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FLUID-CONTROLLING APPARATUS

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This invention relates to apparatus for controlling the passage of fluid through a valve in a conduit either automatically or manually. While the invention is adapted to various uses, it is particularly intended to be employed in connection with gas valves which are installed in a house connection leading from a gas main in the street to a meter within a building. Devices of this general character have been heretofore proposed, but the present invention embodies numerous improvements over the prior constructions, these improvements being directed to a simplification of the parts and the use of novel and efficient mechanisms in conjunction therewith to insure a positive closing of the valve when desired.

For example, in gas connections of the character referred to, it is the usual practice to normally impel the valve into closed position by means of a spring and to hold the spring in check by automatic or manually controlled means which, when released permits the spring to close the valve. When a valve, controlled by a spring, remains inactive through long periods, there is the ever present tendency of the parts to gum or corrode in such manner as to render its action sluggish or in some cases to render the valve inoperative to close when released.

The apparatus of this invention is so constituted that the closing of the valve is positively effected by gravity in such manner that no amount of corrosion or sticking of the valve will preclude its instant closing when it is released either by manually or automatically operable means.

In the preferred form of carrying out the invention, the valve stem with which the sealing member of the valve is associated is so arranged that rotation of the stem will effect the closing of the valve and on the valve stem is secured an operating arm, the outer end of which is heavily weighted and the weight is amply sufficient to effect the closing of the valve when such weight is imposed thereon. The weight is normally held in check by a latch mounted on said arm and which latch is adapted to cooperate with one end of a fusible link supported at its opposite end by a suitable fixed support.

Thus, in the event of fire in the vicinity of the valve, the link will fuse and permit the weighted arm to automatically close the valve. The valve may be manually operated by a cable or other suitable tension member, one end of which is directly secured to the latch, and which tension member extends through a conduit to a pull box positioned on the exterior of a building, so that said tension member may be operated without entering the building.

An important advantage of this construction over all prior art devices resides in the fact that when tension is placed on the cable, it operates to release the latch from the fixed support to thereafter impart a direct pull on the operating arm of the valve stem, so that even though the valve may stick, sufficient tension may be directly applied to the operating arm through the tension member to overcome such sticky tendencies and to permit the manual drawing of the valve into closed position. This is an important practical feature of the present invention and is in marked contrast to prior constructions wherein the pulling of a release cable simply serves to trip spring actuated mechanism to effect the closing of the valve. The positive direct connection to which I have referred insures a positive closing of the valve under all circumstances and makes it impossible for the valve to fail to operate under conditions of emergency.

Another feature of practical importance of the present invention resides in novel and efficient means for locking the valve in closed position, so that it cannot rebound when closed and leave the valve in partially open condition. This locking means is preferably so constituted that while it serves to lock the valve against opening, it also serves to cushion the valve during the closing operation and thus performs a dual function of protecting the operating parts of the valve against strains and locking it against rebound. Furthermore, when the locking mechanism of this invention functions to lock the valve in sealed condition, the valve will remain locked and cannot be reopened until some authorized person, having possession of a key opens a locked box in which the
The operating mechanism of the valve is housed.

The apparatus of this invention is extremely simple in construction and all of its parts are ruggedly built, so that it is practically impossible for these parts to be found inoperative in case of emergency.

Features of the invention, other than those specified, will be apparent from the hereinafter detailed description and claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate one practical embodiment of the invention, but the construction therein shown is to be understood as illustrative, only, and not as delineating the limits of the invention.

Figure 1 is a pictorial view showing the present invention associated with a gas supply system.

Figure 2 shows a gas pipe in which is included the valve, shown in section, which the controlling mechanism of the present invention is adapted to control.

Figure 3 is a section on the line 3—3 of Figure 2 showing the controlling mechanism of this invention associated with the valve.

Figure 4 is a plan view of the mechanism shown in Fig. 3.

Figure 5 is a front elevation of the controlling mechanism shown in Figures 3 and 4, the cover of the housing being removed to show the interior portions of said housing.

Figure 6 is a front view, partly in section showing a pull box forming part of the controlling apparatus.

Figure 7 is a section on the line 7—7 of Figure 6; and,

Figure 8 is a section on the line 8—8 of Figure 6.

Referring to the drawings, 1 designates a gas pipe in which is included a valve 2. This valve, as shown in section in Figure 2, embodies a casing having sealing element 3 therein adapted to cooperate with the seat 4 and carried by an arm 5 secured to a valve stem 6. The stem 6 is mounted to rotate within a suitable bearing 7 in a tubular boss of the casing, which, as shown, embodies a tapering seat 7a. The stem is provided with a frusto conical portion 7b, which is adapted to be forced into engagement with said seat by a spring 7c to which pressure is applied by a screw cap 8, as clearly shown in Fig. 3. The advantage of this construction, which is novel in valves of this character, is found in the fact that packing is entirely obviated.

Rigidly supported and rotatably adjustable on the tubular boss of the valve casing 2 is a housing 9 clamped in place by a jamb nut 10 and adapted to enclose operating mechanism associated with the valve stem 6 and next to be described.

Mounted within the housing 9 and fixed on the valve stem 6 is an operating arm 11. This operating arm is provided at its free end with a weight 12 preferably of considerable bulk, so as to impel the arm 11 in a clockwise direction, as shown in Figure 5 for the purpose of forcing the sealing element 3 to its seat. However, pivoted on the arm 11 by a pivot 13 is a latch 14 provided with a finger 15. This finger is adapted to engage with one end of a fusible link 16, the opposite end of which is secured by means of a screw 17, or other suitable means to a bracket 18 mounted on the housing 9, as shown in Figure 5. As long as the finger 15 is engaged with the fusible link 16, and the parts are in the condition shown in Figure 5, the latch 14 will serve to support the arm in a position to maintain the sealing member in unsealed position. However, if the sealing member becomes disrupted due to the presence of heat of sufficient temperature, or if the finger 15 is disengaged from the fusible link, the weight 12 will drop by gravity and seat the sealing element.

The release of the weight by the fusing of the link 16 is an entirely automatic operation. In addition to this operation, however, a manual release is possible. This is provided for by the cable 19, one end of which is secured to the latch 14, and said cable is thereupon passed through a conduit 20 to a pull box 21 positioned on the exterior of the building, as shown at 21a. Elbows in the conduit 20 at points where the conduit must necessarily change direction are provided with pulleys 22 about which the cable is passed to eliminate friction and undue wear on the cable. The outlets of the pull box are shown in Figures 6 to 8 and will be hereinafter more fully described.

However, it will be noted that if tension is placed on the cable, the latch 14 will be rocked from the full line position of Figure 5 to the dotted line position thereof and by this operation, the pin 15 will be released from the fusible link to permit the weight to drop. If for any reason, such as friction, corrosion or gumming of the valve, the weight is unable to operate the valve, a continued pull on the cable will be communicated to the operating arm 11 to augment gravity acting upon the weight and insure the positive closing of the valve. As the heavy weight 12 falls, appreciable momentum will result which it is desired to cushion in order that the valve stem may not be bent or unduly strained or the sealing member or seat or other working parts damaged. I may cushion the operations of the arm 11 in various ways. For example, the arm 11 may be provided with a lug 23 (Fig. 5) carrying a spring 24, which, as the weight 12 approaches the end of its downward movement, it is adapted to engage with the stop 25 mounted on the housing 9. I find it desirable, however, to use in conjunction with the cushioning spring 24, cushioning and locking
means comprising a leaf spring 26 carried by the weight, and a rack 27 carried by the housing.

The parts 26 and 27 are so associated that as the weight falls, the free end of the spring will ride over the rack 27 and cushion the downward movement of the weight. As the weight approaches the end of its downward movement, the cushioning spring 24 will engage with the stop 25 and the weight will be brought to rest without shock. However, retrograde movement of the weight will be precluded by engagement of the spring with the rack 27 and these parts will function after the manner of a pawl and ratchet to preclude rebound of the weight as the sealing member engages its seat. I have found in practice that the arrangement which I have described is highly efficient in eliminating shocks and in locking the sealing element in seated position. The cushioning spring 24 and stop 25 are preferably used in conjunction with the elements 26 and 27, although the parts 24 and 25 may be omitted without departing from this invention.

Under normal conditions, the housing 9 is closed by a suitable cover 9*, preferably secured to the housing by means of a chain 28 and adapted to be locked in closed position by a padlock 29. When the cover 9* is closed and locked, the operation of the valve in the manner described, will leave the valve in closed locked position and it cannot be reset until the padlock 29 is unlocked, the cover removed and the manual resetting operation carried out. Accordingly, unauthorized persons cannot tamper with the valve of this invention.

The resetting operation may be simply accomplished for in order to reset the parts, it is only necessary to manually retract the spring from the rack, lift the weight and hook the pin 15 into the fusible link if the link has not been disrupted. If the link has been disrupted, due to heat in the vicinity of the valve, a new link is inserted and the parts reset as described.

I have herebefore referred to a pull box positioned on the exterior of the building and to which access may be readily had for the operation of the cable 19. In Figures 6 to 8, the preferred form of box embodied in the present apparatus is shown. The box 21 is provided with two tapped holes 30 and 31, the former of which leads through the bottom of the box, while the latter leads through the back of the box. The conduit 20 may be screwed into either one of these holes, whichever is the most convenient, so that the cable, as it is passed through the conduit, extends from the conduit directly into the interior of the box 21. A pulley 32 is preferably mounted within the box and about this pulley the cable is adapted to operate to eliminate friction or undue wear on the cable. The free end of the cable is secured to a suitable handle 33 and the upper portion of the box is provided with a retaining lock 34 adapted to support the handle 33, when the manner shown in Figure 6.

The box 21 is preferably in the form of a casting and is provided with a cast cover 35 secured to the box by a chain 36. In order to preclude rain from seeping into the box, the upper portion of the box is preferably provided with a channel 37 into which a lip 38 at the upper portion of the cover is adapted to be received. Lugs 39 formed along the lateral edges of the cover cooperate with the depressions 40 in the lateral walls of the box to secure the cover against shifting in an edgewise direction. A suitable lock barrel 41 is mounted at the center of the cover and carries a locking finger 42 which, through operation of the barrel by a key 43 is adapted to be engaged with or disengaged from a keeper 44 formed in the base of the box.

The opening of the box is therefore normally dependent upon the position of a key 43, but inasmuch as there may be times when the apparatus should be operated when a key is not at hand, I preferably form the cover 38 with interiorly disposed weakening channels 45, so that if the cover is struck a sharp blow, it may be broken to permit of access to the cable.

I wish to call attention to the general arrangement of Figure 2, from which it will be noted that the inlet pipe 1* which leads to the valve and the outlet pipe 1* which leads from the valve to the meter, are so disposed as to drain away from the valve, while the valve structure itself is so formed that the seat 4 is lifted appreciably above the base of the valve.

With this arrangement, the collection or lodging of water or other liquids within or about the seat is precluded, when the valve is placed in either horizontal or vertical position, and it is not possible for water to lodge and freeze in the valve in a way to interfere with the proper seating of the sealing element. This is highly important from a practical standpoint, since the accumulation of ice in the valve would make it impossible to close the valve irrespective as to the amount of pressure which might be applied through the cable. With the structure as shown, detrimental accumulations of water cannot occur.

In the construction of Figure 1, this problem is not presented as the valve is installed in a vertical pipe, but there are cases when it is not convenient to install the valve in a vertical pipe and in such cases the arrangement shown in Figure 2 is highly practical and efficient.

It will be apparent from the foregoing detailed description of the invention that the structural elements entering into the apparatus are relatively simple. There are no parts to get out of order and the operation of
the valve may be relied upon in the event of an emergency. Attention is again called to the fact that the pull of the cable is a direct pull upon the operating arm of the valve, so that the valve cannot fail to close. All intermediate operating devices are dispensed with in the interest of simplicity and positive operation. However, to preclude an operator from placing too great a strain upon the valve parts by excess tension applied to the cable as the valve closes, I preferably mount a stop member 46 on the cable, as shown in Figure 5, so that when the stop member engages with the end of the conduit as shown in dotted lines in this figure, the valve parts will be relieved from added tension imposed on the cable.

The apparatus is economical to manufacture, easy to install and thoroughly efficient in its operation. The drawings show the invention in its preferred practical form, but the invention is to be understood as fully commensurate with the appended claims.

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

1. In apparatus of the character described, a service pipe for conducting gas into a building, a valve included in the service pipe and embodying a sealing element, a valve stem secured to the sealing element, an operating arm secured to the valve stem and provided with a weight tending to impel the sealing element to its seat, a latch mounted on the arm for normally restraining the weight, in combination with a pull box adapted to be mounted on the exterior of the associated building, a conduit leading from the pull box into juxtaposition with the operating arm, a tension member extending from the pull box through the conduit and secured to the latch, whereby tension on the cable will release the latch and augment the power of the weight in the seating of the sealing member, and means for cushioning the operation of the weight during the seating of the sealing member.

2. In apparatus of the character described, a service pipe for conducting gas into a building, a valve included in the service pipe and embodying a sealing element, a valve stem secured to the sealing element, an operating arm secured to the valve stem, a weight carried by said arm and a latch mounted on the arm for normally restraining the weight, in combination with a pull box adapted to be mounted on the exterior of the associated building, a conduit leading from the pull box into juxtaposition with the operating arm, a tension member extending from the pull box through the conduit and secured to the latch, whereby tension on the cable will release the latch and augment the power of the weight in the seating of the sealing member, and cooperating pawl and ratchet members positioned externally of the valve casing, one of which is secured to the weight and the other of which is mounted upon a suitable juxtaposed fixed support, said members engaging one another as the weight descends to lock the weight against rebounding.

3. In apparatus of the character described, a service pipe for conducting gas into a building, a valve included in the service pipe and embodying a sealing element, a valve stem secured to the sealing element, an operating arm secured to the valve stem, a weight carried by said arm, and means including a latch mounted on the arm for normally restraining the weight, in combination with a pull box adapted to be mounted on the exterior of the associated building, a conduit leading from the pull box into juxtaposition with the operating arm, a tension member extending from the pull box through the conduit and secured to the latch, whereby tension on the cable will release the latch and augment the power of the weight in the seating of the sealing member, a rack mounted in proximity to the weight, a resilient member carried by the weight and cooperating with the rack to cushion the downward movement of the weight and preclude inadvertent retrograde movement of said weight.

4. In apparatus of the character described, a service pipe for conducting gas into a building, a valve included in said pipe, a weight normally tending to impel the valve into closed condition, means including a detent for normally holding the weight in restraint, a pull box mounted on the exterior of the building, a conduit leading from the pull box to a point inside the building proximate to the detent, a cable extending through the conduit from the pull box to and secured to the detent to permit of the release of the detent and to impart a direct pull on the weight to augment the weight when closing the valve, and means for resiliently arresting the weight as it approaches the end of its downward movement to minimize shock incident to closing of the valve.

5. In apparatus of the character described, a service pipe for conducting gas into a building, a valve included in said pipe, a weight tending to impel the valve into closed condition, means including a detent for normally holding the weight in restraint, a pull box mounted on the exterior of the building, a conduit leading from the pull box to a point inside of the building proximate to the detent, a cable extending through the conduit from the pull box to and secured to the detent to permit of the release of the detent and to impart a direct pull on the weight to augment the weight when closing the valve, and ratchet means coacting with the weight for precluding rebound of the weight when the valve is closed.

6. In apparatus of the character described, a valve comprising a sealing element cooper-
able with the valve stem, an operating arm cooperating with the valve stem for seating and unseating the sealing element, a weight carried by said arm normally tending to impel the sealing element into seated position, a fusible link, one terminal of which is anchored to a suitable support, a latch mounted on the operating arm and engaging with the other terminal of the link to normally hold the weight in restraint, a tension member secured to the latch and adapted when placed under tension to release the latch from the link and apply a pull on the operating arm in substantially the same direction as gravity is acting upon the weight to move said arm to seat the sealing element and cooperating pawl and ratchet members positioned externally of the valve casing, one of which is secured to the weight and the other of which is mounted upon a suitable juxtaposed fixed support, said members engaging one another as the weight descends to lock the weight against rebounding.

7. In apparatus of the character described, a valve provided with a sealing element cooperating with the valve stem, an operating arm cooperating with the valve stem for seating and unseating the sealing element, a weight carried by said arm and normally tending to impel the sealing element into seated position, a fusible link, one terminal of which is anchored to a suitable support, a latch mounted on the operating arm and engaging with the other terminal of the link to normally hold the weight in restraint, a tension member secured to the latch and adapted when placed under tension to release the latch from the link and apply a pull on the operating arm in substantially the same direction as gravity is acting upon the weight to move said arm to seat the sealing element, a leaf spring carried by the weight, and a rack adapted to cooperate with the leaf spring and mounted in a relatively stationary position to be engaged by the leaf spring when the weight descends to preclude retrograde movement of the weight.

8. In apparatus of the character described, a valve provided in the casing thereof with a sealing element, a valve stem secured to the sealing element and passing horizontally outwardly through the side of the casing of the valve, a housing mounted on one side of the exterior of the valve casing and supported thereby with the piping connections of the valve exteriorly of the housing, and means positioned within the housing for normally locking the valve stem in position to hold the sealing element in unseated position.

9. In an apparatus of the character described, a valve casing having a tubular boss extending horizontally and in a lateral direction from the casing, a sealing element within the valve casing, a valve stem secured to the sealing element and passing laterally and horizontally outwardly through the tubular boss, a housing mounted laterally of the valve casing on the tubular boss and adapted for rotary adjustment on a horizontal axis, with reference to the valve casing, and means positioned within the housing for normally locking the stem in position to hold the sealing element in unseated position.

In testimony whereof I have signed the foregoing specification.

HENRY SIEBEN.