Oct. 20, 1936. W. L. BELKNAP 2,057,702

ACCELERATED GRAVITY SHUT-OFF VALVE

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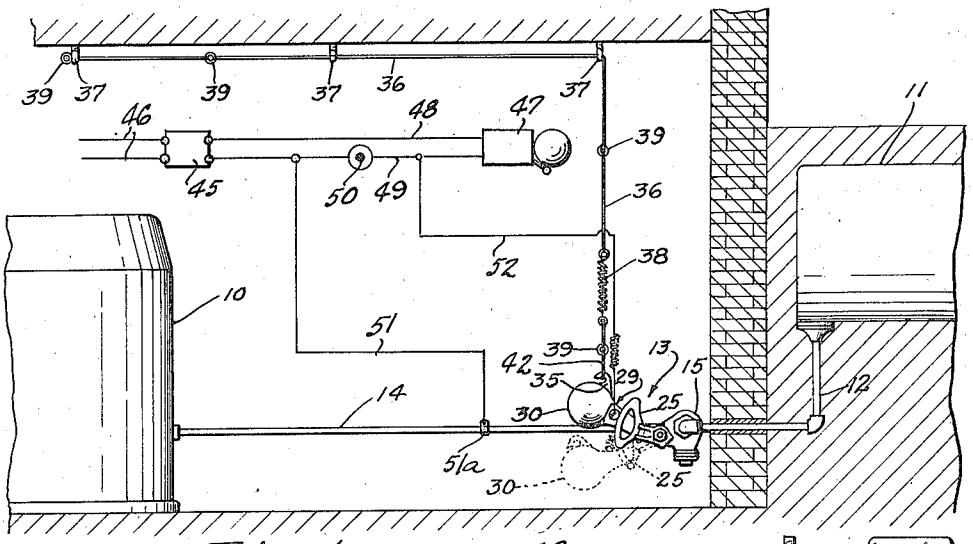


Fig. 1

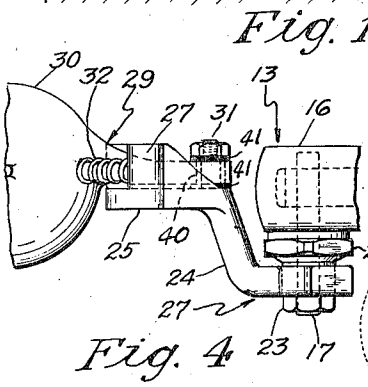


Fig. 4

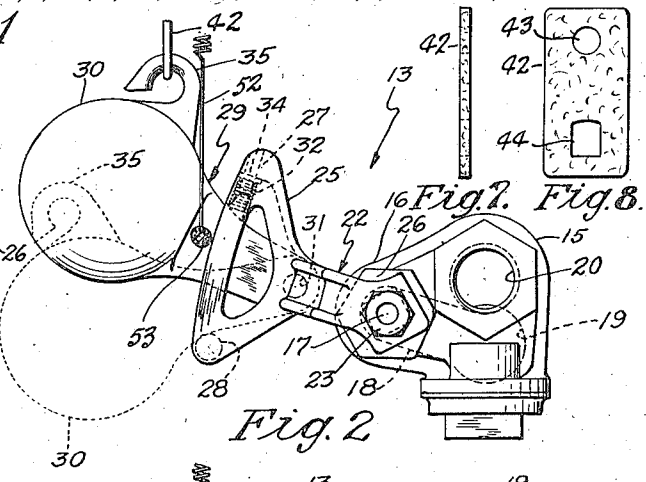


Fig. 2

Fig. 7.

Fig. 8.

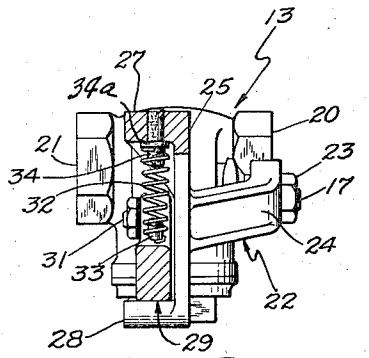


Fig. 5

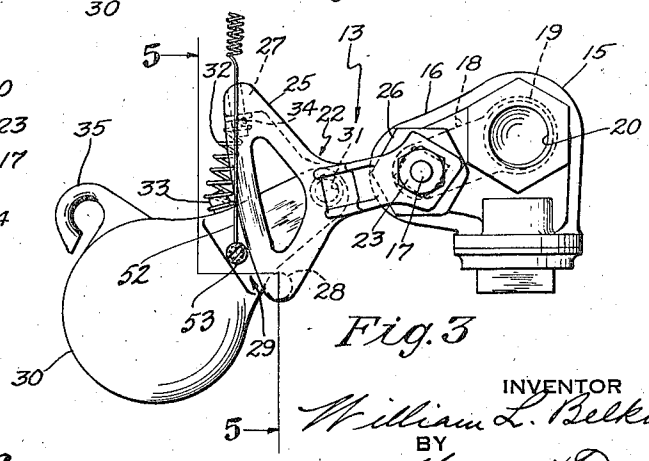


Fig. 3

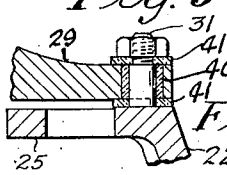


Fig. 6.

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ACCELERATED GRAVITY SHUT-OFF VALVE

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Application November 3, 1934, Serial No. 751,381

12 Claims. (Cl. 137—162)

This invention relates to new and useful improvements in valves, and has particular relation to an accelerated gravity shut off valve especially designed for insertion in a gas or liquid fuel supply line for automatically cutting off the supply of fuel in case of fire.

An object of the invention is to provide a valve for the purpose stated which includes means for applying an initial hammer blow to start the valve toward closed position in case of a fire whereby the closing of the valve is insured and expedited.

Another object is to provide a construction which can be easily set, and which can be readily connected with a door bell ringing outfit or other alarm to sound an alarm when the device is tripped or released, with practically no additional cost.

Other objects and advantages will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawing wherein a satisfactory embodiment of the invention is shown. However, it will be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawing:

Fig. 1 is an elevational view showing one system of installing the valve of the invention;

Fig. 2 is a side elevational view of the valve alone showing the parts positioned with the valve open;

Fig. 3 is a view similar to Fig. 2 but showing the parts in the positions occupied by them when the valve is closed;

Fig. 4 is a top plan view of the valve lever and operating weight and spring;

Fig. 5 is a sectional view taken substantially along the line 5—5 of Fig. 3;

Fig. 6 is a detailed section of the mounting for one of the elements, and Figs. 7 and 8 are edge and side elevations respectively of an insulating element.

Referring in detail to the drawing and at first particularly to Fig. 1 wherein there is illustrated one installation including the valve, at 10 is shown a portion of a furnace the burner of which is supplied with fuel as from a tank 11. The pipe line 12 connects the supply tank 11 with one side of my improved valve generally designated 13 and a pipe line 14 serves to convey fuel from the opposite side of the valve to the burner of the furnace 10. It should be understood that the valve is not restricted to use in a liquid fuel pipe line but that it is equally useful in a gas pipe line, as from a main or the like to a burner. All that is necessary is that the improved valve be positioned in the supply line between the supply main or other source of fuel and the burner which is to consume the fuel.

The valve 13 includes the casing 15 having an extension 16 in which is mounted a valve spindle 17. This spindle is turnable in the casing extension 16 and to the spindle there is secured an arm or lever 18 carrying a valve 19 shiftable between the open position of Fig. 2 and the closed position of Fig. 3. That is, when the valve is in closed position it cuts off communication between the ports 20 and 21 of the valve casing and which ports may be either intake or outlet ports depending upon the manner in which the valve is positioned in the fuel supply line.

The spindle 17 extends beyond one side of the casing extension 16 and to such portion of the spindle there is secured a lever 22 clamped to the spindle as by means of a nut 23. This lever is offset as at 24 whereby its head-like portion 25 is disposed substantially in the plane of movement of the valve 19 and therefore requires very little, if any, more lateral space than the valve casing itself. Since the valve is movable with the spindle 17 and since the lever 22 is also secured to said spindle it will be appreciated that any movement of the lever will be transmitted to the valve through the spindle, and that the lever may therefore be used to shift the valve between open and closed positions. A suitable packing (not shown) may be held in place about the spindle as by the nut 26 to prevent leakage of fuel along the spindle to the outer side of the valve casing.

Lever head portion 25 extends vertically both above and below the body portion of the lever and includes lateral extensions 27 and 28 forming upper and lower stops. At one of its ends a weighted arm 29 including a ball-like head 30 is pivoted to the lever 22 as by a pivot 31 whereby the weighted arm 29 may be moved vertically relative to the lever 22. The weighted arm 29 is located at the same side of the lever 22 as the upper and lower stops 27 and 28 of the head 25 of the lever and the arm 29 extends between said stops whereby vertical movement of the arm relative to the lever is limited. When the valve 19 is in closed position the weighted arm 29 is against the stop 28 as shown in Fig. 3.

Between the upper side of the weighted arm 29 and the upper stop 27 there is arranged a compression spring 32 the lower end of which

bears against the upper side of the arm and receives a nub 33 on the arm and the upper end of which embraces a pin 34 on the under side of stop 27. Obviously, the tendency of the spring 32 is to force the arm 29 away from the stop 27 and against or in the direction of the stop 28. When the parts are released this may be accomplished since the weighted arm may be swung about its pivot 31 in a movement independent of any movement of the lever 22.

On the ball or weight portion 30 of the arm 29 there is formed or secured a hook 35. When installing the valve the casing 15 is arranged horizontally and is inserted in a fuel supply line with the line connected with the ports 20 and 21. The lever 22 may extend at either side of the fuel line and a wire 36 is connected with the hook 35 and is carried upwardly and passed through eyes 37. The eyes 37 may be located at suitably spaced intervals and the wire 36 may extend to likely points about the furnace 10 as required. In the length of the wire 36 there is disposed a coil spring 38, and the wire is secured in a taut condition with the spring 38 stretched sufficiently to support the weighted arm 29 in its upper position as shown in Figs. 1 and 2. When the arm is maintained in such position the spring 32 between the arm and the stop 27 is compressed and the lever 22 is maintained in its upper position with the valve 19 in open position.

At suitably spaced points in its length the wire 36 includes fusible links 39. These links may connect sections of the wire and may be of any suitable or desired construction and of desired material. The only requirement is that the links be fusible at relatively low temperatures so that in the event of a fire outside of the furnace 10 one or more of the links will fuse and cause a parting of the wire 36 permitting the weighted arm 29 to drop. On the weighted arm being released while in the full line position of Fig. 1 or 2 the spring 32 immediately expands and will accelerate the downward movement of the weighted arm causing it to attain considerable momentum and to strike the lower stop 28 on the lever 22 a hammer-like blow. It will be understood that on the weighted arm being released it will gravitate downwardly and strike the stop 28 even though the spring 32 be omitted. However, this spring is included to accelerate the downward movement of the arm and to start downward movement of the arm should the latter be more or less stuck due to dust or dirt working in around its pivot 31.

Since the weighted arm strikes the lever 22 a hammer-like blow it will be apparent that the lever is jarred and that if it is stuck because of dirt or dust or the like it will be jarred loose. When the weighted arm strikes the lower stop 28 of the lever the weight of the arm will serve to carry such lever downwardly as the arm gravitates downwardly, and the lever will impart a turning movement to the valve spindle 17 in a direction to shift the valve from the open position of Fig. 2 to the closed position of Fig. 3. If it is desired to manually close the valve 19 it is but necessary to release the lower end of the wire 36 from the hook 35 on the weight 30, and this may be accomplished by drawing downwardly on the lower portion of the wire in a manner to further stretch the spring 38. When the weighted arm is released either manually or as described or on one or more of the links or elements 39 fusing the spring 32 will act against the weighted arm as described, and the lever 22 will be struck a sharp blow and then carried downwardly to shift the valve 19 into closed position.

With the described construction it will be apparent that if the valve is tight the friction tending to hold the valve open will be overcome and that closing of the valve on melting of one or more of the fusible links is insured since a blow is delivered to the valve lever 22 to give it initial movement. The downward movement of the weighted arm when released is hastened or expedited by the expanding action of the spring 32, and it will be apparent that since the weighted arm starts from a position spaced above the lower stop 28 the said arm has obtained considerable velocity before reaching the stop 28 and therefore gives it a hammer blow which will effectively start the lever 22 moving downwardly and the latter will be carried downwardly further by the weight 30 to the position of Fig. 3 and close the valve. This is important as insuring closing of the valve because these valves may not be operated for considerable periods of time in service and because of this inaction tend to become stuck. This device effectively closes the valve in case of fire even though it may not have been operated for a long time.

This construction also permits its connection with an audible alarm device with very little or no extra cost, so that should a fire start and release the valve not only will the fuel supply be cut off to prevent feed of further fuel to the fire but the householder will be informed that there is a fire, and before the fire has gained much headway.

This may be accomplished without materially changing the construction by electrically insulating the member 29 from the other elements when it is in the raised or set position of Figs. 1 and 2. This member may be insulated from lever 24 by placing an insulating bushing 40 on the pivot stud 31 and insulating washers 41 at the sides of the member 29, by making the pin 34 and its collar 34a of insulating material, such as compressed fibre, and by making the connection 42 between wire 36 and the hook 35 of insulating material, such as compressed fibre. This member 42 may be a flat plate as shown in Figs. 7 and 8 with an opening 43 to receive wire 36 and another opening 44 to receive hook 35. With this construction when member 29 is in its elevated position of Figs. 1 and 2 it is electrically insulated from the lever 22.

The device may be easily connected with the usual door bell installation as shown in Fig. 1. The door bell transformer is indicated at 45 connected to the house wiring system by leads 46. The door bell is indicated at 47 connected to the transformer by wires 48 and 49 in one of which is the hand button switch 50. The wire 49 may be connected on one side of the push button to pipe 14 by wire 51 as indicated at 51a and thus grounded thereon, while a wire 52 may be connected to wire 49 on the other side of the button switch and to the member 29 by any suitable means such as a binding screw 53. It will be seen that as the valve body and lever 22 are now electrically connected with wire 51, as soon as member 29 is released and engages the lower stop 28 the circuit is completed and the bell or alarm sounded, and the bell will continue to ring as long as member 29 engages stop 28. Thus as soon as the valve is tripped the alarm sounds informing the householder there is a fire.

Having thus set forth the nature of my invention, what I claim is:

1. In combination, a normally open valve, a lever connected to move the valve to closed position, spaced stops on the lever, a pivoted weighted arm extending between said stops, means including a fusible means maintaining the arm in position spaced from one stop and cooperating with the other stop to maintain the lever in position with the valve open, and said arm positioned to strike the first stop a hammer-like blow and move the lever to close the valve on fusing of said fusible means.

2. In combination, a normally open valve, a lever connected to move the valve to closed position and provided with a stop, a weighted arm positioned to strike said stop a hammer-like blow to jar the lever and operate it to move the valve closed, a spring tending to move the arm toward the stop, and means including a fusible means maintaining said arm in a position spaced from the stop.

3. In combination, a normally open valve, a lever connected to move the valve to closed position, a stop on said lever, a weighted arm pivoted to said lever for movement relative thereto above said stop, and said arm normally held in a position above said stop and adapted on being released to swing about its pivot connection with the lever and strike the stop a hammer-like blow to jar the lever and then acting against the stop to move the lever to close the valve.

4. In combination, a normally open valve, a lever connected to move the valve to closed position, a stop on said lever, a weighted arm pivoted to said lever for movement relative thereto above said stop, spring means normally tending to move the arm in the direction of said stop, said arm normally held in a position above said stop against the action of said spring, and said spring on release of said arm adapted to force said arm downwardly about its pivot connection with the lever and cause the arm to strike the stop a hammer-like blow to jar the lever and then move it to close the valve.

5. In combination, a normally open valve, a lever connected to move the valve to closed position, a stop on said lever, an arm pivoted to said lever for movement relative thereto at one side of the stop, spring means normally tending to move the arm in the direction of the stop, said arm adapted to be held in a position spaced from the stop by a means including a fusible means, and said spring on release of the arm adapted to swing the latter about its pivot connection with the lever and cause the arm to strike the stop a hammer-like blow to jar the lever and then move it to close the valve.

6. In combination, a normally open valve, a lever connected to move the valve to closed position, a weighted arm positioned to strike said lever a hammer-like blow to jar it and operate it to move the valve closed, means including a fusible means maintaining said arm in said position, and spring means normally tending to move said arm in a direction to strike said blow.

7. In combination, a valve casing, a normally open valve therein, a lever connected to operate said valve to closed position, means pivotally mounting the lever on the valve casing, a pair of stops on the lever, an arm, means pivoting the arm to the lever for movement relative thereto between the stops thereof, means for normally maintaining the arm in a position to hold the valve operating lever in valve open position, and a coil spring between said arm and one of said stops and tending to move the arm in the direction of the other stop.

8. In combination, a normally open valve, a lever connected to operate said valve to closed position, a stop on said lever, an arm, means pivoting the arm to the lever for movement relative thereto at one side of said stop, means for normally maintaining the arm in a position to hold the valve operating lever in valve open position, and spring means tending to move said arm about its pivot in the direction of said stop.

9. In combination, a normally open valve, a lever connected to operate said valve to closed position, a horizontal pivot mounting the lever, a stop on the lever, a weighted arm, a horizontal pivot mounting the arm on the lever for vertical movement relative thereto above the stop thereon, means for normally maintaining the arm in a position to hold the valve operating lever in valve open position, and spring means tending to move said arm downwardly about its pivot in the direction of said stop.

10. In combination, a normally open valve, means mounting said valve for pivotal movement between the open and closed positions, a pivotally mounted lever connected to shift said valve between open and closed positions, a weighted arm pivoted to said lever for movement independently thereof but substantially in the plane of movement of the lever, upper and lower stops on said lever and between which the arm is movable relative to the lever, means for normally maintaining the arm in a position to hold the valve operating lever in valve open position, and a compression spring between the weighted arm and the upper stop of the lever.

11. In combination, a normally open valve, a lever connected to the valve for operating it, a stop on said lever, a weighted arm pivoted to the lever and normally spaced from the stop, a spring tending to shift the lever to engage the stop to swing the lever to close the valve, means electrically insulating the arm from the lever when spaced from the stop, and means for electrically connecting leads from an alarm to the arm and lever respectively.

12. In combination, a normally open valve, a lever connected to move the valve to closed position and provided with a stop, a weighted arm above the stop and pivoted to move to and from engagement with said stop, means including a fusible means to normally maintain the arm spaced above the stop and the lever in position with the valve open, a spring tending to move the arm toward the stop and strike it a blow when the arm is released, means electrically insulating the arm when spaced from the stop, and means for electrically connecting leads from an alarm to the arm and lever respectively.

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