This invention relates to pipe fittings and is more particularly concerned with a temporary by-pass arrangement for use with gas lines.

In domestic and industrial gas supply installations, it is commonly the practice of the gas supplier to increase the capacity of the gas distribution system by elevating the pressure in certain portions of the distribution network. When the pressure is thus elevated, it is necessary to install suitable regulators for reducing the pressure of the gas taken from these high pressure lines for use by individual domestic and industrial users.

It thus becomes necessary to install a large number of such pressure regulators before the high pressure gas can be fed through the lines. The installation of such pressure regulators in a given area which is to be serviced by high pressure gas, may require weeks or even months for its completion. During this period, gas under normal pressure is supplied through the mains and the individual users receiving this normal pressure gas through the pressure reducers are inconvenienced by the limited volume of gas which is thus obtainable. This arrangement is therefore objectionable both from the standpoint of the user and from the standpoint of the supplier, but has been considered heretofore as a necessary inconvenience during the period of pressure reducer installation. It is possible to overcome to some extent the objectionable features of such an installation by the provision of valve arrangements, but such arrangements are relatively expensive and add greatly to the cost and time of the installation, thereby in part defeating their purpose. There remains, therefore, a problem of considerable practical importance.

It is the principal object of the present invention to provide a temporary by-pass assembly for use during the installation of pressure regulators in gas lines which avoids the disadvantages of prior arrangements.

It is another object of the invention to provide a by-pass assembly of the character indicated which permits individual gas users to obtain gas at the full pressure carried in the lines during the period the gas regulators are being installed.

It is another object of the invention to provide a by-pass assembly which is relatively inexpensive and which can be removed and repeatedly reused upon completion of the gas regulator installation program.

It is a further object of the invention to provide a temporary gas by-pass assembly which permits the installation of gas regulators over an extended period of time without affecting the normal supply of gas to the individual users in the area of the installation.

According to the invention, I provide a by-pass assembly comprising a pair of compression coupling T's adapted to be connected to each other and to be connected to the gas main to by-pass the regulator, the runs and the branch of each T being provided with compression type coupling means and one run of each T carrying a valve member adapted for inserting a plug in the gas main when the by-pass is removed.

It is a feature of the by-pass of my invention that it may be installed rapidly and easily and may be removed without damage to the by-pass or to the gas main. It is another feature of my by-pass assembly that it may be removed without the necessity for cutting or otherwise damaging any part of the assembly.

Other features and objects of the invention will be readily apparent from the following detailed description of illustrative embodiments of my by-pass assembly and from the accompanying drawings wherein:

Fig. 1 is a plan view, partly in section, of a by-pass installation involving a removable by-pass assembly embodying features of the present invention;

Fig. 2 is a similar view of a modified form of by-pass assembly in accordance with the invention;

Fig. 3 is a plan view of a by-pass installation similar to that shown in Fig. 1 and showing the relationship of parts after the by-pass unit has been removed;

Fig. 4 is a sectional view taken approximately along the line 4-4 of Fig. 1; and

Fig. 5 is an elevational view showing a modified form of wrench and plug construction.

Referring to the drawings, and particularly to Fig. 1, the numeral 10 designates a gas supply line forming part of a gas distribution system and serving as a branch line for conducting gas from a street gas main (not shown), to an individual consumer's distribution line 12. Positioned between the branch supply line 10 and the beginning of the consumer's local distribution line 12 is a pressure regulator 14 of the type commonly used for supplying gas from a high pressure line at a predetermined reduced pressure. In the lines 10 and 12 at each side of the regulator 14 are T's 16 having runs 18 and forming that elongated branches 19, the branches 19 being internally threaded in the usual manner. Connected to each T 16 with a gas-tight compression fit is a by-pass T 20 of a construction in accordance with my invention. The by-pass T 20 comprises a substantially tubular sleeve or "middle-ring" 22 in which the branch 19 of the T 16 is received. The sleeve 22, which may be of steel, cast iron, brass or other metal, is formed with externally-threaded ends 25 and two inwardly-directed radial ribs 26 which are spaced inwardly from the ends of the sleeve. Each of the ribs 26 has an outer tapered surface 28 which, with the inner surface of the end of the sleeve, defines a gasket recess 29 and terminates at a circular throat 30 formed by the inner surface of the rib. Extending from the side of the sleeve 22 and centrally thereof, is a branch 31 having a threaded end 32 and an inwardly-directed radial rib 33 which defines a gasket recess 34 substantially identical in construction to the gasket recesses 29. At the point of juncture of the branch 31 with the main body portion of sleeve 22 there is advantageously formed a pipe stop 37 to prevent pipes entering through branch 31 from passing into the main body portion of sleeve 22.

As shown in Fig. 1, the T run 18 is received in one of the ends 25 of by-pass 20 while a cylindrical wrench body 40, the purpose of which will be described fully hereinafter, is received in the other end 25. It will be observed that the T run 18 and the wrench body 40 advantageously are received in the throats 30 with only a small clearance.

 Fluid-tight sealing engagement between the ends of sleeve 22, T branch 19 and wrench body 40 is effected by compression of gaskets 45, which, in the embodiment illustrated, are annular in form and are shaped to be received in the gasket recesses 29 of sleeve 22. The gaskets 45 are formed from rubber or rubber composition, this term being used generically to include natural and synthetic rubbers and other elastomeric compounds, or compositions having like properties and characteristics. The material is relatively firm and solid but sufficiently
resilient and elastic to flow under pressure to conform to the surfaces between which it is confined. Advantageously, gaskets 45 are formed from a rubbery composition which is relatively resistant to attack by hydrocarbon gases and oils. Examples of such resistant rubbery compositions suitable for use with my by-pass assembly are Neoprene (polychloroprene) and butadiene-acrylonitrile copolymers, such as those known commercially by the trade designations Buna-N or GR-A. My gasket is not limited to these specific materials, however, and particularly when special resistance to hydrocarbon gases and oils is not required, any rubbery composition having the above-noted characteristics may be employed.

Each of the gaskets 45 is compressed and urged into sealing engagement with the tubular element around which it is placed, e.g. the wrench body 40 and the T branch 19, by means of a follower nut 48, which is provided with internal threads 50 for engagement with the threaded ends 25 of sleeve or middle-ring 22. Each follower nut 48 is formed with a central aperture 51 of sufficient diameter to receive the wrench body 40 or the T branch 19 conveniently. In order to confine and protect the gaskets 45 and to prevent frictional resistance by the gasket when the follower nuts 48 are rotated in tightening or loosening the by-pass T, there are provided suitable gasket follower means. In the embodiment shown in Fig. 1, each of the gasket followers takes the form of a substantially cup-shaped annular member 45 conveniently stamped or otherwise formed from a metal sheet to define a body portion 56 formed with an aperture 58 substantially the size of aperture 50 of follower nut 48, and a peripheral flange 59 which is dimensioned to be received interiorly of the threaded end 25 of sleeve 22. When the follower nuts 48 are tightened upon the end of the sleeve 22, the followers 45 are urged axially inwardly and axially compress the gaskets 45 in the gasket recesses 29, thereby causing the gaskets to expand radially inwardly into tight sealing engagement with the inwardly-adjacent surface, viz. the surfaces of T branch 19 and the wrench body 40.

When the follower nuts 48 are tightened, as described, there may in some cases be a tendency for the gasket to be extruded past the rib 26. Although only a small amount of extrusion may occur, in any case, and although such extrusion is not necessarily detrimental and does not affect the sealing qualities of the gasket, since it is one feature of my by-pass assembly that it may be re-used repeatedly, it is desirable to avoid possible damage to the gaskets by such extrusion. For this reason I advantageously provide at the inner end or "tee" of the gaskets 45 an elastic ring 60 which normally holds the gaskets closely against the outer surface of the cylindrical surface around which the gaskets are positioned. The expansible ring 60 is advantageously in the form of an annular armor helix which is molded into the rubber composition of the gasket by known means. The endless helix 60 may be wound of wire or otherwise formed and has successive turns substantially in contact with one another. The ring 60 is preferably imbedded in the gasket 45 so as to be substantially flush with the inner face of the gasket and also with the outer end face. When the gasket is compressed, the expansible ring is forced between the tapered surface 28 and the surface of the T branch 19 or the wrench body 40 and thus effectively closes the annular aperture between the adjacent surfaces. While, as I have described, I prefer to form the expansible ring 60 as an integral part of the gasket, as shown in Fig. 1, it may, if desired, be formed separately.

The end of the branch 31 of my by-pass T 20 is, as previously indicated, substantially identical in structure with the sleeve ends 25 and is similarly provided with a gasket 64, a follower nut 66 and a follower 68, corresponding to the above-described gaskets 45, follower nuts 48 and followers 55.

As mentioned, my by-pass assembly is intended to be installed temporarily and then to be removed and re-used in another temporary installation. When the by-pass is removed, the opening into the line in which the by-pass was installed must necessarily be closed. For this purpose, I provide a plug which is normally carried by the wrench body 40 and is screwed into place by means of a removable handle member 69 which is received in a passageway 70 formed in the outer end of wrench body 40. Referring to Fig. 1, the inner end of the wrench body 40 tapers inwardly and terminates in an axial projection 71 which fits in the slot 72 of the plug 75. The projection 71 of the wrench body 40 and the upper end of the plug 75 are provided with cooperating apertures 73 and 77, respectively, through which is passed a lock wire 78 for securing the plug 75 to the wrench 40. The above-described construction is shown in detail in Fig. 4.

It will be apparent that the cooperating portions of the plug and the wrench may be varied. For example, as shown in Fig. 5, the wrench body 40a may be formed with a polygonal recess 71a and the plug 75a may be formed with a polygonal projection 72a which is received in the recess 71a. Cooperating apertures 76a and 77a are provided for reception of the lock wire 78a.

When not in use, the by-pass assembly is to be uninstalled by random withdrawal of the cooperating components of the plug and wrench. To do this, the outer follower nuts 48 are loosened slightly and the wrench bodies 40, by means of the removable handle member 82 are moved inwardly to seat the plugs 75 in the branches 19. Both branches 19 are then sealed off and all of the gas in the line 10 flows through the pressure regulator 114 into the line 12. The by-pass is then no longer necessary. To remove the by-pass, the outer follower nuts 48 are loosened, the handle member 69 removed and the assembly is then pulled straight out over the wrench bodies 40. The lock wires 78 are then loosened to permit removal of the wrench bodies from the plugs 75. This will be clear by reference to Fig. 3. It will be apparent that the particular structure of my by-pass assembly is susceptible of considerable modification without changing its manner of functioning. Referring to Fig. 2, for example, wherein parts corresponding to those shown in Fig. 1 have been given similar reference numbers to which 100 has been added, the gas regulator 114 is provided in the gas supply line and reducing T's 116 are placed in the line on each side of the regulator 114. Instead of being an element of the embodiment of Fig. 1, T's 116 have...
3,711,753. 5 relatively short branches 119 and a nipple 121, which is externally threaded at one end and internally threaded at the other, is secured in each of the branches 119, as shown in Fig. 2. Connected to the nipples 121 are the by-pass T's 126 and 127, each being provided with the wrench bodies 140 at their outer ends. The wrench bodies 140 are scored at 190 to facilitate placing of the plug 175 completely free of the by-pass T branch 131.

In Fig. 3 there is shown a gas line containing a gas regulator 214 and two conventional T's 216. Inserted in the branch 219 of each of the T's 216 is a nipple 218 which is externally-threaded at the end received in the branch 219 and internally-threaded at its opposite end. In Fig. 3 the position of the parts is shown after the by-pass T has been removed. After the wrench bodies 240 are removed from the plugs 275, a seal wire 290 may be passed through apertures 277 in each plug 275 and through suitable apertures in T branch 219, to prevent tampering.

It will be obvious to those skilled in the art that various other changes and modifications may be made in the embodiments of the invention described and illustrated without departing from the scope of the invention as defined in the appended claims and it is intended, therefore, that all matter contained in the foregoing description and in the drawings shall be interpreted as illustrative and not in a limiting sense.

What I claim and desire to secure by Letters Patent is:

1. A readily-removable temporary by-pass for a pipe line including a pair of spaced-apart T's having threaded extensions for diverting the flow of liquid from the portion of said pipe line between said T's, a pair of T couplings removably connectable in fluid-communicating relationship with said line T's, each of said T couplings comprising a tubular sleeve portion defining the runs of the T coupling and a branch portion communicating with the interior of said sleeve portion, one of said runs having a nut threadedly engageable therewith and dimensioned to receive one of said T extensions, gasket means cooperating with said nut for providing a fluid-tight connection between said T extension and said run, a removable conduit interconnecting the branch portions of said coupling T's in flexible fluid-tight relationship, cylindrical wrench means slidably extending into each sleeve through the run free from connection with said threaded extension, the wrench receiving run being provided with a threadedly engageable nut dimensioned to receive the cylindrical wrench means and gasket means cooperating with said nut for providing a fluid-tight connection between said nut and said wrench means, pipe closure means removably secured to the inner end of each of said wrench means, said pipe closure means being engageable with said threaded extensions interiorly of said sleeve for closing said extensions, said wrench means being rotateable and axially slidable in said runs, and being slidable away from said T extensions sufficiently to permit free flow of fluid through said T couplings and said conduit while said wrench means are retained in fluid-tight relationship in said T couplings, said T couplings being wholly removable axially of said wrench means when said wrench means is moved axially inwardly to engage said pipe closure means with an extension.

2. In a readily-removable temporary by-pass for a pipe line including a pair of spaced-apart T's having internally threaded extensions for diverting the flow of liquid from the portion of said pipe line between said T's, a pair of T couplings removably connectable in fluid-communicating relationship with said line T's, each of said T couplings comprising a tubular sleeve portion defining the runs of the T coupling and a branch portion communicating with the interior of said sleeve portion, one of said runs having a nut threadedly engageable therewith and dimensioned to receive one of said T extensions, gasket means cooperating with said nut for providing a fluid-tight connection between said T extension and said run, a removable conduit interconnecting the branch portions of said coupling T's in flexible fluid-tight relationship, cylindrical wrench means slidably extending into each sleeve through the run free from connection with said threaded extension, the wrench receiving run being provided with a threadedly engageable nut dimensioned to receive the cylindrical wrench means and gasket means cooperating with said nut for providing a fluid-tight connection between said nut and said wrench means, pipe closure means removably secured to the inner end of each of said wrench means, said pipe closure means being engageable with said threaded extensions interiorly of said sleeve for closing said extensions, said wrench means being rotateable and axially slidable in said runs, and being slidable away from said T extensions sufficiently to permit free flow of fluid through said T couplings and said conduit while said wrench means are retained in fluid-tight relationship in said T couplings, and the end of said wrench means extending beyond the coupling T even when said closure means is engaged with said extension, removable handle means for rotating said wrench means, and indicia on said wrench means for indicating the extent of withdrawal to permit said free flow of fluid, said T couplings being wholly removable axially of said wrench means when said wrench means is moved axially inwardly to engage said pipe closure means with an extension.

4. In a pipe line, a pair of spaced-apart T's having internally threaded extensions, a readily-removable temporary by-pass assembly connecting said T's for diverting the flow of liquid from the portion of said pipe line between said T's, a pair of T couplings removably connectable in fluid-communicating relationship with said line T's, each of said T couplings comprising a tubular sleeve portion defining the runs of the T coupling and a branch portion communicating with the interior of said sleeve portion, one of said runs having a nut threadedly engageable therewith and dimensioned to receive one of said T extensions, gasket means cooperating with said nut for providing a fluid-tight connection between said T extension and said run, a removable conduit interconnecting the branch portions of said coupling T's in flexible fluid-tight
relationship, cylindrical wrench means slidably extending into each sleeve through the run free from connection with said threaded extension, the wrench receiving run being provided with a threadedly engaged nut dimensioned to receive the cylindrical wrench means and gasket means cooperating with said nut for providing a fluid-tight connection between said nut and said wrench means, pipe plugs and means removably securing said plugs to the inner end of each of said wrench means, said pipe plugs being engageable with said threaded extensions interiorly of said sleeve for closing said extensions, said wrench means being rotatable and axially slideable in said runs, and being slideable away from said T extensions sufficiently to permit free flow of fluid through said T couplings and said conduit while said wrench means are retained in fluid-tight relationship in said T couplings, said T couplings being wholly removable axially of said wrench means when said wrench means is moved axially inwardly to engage said pipe closure means with an extension.

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