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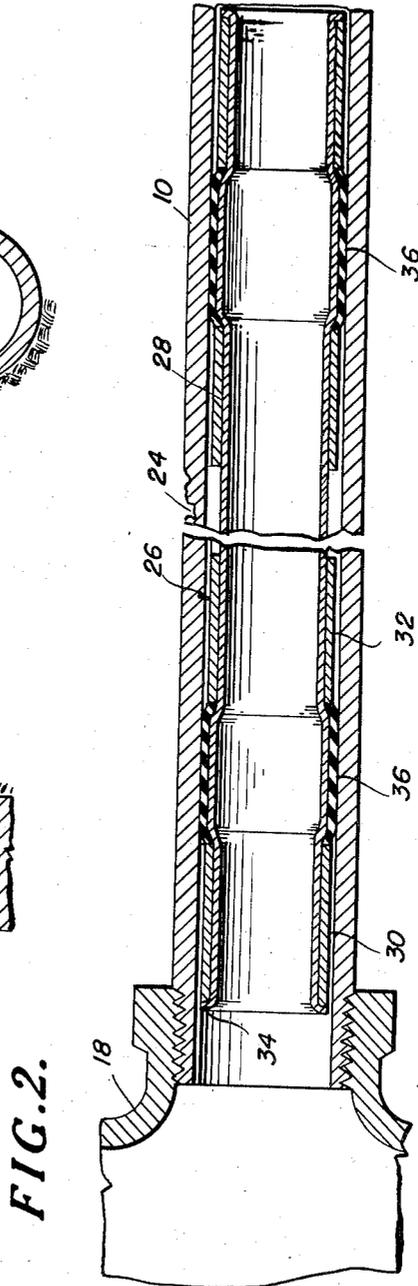
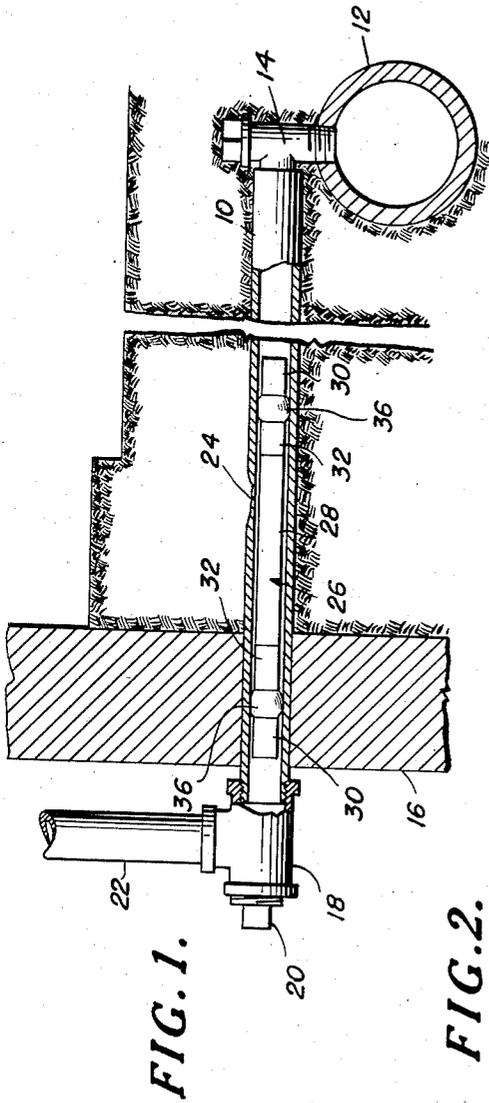
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BY-PASS ASSEMBLY FOR SERVICE PIPE

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2 Sheets-Sheet 1



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FIG. 3.

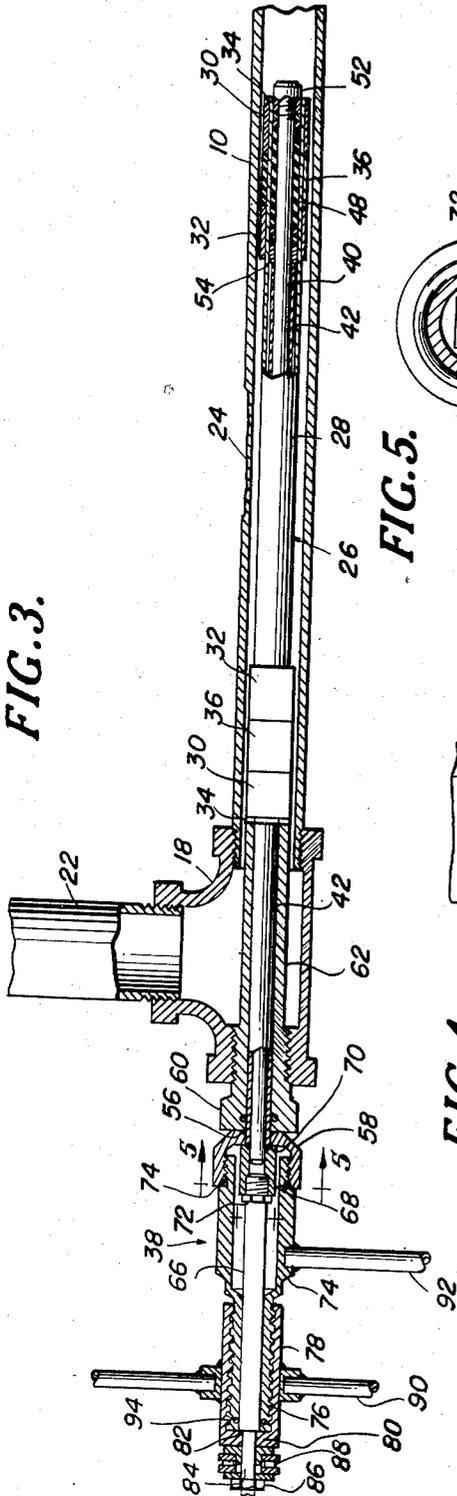


FIG. 5.

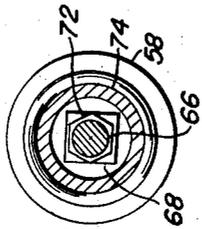
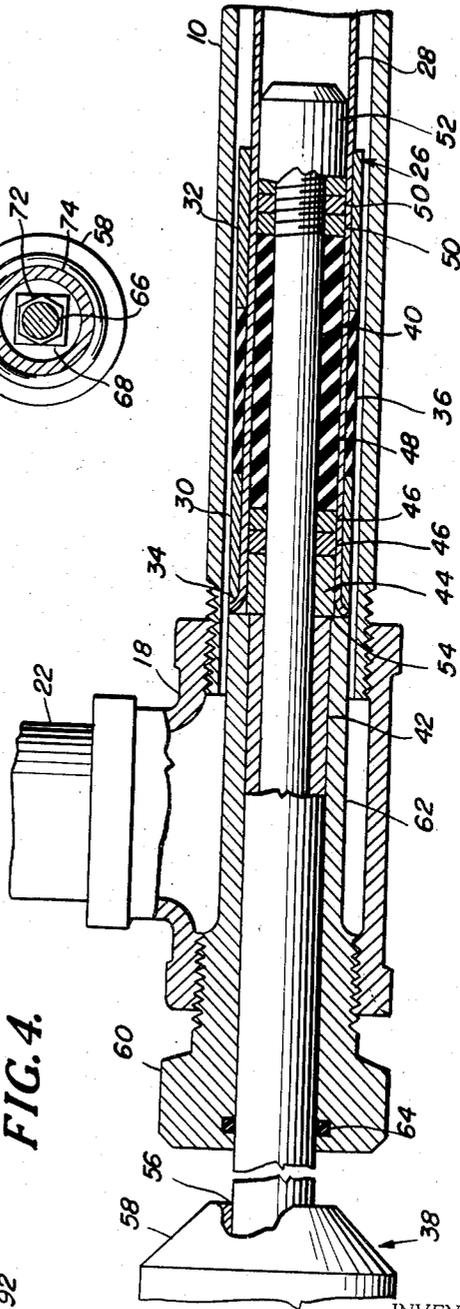


FIG. 4.



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BY-PASS ASSEMBLY FOR SERVICE PIPE

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2 Claims. (Cl. 138—97)

This invention relates to improved means for repairing, without replacement, a leaky section of a gas or water service pipe conducting fluid from a street main into a house or other building. More particularly, this invention pertains to an improved by-pass assembly that is insertable into the service pipe from within the house or other building to isolate or seal off the walls of the leaky section of such pipe. Additionally, this invention pertains to an improved tool used in the installation of the by-pass assembly. The invention will be described with reference to gas service pipes, but it will be understood that the invention is applicable to service pipes for water or other fluids.

Gas service pipes which run underground from the street main into the basement of a house usually are made of iron or steel. Hence, in time, such pipes frequently become defective and leaky because of corrosion, such corrosion usually occurring just outside of the basement wall of the house because the ground frequently is damp at such point, as the result of drainage of water from the roof or for other reasons. By-pass assemblies of the type with which this invention is concerned are known, and eliminate the inconvenience and expense of digging a trench outside of the basement wall to replace the defective section of the service pipe. Some of the known assemblies of this nature, however, not only are unduly complicated with increased manufacturing expense, but also do not permit unobstructed flow of fluid therethrough. This latter disadvantage, of course, greatly increases any tendencies of the assembly for clogging with consequent interruption of service, and also somewhat diminishes the flow capacity of the assembly.

Known by-pass assemblies of the type under consideration include a special wrench device which is used for an insulation. Again, however, known wrench devices of this nature are also rather complicated, with resulting difficulty in use and increased manufacturing expense.

Additionally, gas usually is not shut off at the main during the installation of a by-pass assembly of the type under consideration, so that gas escapes into the basement during such an installation. The escape of a large quantity of gas into a basement presents obvious hazards.

Hence, it is an object of this invention to provide an improved and simplified by-pass assembly of the type under consideration, which not only is effective for its intended purpose, but also results in considerable economies in manufacture and in increased ease of installation.

It is another object of this invention to provide an improved by-pass assembly of the type described that has an unobstructed flow passage to both eliminate the possibility of clogging and minimize reduction in flow capacity of a service pipe when the assembly is installed therein.

It is still another object of this invention to provide an improved by-pass assembly of the type described which is of substantially unitary and inexpensive construction.

It is still another object of this invention to provide a tool for installing a by-pass fitting embodying this inven-

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tion, such tool not only facilitating the installation of the assembly, but also being readily adapted for the installation of by-pass assemblies embodying this invention in pipes of different size.

It is a further object of this invention to provide an improved tool which, during the installation of the by-pass assembly with such tool, minimizes the escape of gas into the basement.

Other objects and advantages of the invention will be apparent from the following description and accompanying drawings, in which:

Figure 1 is a vertical sectional view illustrating a typical service pipe installation and showing the installation in such pipe of a by-pass assembly embodying this invention.

Figure 2 is an enlarged fragmentary vertical sectional view illustrating the details of the installed by-pass assembly shown in Figure 1.

Figure 3 is an enlarged vertical sectional view illustrating the manner of installing a by-pass assembly embodying this invention with a special tool embodying this invention for effecting such installation.

Figure 4 is an enlarged fragmentary view corresponding to Figure 3, but showing the tool in another position.

Figure 5 is an enlarged sectional view taken on line 5—5 of Figure 3.

Referring now to the drawings, there is shown in Figure 1 a typical gas service pipe installation. The service pipe 10, which is usually made of iron or steel, is connected to a street main 12 by a service T 14 and runs underground through the basement wall 16 of a building. The end of the pipe 10 projecting into the basement ordinarily has one end of a T 18 threadedly connected thereto, while the opposite end of the T is closed by a plug 20. The usual riser line 22 is connected into the lateral or side outlet of the T 18 and leads to the customary gas meter (not shown). The ground immediately adjacent the basement wall 16 usually is damp, due to water drainage from the building roof and other reasons, so that the service pipe 10 frequently becomes corroded sufficiently at this point, as at 24, to leak. Since the remainder of the pipe 10 is relatively sound, repair of the leaky section 24 will provide many more years of life for the pipe. Repair of the leaky section 24 without the necessity of excavation may be accomplished by a by-pass assembly 26 embodying this invention.

The by-pass assembly 26, best shown in Figure 4, consists of a main body portion in the form of a ductile tube 28, preferably of copper. Mounted on the main body portion 28 adjacent each end thereof is a pair of longitudinally spaced steel ferrules 30 and 32. The ferrules 30 immediately adjacent the ends of the tube 28 are held in place thereon by outwardly flaring the tube ends to form an outturned lip or flange 34, while the other ferrules 32 preferably are secured to the body 28 by soldering, brazing, or other similar means. Mounted on the tube 28 between each pair of ferrules 30 and 32 and in abutting relationship therewith is an annular resilient packing gasket 36, of rubber or the like. Since the ferrules 32 are rigidly attached to the tube 28, it is apparent that the gaskets 36 will hold the ferrules 30 tightly against the lips 34. As shown in the drawings, the outer diameters of the ferrules and the gaskets are substantially equal and only slightly less than the inner diameter of the service pipe 10. It also will be noted that the interior of both ends of the by-pass assembly 26 are gently rounded outwardly to provide for a smooth flow of fluid therethrough.

In use, the by-pass assembly 26 is installed in a service pipe 10, as shown in Figure 1, to extend therein from a point adjacent the T 18 through the basement wall 16 and outwardly beyond the leaky section 24 of

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the service pipe. The installation is completed by radially expanding those portions of the tube 28 underlying the gaskets 36 (as shown in Figures 1 and 2) to thereby force the exterior cylindrical surface of the gaskets into tight peripheral sealing engagement with the interior wall of the service pipe 10. Because the metal of the tube 28 is cold-worked by such expansion, the expanded portions thereof become relatively inelastic and permanently deformed to thereby maintain indefinitely the aforedescribed tight peripheral seal between the gaskets 36 and the interior wall of the service pipe 10.

When the assembly 26 is thus installed, it will be seen that the walls of the leaky or defective section 24 of the service pipe 10 are completely isolated or sealed off and that flow will take place from the sound part of the pipe through the by-pass assembly and into the T 18 for distribution through riser 22 to the building piping system. Thus, the leaky section 24 of the service pipe 10 is effectively by-passed by a structure which, in effect, relines the leaky section of the service pipe. Moreover, it will be noted that the assembly 26 seals the service pipe 10 on both sides of the leaky section 24 so that any water drainage from the soil into the leaky section cannot drain into the basement. It will be noted further that, since the main body 28 of the by-pass assembly 26 preferably is formed of copper, brass, or other suitable non-corrodible metal, the assembly will remain effective for its intended purpose for an extended period of time. Likewise, the rubber gaskets 36 will also remain effective for their intended purpose for a greatly extended period of time. It also will be seen that the non-conductive rubber gaskets 36 eliminate the possibility of formation of a copper-iron electrolytic action which would hasten deterioration of the remaining portions of the steel service pipe 10.

For installation of the above-described by-pass assembly 26, there is provided a special expanding tool 38 (Figures 3 to 5) that is insertable into the assembly 26 from either end thereof. The tool 38 consists of a long draw rod 40 slidably enclosed within a thrust tube 42 and projecting beyond both ends of the latter. At its forward projecting end, i. e., the end insertable into the assembly 26, the rod 40 carries, in the following order, a thrust collar 44 abutting against the forward end of the thrust tube 42, one or more back-up washers 46, preferably of relatively hard rubber, an expansible rubber sleeve 48, somewhat longer than the gaskets 36, one or more rubber back-up washers 50, and an adjusting nut 52 threaded onto the end of the rod. The collar 44, washers 46 and 50, sleeve 48, and nut 52 are of the same diameter which is slightly less than the interior diameter of the tube 28, while the outer diameter of the tube 42 is of smaller diameter than the collar 44, etc., to form a rearwardly facing shoulder 54, for reasons later explained.

Secured to the rearward end of the thrust tube 42, as by welding, as at 56, or the like, is an adapter 58 having a rearwardly facing interiorly enlarged threaded socket. Slidably mounted on the thrust tube 42 is a nipple 60 adapted to be threaded into one end of the T 18 on removal of the plug 20. The nipple has a tubular extension 62 which will project through the T 18 and into the pipe 10, as shown in Figures 3 and 4. When the adapter 58 abuts against the nipple 60, the thrust tube 42 and the draw rod 40 project forwardly from the extension 62 a distance sufficient to receive the by-pass assembly with the sleeve 48 mounted on the forward end of the draw rod positioned as shown in Figure 3; i. e., the expansible sleeve 48 will be positioned beneath the rubber gasket 36 at the forward end of the by-pass assembly. In this position of the parts, it will be seen that rearward movement of the draw rod 40, while maintaining the thrust tube 42 substantially fixed, will serve to compress the expansible sleeve 48 between washers 46 and 50, to thereby cause radial expansion of

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the sleeve which, in turn, will radially expand that portion of the tube 28 underlying the forward gasket 36 to thereby expand the latter into tight peripheral sealing engagement with the interior wall of pipe 10. During such operation, it will be seen that the ferrules 30 and 32 on each side of the forward gasket 36 confine the expansion of the tube 28 only to the region underlying such gasket.

Prior to this expanding operation, the by-pass assembly 26 is mounted from either end thereof onto the thrust tube 42 in the position shown in Figure 3, the plug 20 is removed from the T 18, and the nipple 60, together with the by-pass assembly 26 and tube 42, is rapidly inserted through the T 18 and into the pipe 10 and the nipple 60 is threaded into the T, thus permitting only a small amount of gas to escape during this inserting operation. It thus will be seen that the tubular extension 62 on the nipple 60 provides a gauge for properly positioning the by-pass assembly 26 within the pipe 10. The nipple 60 also has an interior circumferential groove within which is mounted an O-ring 64 which seals against the periphery of the thrust tube 42, to thereby prevent leakage of gas between the thrust tube and the nipple during the expanding operation.

After the forward end of the by-pass assembly has been expanded to effect a tight seal, as aforedescribed, the adapter member 58, together with the thrust tube 42, is pulled rearwardly through the nipple 60 until the rearwardly facing shoulder 54 on the thrust collar 44 engages the forward end of the tubular extension 62 on the nipple 60, as is shown in Figure 4. It will be seen that, in this position of the thrust tube 42 and draw rod 40, the expansion sleeve 48 on the forward end of the latter will be located beneath that portion of the tube 28 underlying the rear rubber gasket 36. Hence, rearward movement of the draw rod 40 with respect to the thrust tube 42 will be effective to expand a rear section of the tube 28 to force the rear gasket 36 into tight peripheral sealing engagement with the interior wall of the pipe 10, to thereby isolate the walls of the leaky section 24 and permit flow to take place entirely through the by-pass assembly after the expanding tool 36 has been removed and the plug 20 replaced.

That portion of the tool employed for effecting rearward movement of the draw rod 40 relative to the thrust tube 42 comprises a draw shaft 66 threadedly engaged within a socket of a connector member 68 welded, as at 70, to the rearward projecting end of the draw rod 40. Preferably, the draw shaft 66 has a hexagonal or other non-circularly-shaped flange 72 immediately adjacent the socket of the connector 68, while the exterior of the connector 68 is of square or other non-circular configuration, as shown in Figure 5, so that the shaft 66 and the connector 68 can be engaged by appropriate wrenches for connecting or disconnecting the same.

Threadedly engaged within the socket of the adapter 58 is a tubular member 74 having an exteriorly threaded rearwardly extending portion 76 snugly engaging the draw shaft 66. Threadedly mounted on the extension 76 is a draw sleeve 78 having an interior circumferential flange 80 engaged with a rearwardly facing shoulder 82 formed by a reduced extension 84 on the draw shaft 66. Interposed between a nut 86 threaded on the outer end of the extension 84 and the rearward end of the sleeve 78 is an antifriction thrust bearing 88. Both the sleeve 78 and the member 74 are provided with radially extending handles 90 and 92, respectively.

It thus will be seen that rotation of the sleeve 78 by means of its handle 90, while the member 74 is held fixed against rotation by its handle 92, will serve to move the draw shaft 66, and consequently the draw rod 40, rearwardly relative to the thrust tube 42. Preferably, the extension 76 is provided with an interior circumferential groove mounting an O-ring 94 to effect a seal between the draw shaft 66 and the member 74. Additionally, an

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O-ring seal 96 is provided between the adapter 58 and the member 74. By means of these O-ring seals 94 and 96, any gas passing rearwardly between the draw rod 40 and the thrust tube 42 will be prevented from leaking to atmosphere from the tool 38.

It also will be seen that the expansion-effecting portion of the tool is adapted for use with expansion assemblies, i. e., adapter 58, nipple 60, thrust tube 42, draw rod 40, etc., for operation on by-pass assemblies 26 of different size for use in different-size service pipes. For this purpose, the nut 86 may be unscrewed and the member 74 can then be unscrewed from the adapter 58 and, together with the sleeve 78 and bearing assembly 88, slid rearwardly on the draw shaft 66 until flange 72 and connector 68 are exposed for the reception of wrenches to disconnect draw shaft 66 from connector 68. Thereupon, a new forward assembly, i. e., adapter 58, nipple 60, tube 42, rod 40, etc., of different size can be connected to the draw shaft 66 and member 74.

It thus will be seen that the objects of this invention have been fully and effectively accomplished. It will be realized, however, that the specific embodiment of the invention illustrated and described to disclose the principles thereof may be changed without departing from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

We claim:

1. A by-pass assembly for insertion into a service pipe

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to isolate the walls of a section thereof comprising: an open-ended tubular member of ductile metal having a pair of longitudinally spaced relatively rigid ferrules mounted thereon adjacent each end thereof; an expansible annular gasket mounted on said member intermediate and in abutting relation with the opposed ends of each pair of said ferrules, the exterior diameter of said ferrules and gasket being substantially equal and slightly less than the interior diameter of the service pipe, whereby radial expansion of said tubular member in the regions underlying each of said gaskets, by an expanding tool inserted into said member, will force said gaskets into peripheral sealing engagement with the interior surface of the pipe.

2. The structure defined in claim 1 in which the member has outturned lips at both ends thereof engaged with the adjacent ends of the corresponding ferrules to retain the latter and the gaskets on said member, and the other ferrules are rigidly secured to said member.

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