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Moyer

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[54] **LOCK MEANS FOR PLUG VALVES**

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[52] **U.S. Cl.** ..... **251/111,** 151/24, 85/8.1, 285/9 M, 287/DIG. 12

[51] **Int. Cl.** **F16k 35/06**

[58] **Field of Search** ..... 70/179, 276; 317/159; 285/9 M; 151/24; 85/8.1; 287/DIG. 12; 248/206 A; 24/201 B, 201.2, 73.15; 251/111

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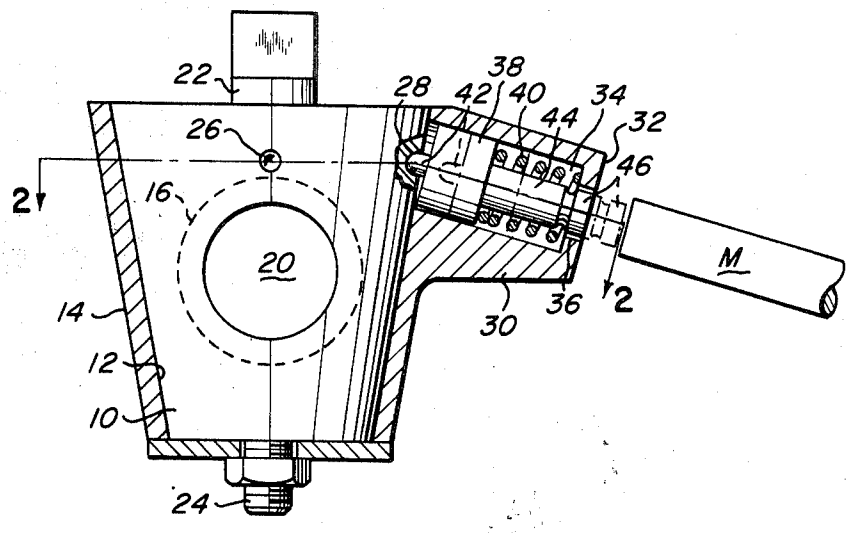
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Primary Examiner—Henry T. Klinksiek
Attorney—J. Warren Kinney, Jr.

[57] **ABSTRACT**

The plug valve disclosed includes a spring loaded locking detent which can be disengaged from the valve plug to unlock it, only by means not readily apparent to the layman, such means being a magnetized implement.

20 Claims, 5 Drawing Figures



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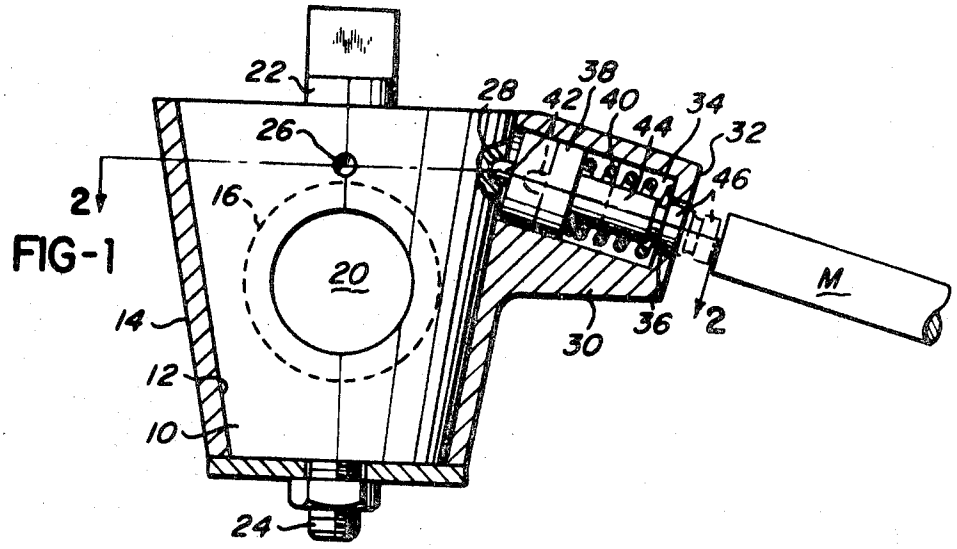


FIG-1

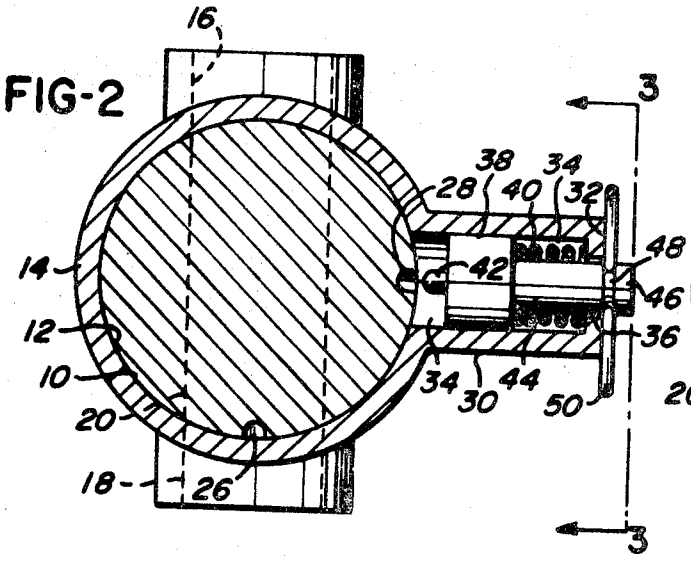


FIG-2

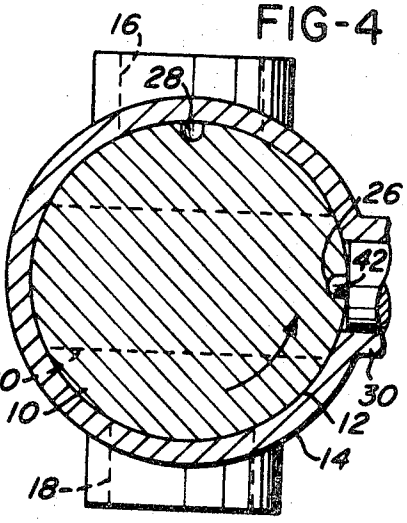


FIG-4

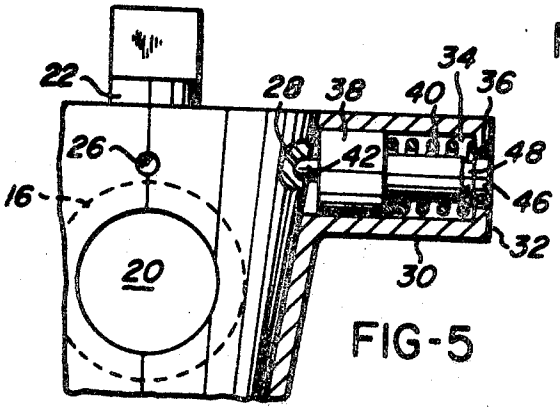


FIG-5

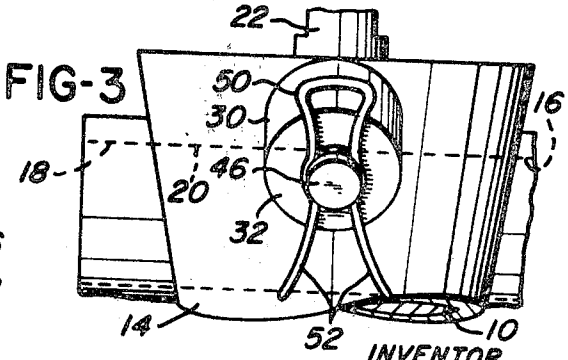


FIG-3

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LOCK MEANS FOR PLUG VALVES

BACKGROUND OF THE INVENTION

The utilities companies of large cities or areas are faced with the problem of loss of revenue in large amounts, resulting from unauthorized opening of gas cocks in buildings or locations where gas service has been legally discontinued. The locking of gas cocks by padlocks, barrel locks or the like, or with the use of various types of shields, has not been effective in the past due to the obviousness of methods or means to disable them. It appears, therefore, that a device for locking the gas cock plug against unauthorized manipulation should not yield to the employment of ordinary tools, or ordinary intelligence, and should offer no clues in aid of possible defeat of purpose.

With the foregoing problems and conditions in view, the present valve has been constructed to include a substantially concealed locking detent which may be disengaged from the valve plug to unlock it, only by means of an uncommon tool or implement in the form of a magnet, or a magnetized body. The magnet or magnetized body may be either a permanent magnet or an electromagnet.

FIELD OF THE INVENTION

The invention relates to a spring loaded locking means for securely though releasably maintaining relatively movable parts in locked position against actuation, except by authorized personnel.

DESCRIPTION OF THE PRIOR ART

Locking means for preventing unauthorized manipulation of the rotatable valving member of gas cocks and the like, have involved the use of devices such as, by way of example, are disclosed in Hill U.S. Pat. No. 835,523 which employs a key-actuated tumbler lock; the Causey U.S. Pat. No. 1,949,926 which employs a key-actuated bolt; Wilson U.S. Pat. No. 448,702 which employs a key-actuated pivotally mounted latch; and Tower U.S. Pat. No. 492,313 which also discloses the use of a key-actuated locking cylinder rotatable between operative and inoperative locking relationship with the valving member of a gas cock.

Notwithstanding the teachings of the prior art, the theft of gas to an astonishing extent persists and poses a problem of great magnitude and concern.

SUMMARY OF THE INVENTION

The present invention employs a hard metal latching member or plunger movable toward and from the rotatable plug of a valve, to lock the plug against rotation or to release it, depending upon the position of the latching member or plunger. The latching member or plunger is spring-urged constantly toward the valve plug, and moves within the confines of a hollow boss formed integrally with the valve body. The boss and the valve body are formed preferably of a hard metal highly resistive to destruction by hammering, sawing, or drilling.

The latching member or plunger is so mounted in the boss chamber, that its outer end is flush with the outer end of the boss when its inner end is in locking engagement with the valve plug. Clearance between the plunger and the boss end opening are minimal to preclude any manipulation of the plunger manually for withdrawal thereof from locking position.

The only feasible way in which the latching member or plunger may be withdrawn from the locked position, is by means of a magnet of such force as will overcome the counterforce of the loading spring, the magnet being applied to the outer exposed end of the plunger or latching member, which is of necessity a ferrous metal or magnetic material.

Means may be provided, if desired, for holding the plunger or latching member in the withdrawn or inoperative position, to permit free rotation of the valving member or plug under normal conditions of use.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a vertical cross-section of a valve embodying the present invention, and showing the rotary plug thereof in locked open position.

FIG. **2** is a cross-section taken on line **2—2** of FIG. **1**, showing the latching member restrained to free the plug for rotation.

FIG. **3** is a fragmental side elevation taken on line **3—3** of FIG. **2**.

FIG. **4** is a view similar to FIG. **2**, and showing the valve plug locked in the closed-valve position.

FIG. **5** is a view similar to FIG. **1** showing a slight modification.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the several drawing views, a tapered valve plug or valving member **10** is rotatably supported in the tapered bore or chamber **12** of a valve body **14** of any suitable type, the plug and the body being shown quite conventionally in general. The body comprises the usual inlet and outlet ports **16** and **18**, through which a flow of fluid may be controlled by means of plug **10** and its diametral through port **20**. The plug may be rotated to open and closed positions by means of an axial stem **22**, as is usual. A stud and nut connection **24** or equivalent means may be employed to properly maintain a seated condition of the plug within the body bore.

For purposes of the present invention, the outer wall of the plug may be provided with recesses **26** and **28** spaced 90° apart, and located at equal distances from an end of the plug. The recesses serve as stops for locating the plug in the fully open and fully closed positions, as will be explained.

At a location preferably midway between the ports **16** and **18**, the valve body is provided with a laterally extended integral boss **30** having an outer end **32**. The boss is drilled or otherwise furnished with an elongate bore **34** which has an inner terminus at the wall of plug bore **12**. At its outer end, boss bore **34** terminates at an opening **36** of reduced diameter in the outer end wall of the boss.

Slidably supported in bore **34** is a latching member or plunger **38**, against which one end of a compression spring **40** acts to urge the plunger constantly in the direction of the valve plug. The opposite end of the spring may bear against the inner face of end wall **32**.

The inner end of plunger **38** carries an extended lock pin or detent **42** to be projected into either of the recesses **26** or **28** by the force of spring **40**, depending upon the rotated position of valve plug **10**. The pin or detent should be of sufficient durability to withstand any attempt to rotate the valve plug by means of its operating stem.

The reduced shank **44** of plunger **38** is to be encircled by spring **40**, and should incorporate an outer end portion or head **46** which is slidable with little clearance through the terminal opening **36** of boss **30**. Head or end portion **46** may be defined by an annular groove **48** formed in the shank, and adapted to accommodate a clamp **50** having resilient arms **52** to embrace the groove and maintain the plunger retracted, (FIGS. **2** and **3**). When the clamp is employed for holding the plunger in the retracted position, valve plug **10** is free to rotate.

Upon removal of clamp **50**, spring **40** will urge the plunger toward the valve plug, and if either of the depressions **26** or **28** is aligned with detent **42**, the detent will enter and thereby positively lock the plug against rotation. As is readily apparent, entry of the detent into recess **28** (FIG. **2**), will lock the valve plug in the open position; and, as in FIG. **4**, entry of the detent into recess **26** will lock the plug in the closed-valve position, thereby foiling any attempt by unauthorized persons to open the valve.

The only feasible way to release the valve plug from locked position, is that of applying to head **46** a magnet M of such force as may overcome the counterforce of spring **40**, so that the plunger or latch member and its detent **42** will be bodily shifted magnetically away from the valve plug. It will be understood of course, that the plunger or at least its head end **46**, will be formed of a magnetic material, for example iron or steel, preferably hardened to discourage drilling.

Once the plunger has been withdrawn by the magnetic means, it may be held withdrawn by a clamp such as **50**. On the other hand, locking of the valve plug by engagement of detent **42** with a recess such as **26** or **28**, effectively and positively precludes any manipulation of the valve in the absence of a proper magnetic instrument M applied to head **46**.

When the valve plug is locked against movement by detent **42**, the plunger head **46** is to be flush with the outer end face **32** of boss **30**, to preclude gripping of the head by pliers or other common tools. Prying of the head outwardly by means of a knife or other implement is rendered impossible on account of the minimal clearance with which the head is supported in boss opening or bearing **36**.

In the light of the foregoing disclosure, it should be apparent that the present valve when used in a gas supply line will greatly reduce theft of gas by unauthorized users. Moreover, use of the improved valve in gas supply lines greatly enhances safety in the vicinity of gas valves which are frequently unattended.

The force of spring **40** may advantageously be operationally related to the pulling force of any magnet chosen as an authorized implement for control of the valve plug. If the authorized magnetic implement is a portable electromagnet, spring **40** may be quite heavy as to its compressive strength.

The modification illustrated by FIG. **5** is distinguished from the valve of FIG. **1** only in that its plunger or latch member **38** moves at right angles to the plug axis, whereas in the FIG. **1** construction the axis of the plunger meets the plug axis at a lesser angle. The angled plunger bore of FIG. **1** is more easily machined than that of FIG. **1**, as is obvious.

The present invention is applicable to many different types of plug valves or cocks, irrespective of whether or not the plugs are tapered, or lined with non-metallic materials to resist corrosion or leakage.

What is claimed is:

1. Magnetically retractable latching means for preventing unauthorized relative movement between a first and a second member, comprising a plunger receptive housing having a bore therein on said first member, a plunger slidably received in said bore and having inner said first member comprising a hard material highly resistant to cutting and drilling, so that said first member cannot readily be damaged to gain access to said plunger for unauthorized movement of said plunger.

2. The latching means of claim **1**, wherein the length of the plunger is such that when it is in locking engagement with the second member, the outer end of the plunger is substantially flush with the outer surface of the housing in which it is housed.

3. The latching means of claim **2**, wherein the clearance between the outer end of the plunger and the outer end of the bore is very small to prevent insertion of an implement between said plunger and bore and prying of said plunger out of locking engagement with said second member.

4. The latching means of claim **1**, wherein the second member is provided with a recess into which the inner end of the plunger projects when in locking engagement with the second member.

5. The latching means of claim **1**, wherein means is on the plunger at the outer end thereof for receiving a stop means to hold the plunger against said bias means and out of locking engagement with said second member.

6. Magnetically retractable latching means for preventing unauthorized relative movement between a first and second member, comprising a plunger receptive housing having a bore therein on said first member, a plunger slidably received in said bore and having inner and outer ends wherein at least the outer end is magnetizable, said plunger movable relative to said first and second members into and out of locking engagement with the second member, the inner end of said plunger normally in locking engagement with said second member, the outer end of the plunger positioned within the bore and housing when the inner end of the plunger is in locking engagement with the second member, an opening in said housing in communication with said bore, the outer end of the plunger projecting through said opening when the inner end of the plunger is out of locking engagement with the second member, biasing means within said housing urging said plunger into locking engagement with the second member, said plunger movable against the biasing means out of locking engagement with the second member when the outer end of the plunger is subjected to the force of attraction of a magnet means applied thereto, and means on the plunger at the outer end thereof for receiving a stop means to hold the plunger against said bias means and out of locking engagement with said second member.

7. A valve, comprising a valve body having inlet and outlet ports therein, a valve chamber between said inlet and outlet ports and in communication therewith, a rotatable valve member mounted for rotation in said valve chamber and having a circumferential wall sealable relative thereto, a transverse port through said valve member movable into and out of registry with

said inlet and outlet ports, valve member locking means including a plunger carried in a portion of said valve body and movable relative to said valve body and into and out of locking engagement with said valve member, said plunger being responsive to the force of attraction of a magnet means placed in proximity thereto to move said plunger out of locking engagement with said valve member, at least the portion of said valve body in which said plunger is carried comprising a hard material highly resistant to cutting and drilling, so that said portion of said valve body cannot readily be damaged to gain access to said plunger for unauthorized movement of said plunger.

8. The combination as defined by claim **7**, wherein is included yielding means tending constantly to advance said plunger into locking engagement with said valving member; and wherein the force of said yielding means is inferior to the force of said magnet acting to reverse the movement of said plunger from said position of locking engagement.

9. The combination as defined by claim **8**, wherein said transitory magnet is a permanent magnet.

10. The combination as defined by claim **8**, wherein said transitory magnet is a portable electromagnet.

11. The combination as defined by claim **8**, wherein the valve body carries a bored boss in which the plunger is supported for longitudinal reciprocation; and said boss has an outer end face which is substantially flush with an exposed end of the plunger while the plunger is in locking engagement with the valving member, said exposed end of the plunger being magnetically attractable.

12. The combination as defined by claim **11**, wherein the plunger near its exposed end carries means to accommodate a stop element effective to hold the plunger in retracted restraint, in opposition to the force of said yielding means.

13. The combination as defined by claim **11**, wherein the plunger includes an extended detent movable therewith toward and from the circumferential wall of the valving member, and said circumferential wall is provided with two recesses spaced approximately 90° from one another and located to receive the detent at different positions of rotation of the valving member.

14. The combination as defined by claim **13**, wherein the plunger near its exposed end carries means to hold the plunger in retracted restraint, in opposition to the plunger driving force of said yielding means.

15. The combination as defined by claim **13**, wherein the bored boss and the exposed end of the plunger are formed of said hard material.

16. The combination as defined by claim **11**, wherein the bored boss is formed of said hard material.

17. The combination as defined by claim **16**, wherein is provided means on the plunger for holding the plunger in retracted restraint, in opposition to the force of said yielding means.

18. The latching means of claim **11**, wherein the clearance between the outer end of the plunger and the outer end of the bore is very small to prevent insertion of an implement between said plunger and bore and prying of said plunger out of locking engagement with said second member.

19. The combination as defined by claim **7**, wherein is included a laterally extended bored boss integral with the valve body, said boss bore providing a guide in which the plunger is supported for movement.

20. A valve, comprising a valve body having inlet and outlet ports therein, a valve chamber between said inlet and outlet ports and in communication therewith, a rotatable valve member mounted for rotation in said valve chamber and sealable relative thereto, a transverse port through said valve member movable into and out of registry with said inlet and outlet ports, valve member locking means including a plunger movable relative to said valve body and into and out of locking engagement with said valve member, said plunger being responsive to the force of attraction of a magnet means placed in proximity thereto to move said plunger out of locking engagement with said valve member, and means on said plunger for receiving a stop means to hold said plunger out of locking engagement with said valve member.

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