May 19, 1936. H. A. MANTZ 2,040,864

CONTROL DEVICE

Filed Aug. 31, 1931

Fig. 2

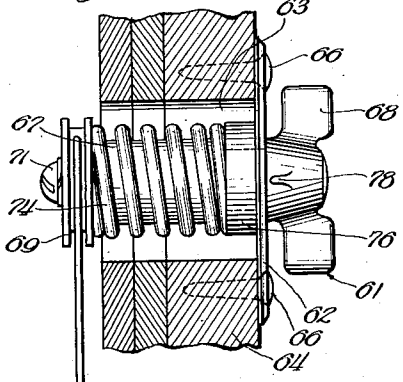


Fig. 3

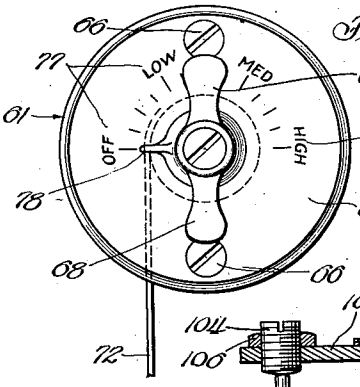
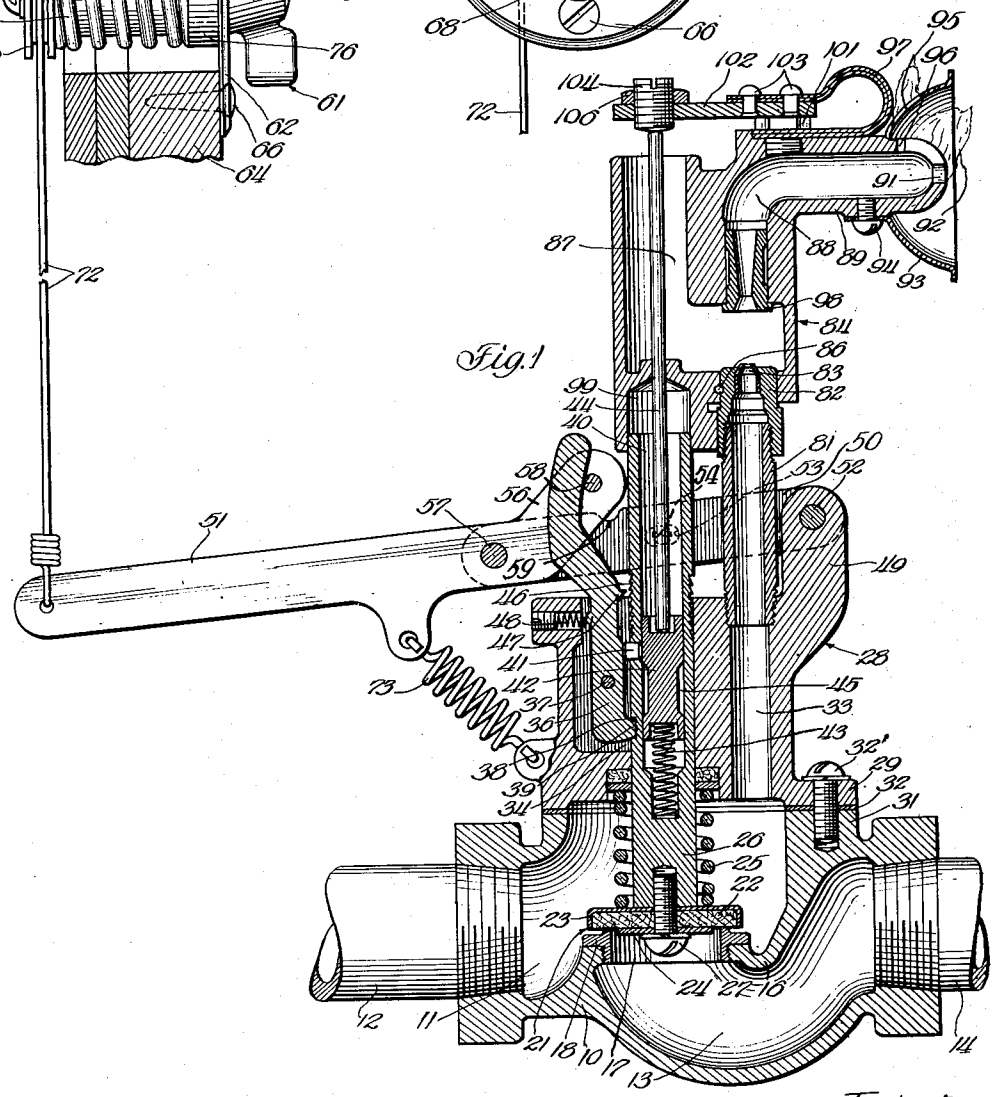


Fig. 1



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CONTROL DEVICE

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20 Claims. (Cl. 137—139)

My invention relates to fluid flow control systems and has particular relation to a control means which is adapted to be controlled and operated by a control device located at a distance from the control means.

In fluid fuel heating devices it is sometimes desirable that the control means for controlling the flow of fuel to the burner or heater be adapted for operation and control from a remote point. For instance, the heating device and the means for controlling the feeding of fuel to the heating device may be located in a basement or in one part of a building and it may be desirable that the control means be controlled and regulated from another part of the building. It is very desirable, particularly in mild climates, that the entire control system be inexpensive to manufacture, install and maintain. The control system must be reliable and dependable and should be arranged so that the quantity of fuel fed to the heater per unit of time may be varied. Preferably the control device should be provided with means for igniting the fuel when it first issues from the burner and preferably also should be provided with means which prevent the flow of fuel to the burner unless the ignition device is in operation.

I have conceived of a control system which meets these requirements. A general object of my invention is to provide a control system for controlling the flow of fuel to a heater or the like which may be controlled and regulated at a distance therefrom.

More particularly it is an object of my invention to provide a device of the above character which is simple and reliable and which is inexpensive to manufacture, install and maintain.

Another object of my invention is to provide a device which employs only one connecting link between the fuel flow control means and the remotely located control and regulation device and in which the connecting link may be led around corners, through irregular passageways and the like.

Another object of my invention is to provide a device of the above character having means for igniting the fuel as it issues from the burner and having also means for preventing the flow of fuel to the burner if the ignition device is not operating.

Other and further features and objects of the invention will be more apparent to those skilled in the art upon a consideration of the accompanying drawing and following specification, wherein is disclosed a single exemplary embodiment of the invention, with the understanding, however, that such changes may be made therein as fall within the scope of the appended claims without departing from the spirit of the invention.

In said drawing:

Figure 1 is a view in vertical section of the control mechanism for controlling the flow of fuel to a burner or the like;

Figure 2 is a view in side elevation of the control device for regulating and controlling the control mechanism shown in Figure 1; and

Figure 3 is a view in front elevation of the control device shown in Figure 2.

The present invention deals particularly with a control system adapted to control the flow of fluid fuels such as gas to a burner and with means for igniting the fuel issuing from the burner, but it is quite apparent that the device may be used or modified for use in controlling and igniting other fuels and in fact for controlling the flow of any fluid through a conduit, by means of a control device situated at a distance from the control means.

Referring now to the drawing for a more complete disclosure of my invention there is shown at 10 a valve body of substantially standard construction having an inlet chamber 11 into which an inlet pipe 12 may be led and having an outlet chamber 13 which communicates with an outlet conduit 14. A wall 16 between the inlet chamber 11 and the outlet chamber 13 is provided with an opening 17 therethrough and a valve seat bushing 18 is disposed in the opening and secured therein by means of cooperating threads on the bushing and in the wall of the opening 17. The bushing 18 is provided with a raised flange to afford a seat for a valve 21 which is comprised of a valve disc 22 and valve disc retainers 23 and 24. The valve disc and the retainers are held on the end of a valve stem 26 by means of a screw 27 which is threaded into a suitable opening in the valve stem.

The upper portion of the valve body 10, over the inlet chamber 11, is open and a valve bonnet 28 is secured over the chamber 11 to the valve body by means of cooperating flanges 29 and 31 on the valve bonnet and valve body respectively. A resilient washer 32 is disposed between the cooperating flanges to afford a seal between the bonnet and the body, and the two parts are held together by means of screws 32'.

The bonnet is provided with two vertically

extending openings, one of which openings 33 is adapted to constitute a conduit to conduct gas from the chamber 11 to an ignition burner, hereinafter described, and the other of which 34 is adapted to constitute a guide for the valve stem 26 and also a means for housing the latch lever 36 used for locking the stem, as hereinafter described. The latch lever 36 is mounted for pivotal movement upon a pin 37 which is suitably secured to the valve bonnet body 28.

The valve stem 26 is provided with a notch or lock groove 38, and a projection 39 on the lower end of the latch 36 is adapted to lock the valve 21 in its closed position when the upper portion of the lever 36 is pressed outwardly as by means of the latch bolt pin 41. The latch bolt pin 41 is mounted for reciprocation in a horizontally extending bore in the valve stem 26 and the upper portion of the valve stem is provided with a vertically extending bore 40 to permit mounting a cylindrical latch bolt 42 therein. The latch bolt is provided with a wide circumferential groove 45 to permit the pin 41 to move inwardly to release the latch 36 when the bolt is raised. The latch bolt is biased upwardly by means of a spring 43 located in a suitable recess at the bottom of the bore 40 in the valve stem but is held down normally by means of a conveyor rod 44 the position of which is controlled by means of a bi-metallic element hereinafter described.

Notches or latch grooves 46 are provided in the upper portion of the outer wall of the stem 26 and a tooth or latch dog 47 on the latch 36 is adapted to engage any one of the grooves 46 when the latch lever is moved inwardly as by means of the spring 48. In its normal position, however, the upper portion of the latch bolt 42 holds the pin 41 outwardly to cause the lower portion of the latch lever to lock the valve stem in its closed position and to prevent engagement of the dog 47 with the grooves 46.

An upwardly extending ear 49 on the valve bonnet 29 provides means for pivotally supporting a lever 50 upon the bonnet by means of the pivot pin 52. A slot 53 in the lever 50 is engaged on a lift pin 54, secured or formed integrally with the upper portion of the valve stem 26. The control lever 51 is pivoted to the free end of the lever 50 by means of the pivot pin 57, and is provided with an upwardly and overlapping extending portion 56 carrying a link 58 engaging the upper portion of the latch lever 36. The lever 51 is also provided with a downwardly offset portion adapted to be engaged by spring 73 for normally holding the lever 51 in the position shown, with the pin 58 in engagement with the angular cam surface formed at the upper end of the lever 36, whereby the lever 36 is held in engaged position within the detent 38 formed in the valve stem. The pin 58, upon pivotal movement of the lever 51 about pivot 57 with respect to lever 50, is adapted to have locking engagement in a groove 59 formed in the upper surface of the lever 50, thereby providing a toggle connection which is locked in position so that upon upward movement of the lever 51 after the rotation thereof about pin 57 has engaged pin 58 in the groove 59, the lever 51 and lever 50 will conjointly rotate about the pivot 52, whereby the pin 54 will be raised to raise the valve stem.

The position of the control lever 51 is determined and regulated by means of a control device 61 which may be located at a distance from the valve control mechanism. The control device 61 includes an escutcheon plate 62 which is secured over a suitable opening 63 in the wall 64 of a room or the like as by means of screws 66. A control shaft 67 is rotatably mounted in a suitable opening in the escutcheon plate and projects into and through the opening 63. A control knob 68 is secured to a reduced portion of the shaft 67 which projects outwardly from the escutcheon plate. A cable guide or reel 69 is secured to the other end of the shaft, at a position on the other side of the wall 64 from the control knob, by means of a screw 71. A control cable 72 is secured at one end of the reel 69 and at the other end to the free end of the control lever 51. Of course the control cable 72 may be carried over pulleys (not shown) to change its direction, and other control devices, like the device 61, may be secured to the control cable to permit control of the lever 51 from any desired location or from several locations.

In order to prevent the spring 73, which is utilized to bias the control lever 51 downwardly, from causing rotation of the reel 69 the shaft 67 is frictionally engaged to the escutcheon plate 62 by means of a spring 74 which bears against the reel 69 at one end and against a washer like shoe 76 at the other end. The shoe 76, being biased against the escutcheon plate, grips the plate between the shoe and the control knob 68 with sufficient force that when the knob is rotated the frictional engagement is sufficiently great that the lever 51 is held in any position to which it is moved.

The escutcheon plate 62 is marked with indicia 77 and the control knob 68 is provided with a pointer 78 to permit the control knob to be moved to a position to secure any desired position of the control lever 51 thereby providing a means for regulating the valve opening to control the heater.

A pilot feeder conduit, in the form of an elongated bushing 81, is threaded into the valve bonnet 28 to communicate with the conduit 33 and a bushing or spud 82 is threaded on the upper end of the bushing 81. A jet 83 is mounted upon the top of the bushing 81 and secured in place thereon by means of the spud 82. Since the port in the jet 83 is of a relatively small diameter, gas flowing from the chamber 11 and the conduit 33 is caused to issue through the jet at high speed.

A pilot head 84 is fastened on the bushing 82 by means of a pin 86. The pilot head is of an irregular shape and is provided with a channel 87 leading downwardly from the top of the pilot head to a position above the jet 83. A second channel 88 leads upwardly from above the jet 83 and horizontally into a burner 89. A port 91 is provided in the end of the burner 89 to permit ignition of the gas issuing from the port to form a pilot flame 92 for igniting the gas issuing from the burner (not shown). A hemispherical shield 93 is fastened to the burner 89, as by means of a screw 94, to protect the pilot flame. A smaller port 96 in the burner 89 and an opening 95 in the shield 93 permit a portion of the gas from the channel 88 to burn in a vertical flame to heat the thermostatic element 97 for a purpose hereinafter explained.

A Venturi bushing 98 is provided in the lower, vertically extending portion of the channel 88 in order that the gas issuing from the jet 83 may pass through the bushing and draw air through the channel 87 and into the channel 88 of burner 89 to aid in combustion. The upper end of the valve stem 26 is journaled for vertical

movement in a suitable bore 99 in the pilot head 84 and the conveyor rod 44 projects through the pilot head and through the channel 87 to a position above the pilot head. The thermostatic element 97 is of U-shape, with one arm secured to the top of the pilot head 84 as by means of a bolt 101, and with a conveyor strip 102 secured to the other arm as by means of rivets 103. An adjusting screw 104 in the free end of the conveyor strip 102 makes contact with the conveyor rod 44 and may be adjusted up and down to permit proper adjustment of the thermostat with respect to the conveyor rod 44 and the latch bolt 42. A lock nut 106 is adapted to lock the adjusting screw 104 in position after it has been properly adjusted.

In operation of the device gas or other fluids are admitted through the conduit 12 to the inlet chamber 11. Some of the gas flows through the conduit 33, out through the jet 83, where it is mixed with air admitted through the conduit 87, through the Venturi bushing 98, through the conduit 88, and out through the ports 91 and 96. If the gas issuing from the ports 91 and 96 is not ignited no motion of the thermostatic element 97 occurs and the latch bolt 42 is held in a depressed position whereby the latch 36 is caused to lock the valve 21 in closed position, but when the gas issuing from the ports is ignited the flame 92 is formed and the thermostatic element 97 is heated and distorted. The thermostatic element is constructed with the material having the highest coefficient of expansion on the inside of the U-shaped loop so that on heating the thermostatic element spreads, causing the upper arm to move upwardly, thereby permitting the conveyor rod 44 and the latch bolt 42 to move upwardly under the influence of the spring 43. When the thermostatic element 97 has been heated to a sufficient extent that the groove 45 in the bolt 42 is under the pin 41 the upper portion of the latch 36 is in position such that it may be moved inwardly by reason of the biasing action of the spring 48 to cause the projection 39 to be disengaged from the groove 38 and to cause the dog 47 to engage the grooves 46 on the valve stem 26, when control lever 51 is operated.

If it is desired that the burner (not shown) be ignited, the control knob 68 is turned to lift the control lever 51. This results in tension being placed on cable 72, which in turn results in moving the lefthand end of the lever 51 upwardly against the pressure of spring 73 about the pivot 57. This disengages the cam pin 58 from the upper end of the latch lever 36, moving the pin 58 downwardly into the groove 59 formed in the upper surface of the lever 50. It is to be noted that as the pin 58 moves in its arc about pivot 57, it moves to the right of the canning surface formed at the upper end of the lever 36, and thereby releases the lever 36 from its locked engagement at its lower end within the detent 38. The spring 48 is then effective to move the lever 36 in a clockwise direction about its pivot 37, whereby the tooth 47 moves into engagement with the teeth 46 of the valve stem. At the same time, the movement of the lever 51 upwardly, after the pin 58 has engaged in groove 59, results in rotation of the lever 50 in a clockwise direction about pivot 52. This results in raising of the valve stem which can now be accommodated by reason of the fact that the detent engagement at the lower end of the latch lever 36 has been released due to movement of the pin 58 away from the upper camming surface of the lever 36. As the valve stem starts to move upwardly, therefore, with the bolt 41 disposed within the annular groove 45 of the latching bolt 42, the dog 47 ratchets along the surface of the teeth 46 as the stem 26 moves upwardly. Continued rotation of the shaft 67 thereby lifts the valve stem 26 and the valve 21 from its seat, to permit gas to flow into the chamber 13 and into the burner where it is ignited by the ignition flame 92.

If it is desired to close or partially close the valve 21 the control knob 68 is rotated in an anti-clockwise direction to permit the lever 51 to move downwardly under the influence of the spring 73. The first downward movement of the lever 51 causes the end 56 to rotate slightly about the pin 57 and pin 58 moves into position to pull against the latch 36 to disengage the dog 47 from the grooves 46. The spring 25 thereupon initiates movement of the valve stem 26 downwardly, which results in moving lever 50 in a counterclockwise direction about pin 52, resulting in lowering of the pivot pin 57, and producing reengagement of the pin 58 in the groove 59. This stops lowering movement of the valve stem, since the toggle connection is then effected between lever 50 and 51, and the lever 51 is maintained in position by means of the position of the control mechanism 61. To raise the valve stem from this position, it is merely necessary to rotate the lever 51 in a clockwise direction about pin 52, since the levers 50 and 51 are locked together by engagement of pin 58 in groove 59. The dog 47 of the latch 36 at this time merely ratchets along the teeth 46 of the valve stem. To close the valve entirely, the control mechanism 61 is turned to off position, which releases the free end of lever 51 so that it pivots about the pivot 57 under the influence of spring 73, resulting in the pin 58 moving the dog 47 away from the teeth 46. The dog 39 at the opposite end of the lever 36 at this time rides along the outer surface of the valve stem, which closes under the influence of spring 25, moving lever 50 downwardly about pivot 52. When the valves reaches its lowermost position, the pin 41 will still be retained within the annular groove 45 of the latch bolt 42, if the pilot flame remains ignited, and therefore the lever 36 will be maintained in a position wherein the teeth 46 of the valve stem are engaged by the dog 47, with the dog 39 out of the detent 38. The valve can thus be raised from this position by means of the control mechanism 61, providing the thermally sensitive element is being heated by the pilot flame.

After the valve stem has been raised, extinguishing of the pilot flame will result in lowering of the member 42, which will cause the button 41 to be pushed against the upper part of the lever 36, slightly below the dog 47. It will be noted that this part of the lever is indented with respect to the normal width of the lever 36. The engagement of the button 41 with the indented portion of the lever results in displacement of the dog 47 from the notches 46, while the detent 39 rides along the external surface of the valve stem 26. This will cause the sudden lowering of the valve stem 26, due to the tension of the spring 25. The detent 39 will not engage the groove 38 until the further lowering of the member 42 will cause the button 41 to ride over the shoulder formed on the surface of the lever 36 above the pivot 37, as shown in Figure 1, when the button will press against the raised portion of the lever to urge the detent 39 into engagement.

It should be understood that the member 42

does not lower at the same rate as does the valve stem 26, and until member 42 is lowered, the button 41 will lie in the groove 45 of the member 42. The closing effect is obtained by means of the varied cam surface on the inner side of the lever 36, which allows for disengagement of the dog 47 without corresponding engagement of the detent 39, and, when the valve stem has assumed its lower position, results in the further urging of the lower end of the lever 36 into engagement to cause the detent 39 to lock in the groove 38.

It is to be noted that I have provided a means of controlling a fluid flow control means from a remote point and that I have also incorporated a safety feature in that gas cannot flow into the burner unless the pilot flame 92 is burning.

In addition I have provided a remote control means which employs only one connecting link or cable. The connecting link is flexible and may be led around corners and through conduits whose direction changes. The control mechanism is actuated by pulling the control lever only and self restoring of the control mechanism after release of the control means is effected. The device is simple and inexpensive in cost, installation and maintenance.

Although I have described a specific embodiment of my invention it is apparent that modifications thereof may be made by those skilled in the art. Such modifications may be made without departing from the spirit and scope of my invention as set forth in the appended claims.

I claim as my invention:

1. In a fluid flow control means, a valve, means for opening the valve, spring means normally urging said valve toward closed position, means for holding the valve in raised position and means engaged between the valve opening means and the valve holding means for releasing the valve holding means upon movement of the valve opening means toward a closing position.

2. In a fluid flow control means a valve, a lever for opening the valve, springs means normally tending to close said valve, a latch for holding the valve in raised position, and means cooperatively engaged between the lever and the latch to withdraw the latch from engagement with the valve when the lever is moved in a closing direction.

3. In a fluid flow control means, a valve, a spring for closing the valve, a means for raising the valve, holding means for preventing closing of the valve under the influence of the spring while the valve is being raised and during the time it is in raised position, and means operatively associated with the raising means whereby lowering of the raising means causes disengagement of the holding means.

4. In a fluid flow control means a valve body, a valve, a valve bonnet, a hollow valve stem for the valve having depressions in the outer wall thereof, a latch pivotally mounted on the bonnet provided with means for selectively engaging the depressions of the valve stem, a latch bolt within the stem mounted for reciprocation and means for actuating the latch according to the position of the latch bolt.

5. In a fluid flow control means a valve body, a valve, a valve bonnet, a hollow valve stem for the valve having depressions in the outer wall thereof, a latch pivotally mounted on the bonnet provided with means for selectively engaging the depressions of the valve stem, a latch bolt within the stem mounted for reciprocation, means for actuating the latch according to the position of the latch bolt, and a control lever also pivotally mounted on the bonnet for lifting the valve stem and also provided with means for actuating the latch.

6. In combination, a valve including a valve housing having inlet and outlet openings therein, a valve bonnet secured to said housing, a passageway in said bonnet, a valve stem slidable in said passageway, pivoted latch means for holding said stem in selected position, and means carried by said stem and having abutting engagement with said latch means for engaging and releasing said latch means from said stem.

7. In combination, a valve including a valve housing having inlet and outlet openings therein, a valve bonnet secured to said housing, a passageway in said bonnet, a valve stem slidable in said passageway, a lever pivoted within said bonnet and adapted to engage said valve stem, and means carried by said stem for releasing said lever.

8. In combination, a valve including a valve housing having inlet and outlet openings therein, a valve bonnet secured to said housing, a passageway in said bonnet, a valve stem slidable in said passageway, a lever pivoted within said passageway and adapted to engage said valve stem, a second lever engaging said stem for opening said valve, and spring means for closing said valve.

9. In combination, a valve including a valve housing having inlet and outlet openings therein, a valve bonnet secured to said housing, a passageway in said bonnet, a valve stem slidable in said passageway and normally urged toward closed position, a lever pivoted within said passageway and adapted to engage said valve stem, a second lever engaging said stem for raising the same toward open position, and a pin carried by said second lever and engaging said first lever.

10. In combination, a valve including a valve housing having inlet and outlet openings therein, a valve bonnet secured to said housing, a passageway in said bonnet, a valve stem slidable in said passageway, and a lever pivoted within said passageway and adapted to engage said valve stem, said lever having an outer cam portion, and means for engaging said cam portion to release said lever from said stem.

11. A control device comprising a valve housing, a valve bonnet secured thereto, a valve stem slidable in said bonnet and having a valve member for controlling flow of fuel through said device, a latch bolt, said stem having a recessed portion receiving said bolt, a lever pivoted in said bonnet and engaging said stem for preventing opening movement thereof, and means carried by said stem and cooperating with said latch bolt providing for disengagement of said lever.

12. A control device comprising a valve housing having inlet and outlet openings, a valve bonnet secured over said inlet opening, a valve stem slidable in said bonnet and having a valve member for controlling flow of fluid through said device, a latch bolt, said stem having a recessed portion receiving said bolt, a lever pivoted within said bonnet and engaging said stem for preventing raising of the same, and means carried by said stem and cooperating with said latch bolt providing for disengagement of said lever from said stem.

13. In a fluid flow control device, a valve housing having inlet and outlet openings, a valve bonnet secured over said inlet opening, a valve stem carried by said bonnet, a lever pivoted about said

bonnet for raising said stem, means carried by said bonnet and cooperating with said lever to hold said stem in raised position, and means carried by said stem for releasing said last named means to permit lowering of said stem.

14. In combination, a valve housing having inlet and outlet openings, a valve bonnet secured to said housing, a valve stem carried by said bonnet, means pivoted to said bonnet for raising said stem, a spring normally tending to lower said stem, means pivoted within said bonnet for holding said stem in raised or lowered position, link means between said two last named means providing for conjoint operation thereof, and means carried by said stem for disengaging said holding means.

15. In combination, a valve housing having inlet and outlet openings, a valve bonnet mounted on said housing, a valve stem slidable in said bonnet, a recess in the exterior surface of said stem, a lever pivoted in said bonnet and having one end thereof engageable in said recess to hold said stem in lowered position, a plurality of annular depressions on the upper external surface of said stem, means carried adjacent the opposite end of said lever and engageable in said depressions to hold said stem in raised position, and means carried by said stem providing selective engagement of said lever with said recess and with said depressions.

16. In combination, a valve housing, a valve bonnet mounted on said housing, a valve stem slidable in said bonnet, means for raising said valve stem, means for lowering said stem, a latch pivoted in said bonnet and engaging said stem for holding said stem in either raised or lowered position, and means carried by said stem for releasing said latch from said stem.

17. In combination, a valve housing, a valve bonnet mounted thereon, a valve stem slidable in said bonnet, means for raising said stem, means for lowering said stem, a latch pivoted in said bonnet, means carried by said latch for holding said stem in raised or lowered position, a cam surface on said latch, and means carried by said raising means for engaging said cam surface to move said latch.

18. In combination, a valve housing, a valve bonnet secured thereto, a passageway extending through said bonnet, a valve stem slidable in said passageway, a recess extending normal to the axis of said passageway, latch means in said recess, and means carried by said stem providing for engagement and disengagement of said latch means therewith.

19. In combination, a valve housing, a valve stem therein, a latch lever normally engaging said valve stem when said stem is in closed position, a lever pivoted at one end to said housing, a second lever pivoted to the free end of said first lever, means carried by said second lever providing for disengagement of said latch from said stem upon initial raising of said lever and for conjoint raising movement of said first lever, and means connected between said first lever and said stem for raising said stem.

20. In a valve actuating mechanism, a valve stem, a pivoted latch lever engaging in said stem for holding said stem and valve in closed position, a lever for raising said stem, means for actuating said lever including a pin normally holding said latch lever in engaged position and releasable from said latch lever upon initial operating movement of said actuating means, said pin subsequently engaging said raising lever to provide for conjoint movement of said lever and said actuating means to raise said valve stem.

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