

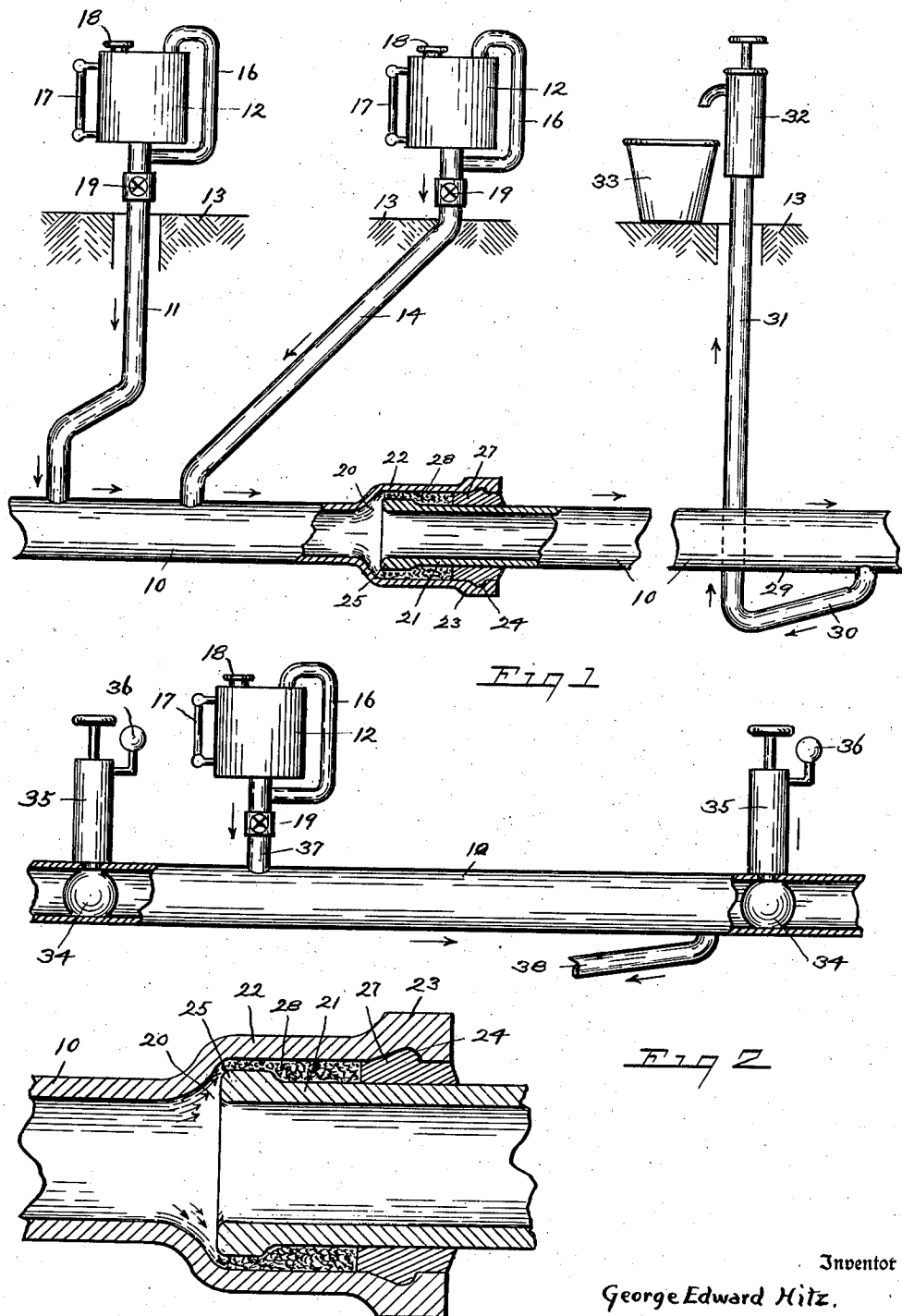
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METHOD OF RESATURATING FIBROUS PACKING

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METHOD OF RESATURATING FIBROUS
PACKINGGeorge Edward Hitz, Poughkeepsie, N. Y., assign-
or to The United Gas Improvement Company,
a corporation of PennsylvaniaApplication June 7, 1933, Serial No. 674,699
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3 Claims. (Cl. 285—109)

This invention relates to a method of treating the joints of gas mains and pipes of the cast iron bell and spigot types, or other types and materials which incorporate in their assembly the use of packing for the joints, such as jute, or other suitable material which is backed up with a suitable material, to render them impervious to leakage of the contained gas from the pipe line or conductor to the surrounding earth or atmosphere.

The invention relates especially to gas transmission and distribution systems, which have been for some period utilized for the conveyance of gas or gases completely saturated with water vapor, tar vapor, naphthalene, toluene, benzene and other condensable hydrocarbons and similar constituents, and these agents were deposited by condensation within the gas main or conduit and were absorbed by the joint packing; and this process being of a continuing nature, rendered the joints gas tight during the period of the saturated gas.

In recent years in many localities, gas manufactured and distributed locally has been superseded by a supply of natural gas, manufactured gas or mixtures of the two coming from a distant source. In order to deliver the gas over a distance, it is necessary to compress it at the source to medium or high pressures ranging from 1# per square inch to over 300# in some cases, and where manufactured gas is transmitted in this pressure range the humidity of the gas is reduced to a point below complete saturation.

As a result of this condition the gas tends to absorb any moisture present in the joints of the distribution system which was previously deposited by condensation from the saturated gas, and in other words gas which is completely saturated will deposit condensation of water vapor, light oil vapor and other constituents as the temperature of the pipe or conduit is reduced below the temperature at which the gas was originally saturated, either from contact in a water sealed gas holder or from the particular process of gas manufacture.

With the introduction of the partially saturated or dry-gas a reverse action is set up, and in this case the gas has an affinity for moisture and absorbs any oil or water present in the packing of the joints of the pipe line or its connections, rendering it dry and susceptible to leakage through the joints to the surrounding earth or atmosphere.

The object of the present invention is to provide a simple, efficient and economical process to introduce a medium to saturate the fibrous packing in existing conventional type bell and spigot gas main joints without exposing said joints by excavation, and without mechanical changes or additions to said joints.

The object of the invention is to provide a sealing medium that will readily and quickly resaturate the packing in the pipe joints and maintain such a saturated condition for a long period of time, and such a sealing medium must have certain characteristics that will adapt it both physically and economically for the purpose for which it is to be used.

Such a sealing medium or compound should have the following characteristics:

(1) The liquid must not be corrosive to steel, wrought iron, cast iron, malleable iron, cement, rubber, brass, copper or aluminum as some or all of these materials are used in the construction of gas transmission and distribution mains.

(2) The liquid must have a proper viscosity factor to insure travel through the conveying pipes or conduits and for the proper absorption of the liquid by the packing through capillary attraction.

(3) The liquid must have a low vapor pressure at ordinary temperatures as experienced in the ground at depths of two to four feet and in the atmosphere. This is necessary to prevent absorption of the liquid by the gas, and thereby remove the material from the packing of the joint.

(4) The liquid should be hygroscopic to insure some absorption of water vapor if the confined gas is partially saturated, thereby aiding in keeping the joint moist.

(5) The liquid should have a high boiling point and be non-volatile.

(6) The liquid should have the quality of being a softening or moistening agent so as to thoroughly saturate the joint packing.

Consistent with the above characteristics examples of some suitable liquids or compounds for this purpose are herewith indicated, but other suitable sealing compounds may be used for the purpose:

Diethylene glycol, $\text{CH}_2\text{OH}-\text{CH}_2\text{OCH}_2-\text{CH}_2\text{OH}$;

Ethylene glycol, $\text{CH}_2\text{OH}-\text{CH}_2\text{OH}$; or

Mixtures of diethylene glycol and ethylene glycol.

In the drawing:

Figure 1 shows a sectional elevation of an under ground gas pipe service line, illustrating two methods for introducing the sealing liquid to the joints.

Figure 2 is a similar view of an under ground pipe line, and shows another method of treating the joints with the sealing liquid.

Figure 3 is an enlarged sectional view of a pipe joint to illustrate the manner of packing the same.

The following methods are to be considered as a part of the invention as they are all closely related and all or part may be applicable to specific cases.

(1) The liquid sealing compound may be introduced by gravitational flow from the end of the pipe line 10, at an elevation above that part of the gas main to be treated, by the use of a feed pipe 11, connected at its lower end to said gas main 10, and at its upper end to a feed tank 12, placed above the ground or roadway 13, or such a feed tank 12 may be connected to the upper end of a service feed pipe 14 that leads to a building, and is connected to the gas main.

When this method is employed, the liquid is admitted to the gas main at a rate consistent with the gradient of the gas main to be treated, the liquid passing from the feed tank 12 through the pipe 11 to the main 10, through which it flows by gravity and meets that annular space 20 existing at the gas main joint where the spigot end 21 of one length of pipe meets the bell 22 of the other length of pipe, and by referring to Figure 3, showing such a joint in detail, it shows that the bell 22 is formed with an outer flange 23 and an inner annular groove 24, and that the end of the other length of pipe is formed with a beaded end 25, and that the pipe end 21 and the bell end 22 are so mounted together that an annular packing space is left between the two, and this space extends between the bead 25 and the bottom of the bell 22, forming an annular space 22; within which is called the fibrous material such as jute 28, which extends within the bell 22 around the pipe end 26 to a point adjacent the groove 24, and upon this packing is placed the lead packing 27 in the usual manner, and from this it will be seen that the jute or fibrous packing communicates with the interior of the pipe in such a way that it will readily be treated with the liquid which is taken up by absorption and capillary attraction.

By a continuing action over a period of time, the joint packing 28 is completely saturated with the liquid and the packing 28 and joint rendered impervious to gas flow, due to the expansion of the packing 28 and the closing of the interstices of the joint.

The excess liquid not absorbed by the joint in the process continues to flow to the bottom of the main slope 29 at which point there is usually a so-called drip receptacle 30, from which the liquid may be pumped through the pipe 31 by the hand pump 32 located above the ground 13 and discharged into a pail 33 or other container.

In order to introduce the liquid into the gas main against any gas pressure carried therein, a device, herewith illustrated in the drawing as the feed tank 12 is employed, and this comprises a tank designed to withstand the prevailing gas pressure, and fitted with a gas pressure equalizing pipe 16 extending from the gas pressure side at the tank outlet, to a point at the top of the tank, thereby neutralizing the effect of the gas pressure against the liquid head. The tank 12 is also provided with a filler opening in the top fitted with a gas tight filler plug 18, and a gage glass 17 is mounted on the side of the tank 12 to provide means for gaging the liquid height and rate of input or feed from the tank.

(2) By cutting a lateral main (branch from a line at right angles to it, which is so constructed as to prevent the flow of liquid from the main line to the lateral or branch line) at a convenient point where the main may be separated from the continuing lateral main, either by divorcing it, or by bagging. A feed pipe is then connected to the top of the main and extended to a height above the highest point in the main to be treated and the liquid is fed from the tank 12, or other suitable apparatus until the liquid level in the riser pipe is above the highest elevation of the pipe to be treated. The liquid is allowed to remain in the pipe for a suitable length of time and is then removed by a syphon, gravity or pumping.

It will be understood that if a packing material has been treated or otherwise rendered wholly non-absorbent in character such, for instance, as by the application and drying of tar, impregnation will obviously require the absorbent condition to be restored prior to or during the course of the treatment set forth herein as described and claimed in copending application, Serial No. 128,556 filed March 1, 1937 by John R. Skeen.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A method of opposing leakage at the fiber packed joints of gas pipes which comprises flowing hygroscopic sealing fluid along the bottom of the inside of a gas pipe into contact with a portion of the fiber packing of successive joints, and raising the sealing fluid into other portions of said fibrous packings by capillary action.

2. Method of leak-proofing packed bell and spigot joints in gas conduits which comprises internally contacting the fibrous packing in said joints with a relatively non-volatile, mildly viscous, hygroscopic liquid which is substantially inert with respect to the gas in said conduits.

3. The method of leak-proofing packed bell and spigot joints in gas conduits without interrupting service which comprises introducing a relatively non-volatile, mildly viscous, hygroscopic liquid which is substantially inert with respect to the gas in said conduits and allowing said liquid to flow by gravity to low points in said conduits, whereby the packing in said joints is internally moistened with said liquid.

GEORGE EDWARD HITZ.