Aug. 20, 1935. F. H. SCHOENFELD 2,011,690

VALVE MECHANISM

Filed March 7, 1934 2 Sheets-Sheet 1

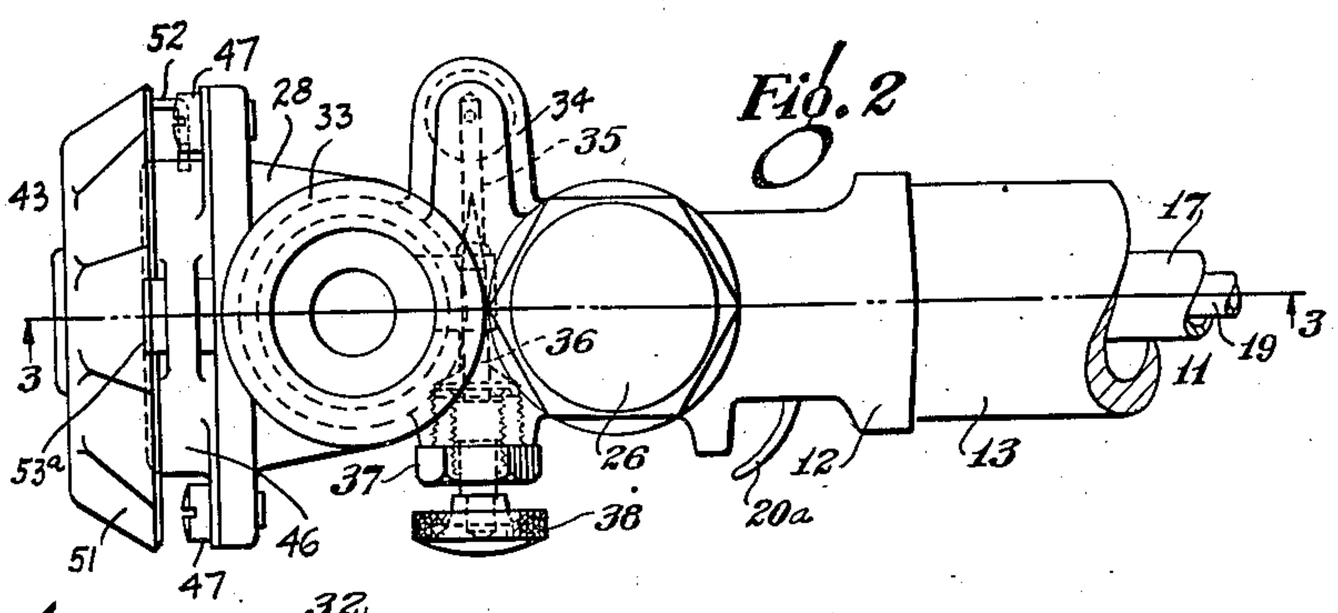

Fig. 2

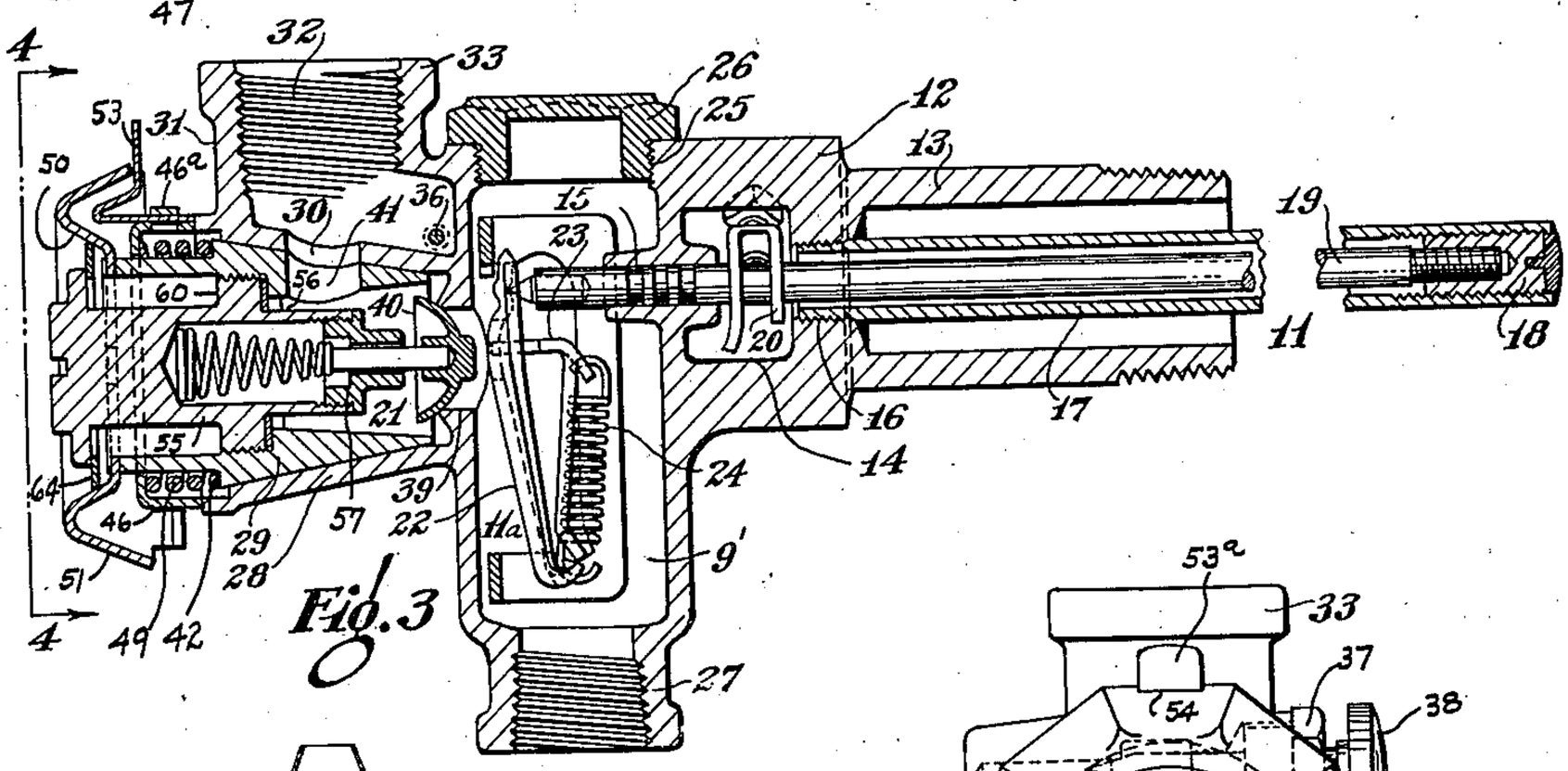

Fig. 3

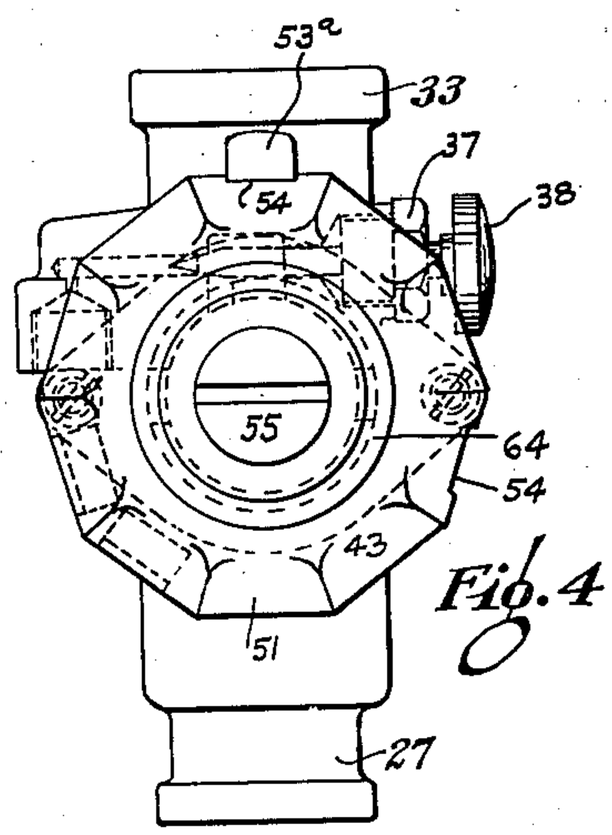

Fig. 4

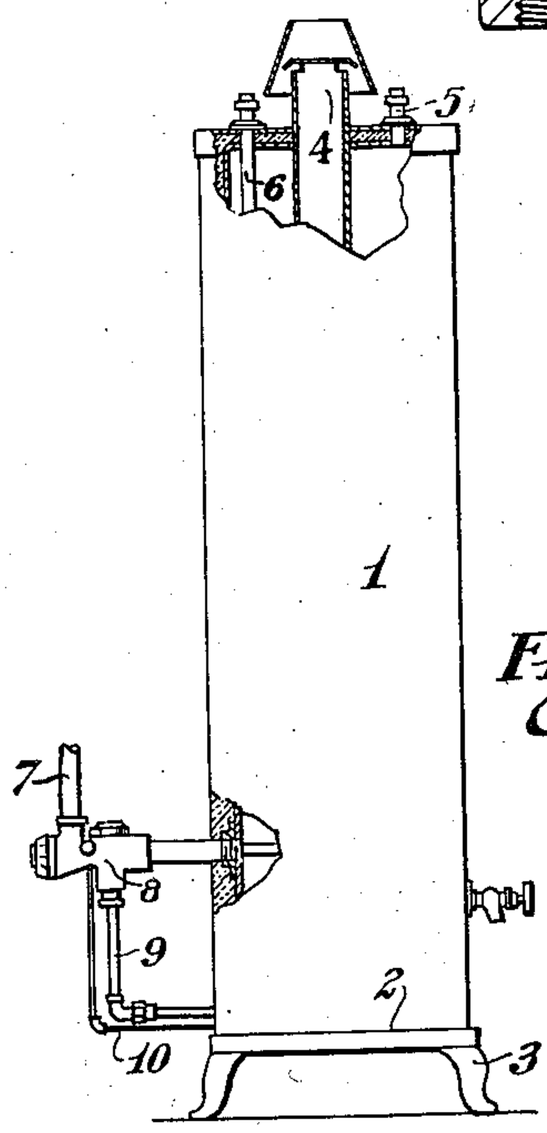

Fig. 1

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VALVE MECHANISM

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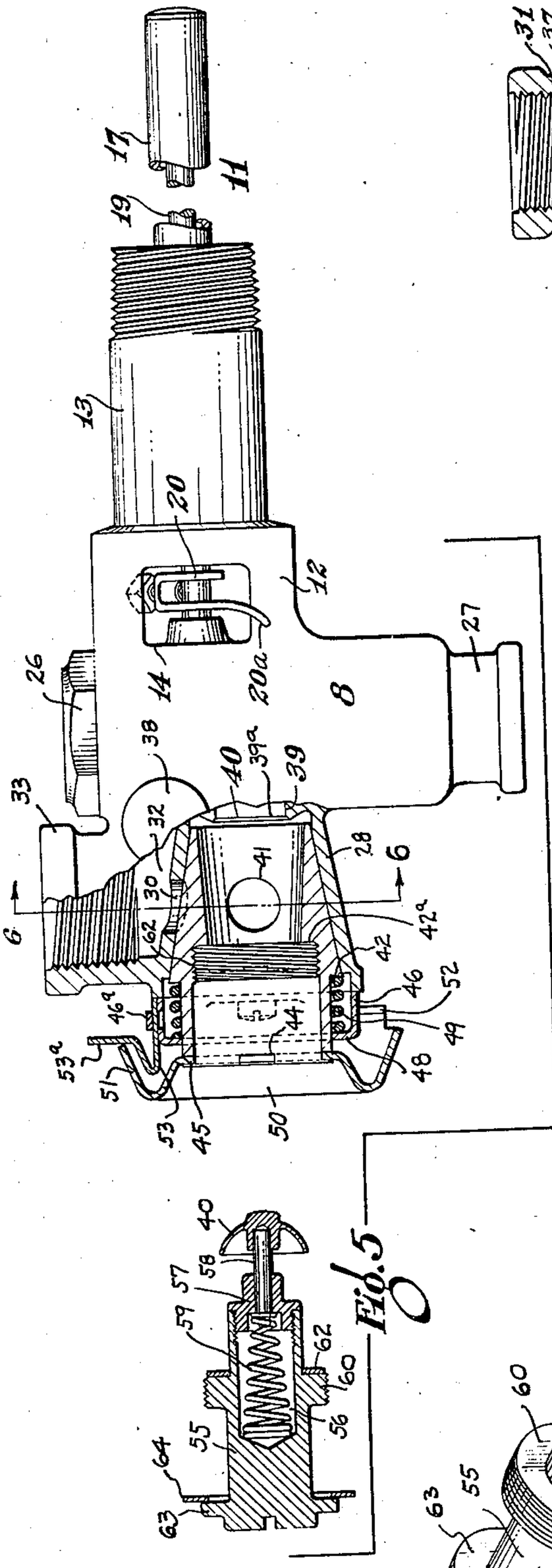

Fig. 5

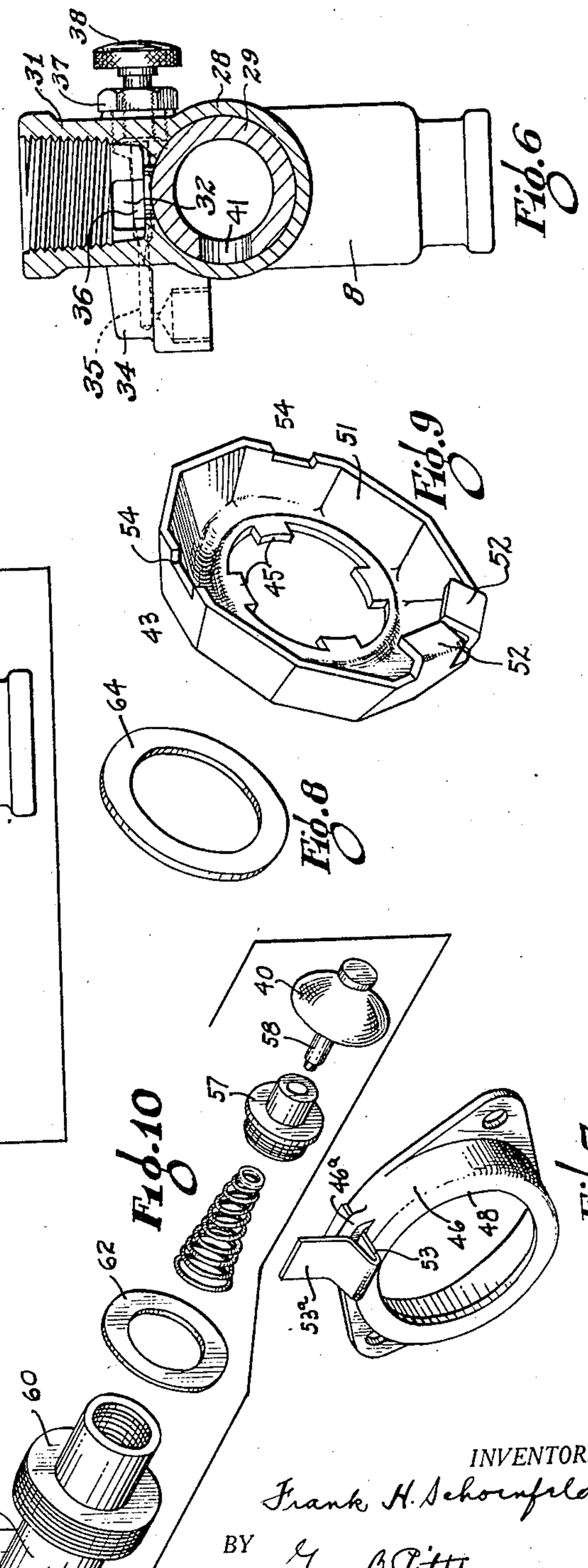

Fig. 6

Fig. 9

Fig. 10

Fig. 7

Fig. 8

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2,011,690

VALVE MECHANISM

Frank H. Schoenfeld, Cleveland Heights, Ohio, assignor to The Titan Valve and Manufacturing Company, Cleveland, Ohio, a corporation

Application March 7, 1934, Serial No. 714,472

12 Claims. (Cl. 277—64)

This invention relates to a valve mechanism for controlling fluid flow, more particularly a dual or combination valve construction comprising a controlling valve which operates (for example, automatically) to meet operating conditions and a main valve which provides for permanent cut off of the fluid. In exemplifying the preferred application of my improved valve mechanism, it is shown controlling the supply of a combustible fluid to a burner for a boiler. In this application, the mechanism is associated with a thermostat mechanism, which, being affected by the temperature of the water in the boiler, automatically operates one valve of my mechanism to control the supply of the combustible fluid to the burner, whereby the temperature of the water in the boiler is maintained at substantially a predetermined degree or re-heated to such degree of temperature when the heated water is withdrawn and replaced by cold water from the supply mains. As the valve element of the controlling valve and its seat require cleaning from time to time due to residue adhering thereto, I provide an improved arrangement permitting removal of the valve element, access to its seat and the automatic cut off of the fuel supply to the burner, so that danger of fuel waste is eliminated and such removal and cut off is effected by a single operation.

One object of the invention is to provide an improved combination valve construction comprising a main valve and controlling valve in associated relation, whereby (*a*) the casing, through which the gaseous fuel flows, may be simplified and relatively small in construction and (*b*) the fuel supply pipe may be readily and economically valve connected with the casing.

Another object of the invention is to provide an improved valve mechanism having a main cut off and a controlling valve so arranged and constructed that the removal of the valve element for the latter valve serves to operate the cut off.

Another object of the invention is to provide an improved combined dual mechanism in which the valves may be independently operated, one valve may be removed independently of the other valve or both valves may be removed as a unit.

Another object of the invention is to provide a valve mechanism comprising a main valve and a controlling valve which is removable whereby its valve element and valve seat may be readily cleaned.

Another object of the invention is to provide an improved valve mechanism comprising a main valve and a controlling valve removably associated with the main valve and interconnected therewith, whereby the removal of the controlling valve will close the main valve and the replacement thereof will open the main valve.

Another object of the invention is to provide an improved valve mechanism comprising a rotary valve and a spring-operated valve having its mounting threaded into the rotary valve and interconnected therewith so that upon removal of the valve mounting the rotary valve is rotated to shut off the supply.

A further object of the invention is to provide a valve mechanism having independently operable main cut off and controlling valves and which is relatively simple, readily assembled and operated.

Other objects of the invention will be apparent to those skilled in the art to which my invention relates from the following description taken in connection with the accompanying drawings, wherein

Fig. 1 is a side elevation of a boiler, such as a storage water heater, having a gaseous fuel supply controlled by a valve mechanism embodying my invention.

Fig. 2 is a plan view of parts shown in Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 is an end elevation of the parts shown in Figs. 2 and 3.

Fig. 5 is a view partly in side elevation and partly in section, showing the controlling valve and its mounting removed; the latter parts being in section.

Fig. 6 is a section on the line 6—6 of Fig. 5.

Figs. 7, 8, and 9 are perspective views of certain parts detached.

Fig. 10 is a view showing in perspective the controlling valve element, its mounting and operating spring in separated relation.

In the drawings, 1 indicates a storage water heater comprising an insulated tank, the burner for a gaseous fuel being below the tank and mounted in a casing incorporated with the insulation for the tank and forming a combustion chamber, the casing being secured to a ring 2 having suitable feet 3. 4 indicates a flue which leads through the tank from the combustion chamber. 5 indicates the outlet for hot water, leading to service points or stations. 6 indicates the water supply pipe leading from the supply mains. The parts above described form no part of my invention and may be of any preferred construction and arrangement.

The gaseous fuel is supplied by a pipe 7 to a casing 8, to be later referred to, and from the

casing through a pipe 9 to the burner and through a pipe 10 to a suitable pilot. The pipe 7, casing 8 and pipe 9 form a conduit for the fuel leading to the burner.

In the illustrated application of my invention, my improved valve mechanism is associated with a thermostat mechanism, indicated as an entirety at 11, which, due to change in temperature of the water in the tank, operates the controlling valve of my mechanism, to admit fuel or cut off its supply to the burner; but it is to be understood that my valve mechanism may be otherwise used, for which reason the invention is not to be limited to a valve mechanism wherein the controlling valve is to be operated by or through a thermostat. The thermostat mechanism may be of any desired construction. Where my valve mechanism is associated with a thermostat mechanism of the construction and arrangement herein shown, the casing 8 is shaped to form a chamber 9' in which is mounted a suitable multiplying leverage 11a forming part of the thermostat mechanism 11 and on its rear wall a body portion 12 having a tubular member 13. The free end of the member 13 is threaded into the side wall of the tank 1, as shown in Fig. 1. The body portion 12 is formed with a recess 14 which extends inwardly from one side thereof. The side walls of the recess 14 are formed with openings 15, 16, in axial alinement with the tubular member 13. The walls of the opening 16 are threaded to receive and support the inner end of a tube 17 formed of copper or other material having a high co-efficient of expansion to serve as one thermostatic element. The tube 17 extends through the member 13 into the tank 1 and its outer end is closed in a liquid tight manner by a plug 18 (preferably a plug threaded into the tube). The plug 18 is formed with a threaded opening, extending axially inwardly from its inner end, and arranged to receive the outer, threaded end of a rod 19, formed of invar metal or other material having a low co-efficient of expansion to serve as the other thermostatic element. The rod 19 extends through the tube 17 and opening 15 into the chamber 9 for engagement with and operation of the leverage 11a. 20 indicates a device connected to the rod 19 within the recess 14 and extending outwardly to a point of access, as shown at 20a. The device 20 serves as a means for rotating the rod 19, which operation through the threaded connection with the plug 18 will move the rod 19 endwise and effect an adjustment between it and the leverage 11a, so that movement of the rod 19 will actuate the leverage with greater or lesser change in temperature of the water, to control a valve 21 to be later referred to. The leverage 11a herein shown comprises a main lever 22, engaged by the inner end of the rod 19, a separate lever 23 and a spring 24 between the free end portions of the levers, so arranged that upon movement of the main lever 22, the spring is moved relative to the fulcrum of the lever 23 and effects a snap action thereof to open or permit closing of the valve 21.

While construction and arrangement of the thermostatic elements and the leverage 11a operated thereby may be of any desired construction, that shown herein forms the subject-matter of a co-pending application Serial No. 714,682 filed by me Mar. 8, 1934, for which reason no claim is made to such subject-matter herein.

In the structural form of the casing shown, the top wall of the chamber 9' is formed with a threaded opening 25, closed by a plug 26, and its bottom wall is provided with a nipple 27 to which the pipe 9 is connected.

The dual valve mechanism comprises the following: 28 indicates a circular wall formed integrally with the outer side wall of the chamber 9' and open at its outer end. The wall 28 is preferably of conical shape and forms the seat for a valve element 29. The valve element preferably rotates in the wall or seat 28 and opens and closes a port 30 formed therein. The pipe 7 may be connected to the wall 28 to supply the gaseous fuel to the port 30, but by preference the casing 8 is provided with a wall 31 integral with its walls and the wall 28 to form a fuel inlet chamber 32 and related to the port 30 so that the fuel supplied to the inlet chamber 32 flows therefrom through the port. The wall 31 terminates in a suitable nipple 33 to which the pipe 7 is connected. By the provision of the chamber 32, provision is made for a valved outlet connected to the pilot pipe 10. For this latter purpose, the wall 31 is provided at one side with an integral boss 34 having an opening 35 through it, the pipe 10 being suitably fixed in the outer end of the opening 35, its inner end forming a seat for a needle valve 36. The needle valve 36 has a threaded shank threaded in and extending through a plug 37 mounted in the opposite side of the wall 31 and a head 38 for turning the valve. The wall 28 is concentric to an opening 39 formed in the outer wall of the chamber 9'. The wall surrounding the opening 39 forms a valve seat, as shown at 39a for the valve 21, already referred to. The valve element 29 is open at its front end to removably receive the valve element 40 of the valve 21 and its mounting and is formed with a port 41 which registers with the port 30 in one position of the valve element 29 to permit the fuel to flow from the inlet chamber 32 through the valve element 29 and through the valve 21, when the latter is opened, and into and through the chamber 9', from which the fuel flows through the pipe 9 to the burner. The valve element 29 may be rotated any desired distance to close the port 30, but in the preferred arrangement wherein the removal of the valve element 40 and its mounting serves to rotate the valve element 29 and close the port 30 and replacement of these parts serves to rotate the valve element 29 and open the port 30, I prefer to provide means (to be later referred to) for limiting the rotative movement of the valve element 29, this being especially advantageous in the opening movement of the valve element 29 to insure registration of its port 41 with the port 30. The outer end portion of the valve element 29 is reduced to form an annular exterior shoulder 42 and an annular interior shoulder 42a for purposes later set forth. The outer end of the element 29 carries a handle 43 by which the element may be rotated manually or automatically as hereinafter described, the handle being of annular shape to permit the removal and replacement of the valve element 40 and its mounting. To secure the handle in position, the end edge of the element 29 is provided with spaced cut-aways or recesses 44 and the inner annular wall of the handle 43 is provided with spaced lugs 45 which fit into the recesses 44, the lugs being preferably secured in the recesses by peening over their end walls. 46 indicates a collar preferably formed of sheet metal and removably secured to the outer end of the wall 28. As shown, the collar 46 and wall 28 are provided with diametrically arranged outwardly extending lugs having aligned openings to receive screws 47, which secure the collar 46 in position. The outer end of

the collar 46 is provided with an in-turned flange 48 which forms the seat or abutment for one end of a coiled spring 49, the other end of the spring engaging the shoulder 42 and normally tending to move the valve element 29 inwardly to maintain it in its seat. The handle 43 is preferably formed of sheet metal and shaped to form an inner annular, outwardly flaring wall 50 and an inwardly extending skirt 51, the latter being of non-circular formation to facilitate gripping thereof when turned manually. The skirt 51 is provided with in-turned members 52 so arranged that one member engages the head of one screw 47 and the other member engages the head of the other screw 47, whereby these screws serve as stops to limit the rotative movement of the handle 43 and valve element 29. The members 52 are preferably arranged so that the valve element may rotate a quarter turn and in the opening movement thereof it is stopped by the adjacent screw 47 at the point where the ports 30 and 41 are in registry. The handle 43 may be locked in either position as limited by the screws 47 by means of a spring catch 53 arranged to enter slots 54 formed in the rim or edge of the skirt 51. The latch 53 consists of a resilient strip having a base portion suitably secured to the collar 46 and a portion 53*a* extending radially therefrom and arranged to ride on the skirt rim and enter one of the slots as shown in Fig. 3. The portion 53*a* extends beyond the handle 43 so that it may be manually pressed inwardly to release the handle. The strip 53 may be secured to the collar 46 by slitting the latter on parallel lines throughout a portion of its circumference to form between the slits a section 46*a*. This section is distended or flexed sufficiently to permit the base portion of the strip to be inserted below it and thus engage with the collar at opposite sides of the section 46*a*. As the opening through the valve element 29 is sealed by the mounting for the valve element 40, as later set forth, no danger of leakage through the slits is present. The mounting for the valve element 40 consists of the following: 55 indicates a closing member removably extending into the valve element 29, its inner end portion being reduced to provide fuel flow space within the element 29. The closing member 55 is hollowed out axially from its inner end to form a chamber 56. The outer end of the chamber 56 is closed by a plug 57 preferably threaded to the internal wall of the chamber 56. The plug 57 is formed with a through axial opening which forms a guide for a shank 58 fixed at its inner end to the valve element 40. The outer end of the shank 58 engages with the adjacent end of a coiled spring 59 (being preferably fixed thereto), the opposite end of the spring engaging the end wall of the chamber 56. The spring 59 normally tends to move the valve element 40 against its seat 39*a*, but is compressed when the valve element 40 is unseated by movement of the lever 23 toward the left, as shown in Fig. 3. 60 indicates a collar integrally formed on the closing member 55. The outer wall of the collar 60 is threaded and arranged to engage a threaded wall 62 provided on the valve element 29, so that when the closing member 55 is turned to screw the collar 60 on the threaded portion 62, the collar engages the shoulder 42*a* to close the opening through element 29. By means of a suitable gasket which is compressed by the collar 60 into engagement with the shoulder 42*a*, the opening through the element is gas-tight sealed. When the collar 60 is screwed into position against the shoulder 42*a*, the closing member is rigidly secured to the valve element 29 and may rotate therewith when turned. By releasing the spring latch 53*a*, the valve element may be turned to close the port 30 or open it. The outer end of the closing member 55 is provided with flange or collar 63 the diameter of which is somewhat larger than that of the collar 60 to permit the positioning over the latter of a ring 64. The ring 64 is preferably slightly resilient and is arranged to be pressed into tight frictional engagement with the handle wall 50 when the member 55 is screwed into final position. Accordingly, when the closing member 55 is rotated in the operation of removing it, the engagement of the ring 64 with the wall 50 will serve to turn the handle 43 and valve element 29 until the handle is stopped by the engagement of one lug 52 with the adjacent screw 47, thereby closing the port 30; likewise, in the replacement of the closing member 55, the ring 64 will be forced into tight engagement with the wall 50 and operate to turn it until it is stopped by the engagement of the other lug 52 with the adjacent screw 47. If desired, the ring 64 and handle wall 50 may be provided with interlocking elements. From the foregoing description it will be seen that the closing member 55 is detachably connected to the handle 43 so that when the member is turned in one direction to remove it, it automatically turns the handle and valve element to close the main valve port 30 and releases itself from the handle; and that when the closing member is replaced and turned to position it in the valve element, the handle is engaged and automatically turned to open the valve port 30. It will also be seen that when it is desired to inspect, clean or repair the elements of the closing valve, the single operation of unscrewing the closing member, removes the valve element 40 and closes the port 30 and that but one operation is required to replace the valve element 40 and open the port 30. The outer end of the closing member 55 is preferably provided with a kerf 65 to receive a tool to facilitate turning of the member.

The valve element 40 is preferably of substantially semi-spherical shape and its seat 39*a* is correspondingly ground.

It will be noted that in my construction the valve element for the controlling valve 21 is mounted upon or in the closing member 55 and operates therein independently of the valve element 29. Accordingly, the closing member serves as a removable mounting for the valve element, whereby the latter may be removed and cleaned when desired; and when the member is removed, the valve seat 39*a* is accessible for cleaning.

In my improved valve mechanism I provide a main valve or cut-off and a controlling valve, each operable independently of the other valve, in associated relation to form a unitary device. This simplifies the construction of the casing through which the fluid flows, eliminates the insertion of a cut-off valve in the supply pipe and simplifies the connection thereof to the casing. As shown, the dual valve mechanism is associated with a thermostat mechanism in such manner that the thermostat mechanism, controlling valve and main valve constitute a unitary assembly readily connectible in the fluid supply pipe.

To those skilled in the art to which my invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope thereof. My disclosures herein are purely illustrative and are not intended to be in any sense limiting.

What I claim is:

1. In a valved fluid supply means, the combination with a conduit for fluid, of a dual valve mechanism in said conduit and comprising a main valve and a controlling valve, the mounting for the valve element of one valve being removably supported within the other valve and detachable connections between said mounting and said other valve operable to close said other valve as said mounting is removed.

2. In a valved fluid supply means, the combination with a conduit for fluid, of a dual valve mechanism in said conduit and comprising a main valve and a controlling valve, the mounting for the valve element of one valve being removably supported within the other valve and detachable connections between said mounting and said other valve operable to close said other valve as said mounting is removed, said connections being engageable as said mounting is replaced, whereby said mounting operates to open said other valve.

3. In a valved fluid supply means, the combination with a conduit for fluid, of a dual valve mechanism in said conduit and comprising a main valve and a controlling valve, said main valve having a hollow rotary valve element and the mounting for the valve element of said controlling valve being removably secured in said first mentioned valve element by a rotative movement of said mounting, and detachable connections between said mounting and said first mentioned valve element for operating the latter when said mounting is turned in either direction.

4. In a valved fluid supply means, the combination with a casing and a supply pipe for fluid, of a dual valve mechanism between said pipe and casing comprising a main valve having a hollow, rotary valve element and a controlling valve having a reciprocatory valve element, the mounting for the last mentioned element being removably supported in said rotary valve element and arranged to close the outer end thereof, separate means for operating said valve elements, and means between said mounting and said rotary valve operable to close the latter when the mounting is removed.

5. In a valved fluid supply means, the combination with a conduit for fluid, of a main valve having a hollow, rotary valve element, a member removably mounted in said element for closing the outer end thereof, a separate valve having a valve element movably mounted in said member. devices carried by said rotary valve element and said member normally engaged when said member is in position and arranged to rotate said rotary valve element to close said main valve by the removal of said member and to rotate said valve element to open position by the replacement of said member.

6. In a valved fluid supply means, the combination with a conduit for fluid, of a main valve having a hollow, rotary valve element, a member removably mounted in said element for closing the outer end thereof, a separate valve having a valve element movably mounted in said member, devices carried by said rotary valve element and said member normally engaged when said member is in position and arranged to rotate said rotary valve element to close said main valve by the removal of said member and to rotate said valve element to open position by the replacement of said member, and means for limiting the movement of said rotary valve element in either direction.

7. In a valved fluid supply means, the combination of a conduit for fluid, of a main valve having a hollow, rotary valve element, means for limiting the movement of said valve element in one direction to its valve open position, means for limiting the movement of said element in the opposite direction, a member removably supported in said element for closing the outer end thereof, a device on said member arranged, when it is operated into closing position in said element to engage a portion thereof and rotate said element to its valve open position and when removed from said valve element to rotate it from its valve open position to close the valve, and a separate valve having a valve element movably mounted in said member.

8. In a valved fluid supply means, the combination with a conduit for fluid, of two valves in said conduit, one valve having a hollow rotary valve element through which the fluid flows to the other valve, said element being provided on its outer end with an annular wall, a member removably mounted in said rotary valve element for movably supporting the valve element for the other valve, and a ring carried by said member and normally held in detachable engagement with said wall when said member is in position and operable to rotate said wall to rotate the adjacent valve element to closed position as said member is removed.

9. In a valved fluid supply means, the combination with a conduit for fluid, of two valves in said conduit, one valve having a hollow rotary valve element through which the fluid flows to the other valve, said element being provided on its outer end with an annular wall, a member removably mounted in said rotary valve element for movably supporting the valve element for the other valve, and a ring carried by said member and normally held in detachable engagement with said wall when said member is in position and operable to rotate said wall to rotate the adjacent valve element to closed position as said member is removed, said wall being arranged in the path of movement of said ring when said member is replaced, whereby said ring through its engagement with said wall moves the rotary valve to open position.

10. In a valved fluid supply means, the combination with a conduit for fluid, of two valves in said conduit, one valve having a hollow valve element through which the fluid flows to the other valve and provided on its outer end with a wall, a member removably mounted in said element for movably supporting the valve element of the other valve, a device carried by said member and normally held in detachable engagement with said wall when said member is in position and operable through said wall to move said hollow valve element to valve closing position as said member is removed and to engage said wall and through it move said valve element to valve open position as said member is replaced.

11. In a valved fluid supply means, the combination with a conduit for fluid, of two valves in said conduit, one valve having a hollow valve element through which the fluid flows to the other valve and provided on its outer end with a wall, a member removably mounted in said element for movably supporting the valve element of the other valve, a device carried by said member and normally held in detachable engagement with said wall when said member is in position and operable through said wall to move said hollow valve element to valve closing position as said member

is removed and to engage said wall and through it move said valve element to valve open position as said member is replaced, and means for stopping the movement of the hollow valve element when moved to its valve open position.

12. In a valved fluid supply means, the combination with a conduit for fluid, of a valve mechanism comprising related walls formed with valve openings, one of said walls forming a valve seat, a hollow, rotary valve element fitting said seat and formed with a port arranged to register with the opening in said seat, a member removably supported in said element for closing the outer end thereof, a device on said member arranged when operated into closing position in said element to engage a portion thereof and rotate said element to its valve open position and when removed from said element to rotate it from its valve open position to a valve closed position, and a separate valve element for the other valve opening.

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