March 31, 1936. R. H. LOWNDES 2,035,711

VALVE CONTROL MECHANISM

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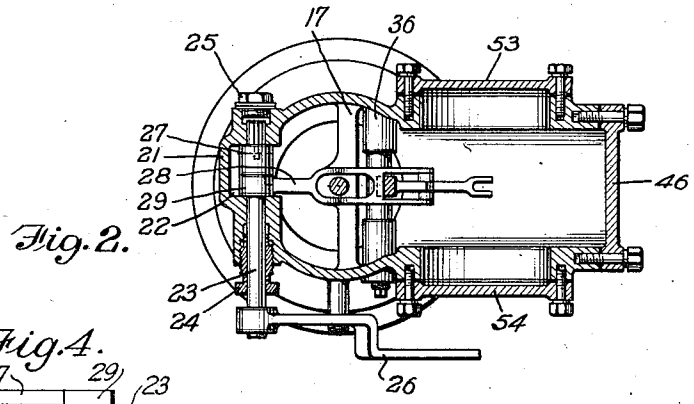
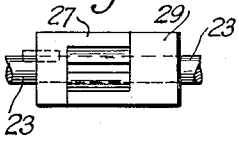


Fig. 2.

Fig. 4.



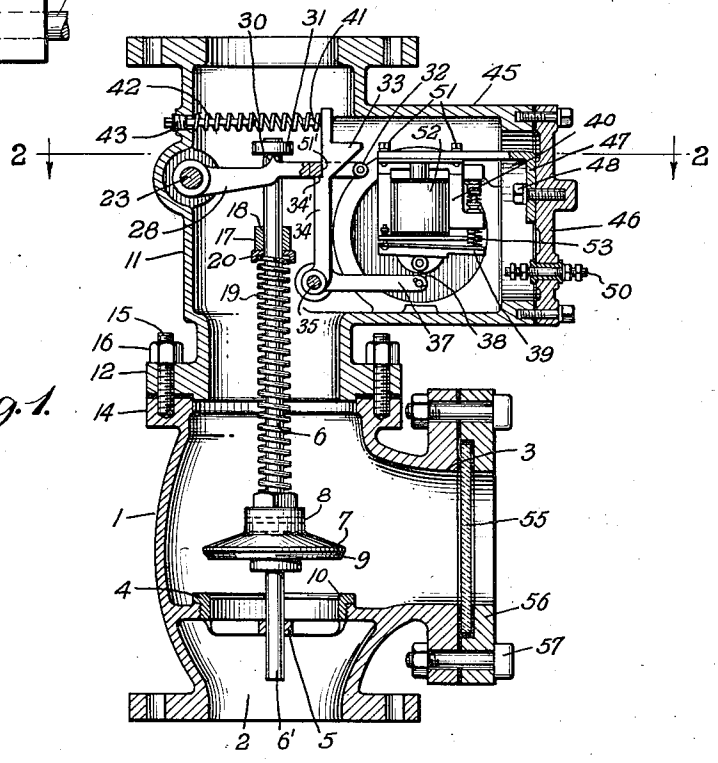


Fig. 1.

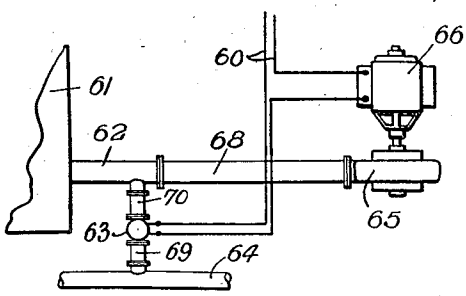


Fig. 3.

Inventor
Richard H. Lowndes.

By Alexander M. Burns,
Attorney

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VALVE CONTROL MECHANISM

Richard H. Lowndes, Atlanta, Ga., assignor to Atlantic Steel Company, Atlanta, Ga., a corporation of Delaware

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6 Claims. (Cl. 137—139)

The present invention has for its primary object the provision of a valve for gas fuel lines of such a construction that cessation of the electric current driving the air blower will result in instant automatic closing of the valve.

To more specifically define the scope and object of the invention, it will be stated that the structure is comprehended for use in assemblies utilizing gas as a fuel. In assemblies of this type air is supplied with the gas, the air being under pressure developed by a suitable fan or blower driven by an electric motor. With such an assembly, should the current supplied to the motor go off, the air blower necessarily stops, and the gas which is fed from another source continues to flow into the combustion chamber. It an extremely short period of time the feeding of gas alone to the combustion chamber will result in a gas accumulation subject to explosion, and this explosion would necessarily cause severe damage to the equipment and possible loss of life. The present valve, when installed in the gas line, renders the accumulation of gas impossible and eliminates the resulting hazard.

By the present invention a valve is positioned in the gas line and is held normally opened by the same current which supplies the electric motor driving the blower. When the current goes off the valve is instantly released and closed, whereby the flow of gas to the furnace is stopped. In fact by means of the present invention the valve is closed an instant before the air supply ceases, inasmuch as the blower which is driven by the electric motor and which furnishes the air will, when the current goes off, continue for a time to rotate due to inertia and maintain an air pressure in the air line. Before the fan movement is terminated, due to its movement under inertia, the valve catch has been released and the valve closed.

This invention also contemplates a valve casing structure in which an observation window is provided at such a point as to permit inspection of the valve to determine whether it is in open or closed position. The provision of this transparent window for inspection of the valve enables the operator to quickly examine the position of the parts before operating the lever or the ignition means.

Reference will now be had to the accompanying drawing forming a part of the invention, wherein similar reference characters designate corresponding parts throughout the several views, in which—

Fig. 1 is a transverse section on line 2—2 of Fig. 2.

Fig. 2 is a vertical section of the assembly showing the valve in elevation, and,

Fig. 3 is a diagrammatic view of the valve assembled in the burner system.

Fig. 4 is a detail drawing of the members 23, 27 and 29 looking from the opposite side from that shown in Fig. 2 and showing how the dog 27 engages and lifts the lever 28.

The valve body is indicated by reference character 1, and provides a longitudinal passage having discharge opening 2 and a lateral opening 3. The valve seat 4 is of conventional type and includes the central guide opening 5 for the lower valve stem 6'. The valve 7 is locked by means of a pin 8 on the valve stem 6 and includes beveled face 9, which seats on the beveled face 10 of the valve seat. The upper valve stem 6 extends into the casing 11 which houses the valve actuating mechanism. Upper valve stem 6 and lower valve stem 6' are two separate pieces, each set into valve 7. By this construction a through hole in valve 7 is avoided, eliminating any leakage. The valve casing 1 and the super casing 11 for the actuating mechanism are each provided with coacting flanges 12 and 14 through which stud bolts 15 extend. Suitable nuts 16 lock the parts together. A transverse guide 17 extends centrally across the passage through the casing 11 and this guide is formed with a central perforation through which the upper extremity of the upper valve stem extends, as shown at 18 in Fig. 1. A coiled spring 19 is positioned between the guide 17 and the valve head and normally causes a seating of the valve on the seat 4. A cap 20 encloses the upper end of the spring and a similar cap may be provided at the bottom, if desired.

Referring now to the operating mechanism, it will be noted that the casing 11 is offset at 21 to provide a chamber 22 through which the shaft 23 extends. The shaft 23 projects through aligned openings formed in the offset wall portions of the casing 11, so as to position the shaft 23 approximately centrally of the chamber 22. A packing 24 is provided for one end of the shaft 23 and the opposite wall opening is sealed by means of the plug 25, whereby frictional engagement of a packing is present at only one point and this, as will later appear, does not affect the valve operating mechanism. A lifting hand lever 26 is fixed to the end of the shaft 23 which projects through the packing 24. Within the chamber 22 and on the shaft 23 there is fixed a dog 27 which, upon lifting of the lever 26, engages and lifts the

operating lever 28 loosely mounted at 29 on the shaft 23. The lever 28 is forked midway of its length and is provided with vertically extending integral projections 30 which engage centrally beneath the valve stem head 31. The extremity of the lever 28 is provided with a roller 32 which engages a tapered projection 33 that projects outwardly from a point near the upper extremity of the vertical arm 34 of the bell crank lever. The bell crank lever is pivoted within the casing 11 on the transverse shaft 35, and the vertical arm 34 extends between the forked lever portions so that the shoulder 34' may engage the flat crotch portion 51' to lock the parts in elevated position. The shaft 35 is fixed within the trunnions 36 projecting inwardly and axially within the casing. The lower horizontal arm 37 of the bell crank lever is connected by a link 38 with the armature 39, the latter coacting with the solenoid 52 to hold or release the parts as hereinafter more clearly shown. The extremity of the upper vertical arm 34 of the bell crank lever includes a pin 41 which seats within the end of coiled spring 42 positioned within the casing. The opposite end of the spring is held by a similar pin made integral with the plug 43. The function of the spring, obviously, is to exert pressure and to cause a positive separation of the latching parts.

The actuating mechanism is contained primarily within an auxiliary chamber formed by casing extension 45. This casing extension has an end opening closed by the end plate 46, which latter also functions to mount the solenoid through the angular support 47 bolted in position by stud bolt 48. The end plate further supports the terminals 50 through which connection is made with the terminals 51 of the solenoid 52.

In order to further facilitate the positioning, adjustment and repair of the parts which comprise the actuating mechanism for the valve, the shell extension is provided with oppositely arranged side ports closed by plates 53 and 54. A glass plate 55 is provided for closing the lateral opening 3, and is held in position by the ring 56 bolted to the casing. The provision of this closed plate permits instant inspection of the valve whereby the operator may determine whether the same is in open or closed position. The necessity for inspecting the parts is brought about primarily by the fact that the handle 26 will, after being released, assume its normal lowered position after the elevation of the arm 28 and the opening of the valve 9.

In operation of the device the air blower, or fan, is first started by turning on the electric current to the fan motor. This electric current, or part of it, passes through the coils of the solenoid 52 and energizes same. The fan then blows air through the burner-mixer and burner into the furnace, thus clearing the entire system. During this time the valve 7 has remained closed, resting on seat 4. After the fan, or blower, has been running for a short time, long enough to thoroughly purge the system of all residual gas, the valve is opened by hand, admitting gas to the mixer and to the burner, where the fire is set.

The operation of the valve is as follows:—

(Reference being had to the numbers of the drawing). Hand lever 26 is raised, this rotates shaft 23, causing dog 27 to engage hub 29 of lever 28. This raises lever 28 and so lifts valve 7 from its seat, till the latch supports it. Hand lever 26 is then returned to its lower position, so that stuffing box resistance can have no effect whatever on subsequent automatic closing of the valve. The elevating of hand lever 26 further results in the movement of bell crank lever due to the engagement of roller 32 with the inclined face of projection 33, which shifts shoulder 34' under latch part 51', thereby latching the same in position. Upon thus opening the vlave, and latching the arm 28 in elevated position, gas is admitted to the burner, and the fire is started.

It will now be readily noted that the valve is being held open by lever 28, which in turn is supported by shoulder 34' engaging latch part 51'. These parts are all so held in proper juxtaposition by energized solenoid retaining armature 39, link 38, and arms 37 and 34, in latched position. If now, for any cause, the electric current driving the air blower goes off, solenoid 52 is instantly de-energized, its armature is released, dropping link 38, and arm 37. Spring 42 insures disengagement of the latching parts, and the valve drops to closed position. The gas supply is thus instantly cut off, while the air supply will continue for many revolutions of the fan and motor, until they "run down." This continued air flow again has a purging effect, which further insures against gas accumulation in the combustion chamber.

In Figure 3 the valve mechanism is shown diagrammatically in the required assembly and in this view the electric circuit 60 is disclosed connecting the blower motor and valve to insure the operation of the latter when the motor current fails. In this figure the furnace illustrated at 61 is provided with fuel from the burner mixer 62, where the air from the blower 65, driven by the motor 66, and the gas from the main 64 through the duct 69 and safety valve 63 first come together and mingle. The duct 68 connects the blower 65 with the mixer 62. Reference 70 indicates the duct from the safety valve to the mixer.

From the diagram it is at once clear that cessation of electric current closes valve and so stops flow of gas, while air may continue to flow.

What I claim is:—

1. In combination, a valve casing, a valve in said casing adapted to be latched open against spring pressure, an elongated valve stem formed with a head, a pivoted arm engaging the valve stem head, a roller carrier by said arm, a bell crank lever having an inclined face adapted to be engaged by said roller, a shoulder projecting inwardly from one of the arms of said bell crank lever for supporting the pivoted arm when in its elevated position, an electro-magnet, a link connection between the electro-magnet and the extremity of one of the bell crank arms, and means independent of the pivoted arm for elevating the same.

2. In combination, a valve casing, a valve adapted to be latched open against spring pressure, an elongated valve stem formed with a head, a pivoted bifurcated arm engaging the valve stem head, a roller carried by the arm extremities, a bell crank lever having a vertical arm extending through the bifurcated pivoted arm and a cam face positioned to engage said roller, means carried by said vertical arm for engaging and supporting the pivoted arm, an electro-magnet, a connection between the bell crank lever and the electro-magnet, spring means cooperating with said electro-magnet to cause a positive movement of the bell crank lever, and means independent of the pivoted arm for elevating the same to cause its engagement with the bell crank lever.

3. In combination, a valve casing, a valve in

the casing adapted to be latched open against spring pressure, an elongated valve stem formed with an enlarged portion, a pivoted arm having a projection for engaging the enlarged portion of the stem, manual means for moving said pivoted arm for elevating the valve from its seat, a friction element carried by the extremity of the pivoted arm, a lever having an inclined face adapted to be engaged by said friction element, a shoulder on said lever projecting inwardly of the arm for supporting the pivoted arm when in elevated position, spring means opposing the movement of said pivoted arm, and electric means for moving the pivoted arm against the opposition of said spring.

4. The substance of claim 3, characterized in that a one-way clutch is provided to permit the manual means to swing the pivoted arm to elevate the valve from its seat.

5. In combination, a valve casing, a valve seat, a valve for engaging the seat, a valve stem, a spring on said valve stem for seating said valve, a pivoted arm normally engaging said valve stem, manual means for swinging said pivoted arm to elevate said valve from its seat, a catch operated by the movement of the pivoted arm supporting the latter to retain the valve in open position, an electro-magnet, a link connection between the electro-magnet and the catch whereby the catch is retained in supporting position beneath the pivoted arm when the electro-magnet is energized, and means for disengaging the catch upon de-energization of the electro-magnet.

6. The substance of claim 5, characterized in that the electro-magnet is positioned in a laterally extending chamber formed in the casing.

RICHARD H. LOWNDES.