

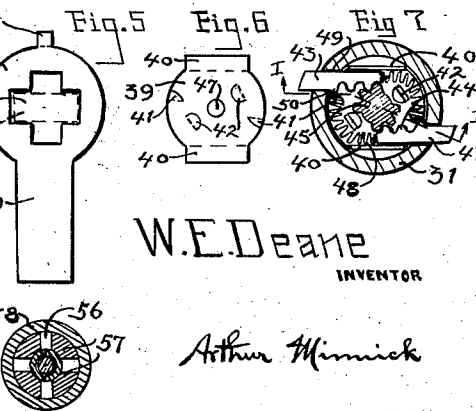
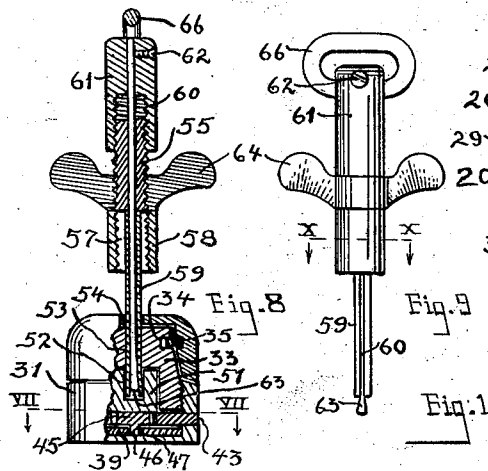
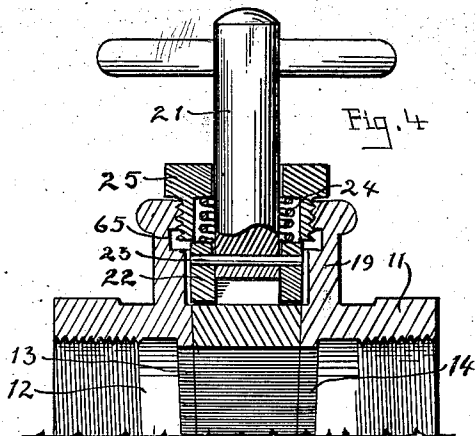
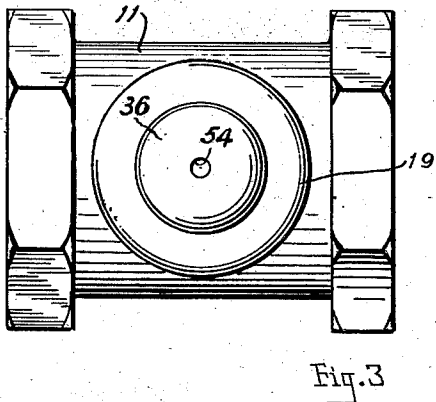
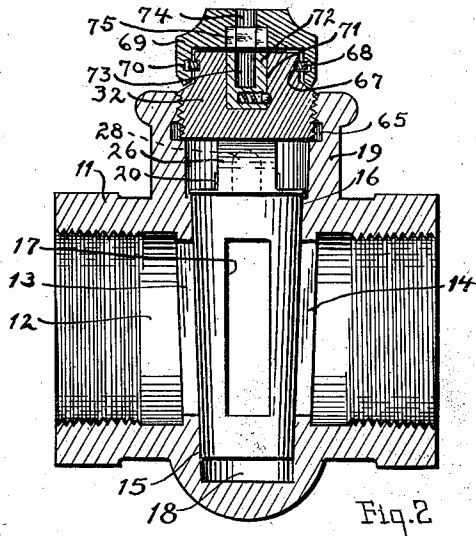
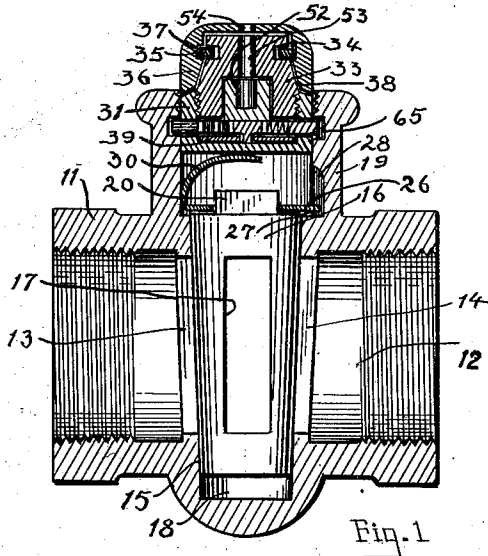
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CONCEALED VALVE AND LOCK PLUG

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CONCEALED VALVE AND LOCK PLUG

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3 Claims. (Cl. 70—176)

This invention relates to valves for liquids and gases for use in places where it is desirable to provide means for preventing unauthorized opening and closing of the valves.

5 Theft of gas and of water causes great loss of income to public utilities companies and to cities operating municipal gas or water plants. Where meters have been installed in residences, there is frequently great difficulty in gaining admission 10 to the house to shut off gas and to remove meters where persons have delinquent accounts which often run for long periods before the company can shut off the supply and recover their meter. To cut off the service at the street where no 15 valve is usually placed involves a fee to the city for opening privileges, besides the cost of labor and the cost of replacing pavement, even where a permit to open is granted. The service lines of pipe frequently have no valves or unions between the main and the meter.

It is current practice to provide a valve at the meter bar which is closed when the meter is removed, but often this valve has no lock or other means to prevent its being opened and unauthorized 25 use of gas is accomplished by simply replacing the meter by a piece of tubing which can readily be removed and concealed when a representative of the gas company arrives to inspect their equipment. It is seldom that a case can be made against offenders because of the difficulty 30 in obtaining admission to the premises.

Lock valves having various forms of keys have been found objectionable because the key openings can so easily be stopped up with broken off 35 pieces of wood or metal, thus preventing the use of the regular key, and in many cases rendering it necessary to remove the damaged valve from the line.

The present invention seeks to overcome the objections urged against the usual lock valves by providing a device which can be used anywhere 40 between the main and the meter, preferably before the line enters the house, and having a simple and easily operated closure for persons having a special tool, but forming a locking device which cannot be opened by those not so equipped without destroying the integrity of the valve.

It is a primary object of the present invention to provide a valve casing within which the rotary valve is completely hidden by a plug which cannot be taken out by any ordinary key or tool and the operation of which cannot be determined by inspection of the exposed parts. A further object is to provide the lock plug with a smooth 55 cylindrical opening for the reception of the un-

locking tool, the opening having no recesses or projections to be engaged by a tool to remove the plug or to operate its locking means, but permitting the use of an ordinary drill for the removal of any piece of foreign material in the bore that 5 may prevent the normal operation of the lock. A still further object of the invention is to make the projecting portion of the plug freely rotatable so that its turning accomplishes nothing toward opening the valve. Another object is 10 the provision of a handle assembly which may normally be used to open and close the valve but which may readily be removed and be replaced by a plug. A further object is the provision of a simple, inexpensive, and efficient tool adapted 15 for the removal of plugs of more than a single type. Other objects include low initial cost, simplicity of operation, and ease of assembly.

For purposes of illustration, the drawing has been made to show certain specific embodiments 20 of the invention but it will become evident as the description proceeds that the invention is not limited to the exact details shown but is capable of considerable variation within the scope of what is claimed. 25

In the drawing, Figure 1 is a longitudinal sectional view through a preferred form of valve assembly including a preferred form of lock plug; Fig. 2 is a longitudinal sectional view through the same form of valve assembly but showing the use 30 of a different form of lock plug; Fig. 3 is a plan view of the device of Fig. 1; Fig. 4 is a fragmentary sectional view showing one method of applying a valve handle to the valve and casing when the lock plug is not in use; Fig. 5 is a plan of 35 the lock washer blank before bending; Fig. 6 is a plan of a pawl assembly washer before bending up certain parts; Fig. 7 is a transverse section through the base of the lock plug on the line VII—VII of Fig. 8, the pawls and springs being 40 shown in plan; Fig. 8 is a longitudinal section through a preferred form of expansion tool, shown as in place and expanded within the inner cylinder, with the pawls in inoperative position; Fig. 9 is an elevation of the same tool closed; 45 and Fig. 10 is a transverse section on the line X—X of Fig. 9 on an enlarged scale.

The valve casing 11, which may be of any suitable form and size, is shown as provided with a fluid passage 12 having ports 13 and 14 on opposite sides of a tapered bore 15 within which is fitted an apertured tapered valve 16, preferably 50 engaging the bore with a ground joint. The aperture 17 through the valve is shown in Fig. 4 as in registration with the ports 13 and 14, while 55

the aperture 17 in Figs. 1 and 2 extends transversely of the passage 12, the ports 13 and 14 being closed by the walls of the valve in the usual manner. The tapered bore 15 is made longer than the valve as indicated at 18 in Figs. 1 and 2 to permit the valve to seat firmly in the bore but it does not extend through the side of the casing 11. Opposite the recess 18, the casing is formed with a plug housing 19 through which the valve 16 may be introduced and removed.

A non-circular projection or head formed on the larger end of the valve 16 is preferably rectangular in section as indicated in broken lines in Fig. 5 for engagement with any handle or tool to rotate the valve from open to closed position or vice versa, this head 20 lying entirely within the housing 19. In Fig. 4, a handle 21 is shown as provided at its inner end with a sleeve 22 secured to the handle in any suitable manner as by a pin 23, the handle being held in contact with the end of the valve by a spring 24 surrounding the handle and bearing at one end upon the sleeve 22 and at the other end upon a bushing 25 held within the threaded outer end of the plug housing 19. The pressure of the spring holds the valve securely in its tapered bore.

When it is desired to close the valve and to prevent its unauthorized opening, the bushing 25 may be up-screwed and lifted out with the handle, the lock washer 26 then being placed over the head 20 within the housing 19, a projecting lug 27 on the washer entering a recess 28 formed in the side of the housing to prevent rotation of the washer and hence of the valve. The lock plug may then be placed in the housing and the valve cannot be operated either to open or to close it while the plug is in the housing.

The washer 26 has formed therein a cross-shaped aperture 29 adapted to engage the rectangular head 20 of the valve in any of four positions, i. e. at any open or closed position of the valve, so that the valve may be turned to the open position shown in Fig. 4 or to the closed positions shown in Figs. 1 and 2 and there be locked either open or closed when the lug of the washer engages within the recess 28. Opposite the lug, the washer 26 is formed with spring arm 30 curved to extend over the head 20 for engagement with the base 31 of the plug shown in Fig. 1 or with base 32 of the plug shown in Fig. 2, the spring arm 30 acting to hold the valve 16 securely in its tapered bore.

The plug of Fig. 1 has an inner core 33 shown as in threaded engagement with the base 31 and as having a groove 34 near its outer end to receive a lock ring or washer 35. A cap 36, preferably of case-hardened steel, has formed on its inner periphery a groove 37 made to lie opposite the groove 34 and to receive the same lock washer 35. The cap has a tapering inner surface indicated at 38. The lock washer 35 being placed in the groove 34 of the core 33, the tapering surface of the cap will act to compress the washer as the cap is forced over the core until the washer snaps out into the groove 37 to prevent the removal of the cap from the core. Within the base 31 is a washer 39 having portions struck up to form side lugs 40, spring abutments 41, and guard lugs 42. Flat pawls 43 are placed upon the washer 39 with one smooth edge of each pawl lying against the adjacent side lug 40. The opposite edge of each pawl is formed with gear teeth or rack teeth 44 engaged by the teeth of a mutilated gear member 45 set between the pawls and having a pivot 46 rotatable within

a central hole 47 in the washer 39, the pawls being engaged at their inner ends by coiled compression springs 48, the other ends of which engage abutments 41. These springs act to thrust the pawls outward through openings 49 in the base 31, lugs 50 on the pawls limiting the extent of movement of the pawls outward.

The showing of the pawls in Fig. 1 is substantially as they would appear on line I—I of Fig. 7 looking in the direction of the arrows. The guard lugs 42 act to hold the springs in position. It will be noted that the mutilated gear 45 must be turned to the right in Fig. 7 to cause the pawls to be withdrawn into the plug, and that the springs 48 will act automatically to throw them outward when they are released.

The gear member 45 is formed integral with or is secured in any suitable manner to an inner cylinder 51 rotatable within a cylindrical bore in the core member 33. The cylinder 51 is preferably case-hardened to prevent drilling or penetration by any tool. Its axial cylindrical bore 52 is accessible through an axial bore 53 in the core 33 and a bore 54 in the cap 36.

A tool which can be expanded within the bore 52 with sufficient pressure to hold it for rotation may be used to turn the gear to operate the pawls and thus withdraw them into the base 31 against the outward pressure of the springs 48. Such a tool is shown in Figs. 8, 9, and 10. A body member 55 is split to one end by longitudinal slits 56 to form clutch jaws 57 exteriorly threaded to receive a chuck nut 58. Within the jaws and firmly but removably held in place are two spreader spring members 59 curved oppositely to form a substantially cylindrical passage for a spreader wire 60 adjustably secured within a bore in the handle 61, as by a screw 62. The handle 61 is interiorly threaded for engagement with the body 55 and when the handle is screwed down upon the body to the limit of its movement, the wire 60 will be adjusted to a point at which the spreader tip 63, shown as wedge-shaped, will lie just beyond the outer ends of the spreader springs 59. Unscrewing the handle 61 from the body will draw the wedge 63 between the spring ends and will force them sidewise into firm engagement with the interior surface of the bore 52.

Using the normal right-hand thread, this unscrewing action will require that the handle be turned to the left while the body will be prevented from turning by holding the wing nut 64 from rotation. After the springs 59 engage the bore tightly, the nut 64 will be turned to the right until the pawls are fully retracted and then the whole tool may be lifted out of the housing carrying its attached plug as indicated in Fig. 8. These three different movements must be made in the order named to accomplish the removal of the plug, for unless the spreader springs are tightly clamped, rotation of the nut to the right will not operate the pawls, and unless the pawls are withdrawn into the plug, an outward pull will not lift the plug out of the plug housing.

The plug housing 19 has formed therein inward of the screw-threaded portion an annular groove 65 into which the pawls extend when thrust outward by the springs 48, and when the pawls are in this groove, the plug will rotate freely within the housing, as well as the cap upon the core. A loop 66 is provided upon the handle as a convenient means for engaging the spring arm 30 to raise the lock washer off the head 20.

In Fig. 2 is shown a different form of lock plug comprising a base 32 provided at its outer

end with a peripheral groove 67 for a lock washer 68 and a cap 69 having an interior groove 70 opposite the groove 67 to receive the same washer which holds the cap upon the base but permits it to rotate freely. Within the base 32 is a non-circular socket 71 for a pin 72 having a central cylindrical bore 73 to receive an expanding tool such as just described. The cap 69 has a central bore 74 in line with the bore 73 and also has a noncircular socket 75 for the reception of one end of the pin 72. The tool is placed within the bore 73, and the wedge 63 drawn between the spreader springs to force them into firm engagement with the interior of the bore, whereupon the pin 72 may be slid outward from the socket 71 into the socket 75 when the cap has been rotated to bring the socket 75 into alignment with the socket 71. But since the pin is longer than the outer socket it will also remain in engagement with the base, and since the pin and both sockets are non-cylindrical, the base and cap will be held together as against relative rotation. A wrench applied to the cap 69 may be used to unscrew the base from the housing. In applying the plug to the housing, a wrench will be used to screw the plug into the threaded end of the housing, and then the pin 72 will be pushed out of the cap socket.

It will be seen that the valve cannot be turned on or off except when the plug has been removed from the housing and that the valve cannot be left turned partly on or partly off with the lock spring in place, since the lug 27 of the spring 26 can enter the recess 28 in one position only, and the head 20 of the valve can enter the aperture 29 only when the valve is fully open or closed. The tapered plug cannot be jarred out of its seat if the valve is turned upside down and struck with a tool in an effort to dislodge the valve enough to permit the flow of gas, because of the action of the spring bearing against the plug and held in place by the lock plug.

With either plug, if the small central bore is filled with wood, nails, or other material, a drill can readily be used to remove the obstruction without damage to the plug, and when the hole is clean again, the expansion tool can be used to remove the lock.

When placed in the service line outside of the

house, the valve can be inspected without the necessity of obtaining admission to a kitchen or enclosed porch, and often without the occupant of the house knowing that the inspection has been made.

The tool used to remove the plug is easily taken apart and worn portions may be replaced at small cost without the use of any tools except a screw-driver for the screw 62 when it needs to be adjusted. The key need be used only to remove the plug, which can be replaced with the fingers, the pawls being easily pushed into the plug against the action of the springs and being pressed out into the groove in the plug housing by the action of the springs when it has been thrust deep enough into the housing.

I claim:

1. A valve assembly comprising a casing having a fluid passage therethrough and having a tapered bore intersecting the fluid passage, an apertured tapered plug fitted for rotation in the tapered bore to control the fluid passage, one end of the bore being closed by the casing and the other end of the bore being formed as a housing to receive a lock plug, and a lock spring engaging the tapered plug and the casing to prevent rotation of the plug.

2. A valve assembly comprising a casing having a fluid passage therethrough and having a tapered bore intersecting the fluid passage, an apertured tapered plug fitted in the tapered bore to control the fluid passage, one end of said bore being closed by the casing and the other end being formed as a housing to receive a lock plug, a removable lock plug engaging in the housing, and a lock spring interposed between and engaging the lock plug and the tapered plug to cause pressure on the tapered plug to hold it in its seat.

3. A valve assembly comprising a casing having a fluid passage therethrough and having a bore intersecting the fluid passage, an apertured plug fitted for rotation in the bore to control the fluid passage, one end of the bore being closed by the casing and the other end of the bore being formed as a housing to receive a lock plug, and a removable lock plug engaging in the housing and having an exterior portion freely rotatable upon the locking plug.

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