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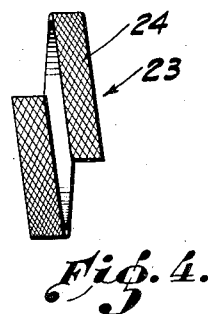
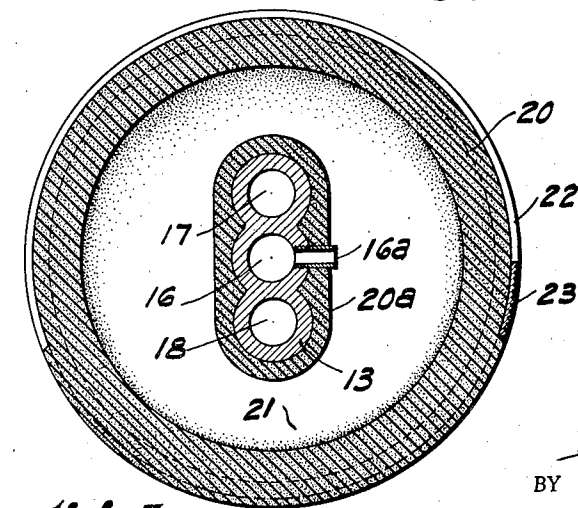
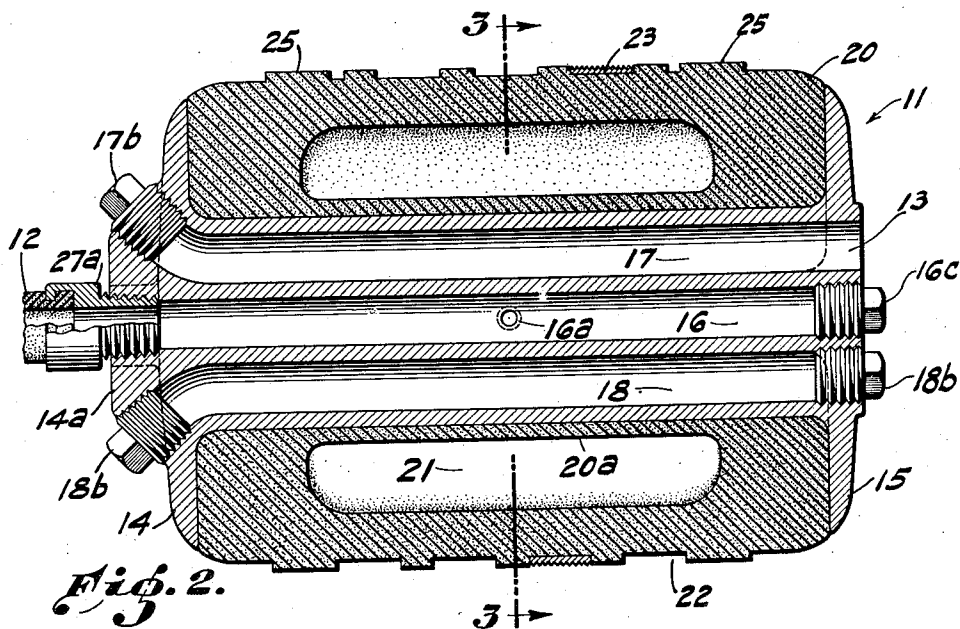
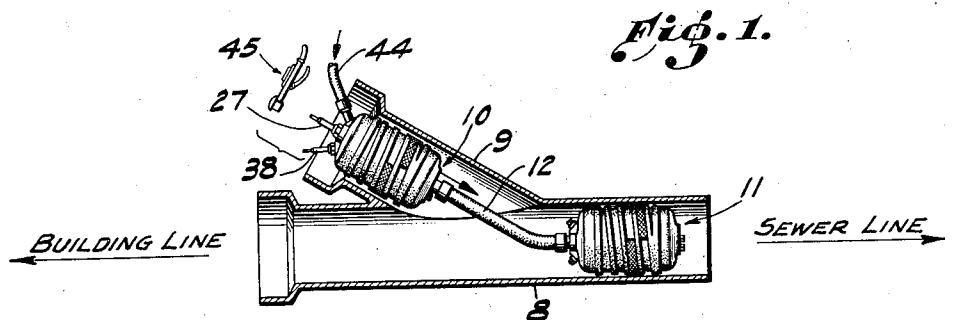
B. SVIRSKY

2,299,116

EXPANSIBLE PLUGS FOR CONDUITS

Filed May 5, 1941

2 Sheets-Sheet 1



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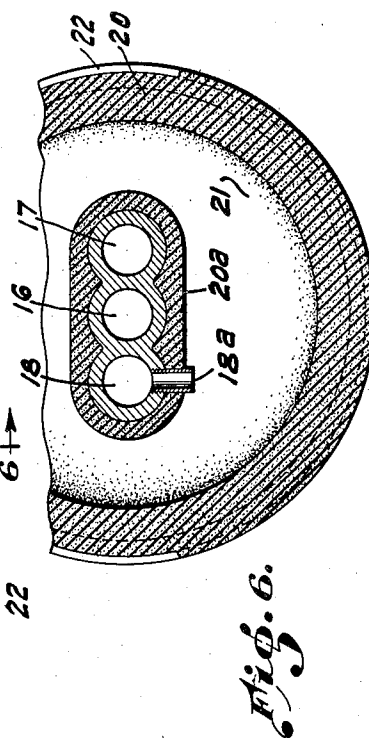
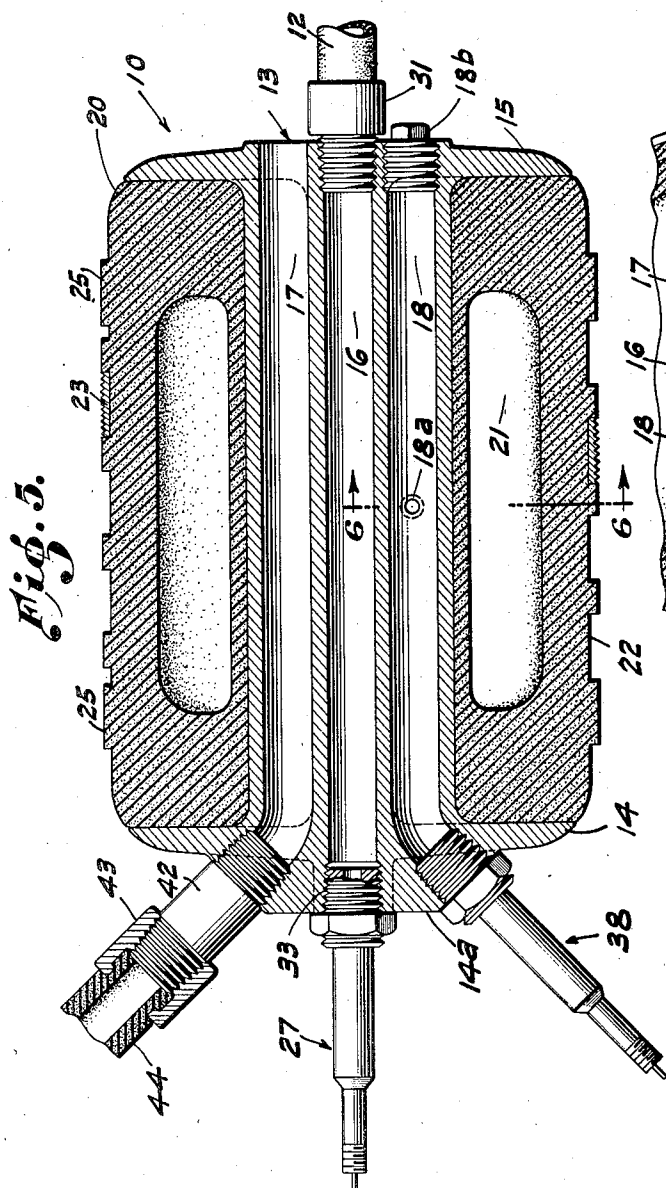
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UNITED STATES PATENT OFFICE

2,299,116

EXPANSIBLE PLUGS FOR CONDUITS

Bennett Svirsky, Glendale, Calif.

Application May 5, 1941, Serial No. 391,893

10 Claims. (Cl. 138—90)

The present invention relates to improvements in expansible closure means for conduits, as set forth in my copending application Serial No. 378,381, filed Feb. 11, 1941.

In order to comply with city requirements for testing plumbing, a pneumatically expansible plug may be inserted into the soil pipe line and utilized to form a closure therein, whereupon the pipe line above the plug may be filled to detect any leaks that may be present. One of the objects of the present invention is to provide co-operating, dual expansible plugs for this purpose of a character that will fixedly remain in their installed position during use, means being provided to safeguard the plugs against being accidentally washed down into the sewer, or being prematurely moved out of place in any other manner.

In twin stoppers as previously used no provision is made for deflating the inner plug of an installed device independently of and previously to the outer plug. Hence part of the water being used for test purposes is apt to flow back past the more or less deflated outer plug, much to the annoyance of the workman. It is an important object of the present invention to avoid this objectionable feature by providing means for the independent inflation and deflation of the plurality of plugs used.

A further object of the invention is to provide improved rigid means for supporting the elastic part of the device, thereby rendering the device as a whole more sturdy and dependable, and rendering its expansible portion more effective in its operation.

It is a specific object of the invention to provide, in combination with a pneumatically expansible plug for conduits; an annular member, of an improved kind, to encircle said plug for the purpose of forming an anti-slip contact with the inner surface of the section of pipe within which the plug is inserted to form a stopper. This feature is particularly valuable by reason of the fact that some sewer pipes are quite smooth inside and also often have slimy, greasy interior surfaces.

Other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawings, which illustrate what is at present deemed to be a preferred embodiment of the invention,

Fig. 1 is a side elevation of the complete device in one of its operative positions, showing the same with two expansible bodies inside of a sectioned Y-shaped sewer pipe member. In this

view the applicator portion of the air pressure supply means is shown positioned in readiness for use.

Fig. 2 is a longitudinal mid-section, on a larger scale than Fig. 1, of the expansible member shown in the lower right hand portion of the latter view.

Fig. 3 is a cross section on line 3—3 of Fig. 2.

Fig. 4 is a side elevation of one of the anti-slip spiral rings with which both of the plug-forming bodies of Fig. 1 are provided.

Fig. 5 is a longitudinal mid-section, on the same scale as Fig. 2, of the expansible body shown in the upper left hand portion of Fig. 1, some conduit portions being shown in side elevation.

Fig. 6 is a fragmentary cross section taken on line 6—6 of Fig. 5 turned through an angle of ninety degrees.

Referring in detail to the drawings, the principal parts of the device are, as seen in Fig. 1, the upper expansible member 10 at the liquid air intake end of the device, the lower expansible member 11 at the opposite end of the device, and the flexible conduit 12 whereby said members 10 and 11 are connected in a communicating manner, the device being shown in a Y-shaped sewer section having a body portion 8 and an upper limb 9.

Said members 10 and 11, by preference and as shown, are of a generally cylindrical shape, the axis of each member aligning with the axis of the conduit 12 which connects them. Said members are of nearly identical construction, but are shown furnished with somewhat different fluid supply connections and stopper means. Hence similar lettering is used for these two members, and a description of the member 11 (along with a reference to its slight difference from the member 10) will suffice for both.

Said member 11 has its metallic core 13 furnished at one end with a pronounced central rise 14a surrounded by a peripheral, radially extending flange 14, the opposite end of said core 13 being shown nearly flat and being surrounded by a peripheral, radial flange 15 equal in diameter to the flange 14. From end to end of the core extends an axial passage 16, along one side of which is a passage 17 and along the opposite side of which is a passage 18. These three passages all lead from end to end of the core and, by preference and as shown, are the same in diameter, space being provided for them by broadening the core member and shaping it as shown in cross section in Fig. 3.

A rubber or rubber-like body 20 is molded around each of the core members 13, said body having a slightly greater diameter than the flanges 14 and 15, and having within it a chamber 21 which is circular in cross section as to its outer side and has its inner side formed by the rubber layer or sheet 20a which encases the three-part tubular structure that extends axially of the core member.

Said rubber body 20 has a peripheral channel or groove 22 within which is seated a split, spirally shaped, anti-slip ring 23. Said ring is desirably made of steel of a length at least equal to or greater than the girth of the plug. It is furnished with a milled or otherwise roughened exterior surface 24 for anti-slip interior contact with the conduits within which the device is to be used, and the ring as a whole possesses considerable resiliency, causing it, when permitted to do so, to expand as to its diameter into a firm pressure contact with the surrounding conduit, assuming that the device is inserted into a conduit having an internal diameter slightly greater than the diameter of the body 20.

Near each end, each body 20 has a peripheral rib or flat faced annular shoulder 25 which continues around the body in an unbroken manner so as to form an effective fluid tight seal with the interior of a section of sewer pipe, or other conduit, when said body is inserted therewithin and then inflated.

As to their internal construction, the cores of the plug members 10 and 11 differ from each other only in that the axial passage 16 of the core of the member 10 extends from end to end of said member in a non-communicating manner, with reference to the surrounding air chamber 21, whereas in the member 11 said passage 16 (see Fig. 3) communicates with said chamber by means of a small tube 16a that leads through the rubber layer 20a; and the passage 18 of the member 11 extends from end to end of the core of said member in a non-communicating manner; whereas in the member 10 said passage 18 (see Fig. 6) communicates with the chamber 21 by means of a small tube 18a that leads through the rubber layer 20a.

At its left end (outer end in its assembled, installed relation) the plug member 10 has the mouth portion of its axial passage 16 internally screw threaded to have screwed into it an air valve structure 27 utilizable both for pneumatically inflating and deflating the plug member 11 through the flexible conduit 12. Connection with said conduit 12 is made by internally screw threading the opposite end of the passage 16 under consideration to screw in a coupler 31. A like coupler 27a screws into the left end of the axial passage 16 of the plug member 11 to connect the adjacent end of the conduit 12 therewith.

The passage 18 of the plug member 10 has its adjacent mouth portion deflected away from the axis of said member and internally screw threaded to have screwed into it a conventional valve 38, desirably of the same type as the valve 27, hence after a plug 18b has been screwed into the opposite end of the passage 18, air delivered under pressure through said valve 38 may be used to inflate the surrounding elastic body 20, being fed through the small tube 18a into the air chamber 21 of said body.

In some situations it may be found necessary to supply water from a specially provided source

to the section of the sewer pipe or other conduit located at the side of the body 10 which is directed toward the body 11. For this purpose the left end portion of the passage 17 is outwardly deflected and is internally screw threaded to have screwed into it a pipe section 42 which cooperates with a coupling member 43 to connect with a water supply tube 44.

When the plug member 11 is in the installed position shown in Fig. 1, the left ends of its channels 17 and 18 are respectively closed by plugs 17b and 18b which are screwed into their deflected mouth portions; and the axial passage of this member is closed at its right hand end by screwing into it a plug 16c.

The applicator portion 45 of the air pressure supply means is shown in Fig. 1 positioned in readiness for use.

In the operation of the device the same is installed as illustrated in Fig. 1 for testing purposes, for example, to test the joints of a portion of a building line located at a higher level than the Y fitting shown and forming a conduit structure which is continuous with the left end of the body portion of said Y fitting. After the device has been put into place in the position shown, air under pressure will be supplied through the connections 38 and 27 to inflate the rubber parts of the first expansible member 10 and second expansible member 11. The peripheries of said members will thus be brought into fluid tight and anti-slip relations to the surrounding interior surfaces of the pipe, the flat faced rises or annular shoulders 25 near the ends of the members 10 and 11 affording liquid tight seals, and the spiral rings 23 providing the anti-slip feature, the latter feature being particularly valuable when the pipe is made of cast steel, the interior surface of which is smoother than cast iron. In either case, however, sewer liquids of a greasy character may add to the importance of using the anti-slip rings.

After the device has been installed and inflated in the manner stated, a sufficient quantity of water from the hose or other conduit 44 will be fed through the first or outer member 10 to the pipe section leftward of the member 11 to fill all the superjacent conduit structures which it is desired to test. It may be necessary to supply a considerable quantity of water to make the test and to use a high pressure before the column of water in the building line above the device has reached the required height.

After the water used for making the test has remained in the building line for the required length of time and it is desired to allow it to flow into the sewer system that is in communication with the right hand end of the Y fitting the valve 27 is opened, thus releasing air from the interior of the rubber portion of the member 11, allowing the diameter of this member to contract, which produces around it an annular passage through which the water flows into the sewer. After all the water used for making the test has thus been allowed to escape, the valve 38 may be opened to deflate the member 10 preparatory to withdrawing the device from its operative position.

An important advantage is attained by providing for deflating the inner body 11 while the outer body 10 is allowed to remain in its fully inflated, firmly fixed position; for if the two members were deflated simultaneously the suction created when the column of water started to flow into the sewer might drag the whole de-

vice down the pipe line; and also, a considerable portion of the water could escape back past the member 10 greatly to the annoyance of the workman making the test.

When it is desired to supply water under pressure to the open end of a pipe line not having (like the Y fitting) any lateral opening, it is only necessary to use one of the two expansible members. In such a case the member 10 may be prepared for use by detaching the member 11 therefrom. Then said member may be inserted within the pipe line with its left end directed toward the mouth thereof and after having been inflated in the manner already stated and a plug (like 17b of Fig. 2) screwed into its conduit portion 17, water supply connection may be made with its axial intake portion 33. Likewise it will be obvious that the member 11 may be made use of singly for the same purpose.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the subject matter claimed.

What is claimed is:

1. In a device of the kind described, two similarly shaped, generally cylindrical plug members each having an elastic peripheral portion and a metal core portion, each of said elastic portions having within it an annular, concentric air chamber encircled by a peripheral diaphragm, each of said core portions having flanges against which the peripheral radial end portions of the elastic parts of said members abut, there being a conduit leading axially through one of said cores in a non-communicating relation to the surrounding elastic portion and then leading into the other core and communicating with the interior of the elastic material around the latter core, there being two additional conduits leading through each of said cores, each in an adjacent substantially parallel relation to their axial conduits, one of the two conduits which parallels the axial conduit of one plug member being in communication with its elastic portion, and means whereby the elastic portion of one of the plug members is inflatable by air fed thereinto through said axial conduit and the elastic portion of the other plug member is inflatable by air delivered thereinto through one of said adjacent conduits which is in an eccentric relation to its axis.

2. In a device of the kind described, two plug members each having a metal core portion and an elastic portion surrounding said core portion, said elastic portion of each member having within it an annular air chamber encircled by a diaphragm, there being a spiral channel extending around said elastic portion of each member, the bottom of said channel being formed by said diaphragm, there being in each member along each side of the space occupied by said spiral channel an annular shoulder extending around the member and capable of being diametrically expanded, an anti-slip spiral ring in each of said spiral channels, conduit means leading through one of said plug members in a non-communicating manner in relation thereto and thence into the other member to conduct an expanding fluid into the latter member whereby both its diaphragm and its aforesaid annular shoulders may be simultaneously diametrically expanded, and conduit means leading into the first recited plug member simultaneously to expand both its annular shoulders and diaphragm independently of

the corresponding parts of the second recited plug member.

3. In a device of the kind described, an elastic pneumatically expansible body of a circular character having a spiral peripheral channel extending around it, and a spiral resilient ring seated in said channel, said ring being diametrically expansible under the urge of the expansion of said body and having a roughened exterior surface to engage the interior surface of a sewer pipe in a non-slip manner, said expansible body also having around its expansible portion two continuous ribs engageable with the interior of a sewer pipe in a fluid tight manner, one of said ribs being located at each side of the space occupied by said spiral ring.

4. In a device of the kind described, two elongated multi-tubular metal core members including spaced apart radial peripheral flanges adjacent the ends thereof, a body of elastic material molded around each of said core members between said flanges, each of said bodies having within it an annular concentric air chamber encircled by an expansible diaphragm, each of said bodies having an annular shoulder extending around each of its ends, the inner sides of the shoulders of each body together with the outer face of said diaphragm forming around the body a space including a spiral channel, conduit means connecting one of the tubes of one core member in series with a like tube of the other core member, means to supply air under pressure through one tube of one core member thence through said conduit means and through the other tube joined thereto to the air chamber of the elastic body of the core member farthest from the source of air supply, and means to supply air under pressure through another tube in the core member nearest the air supply to the air chamber of its elastic body, there being a passage through which the air is conducted from each of said tubes to the concentric chamber to which the air is delivered.

5. The subject matter of claim 4 and, a manually detachable spiral resilient split ring occupying said channel and expansible under the urge of pressure from said diaphragm.

6. In a device of the kind described, a pair of pneumatically expansible bodies, conduit means extending through one of said bodies in a non-communicating relation thereto and leading to the other of them to convey fluid under pressure to expand the latter body independently of the former, independent conduit means to convey fluid pressure to the former body to expand it independently of the latter body, each of said expansible bodies being of a circular character having a spiral peripheral channel extending around it, and a spiral ring seated in each said channel, each of said rings being diametrically expansible under the urge of the expansion of the body to which it is affixed, each of said expansible bodies also having around its expansible portion two continuous ribs engageable with the interior of a sewer pipe in a fluid tight manner, one of said ribs being located at each side of the space occupied by its said spiral ring.

7. In a device of the kind described, an elastic pneumatically expansible body of a circular character having a spiral peripheral channel extending around it, said expansible body also having around its expansible portion two continuous ribs engageable with the interior of a sewer pipe in a fluid tight manner, one of said ribs being located

at each side of the space occupied by said spiral channel.

8. The subject matter of claim 7 and, a manually detachable spiral resilient ring seated in said channel and being expansible under the urge of the expansion of said body to engage the interior surface of said sewer pipe.

9. In a device of the kind described, two plug members each having a metal core portion and an elastic portion surrounding said core portion, said elastic portion of each member having within it an annular air chamber encircled by a diaphragm, there being a spiral channel extending around said elastic portion of each member, the bottom of said channel being formed by said diaphragm, there being in each member along each side of the space occupied by said spiral channel an annular shoulder extending around the member and capable of being diametrically expanded,

an anti-slip spiral ring in each of said spiral channels, and axial conduit means leading through one of said plug members in a non-communicating manner in relation thereto and thence into the other member to conduct an expanding fluid into the latter member whereby both its diaphragm and its aforesaid annular shoulders may be simultaneously diametrically expanded and then contracted independently of the corresponding parts of the other plug member.

10. The subject matter of claim 9 and, conduit means leading into the first recited plug member simultaneous to expand and contract both its annular shoulders and diaphragm independently of the corresponding parts of the second recited plug member.

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