gum rubber or equivalent rubber or plastic material preferably having an elongation of approximately 900 percent. Finally, the thickened wall portion 18 surrounding the body nose portion opening 16 is preferably approximately twenty-five one-hundredths of an inch in axial dimensions, but this, of course, can be increased or decreased to control the water pressure expansion of the side walls 12 as desired.

In operation, the water pressure drain cleaning device of the present invention in the free-standing condition shown in FIG. 1 is threadably secured to a water pressure hose 38, shown in phantom lines in FIG. 2, and the assembly inserted into a typical drain pipe 40, also shown in phantom lines in FIG. 2. Upon a flow of water under pressure being admitted into the device, the body 10 begins to radially expand since the water flow forwardly of the body 10 is restricted by the restricted opening 16 of the body nose portion 14 and the expansion of the body nose portion about this opening is controlled by the thickened wall part 18. Thus, the expansion of the size of the nose portion opening 16 of the body 10 is restricted and the body side wall 12 forced to expand radially outwardly beginning to internally engage and grip the interior of the drain pipe 40 in the manner shown in FIG. 2.

Through this same restriction of the body nose portion 14 and the thickened wall part 18 thereof, the body 10 also begins to expand axially, as shown in FIG. 2, which axial expansion is somewhat evened out and distributed uniformly over the body side walls 12 by engagement of one or more of the body circumferential rings 22 against the drain pipe interior. Also, the outward radial expansion of the body side walls 12 is reduced immediately forwardly of the hose coupling internal and external sleeves 26 and 28 by the side wall rearward thickened portion 20 to reduce the strain on

the engagement of the body rearward portion 24 by the hose coupling sleeves. The rearward terminal portion 36 of the body rearward portion 24 which is hooked rearwardly of the hose coupling external sleeve 28 likewise aids in strength of engagement and resists the axial expansive forces of the body 10 which would otherwise tend to disengage the body from the hose coupling sleeves.

Finally, as the internal water pressure and flow is continued, the body side walls 12 over a portion thereof ultimately flatten out against the interior of the drain pipe 40 as shown in FIG. 3, and the body nose portion 14 around the opening 16 expands slightly further while remaining fully controlled by the thickened wall part 18. A high pressure stream of water is thereby emitted from the body nose portion opening 16 to accomplish the blockage breakup and debris breakup within the drain pipe 40 for cleaning the same. When the cleaning has been completed, it is then merely necessary to cut off the flow of high pressure water from the water pressure hose 38 and the body 10 will then contract back to its free standing condition as shown in FIG. 1 and the entire assembly can be removed from the drain pipe 40.

I claim:

1. In a water pressure drain cleaning device of the type for attachment to a water pressure hose and insertion into a drain pipe; the combination of: a unitary, resilient material, tubular body of generally circular cross section throughout terminating forwardly in an inwardly extending nose portion, said body nose portion having a generally axial opening formed generally centrally therethrough, said body in unexpanded condition having a generally uniform internal diameter throughout forwardly to said nose portion with said nose portion being generally conical, said body internal diameter in unexpanded condition being in a proportion in an order of between eight and ten to one relative to an average diameter of said nose portion opening, a thickened wall part at said body nose portion immediately surrounding said nose portion opening restricting and controlling expansion of said body nose portion at said opening relative to a major remainder of said body; and coupling means secured to a rearward portion of said body for attaching said body rearward portion to a water pressure hose.

2. A water pressure drain cleaning device as defined in claim 1 in which a thickened wall part is formed in said body immediately forward of said coupling means restricting expansion of said body immediately forward of said coupling means relative to a major remainder of said body to reduce forces between said body and coupling means tending to separate the same during body

expansion.

3. A water pressure drain cleaning device as defined in claim 1 in which said coupling means includes rigid inner and outer sleeves within and over said body rearward portion compressing said body rearward portion therebetween, a rearward terminal part of said body rearward portion extending rearwardly along said inner sleeve and expanding outwardly against a rearward end of said outer sleeve increasing axial engagement between said body and coupling means.

4. A water pressure drain cleaning device as defined in claim 1 in which said body between said coupling means and said nose portion has axially spaced, circumferential ribs on an outer surface thereof engaging an inner surface of said drain pipe during body expansion reducing axial expansion of said body.

5. A water pressure drain cleaning device as defined in claim 1 in which a thickened wall part is formed in said body immediately forward of said coupling means restricting expansion of said body immediately forward of said coupling means relative to a major remainder of said body to reduce forces between said body and coupling means tending to separate the same during body expansion; and in which said coupling means includes rigid inner and outer sleeves within and over said body rearward portion compressing said body rearward portion therebetween, a rearward terminal part of said body rearward portion extending rearwardly along said inner sleeve and expanding outwardly against a rearward end of said outer sleeve increasing axial engagement between said body and coupling means.

6. A water pressure drain cleaning device as defined in claim 1 in which a thickened wall part is formed in said body immediately forward of said coupling means restricting expansion of said body immediately forward of said coupling means relative to a major remainder of said body to reduce forces between said body and coupling means tending to separate the same during body expansion; in which said coupling means includes rigid inner and outer sleeves within and over said body rearward portion compressing said body rearward portion therebetween, a rearward terminal part of said body rearward portion extending rearwardly along said inner sleeve and expanding outwardly against a rearward end of said outer sleeve increasing axial engagement between said body and coupling means; and in which said body between said coupling means and said nose portion has axially spaced, circumferential ribs on an outer surface thereof engaging an inner surface of said drain pipe during body expansion reducing axial expansion of said body.

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