

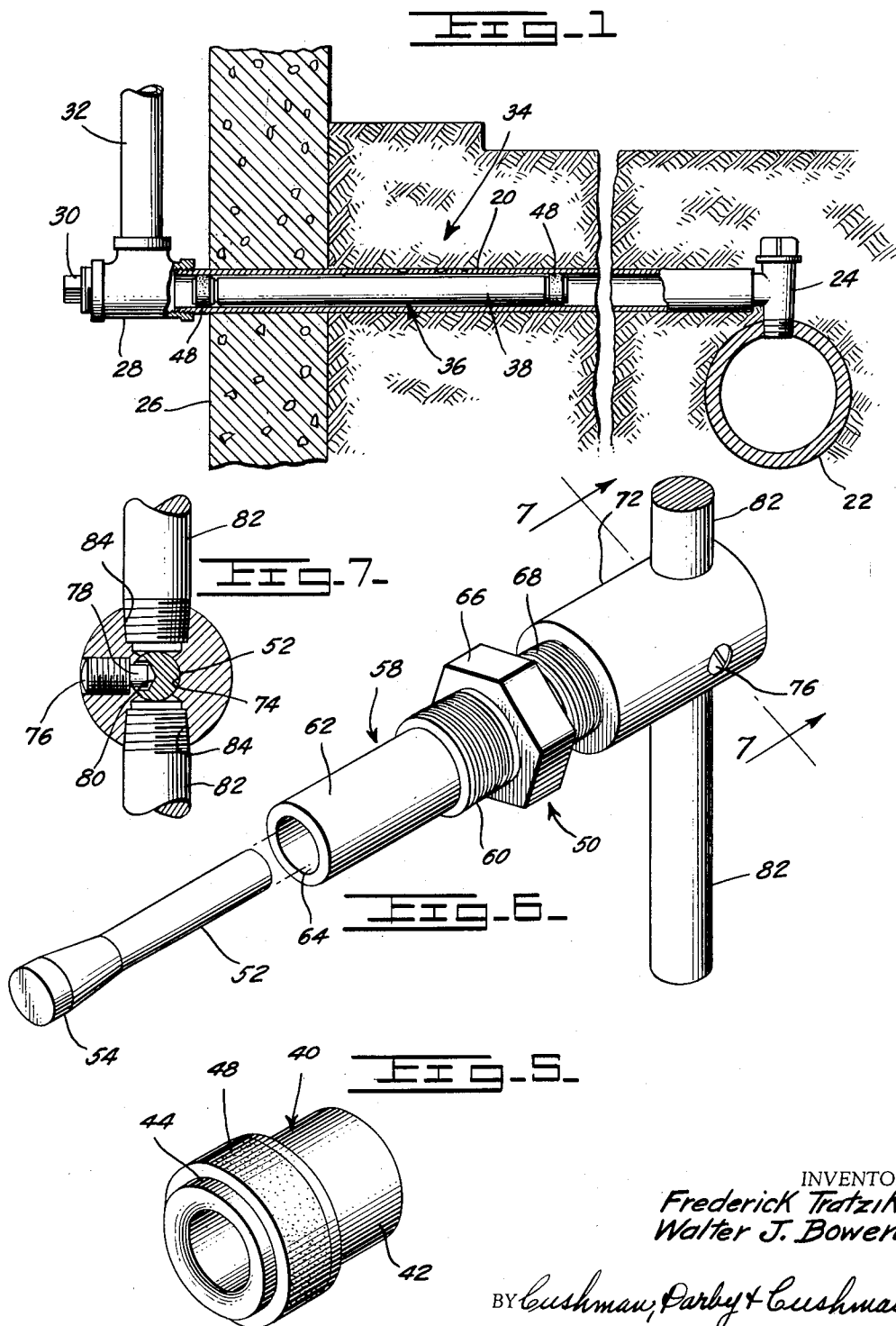
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BY-PASS ASSEMBLY FOR SERVICE PIPE
AND METHOD OF INSTALLATION

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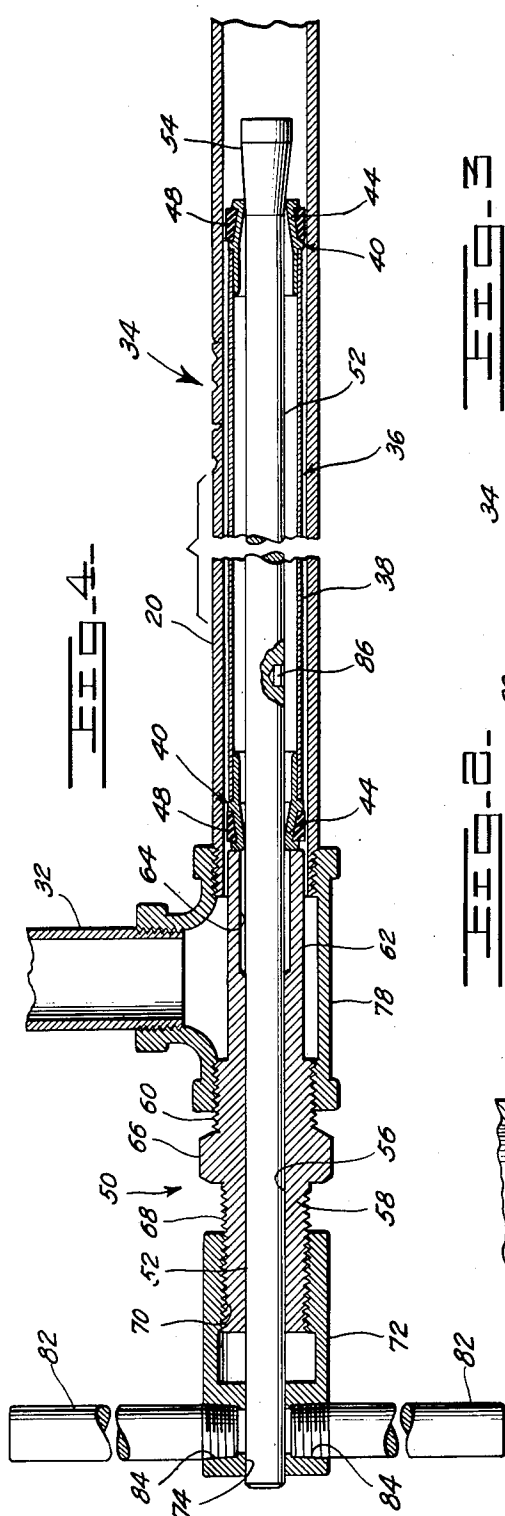
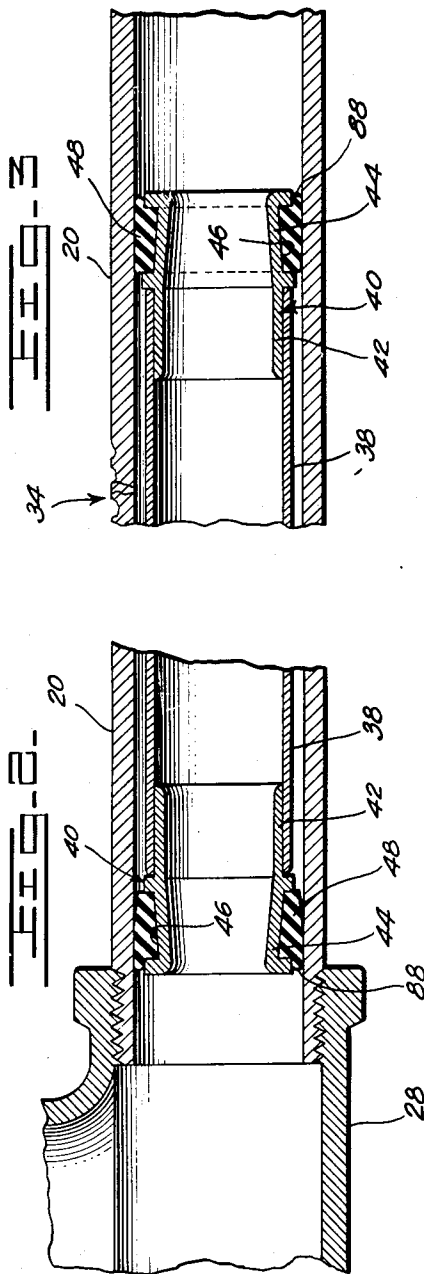
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BY-PASS ASSEMBLY FOR SERVICE PIPE AND METHOD OF INSTALLATION

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3 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. 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 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 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 construction.

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

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this invention, such tool not only facilitating the installation of the assembly, but also being of such simplified design that the tool may be manufactured at little expense.

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 gases 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 left-hand end of the installed by-pass assembly shown in Figure 1.

Figure 3 is an enlarged fragmentary vertical sectional view illustrating the details of the right-hand end of the installed by-pass assembly shown in Figure 1.

Figure 4 is an enlarged vertical sectional view illustrating the manner of installing a by-pass assembly embodying this invention and a special tool embodying this invention for effecting such installation.

Figure 5 is a perspective view of a fitting included in a by-pass assembly embodying this invention.

Figure 6 is a perspective view of the special tool used to install a by-pass assembly embodying this invention.

Figure 7 is a fragmentary detailed transverse sectional view taken substantially on line 7—7 of Figure 6.

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 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 other reasons, so that the 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 by-pass assembly 36 embodying this invention.

The by-pass assembly 36, best shown in Figure 4, consists of a main body portion in the form of a copper or brass tube 38 having identical fittings 40 soldered or brazed to the opposite ends thereof. Since these fittings 40 are identical, a description of one will suffice for both. Preferably, each fitting 40 is formed of copper or a similar non-corrodible metal or metal alloy which is somewhat ductile for reasons later apparent. The fitting 40 has an exteriorly reduced end portion 42 which is snugly received within one end of the copper tube 38 and brazed or soldered thereto in a conventional manner, as shown in Figures 2 and 3. The other end portion 44 of the fitting 40 is somewhat contracted, as best shown in Figure 4, so that both the interior and exterior diameters of this end of the fitting are less than the corresponding diameters of that portion of the fitting immediately outside of the end of the tube 38.

The contracted or constricted portion 44 of the fitting 40 is provided with an exterior circumferential groove 46 in which is snugly disposed an annular packing gasket 48, preferably of rubber or other resilient material hav-

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ing adequate packing qualities. As shown in the drawings, the interior peripheral surface of the annular gasket 48 is frusto-conical to conform with the bottom of the groove 46, while the exterior peripheral surface of the gasket is cylindrical and of a diameter slightly less than the interior of the service pipe 20. It will be noted that the interior surface of the fitting 40 is flared or gently rounded outwardly at both ends thereof to provide for a smooth flow of fluid therethrough.

In use, the by-pass assembly 36 is installed in the service pipe 20, as shown in Figure 1, 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 radially expanding the constricted portion 44 of each fitting 40 (as shown in Figures 2 and 3) to thereby force the exterior cylindrical surface of the packing gaskets 48 into tight peripheral sealing engagement with the interior walls of the service pipe 20. Because of the inelasticity of the metal forming the fittings 40, their expansion is substantially permanent and will serve to maintain indefinitely the aforescribed tight peripheral seal between the annular gaskets 48 and the interior walls of the service pipe 20.

When the assembly is 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 pipe through the by-pass assembly 36 and into the T 28 for distribution through the riser 32 to the building piping 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 assembly will remain effective for its intended purpose for an extended period of time. Likewise, the rubber packing gaskets 48 will also 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 expanding tool 50 (Figure 6) that is insertable into the assembly 36 from the rearward end thereof. The tool 50 consists of a long expanding rod 52 having a diameter slightly less than the minimum interior diameter of the constricted portions 44 of the fittings 40. On its forward end the rod 52 is provided with a rearwardly tapering expanding head 54 of a diameter greater than the interior diameter of the constricted portion 44 of the fittings 40. The rod 52 is of a length to extend completely through the T 28 and through the by-pass assembly 36 so that the flaring head 54 may be positioned beyond the forward end of the assembly, as shown in Figure 4. Outside of the service pipe 20, the rod 52 extends snugly through an axial bore 56 in a tubular member 58 having exterior threads 60 between its ends for engaging with the interior threads at the plug end of the T 28. The tubular member 58 has a portion 62 which extends forwardly through the T and into the service pipe 20 to serve as an abutment for the rearward end of the rear fitting 40. The bore 56 of the member 50 is interiorly enlarged at its forward end, as at 64, so that the expanding head 54 of the rod 52 may be completely received within such enlarged portion of the bore, for a purpose which will be later explained.

Rearwardly of the T-engaging threads 60 of the tubular member 58, the latter is provided with an exterior square or hexagonal portion 66 for engagement by an appropriate wrench (not shown) for tightening the member into the T 28. Rearwardly of the wrench-engagable portion 66 of the tubular member 58 there are pro-

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vided exterior feed threads 68, engageable by the interior threads 70 of a feed sleeve or nut 72. The rearward portion of this feed sleeve or nut 72 is interiorly reduced to provide an axial bore 74 of substantially the same diameter as the bore 56 in the tubular member 58 and within which the expanding rod 52 is received. The expanding rod 52 is detachably connected to the feed sleeve 72 by a set screw 76 having a dog point 78 that is engageable within an appropriate indentation or complementary recess 80 in the side of the expanding rod. The feed sleeve 72 is also provided with appropriate means for rotating the same, such as the radial handles 82 which are threadedly engaged in sockets 84 at the rearward end of the feed sleeve. Between the indentation or set screw receiving recess 80 and the expanding head 54 of the rod 52 there is provided in the latter another set screw receiving recess 86 for a purpose presently to be described.

In use of the tool for installation of the bypass assembly 36, the set screw 76 is loosened and the rod 52 pulled out of the nut 72 and the tubular member 58 from the forward end of the latter. The by-pass assembly 36 is then slipped over the rear end of the rod 52 until the forward fitting 40 of the assembly engages against the expanding head 54 on the rod. The rod 52 is then reinserted into the tubular member 58 and into the feed sleeve 72 and secured to the latter by tightening the set screw 76 into the recess 80. The plug 30 is then removed from the T 28 and the tool 50, together with the by-pass assembly 36 mounted thereon, quickly is pushed through the T 28 and into the service pipe 20 until the thread 60 on the tubular member 58 are engaged with the threads at the plug end of the T 28. A wrench is then applied to the wrench-engaging portion 66 of the tubular member 58 and the latter tightened into the T 28, as shown in Figure 4. The feed sleeve 72 is then rotated by means of the handles 82 to move the sleeve rearwardly with respect to the tubular member 58, thereby pulling the expanding head 54 into the constricted portion 44 of the forward fitting 40. Since the rearward end of the assembly 36 abuts the forward end of the tubular member 58, continued rearward drawing movement of the expanding rod 52 will serve to pull the expanding head 54 completely through the forward fitting 40 and during such process will expand the constricted portion 44 of the latter. Such expansion of the constricted portion 44 of the forward fitting 40 will serve to radially outwardly expand the annular gasket 48 mounted thereon and to force the latter into peripheral sealing engagement with the interior surface of the service pipe 20, as shown in Figure 3.

After the forward gasket 48 has been thus expanded by the procedure described above, the set screw 76 is loosened and the rod 52 pulled rearwardly through the tubular member 58 and the feed sleeve 72 until the expansion head 54 engages with the constricted portion 44 of the rearward fitting 40. In this position of the parts, the sleeve 72 is fed forwardly until the recess 86 in the rod 52 is located in a position to be engaged by the set screw 76, so that upon tightening the latter the rod will again be secured to the feed sleeve 72 for rearward drawing movement thereby. Thereupon, the rearward fitting 40 is expanded and its gasket 48 forced into peripheral sealing engagement with the interior walls of the pipe 20 (Figure 2) by the same procedure described above for the expansion of the forward fitting. In this connection it will be noted that the interior enlargement 64 in the member 58 receives the head 54 so that the latter can be pulled completely through the rear fitting 40.

After the two gaskets 48 have been thus forced into sealing engagement with the interior walls of the service pipe 20 to permanently maintain the by-pass assembly 36 in place in the latter and to effectively reline or isolate and seal off the leaky section 34 of its walls, the tubular mem-

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ber 58 may be unthreaded from the T 28, the tool 50 completely removed therefrom, and the T quickly re-plugged.

The major radial thickness of the rubber gaskets 43 is relatively large so that the by-pass assembly 36 may be effectively installed in undersized as well as in oversized service pipes. For example, when the assembly is installed in a pipe having an oversized interior diameter, expansion of the constricted portion 44 of the fitting 40 will expand the gasket 43 sufficiently radially to make a tight seal against the interior surface of the service pipe. Again, should the interior diameter of a service pipe be somewhat undersized, so that the assembly 36 is barely receivable therein, during expansion of the constricted portion 44 of the fitting 40 by the aforescribed procedure, gasket rubber may flow outwardly beyond the outer end of the fitting, as at 88 in Figures 2 and 3, in order to permit the constricted portions of the fittings to be expanded sufficiently for passage of the expansion head 54 therethrough.

It will be noted that once the tubular member 58 is tightened into the T 28, very little gas can escape into the basement because of the snug fit between the expanding rod 52 and the walls of the bore 56.

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 by the spirit and scope of the following claims.

We claim:

1. A by-pass assembly for insertion into a service pipe to isolate the walls of a section thereof comprising: an open-ended, substantially integral tubular member interiorly unobstructed throughout its entire length and having no movable parts, said member being provided with ductile metal end portions of exterior and interior reduced diameter, the interior of said member between said end portions being of a diameter larger than the minimum interior diameter of said end portions; and a yieldable annular gasket mounted on each of said end portions and of a diameter less than the interior diameter of the pipe, radial expansion of said end portions by an expanding tool inserted in said member being adapted to force said gaskets into peripheral sealing engagement with the interior surface of the pipe.

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2. A by-pass assembly for insertion into a service pipe to isolate the walls of a section thereof comprising: an open-ended, substantially integral tubular member interiorly unobstructed throughout its entire length and having no movable parts, said member being provided with ductile metal end portions each having an exterior, circumferential groove, said end portions tapering interiorly and exteriorly toward the corresponding end of said member and the interior of said member between said end portions being of a diameter larger than the minimum interior diameter of said end portions; and a yieldable annular gasket mounted in each of said grooves and of a diameter less than the interior diameter of the pipe, radial expansion of said end portions by an expanding tool inserted in said member being adapted to force said gaskets into peripheral sealing engagement with the interior surface of the pipe.

3. The method of isolating, while in service and with a minimum escape of fluid to the atmosphere, the walls of a section of service pipe having one end thereof connected to one end of a T which has its other end closed by a removable closure, the steps comprising: removing the closure; rapidly inserting through the T and into the pipe section an expanding tool having a tubular member mounted thereon for positioning within the pipe section, and substantially sealing the other T end by the tool; expanding both end portions of the member into sealing engagement with the walls of the pipe section while the other end of the T is sealed; removing the tool; and rapidly replacing the closure.

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