March 12, 1957 F. H. MUELLER ET AL 2,784,627

BY-PASS ASSEMBLY FOR SERVICE PIPES AND WRENCH FOR INSTALLATION OF THE SAME

Original Filed June 18, 1952 3 Sheets-Sheet 1

Fig. 1.

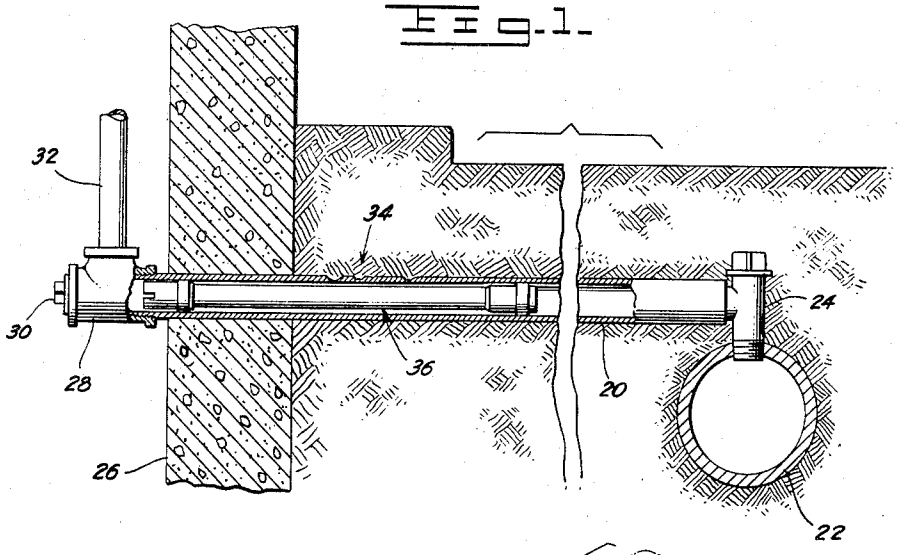


Fig. 8.

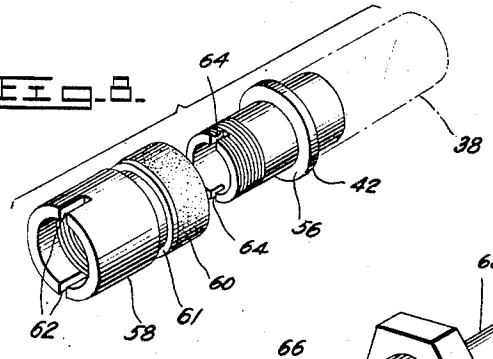
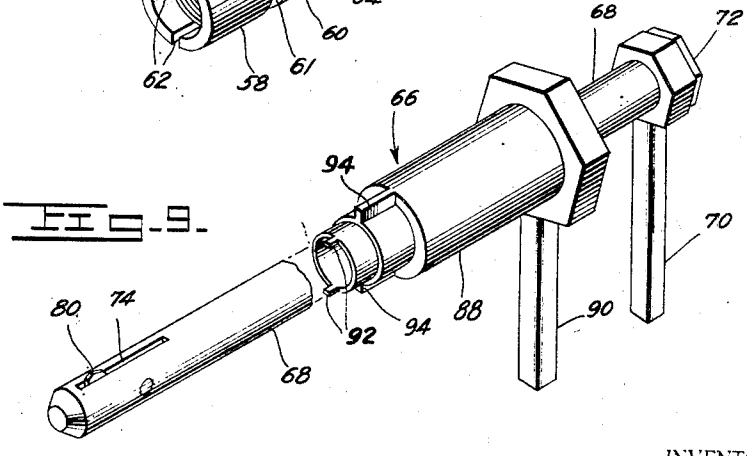


Fig. 9.



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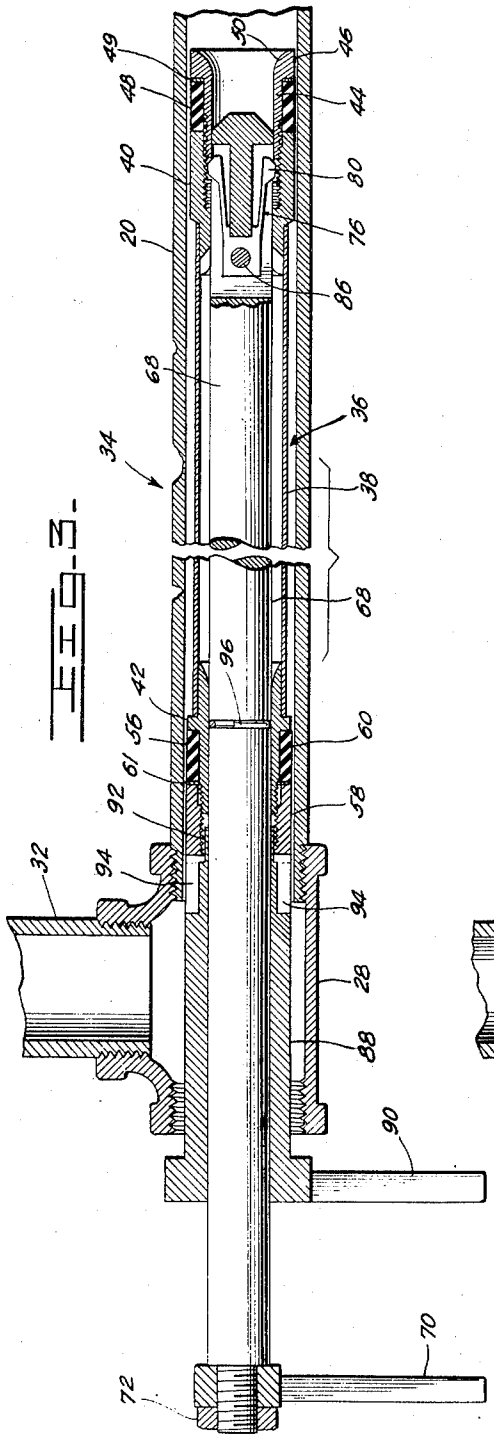


FIG. 1

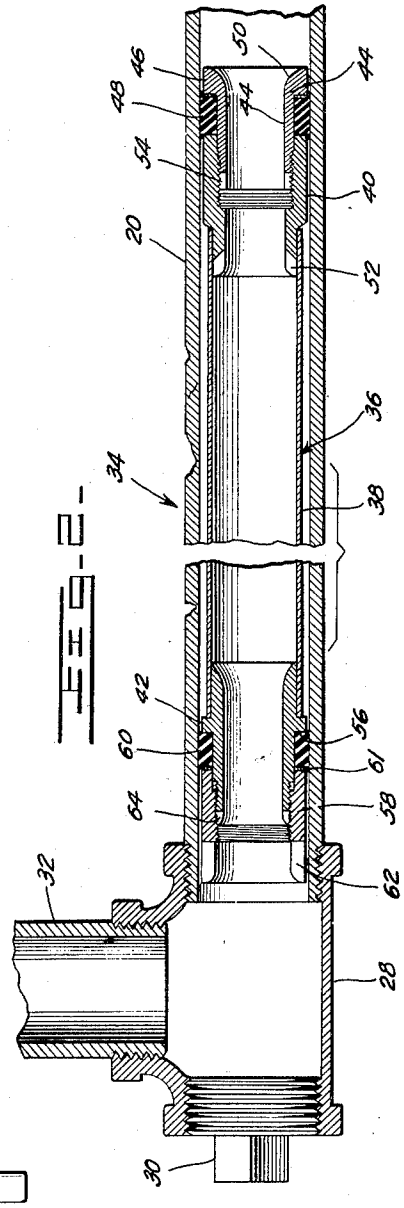


FIG. 2

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Fig. 4

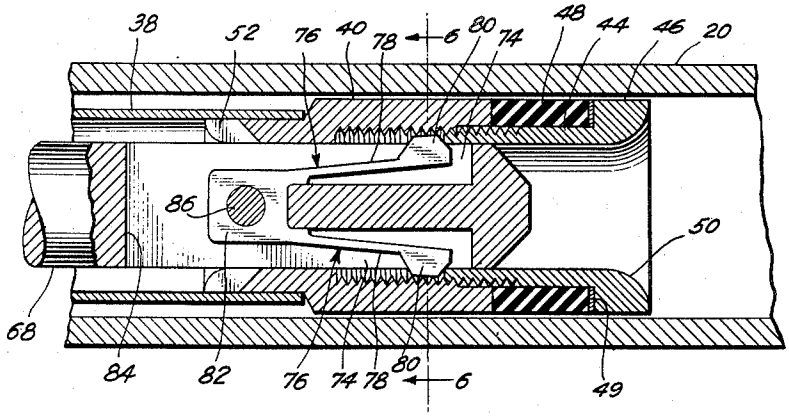


Fig. 5

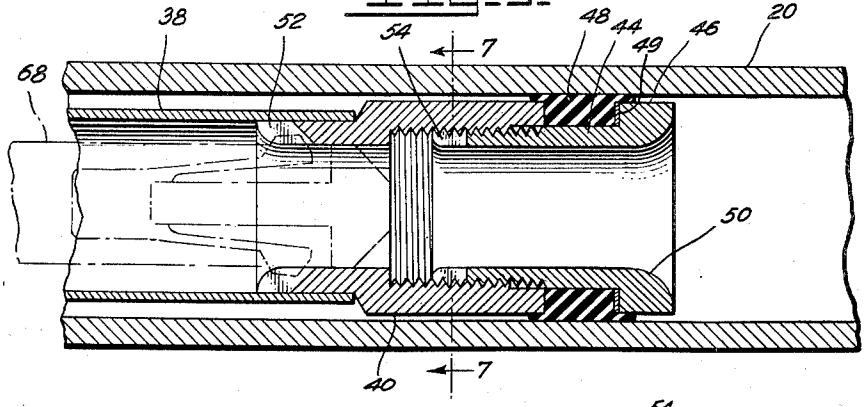


Fig. 6

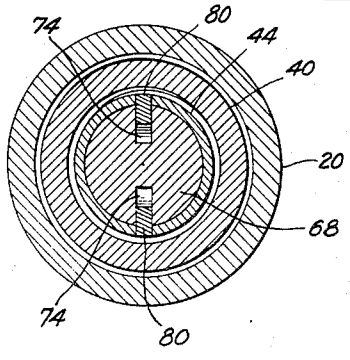
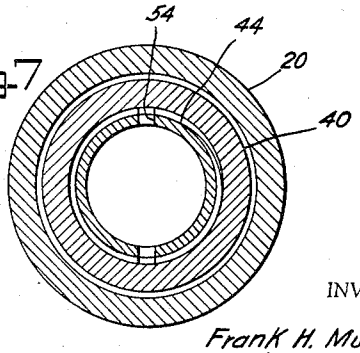


Fig. 7



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BY-PASS ASSEMBLY FOR SERVICE PIPES AND WRENCH FOR INSTALLATION OF THE SAME

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Original application June 18, 1952, Serial No. 294,285, now Patent No. 2,731,041, dated January 17, 1956. Divided and this application July 6, 1954, Serial No. 441,438

4 Claims. (Cl. 81—55)

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 wrench device 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. This application is a division of our copending application, Serial No. 294,285, filed June 18, 1952, now Patent No. 2,731,041, January 17, 1956.

Gas service pipes which run underground from the street main into the basement of a house 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 of the drainage of water from the roof. 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. Known assemblies of this nature, however, not only are unduly complicated, 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 their installation. Again, however, known wrenches 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 installation. The escape of a large quantity of gas 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 economies in manufacture and 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 therethrough 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 and simplified special wrench device for installing a by-pass fitting embodying this invention, such

wrench device not only facilitating the installation of the assembly, but also decreasing the manufacturing cost of such wrench.

It is a further object of this invention to provide an improved special wrench device which, during installation of the by-pass assembly with such wrench, 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 a fragmentary enlarged vertical sectional view illustrating the details of the by-pass assembly installation shown in Figure 1.

Figure 3 is a view corresponding to Figure 2 and illustrating a service saver embodying this invention in place in a service pipe but before permanent installation therein, and a special wrench device embodying this invention in engagement with the by-pass assembly for effecting the permanent installation of the latter within the service pipe.

Figure 4 is an enlarged fragmentary sectional view corresponding to a portion of Figure 3.

Figure 5 is an enlarged fragmentary sectional view corresponding to a portion of Figure 2.

Figure 6 is a sectional view taken on line 6—6 of Figure 4.

Figure 7 is a sectional view taken on line 7—7 of Figure 5.

Figure 8 is an exploded perspective view of the left end of the by-pass assembly illustrated in Figure 2.

Figure 9 is a perspective view of a special wrench device embodying this invention.

Referring now to the drawings, there is shown in Figure 1 a typical gas service pipe installation. The pipe **20**, which usually is made of iron or steel, is connected to a street main **22** by a service T **24** and runs underground through the basement wall **26** of a building. The end of the pipe **20** projecting into the basement ordinarily has one end of a T **28** threadedly connected thereto while the opposite end of the T **28** is closed by a plug **30**. The usual riser line **32** is connected into the lateral or side outlet of the T **28** and leads to the customary gas meter (not shown). The ground immediately adjacent the basement wall **26** usually is damp, due to water drainage from the building roof and for other reasons, so that the iron or steel service pipe **20** frequently becomes corroded sufficiently at this point to leak. Since the remainder of the pipe **20** is relatively sound, repair of the leaky section **34** will provide many more years of useful life for the pipe. Repair of the leaky section **34** without the necessity of excavation may be accomplished by a bypass assembly **36** embodying this invention.

The by-pass assembly **36**, best shown in Figures 2 and 3, consists of a main body portion in the form of a copper or brass tube **38** having copper or brass fittings **40** and **42** soldered or brazed to the opposite ends thereof. The forward fitting **40**, i. e., the fitting at that end of the assembly **36** which is inserted first into the service pipe **20**, consists of a tubular member having an interiorly and exteriorly reduced rearward portion which is snugly received within one end of the tube **38** and soldered or brazed thereto in a conventional manner. The forward and enlarged portion of the fitting **40** is interiorly threaded for the reception of a correspondingly exteriorly threaded nipple **44**. The forward end of the nipple **44** projects out of the fitting **40** and is provided with an exterior circumferential flange **46** which is opposed, longitudinally, to the flat annular end

of the fitting 40 to form an exterior circumferential groove therebetween.

Disposed snugly in this groove is a yieldable annular packing gasket 48, preferably of rubber or other resilient material having adequate packing qualities. The outer diameter of the gasket 48, when relaxed, is somewhat less than the interior diameter of the service pipe 20, as shown in Figures 3 and 4. Preferably, a metallic anti-friction washer 49, of brass or the like, is interposed between the gasket 48 and the flange 46. It will be noted that the forward or entrance end of the nipple 44 has an outwardly-flaring interior surface 50 to provide a smooth intake orifice for flow of fluid into the by-pass assembly 36 from the service pipe 20, while the rearward ends of both the fitting 40 and the nipple 44 are each provided with a pair of diametric slots 52 and 54, respectively, as shown best in Figures 5 and 7. Preferably, the rearward interior surfaces of both the nipple 44 and the fitting 40 also flare gently outwardly, as shown, for smooth fluid flow therethrough.

The rearward fitting 42 has an exteriorly-reduced forward portion for snug reception within the rearward end of the body or tube 38 of the assembly 36 and which is soldered or brazed to the tube in a conventional manner. A short distance to the rear of the reduced forward portion the fitting 42 is again reduced in outer diameter to form a rearwardly-facing annular shoulder 56 and is exteriorly-threaded for the engagement of an interiorly-threaded sleeve or collar 58 thereover. The fitting shoulder 56, in conjunction with the forward end of the collar 58, forms an exterior circumferential groove in which is disposed another packing gasket 60, similar to and to all intents and purposes the same as the gasket 48 at the forward end of the assembly 36. Preferably, another metallic antifriction washer 61 is interposed between the gasket 60 and the collar 58. The rearward ends of both the collar 58 and the fitting 42 are provided with a pair of diametric slots 62 and 64, respectively, the collar slots 62 being considerably longitudinally longer than the fitting slots 64, as is shown best in Figure 8. The interior of the forward end of the fitting 42 and the interior of the rearward ends of the fitting and the collar 58 are also flared outwardly to provide for smooth flow of fluid therethrough.

In use, the by-pass assembly 36 is installed in the service pipe 20, as shown in Figure 3, to extend therein from a point adjacent the T 28 through the basement wall 26 and outwardly beyond the leaky section 34 of the service pipe. The installation is completed by rotating the nipple 44 and the collar 58 with respect to their respective fittings 40 and 42 and in directions which will serve to narrow the grooves to compress the gaskets 48 and 60 and thereby expand the latter radially outwardly into peripheral sealing engagement with the interior walls of the service pipe 20, as shown in Figure 2. When thus installed, it will be seen that the walls of the leaky section 34 of the service pipe 20 are completely isolated or sealed off and that flow will take place from the sound part of the service pipe through the by-pass assembly 36 and into the T 28 for distribution through the riser 32 to the building pipe system. Thus, the leaky section 34 of the service pipe 20 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 36 seals with the service pipe 20 on both sides of the leaky section 34 so that any water drainage from the soil into the leaky section cannot drain into the basement. It further will be noted that, since the by-pass assembly 36 preferably is formed of copper, brass, or other non-corrodible material, the by-pass assembly will remain effective for its intended purpose for an extended period of time. Likewise, the rubber packing gaskets 48 and 60 also will remain effective for their intended purpose for a greatly extended period of time.

For installation of the above-described by-pass assembly

36 there is provided a special wrench device 66 (Figure 9) that is insertable into the assembly from the rearward end thereof. The wrench device 66 consists of a long rod 68 having a diameter only slightly less than that of the smallest interior diameter of the fittings 40 and 42. On its outer or rearward end the rod 68 is provided with a manipulating handle 70 which may be secured thereon in any appropriate fashion, as by being received on a reduced threaded end portion of the rod and secured thereto by a nut 72. The rod 68 is of a length sufficient to extend completely through the T 28 and through the by-pass assembly 36 to the forward end of the latter, as shown in Figure 3. The forward end of the rod 68 is provided with a diametric pair of longitudinal grooves 74 (Figures 4 and 9). Securely mounted within each groove 74 is a key 76 having a spring shank 78 and a head 80. The heads 80 on these keys 76 are adapted to engage in the slots 54 at the rear end of the nipple 44 or alternately in the slots 52 at the rear end of the fitting 40.

It will be seen that the spring shanks 78 of the keys 76 urge the heads 80 radially outwardly of the grooves 74, for engagement in the aforesaid slots 52 or 54, but that the radial dimension of both the heads and the grooves is such that the heads may be pressed back and received completely within the grooves for passage of the rod 68 through both of the fittings 40 and 42. In this connection, it will be noted that the opposite ends of the key heads 80 are bevelled so that the inner edges of the fittings 40 and 42 or the bottoms of the slots 52 and 64 therein exert a camming effect on the keys 76 to push them back into their respective grooves 74 and thereby permit longitudinal movement of the rod through the by-pass assembly 36. For convenience in manufacture, the keys 76 may be formed as an integral unit having a common base 82 (Figure 4) which may be disposed in a slot 84 extending through the rod 68 and connecting the grooves 74 at one end thereof. This common base 82 may be secured to the rod 68 by means of a transverse pin or rivet element 86.

Rotatably and slidably mounted on the rod 68 adjacent the rearward end thereof is a sleeve 88 of a length to project through the T 28 and into engagement with the rearward end of the by-pass assembly 36. For convenience of manipulation, this sleeve 88 is provided with a radially-extending handle 90 on its rearward end. The forward end of the sleeve 88 is provided with a diametric pair of forwardly or longitudinally-extending lugs or keys 92 which are adapted to be engaged within the slots 64 at the rearward end of the fitting 42. In this connection, it will be noted that the diametric distance between the lugs 92 is substantially equal to the inner diameter of the sleeve 88 and that the radial dimension of the lugs is substantially equal to the radial dimension of the slots 64 in the fitting 42. To the rear of these lugs 92, the sleeve 88 is cut away exteriorly to form another pair of lugs or keys 94 that are aligned longitudinally with the lugs 92 and adapted to engage in the slots 62 at the rearward end of the collar 58. These slots 62 and the lugs 94 are of considerably greater longitudinal dimension than the slots 64 and the lugs 92.

In use of the wrench 66 for installation of the by-pass assembly 36, the by-pass assembly is slipped over the rod 68, as shown, and the latter manipulated until the spring keys 76 thereon engage in the slots 54 at the rearward end of the nipple 44. The sleeve 88 is then slid forwardly on the rod 68 and manipulated until the lugs 92 thereon engage in the slots 64 in the rearward fitting 42 and in the collar 58. The plug 30 is then removed from the T 28, and the wrench 66, together with the by-pass assembly 36 mounted thereon, is quickly pushed through the T 28 and into the service pipe 20 until the rearward fitting 42 and collar 58 are completely received within the service pipe, as shown in Figure 3. In this position of the parts, the tube 38 and forward fitting 40 are held stationary by means of the sleeve handle 90,

while the rod 68 is rotated by means of its handle 70 to thread the nipple 44 into the forward fitting 40 and thereby compress the gasket 48 to expand the same radially outwardly into peripheral sealing engagement with the interior surface of the service pipe 20 and at a location therein beyond the leaky section 34 thereof. After the forward gasket 48 has been thus expanded by the procedure described above, the rod 68 is pulled slightly rearwardly to disengage the spring keys 76 from the slots 54 in the nipple 44 and manipulated to reengage these keys in the slots 52 in the forward fitting 40, as shown in dotted lines in Figure 5. The sleeve 88 is thereafter pulled rearwardly to disengage its lugs 92 from the slots 64 in the rearward fitting 42, while maintaining engagement between its lugs 94 and the slots 62 in the collar 58. Thereupon, the rod 68 is held fixed against rotation by its handle 70 to thereby maintain the tube 38 and rear fitting 42 fixed against rotation while the sleeve 88 is rotated by its handle 90 to thread the collar 58 tightly against the rear gasket 60 to thereby compress and radially-outwardly expand the same into peripheral sealing contact with the interior surface of the service pipe 20 to thus complete the installation of the by-pass assembly 36.

It will be noted that the rod 68 is provided with a circumferential groove having a rubber O-ring 96 disposed therein (Figure 3). This groove and O-ring 96 are so located on the rod 68 that, when the keys 76 on the latter are engaged with either the slots 54 in the nipple or the slots 52 in the fitting, the O-ring makes sealing contact with the interior surface of the rear fitting 42. This contact effects a seal between the rod 68 and the by-pass assembly 36 which effectively prevents flow of gas therethrough while the wrench device 66 is being manipulated to expand the gaskets 48 and 60. Hence, since the outer diameter of both gaskets 48 and 60 is only slightly less than the interior diameter of the service pipe 20, only a very small quantity of gas may escape out of the T 28 past the wrench 66 prior to the expansion of the forward gasket 48, and, once such forward gasket is expanded, no gas may flow through the by-pass assembly 36 as long as the special wrench device is in operative position therein.

After the two gaskets 48 and 60 have been expanded to permanently maintain the by-pass assembly 36 in place in the service pipe 20 and to effectively reline or isolate and seal off the leaky section 34 of its walls, the special wrench device 66 is pulled rearwardly out of the assembly and out of the T 28 and the latter quickly replugged.

It thus will be seen that the objects of the 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 by the spirit and scope of the following claims.

We claim:

1. A wrench device for installing a by-pass assembly of the type described comprising: an elongated rotatable member; a handle on a rearward end thereof; a key projecting radially from a forward end of said member; yieldable means mounting said key for radial inward movement; a sleeve rotatable and axially slidable on said member; at least two longitudinal keys on that end of said sleeve facing said forward end of said member, one of said sleeve keys being offset radially inwardly and longitudinally forwardly of the other; and a handle on the other end of said sleeve.

2. The structure defined in claim 1 including gasket means mounted on the member between the key thereon and the sleeve for peripheral sealing engagement with the interior surface of the by-pass assembly.

3. A wrench device for installing a by-pass assembly of the type described comprising: a rotatable rod; a handle on a rearward end thereof; a radial key resiliently mounted on a forward end of said rod; a sleeve rotatable and axially slidable on said rod; a first key projecting longitudinally from one end of said sleeve toward said forward end of said rod; a second longitudinally-extending key on said sleeve offset rearwardly and radially outwardly of said first key and of greater length than the latter; and a handle on the other end of said sleeve.

4. A wrench device for installing a by-pass assembly of the type described comprising: a rotatable rod; a handle on a rearward end thereof; key means on a forward end of said rod; a sleeve rotatable and axially slidable on said rod rearwardly of said key means; key means on a forward end of said sleeve; a handle on a rearward end of said sleeve; and an O-ring disposed in a circumferential groove in said rod forwardly of said sleeve for peripheral sealing engagement with the interior surface of the assembly.

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