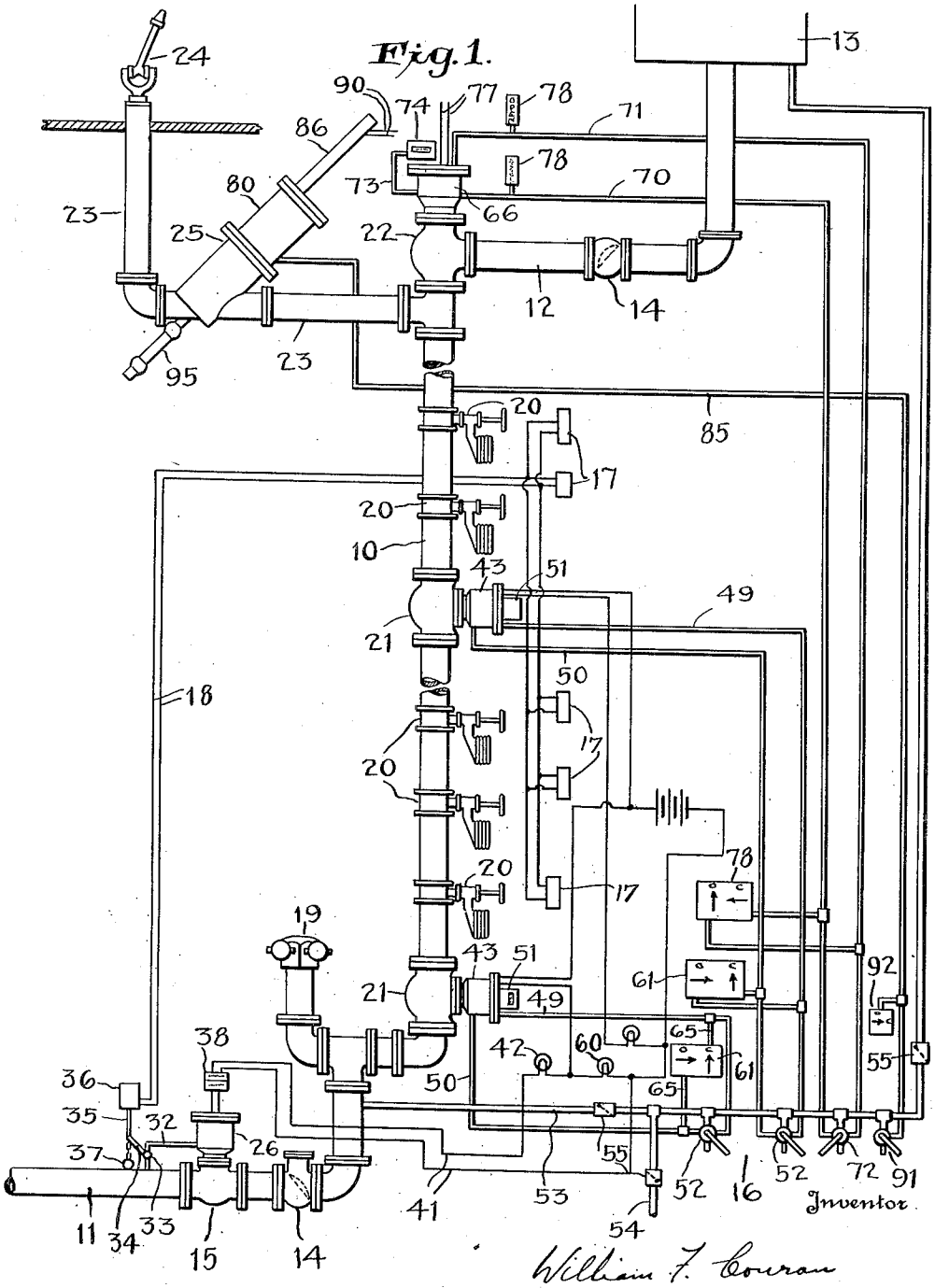
April 3, 1934. W. F. CONRAN 1,953,671

STANDPIPE SYSTEM

Filed Dec. 11, 1930 5 Sheets-Sheet 1

Fig. 1.



Inventor.

William F. Conran

By J. F. Bamberg

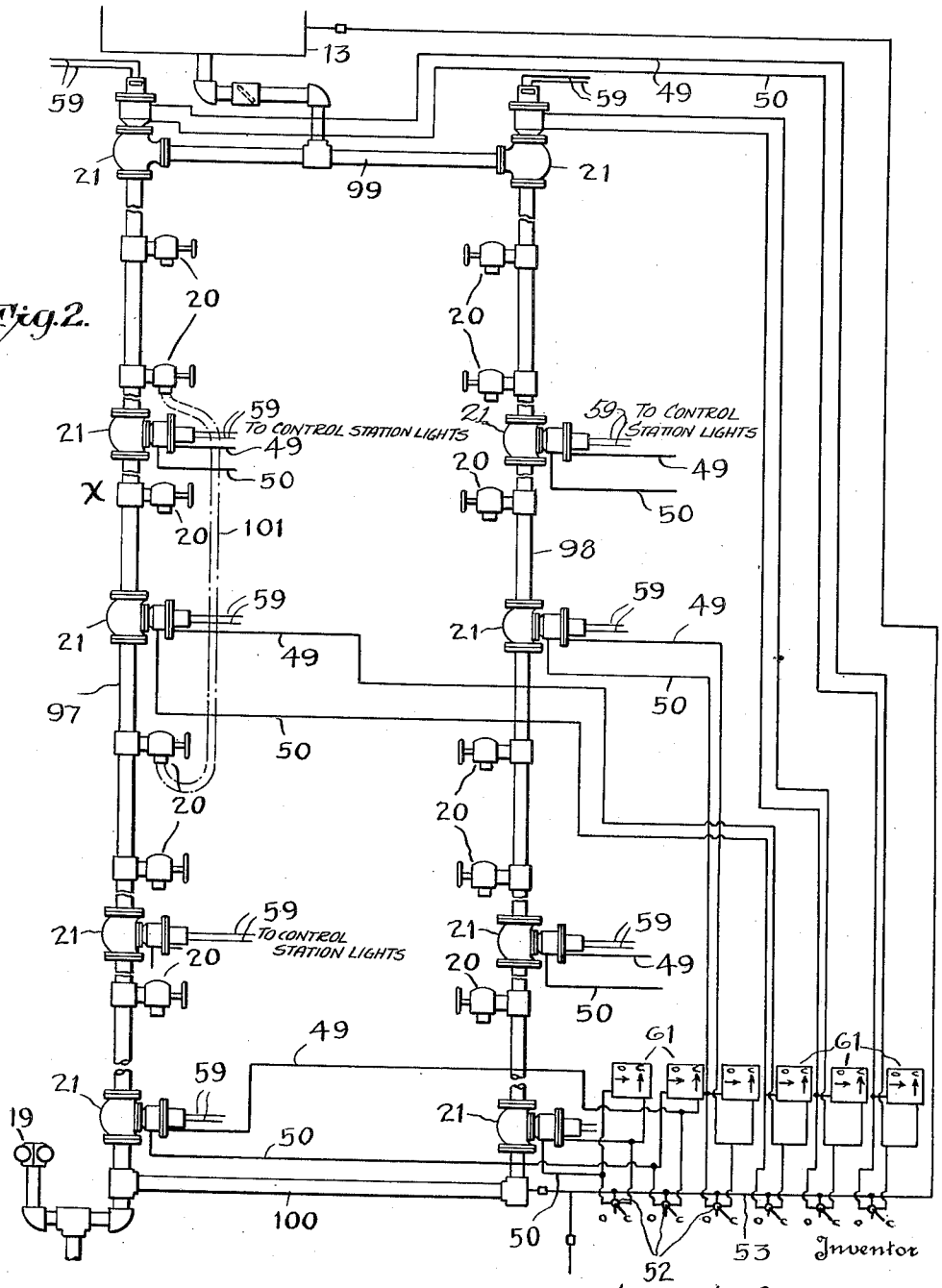
Attorney

April 3, 1934. W. F. CONRAN 1,953,671

STANDPIPE SYSTEM

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Fig. 2.



Inventor

William F. Conran

By J. F. Rundenberg

Attorney

April 3, 1934. W. F. CONRAN 1,953,671

STANDPIPE SYSTEM

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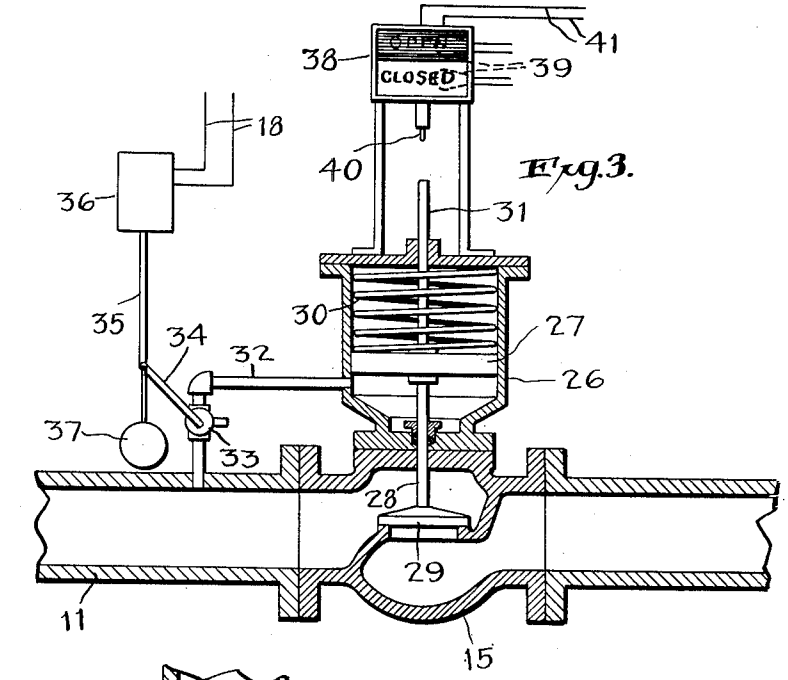


Fig. 3.

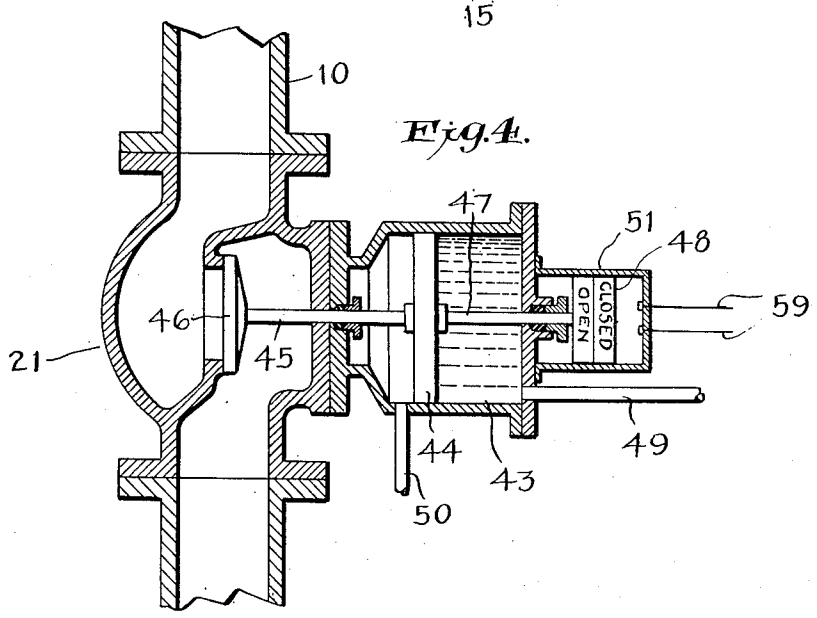


Fig. 4.

Inventor

William F. Conran

By J. P. Vandenburg

Attorney

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STANDPIPE SYSTEM

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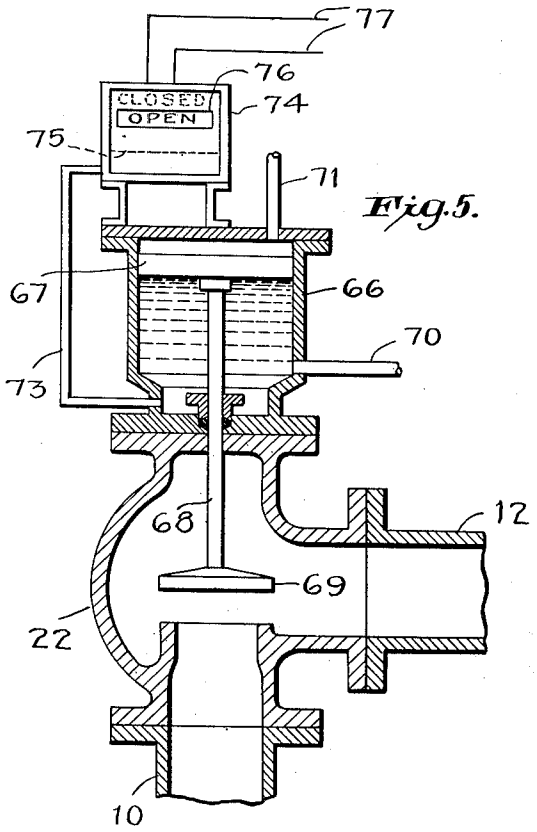


Fig. 5.

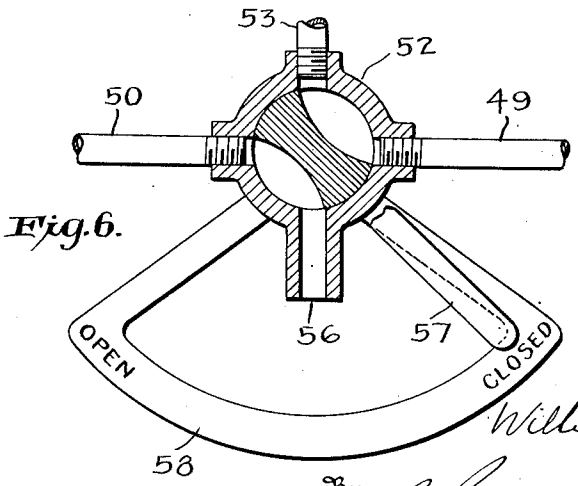


Fig. 6.

Inventor

William F. Conran

By G. Brandenburg

Attorney

April 3, 1934. W. F. CONRAN 1,953,671

STANDPIPE SYSTEM

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Fig. 7.

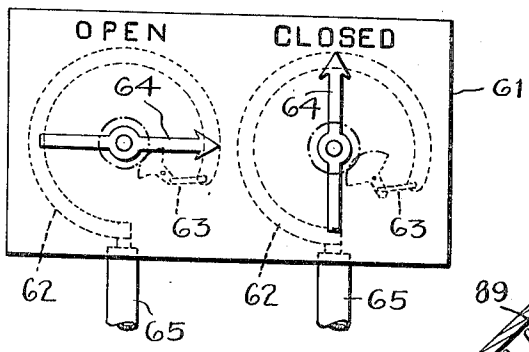


Fig. 8.

Fig. 9.

Inventor

William F. Conran

By J. F. Brandenburg

Attorney

Patented Apr. 3, 1934

1,953,671

UNITED STATES PATENT OFFICE

1,953,671

STANDPIPE SYSTEM

William F. Conran, Brooklyn, N. Y.

Application December 11, 1930, Serial No. 501,542

13 Claims. (Cl. 169—5)

The invention relates to standpipe systems for buildings.

Fire protection standpipe systems disclosed herein have branches for distributing water to different parts of the building, and valves at different points for controlling the flow of the water. In order to successfully combat a fire it is essential for the water to reach the branch or branches of the system in which it is needed, but this might be prevented during a fire by a break in the piping. Again, the supply of water might be delayed or cut off through mistake or lack of knowledge as to which valves are open or closed. During a fire various valves of the system may be inaccessible.

In a standpipe system part of which is exposed to freezing temperature in winter, it is necessary to empty that part of the system and to segregate it from the other parts. It is objectionable to connect standpipes to the high-pressure water system of the city because in case of fire the collapse of a part of the building may cause a broken main and drain the system or so reduce the pressure that the water supply is insufficient to successfully combat the fire. I have thought to solve these problems by providing valves in the system with a novel combination of control devices and signals so that the efficiency and effectiveness of the system can not be impaired by one or more of these valves becoming inaccessible during a fire, or through mistake or lack of knowledge as to which valves are open or closed.

The principal object of this invention is to provide an improved fire protection standpipe system in which the valves are hydraulically operated, with remote control means at a central control station, and in which means are provided at the valves, as well as at the central control station, for indicating the operation or condition of the system. More specifically, the object is to provide simple means for indicating whether the various valves are open or closed, such means being located at the valve and at the central control station remote from the valves.

Another object is to provide a means for ascertaining whether or not fluid is being supplied to the hydraulically operated means for opening and closing the valves. This means likewise may be located at the valves or at a station remote from the valves. The valve for supplying the fluid to the hydraulic operating means might indicate the standpipe valve as being in an open or closed position. However, if for different reasons, for instance a drop in pressure or a break in the line, no fluid were being supplied to the valve-operating means, the results in an emergency would be most serious. In the present invention this fact would immediately be known, both at the valve and at a control or supervisory station remote from the valve, and suitable steps could be taken to remedy the situation.

Still another object of the invention is to provide a means of isolating or segregating a part of the standpipe system without interfering in any way with other parts of the system. It sometimes happens that, owing to fire or other causes, a break occurs in some portion of the standpipe system. For example, in a tall building a fire might take place on the nineteenth story and a break in the standpipe system occur on that floor or one or two floors above or below it. Due to loss of pressure, the entire standpipe system would then be useless.

The present invention contemplates locating hydraulically operated shut-off valves in the standpipe at different floors. These valves in addition to the hose valves might be on every floor, or they might be positioned a few floors apart, depending upon conditions in the building. The valves are operable from a control station remote from the standpipe system. If a break occurs at some point in the standpipe, the shut-off valves above and below the break are closed from the control station and the water supply would not be interfered with on the floors above and below the break. This would often result in considerable saving of property damage.

In a standpipe system where only a single standpipe is used, the hydraulically operated shut-off valves above and below the break would be closed and a hose run from the hose valve on the floor under the lower hydraulic valve to the hose valve on the floor above the upper hydraulic valve, thus by-passing the break. In a standpipe system using a plurality of standpipes connected together, it would not be necessary to use the hose to by-pass the break, although this could be done if desired.

A number of other objects and advantages will become apparent as the specification proceeds. Referring to the drawings, in which several embodiments of the invention are illustrated:

Fig. 1 is a schematic view of a standpipe system illustrating various types of valves and different methods of indicating whether the valves are open or closed;

Fig. 2 is a schematic view of another form of standpipe system and control station for its valves;

Fig. 3 is a detail sectional view, parts being in

elevation, of the type of valve indicated at the high-pressure inlet in Fig. 1;

Fig. 4 is a detail sectional view, parts being in elevation, of the valves indicated in the standpipe riser;

Fig. 5 is a detail sectional view, parts being in elevation, of the type of valve indicated on top of the standpipe riser;

Fig. 6 is a detail sectional view, parts being broken away, of a four-way valve used for controlling the direction of the flow of fluid for operating the standpipe valve-positioning means;

Fig. 7 is an elevational view of the Bourdon tubes for ascertaining whether or not fluid is being supplied to the valve-operating means;

Fig. 8 is a detail sectional view, parts being in elevation, of a Y-valve which may be used in the system; and

Fig. 9 is a detail elevational view illustrating a means of ascertaining the position of the valve and whether or not fluid is being supplied thereto.

Referring again to said drawings, and particularly to Fig. 1, the reference numeral 10 designates a standpipe riser. There may be one or more of these risers, depending upon conditions and the size of the building, and these risers are preferably connected together. As illustrated in Fig. 2, two risers are indicated, the same being connected together. A plurality of different types of valves and a plurality of valve-position indicating means are illustrated schematically in Fig. 1, and it is to be understood that any one of these valves may be substituted for any other and that the forms of valve-position indicating means may likewise be substituted for each other.

Water may be admitted into the standpipe system at its lower end, through a pipe 11, which leads to a pump or a high-pressure city main. Water may be led into the upper part of the system through pipe 12, leading from the tank 13 on the roof or in the upper part of the building. The usual check valves 14 are provided.

A valve 15, particularly illustrated in Fig. 3 and described in detail hereinafter, is located in the pipe 11 and controls the supply of water from the fire pump or high pressure city main. This valve may be operable from the control station indicated generally at 16, or as shown it may be caused to function by a break-glass box or switch 17 electrically connected at 18 to mechanism hereinafter described for opening the valve. If so desired, break-glass boxes 17 may be located on each floor of the building or at any strategic points.

The usual Siamese connection 19 for one or more fire hoses is provided. The standpipe riser 10 has the customary hose valve outlets 20, which are located at each floor of the building.

A plurality of hydraulically operated valves 21 are positioned in the standpipe riser. These valves are illustrated in detail in Fig. 4 and will be further described hereinafter. The valves 21 control the flow of water through the standpipe riser 10 and are independently operated from the central control station 16. One of these valves may be located on each floor if desired, or they may be spaced several floors away.

At the upper part of the standpipe riser is positioned another valve 22, particularly illustrated in Fig. 5. This valve likewise is a hydraulically operated valve and is operated from the central control station 16.

A pipe line 23 may lead from the riser 10 to a nozzle 24 on the roof of the building. A Y-valve 25, shown in detail in Fig. 8, may be located in the line 23. This Y-valve may also be opened or closed from the central station 16.

The valve 15 (see Fig. 3) and its operation will now be described. Positioned above the valve is a chamber 26 and mounted therein is a piston 27, which is connected by the valve stem 28 to the valve member 29. A spring 30 normally holds the valve member 29 on its seat. Connected to the upper side of the piston 27 and projecting through the top wall of the chamber 26 is a rod 31.

A control line 32 connects the pressure line 11 with the chamber 26 and mounted in this control line is a three-way valve 33. The operating handle 34 of the valve is connected to a depending member 35, which may be tripped by a conventional electrically operated mechanism 36, this mechanism being energized by closing a circuit at the box 17. Suspended from the valve-operating handle 34 is a weight 37, which will rotate the valve handle after member 35 has been released by breaking the glass in the break-glass box 17.

The valve 33 is then opened and the piston 27 will be raised, thus lifting the valve 29 from its seat. The rod 31 will also be raised to operate the valve-position indicating means.

The valve-position indicating means in this instance comprises a casing 38, in which is housed a pair of lamps 39. The circuits for these lamps are so arranged that when the parts are in the position of Fig. 3 the lamp behind the legend "Closed" will be lit and when the rod 31 hits the contact member 40 and the valve is open the lamp behind the word "Open" will be lit.

The member 31 may also close another circuit, indicated at 41, which will cause signaling means at the control station 16 to be operated. A lamp 42 comprises the preferred form of signaling means. From the foregoing it will be apparent that one simple means for visibly indicating the position of the valve, both at the valve and at a station remote from the valve, has been provided.

Particular attention is now directed to Fig. 4, in which one of the valves 21 is illustrated. This valve is also provided with a hydraulic chamber 43, which houses a piston 44 connected at one side to the valve stem 45 and valve member 46. A rod 47 connected to the other side of the piston carries on its outer end a member 48 bearing the words "Open" and "Closed".

Control pipes 49 and 50 lead to the control station 16, and when the valve is in the position of Fig. 4 fluid is being supplied to the chamber through the pipe 49. The valve is in its closed position at this time, and the word "Closed" is displayed through a window in the casing 51 which may be secured to the chamber 43.

When fluid enters the chamber 43 through the pipe 50, the piston 44 is moved outward, the valve member 46 is lifted from its seat and the word "Open" is displayed through the window in the casing 51.

A valve 52 at the control station directs the fluid through either of the pipes 49 or 50. This valve is a four-way valve, and is shown in detail in Fig. 6. Water or suitable fluid is supplied to this valve from a main control line 53. To insure a supply of water to this main control line, it is connected to the pressure line 11, the tank 13, and an independent supply 54, suitable check valves 55 being provided.

When water is being supplied through the pipe 49, the pipe 50 is opened to the drain 56, as indicated in Fig. 6. At this time the valve-oper-

ating handle 57 rests over the word "Closed" on the bracket 58. Obviously when the valve handle is turned 90°, the pipe 49 will be opened to drain and fluid pressure will be supplied to pipe 50 to open the valve.

From the foregoing it will be clear another simple means has been described and illustrated whereby the position of the valve may be ascertained at a glance, either at the valve or at the control station. The valve 21 and its indicating means 22 may be replaced with a valve and indicator such as used for the valve 15, or vice-versa.

Electric means similar to that described in relation to the valve 15 may be used in connection with valve 21. The member 48 may close a circuit indicated at 59 and cause the light 60 to be energized, and thus indicate the open position of the valve 21.

For some unforeseen reason there might be an absence of water in the line 53. In that event, when the valve handle 57 would be turned from "Closed" to "Open" no hydraulic power would be supplied to valves 21, and if the light 60 did not function the operator would have no way of telling at the control station whether the valves 21 were open or closed. This might lead to most serious consequences and the invention includes means for knowing at a glance whether or not hydraulic pressure is being supplied to the valves.

This means is generally illustrated in Fig. 7 and comprises a casing 61 which encloses a pair of Bourdon tubes 62 connected by suitable mechanism 63 to a pair of indicators 64. Lines 65 connect the Bourdon tubes to control lines 49 and 50. In the closed position of the valve 21 the Bourdon tube connected to the control line 49 will be expanded, due to the pressure, and its indicator 64 will point to "Closed". There being no pressure in the other tube, its indicator will point away from "Open" as shown in Fig. 7.

From the foregoing it is thought one may readily understand that an effective means has been provided whereby the operator at the control or supervisory station may instantly ascertain whether or not fluid pressure is being supplied to the valves to actuate them.

The valve 22 illustrated in Fig. 5 will now be described. This valve is quite similar to the valve 21, except that a different method has been provided to actuate the visible means of determining the position of the valve.

The customary hydraulic chamber 66 is provided. A piston 67 is mounted in the chamber and its lower side is secured to the valve stem 68, to which is attached the valve member 69. Control pipes 70 and 71 lead to the lower and upper parts of chamber 66 and thence to a valve 72, similar in all respects to the valve 52, shown in Fig. 6.

In the position indicated in Fig. 5 fluid pressure is being supplied through the pipe 70, the piston is raised and the valve is open. The fluid pressure is transmitted through a pipe 73 into a compartment 74, which houses a float 75 bearing the words "Open" and "Closed". The compartment 74 has a window 76, through which either of the words may be displayed.

When the valve 72 is turned to admit pressure through pipe 71 and allow the fluid in pipe 70 to drain, the float 75 will drop, the valve will close, and the word "Closed" will be displayed.

An electrical circuit similar to those previously described may be closed by the float 75. This circuit is indicated at 77, but has not been continued to the control station as its operation will be obvious and it is not desired to unduly complicate the drawings. A casing 78, enclosing Bourdon tubes and entirely similar to that shown in Fig. 7, is also provided. The valves 15, 21 and 22 are all interchangeable and may be substituted one for the other.

In the lines 70 and 71 leading to the valve 22, other means are indicated showing the position of the valve and whether or not fluid pressure is being supplied to the hydraulic means for operating the valve.

This means, illustrated more clearly in Fig. 9, comprises a casing 78 having a transparent window on which the word "Open" or "Closed" is printed. The casing is connected to the control line by a nipple 79. When either of the lines 71 or 72 is filled, the fluid naturally will fill the respective casing 78 and the transparent window is of such a color that the lettering will be obscured or darkened by the fluid in the casing. The other line being connected to the drain will contain no fluid, and the lettering on the window of the casing 78 connected to this line will stand out and clearly show whether the valve is open or closed and whether or not fluid pressure for operating the valve is being supplied.

In the condition shown in Fig. 1 and Fig. 5, the valve 22 is open, and there being no pressure in pipe 71 the word "Open" will clearly stand out in the casing 78 attached to this line. The pipe 70 having fluid therein under pressure, the word "Closed" on its casing will not be visible.

The transparent members in the casings 78 might be so colored that the presence of water in the casings would cause the legends to stand out. In this event the words "Open" and "Closed" would be substituted for each other. The casings 78 may be placed in any or all of the control lines and may be placed in any part of the control lines, that is, adjacent the valve as illustrated, at the control station, or in an intermediate part of the control lines.

Another means of visibly determining the position of the valve is shown in connection with the Y-valve 25 in the line 23. This valve is shown in detail in Fig. 8 and also embodies an automatic draining feature, which is particularly useful on pipe lines exposed to the atmosphere, such for instance as the pipe line supplying the nozzle 24 on the roof of the buildng.

The valve 25 is provided with the hydraulic chamber 80 having a piston 81 therein. The under side of this piston, as in the other valves, is connected to the valve stem 82 of the valve member 83. A spring 84 in the chamber 80 normally holds the valve in its closed position and fluid admitted through line 85 below the piston opens the valve.

A casing 86 is mounted on the upper side of the hydraulic chamber, and this casing 86 accommodates a slidable member 87, which will blank either of the words "Open" or "Closed", depending upon the position of the valve. The slidable member 87 is normally held in the position of Fig. 8 by a spring 88, which is confined between an abutment in the casing 86 and a collar on a rod 89 extending downwardly from the member 87.

As the piston 81 is forced upwardly to raise the valve member 83 from its seat, it contacts with the rod 89 and moves the slidable member 87 into position to blank the word "Closed" and display the word "Open". In this manner another simple means is provided for ascertaining the po-

sition of the valve. An electric circuit which may lead to a light at the control station or other suitable point is indicated at 90, and this circuit may be closed by the slidable member 86.

The control line 85 leads to a three-way valve 91 at the control station and a single Bourdon tube 92 with its indicator may be provided for similar purposes to the Bourdon tubes heretofore described.

Means are disclosed in connection with the Y-valve 25 for automatically draining that part of the line beyond the valve after the valve has been closed.

The valve member 83 has a depending valve stem 93, which carries a valve 94 on its lower end. The depending valve stem 93 extends into an extension 95 from the valve chamber, and in the position of Fig. 8 the water will drain from the pipe 23 into the extension 95 and thence to a connection (not shown) attached to the open end of the extension 95.

When the valve 83 is raised to allow passage of water through pipe 23, the valve 94 will be forced against a seat 96 and prevent the water passing into the extension 95.

Attention is now directed to Fig. 2, in which a double standpipe system is illustrated. The standpipe risers are numbered 97 and 98. They are connected together at their upper ends by a pipe 99, which has the usual connection to a tank 13 in the upper part of the building. The lower ends of the risers are connected together by a pipe 100 and the usual pipes to the Siamese connection and high pressure main or fire pump are provided.

Any type of hydraulic valve heretofore described may be used in the system, but for simplicity of illustration the valves 21 have been indicated. The usual hose valves 20 are also provided at each floor. It will be understood that standpipe systems of the type herein described are particularly applicable for use in comparatively high buildings, and in both Figs. 1 and 2, due to economy of space, only a small number of hydraulically operated valves and hose valves have been indicated.

Each of the valves 21 has its control lines 49 and 50 leading to four-way valves 52 at the control or supervisory station 16. Each pair of control lines is also connected to a casing 61 enclosing Bourdon tubes such as heretofore described.

If for any reason a break should occur in the system, say for instance in the region of the hose valve marked "*x*", the hydraulically operated valves above and below this break could be instantly closed from the control station 16 and that part of the system between the two valves would not function. However, the supply of water would not in any way be interrupted in the balance of the system.

At 101 in Fig. 2 is illustrated in broken lines a hose line connecting the hose valves above and below the hydraulically operated shut-off valves which have been closed due to the break at *x*. As previously stated, the use of a hose to by-pass the break is particularly applicable to a standpipe system in which only a single standpipe is used. It would not be necessary to use a hose in a system having a plurality of interconnected standpipes unless breaks occurred in several places.

This feature of segregating part of the system is considered an important aspect of applicant's invention, as in many cases the complete failure of the standpipe system would entail serious losses and with applicant's arrangement this can not happen.

Electrical connections 59 are also indicated in Fig. 2, and it will be understood that these connections lead to lights at the control or supervisory station in a manner similar to that shown in Fig. 1. To save confusion the complete circuits have not been illustrated in Fig. 2. For the same reason the pressure lines 49 and 50 of some of the hydraulically operated shut-off valves have not been continued to the control station. However, it is to be understood that these lines are also provided with the valves 52 and Bourdon tubes 61.

As previously stated, any type of hydraulically operated valve having means in connection therewith for telling the position of the valve may be used in the system shown in Fig. 2, and other means utilized in Fig. 1, such for instance as the indicators 78, may be employed. Fig. 2 is intended to represent a simple typical showing of a standpipe system.

Since numerous changes may be made in the construction of the systems which have been described, without departing from the scope of the invention, it is desired that the specification and drawings should be considered as being illustrative rather than in a limiting sense.

I claim:

1. In a standpipe system for buildings, the combination of a standpipe, hydraulic valves at spaced points in the system for controlling the flow of water through said standpipe, means for opening and closing said valves from a station remote from said valves, and means for positively determining whether said valves are open or closed, said means being located at the valves and at a control station remote from the valves.

2. In a standpipe system for buildings, the combination of a standpipe, valves for controlling the flow of water through said standpipe, hydraulically operated means for opening and closing said valves from a station remote from said valves, visible means for ascertaining if a fluid is being supplied to said hydraulically operated means for opening and closing said valves, and means for determining whether said valves are open or closed, said means being located at the valves and at a control station remote from the valves.

3. In a standpipe system for buildings, the combination of a standpipe riser, a plurality of hose valves in said riser, means for supplying water to said riser, a plurality of hydraulically operated valves in said riser, means for opening and closing said hydraulically operated valves from a control station remote from said riser, and visible means for determining whether said hydraulically operated valves are open or closed, said means being located at the valves and at a control station remote from said valves.

4. In a standpipe system for buildings, the combination of a standpipe riser, a plurality of hose valves in said riser, means for supplying water to said riser, a plurality of hydraulically operated valves in said riser, means for opening and closing said hydraulically operated valves independently of each other from a control station remote from said riser, means for ascertaining if a fluid is being supplied to said hydraulically operated valves, and visible means for determining whether said hydraulically operated valves are open or closed, said means being located at the valves and at a control station remote from said valves.

5. In a standpipe system for buildings, the com-

bination of a standpipe, valves for controlling the flow of water through said standpipe, said valves having hydraulic chambers adjacent thereto, pistons in said hydraulic chambers connected to the valve members in said valves, means for admitting fluid to said chambers to move said pistons, means operable by said pistons for visibly determining whether said valves are open or closed, and means at a remote control station for controlling the liquid supply to said chambers.

6. In a standpipe system, a hydraulically operated valve, visible means for ascertaining whether the valve is open or closed, said means being located at the valve and at a point remote from the valve, and visible means for determining whether or not fluid is being supplied to said hydraulically operated valve to cause same to function, said means being located at a station remote from the valve.

7. In a standpipe system for buildings, the combination of a valve in a portion of said system, said valve having a hydraulic chamber adjacent thereto, a piston in said hydraulic chamber connected to the valve member in said valve, means for admitting fluid to said chamber to move said piston in a direction to open the valve, means operable by said piston for visibly determining whether said valve is open or closed, and means operable by said piston for draining that part of said standpipe system beyond said valve.

8. In a standpipe system for buildings, the combination of a valve in a portion of said system, a hydraulic chamber adjacent said valve, a piston in said hydraulic chamber connected to the valve member in said valve, and means operable by the movement of said piston and valve member for automatically draining that part of the standpipe beyond the valve after the valve has been closed.

9. In a standpipe system for buildings, the combination of a valve in a portion of said system, a hydraulic chamber adjacent said valve, a piston in said hydraulic chamber connected to the valve member in said valve, another valve operable by the movement of said piston and valve member, said second-mentioned valve being opened by closing of said first-mentioned valve so as to drain that part of the standpipe beyond said first-mentioned valve.

10. In a standpipe system for buildings, the combination of a standpipe; means for segregating parts of said standpipe system, without interrupting the supply of water to the other parts of the system, including hydraulically operated valves for controlling the flow of water through the system; and remote control means at a station for controlling said means for segregating parts of the standpipe system.

11. A standpipe system for buildings comprising a standpipe riser; means for segregating the riser or a section of the riser, including hydraulically operated valves at spaced points along the riser for controlling the flow of water through the riser and normally closed hose couplings in communication with the standpipe and so located that a hose can be attached to said nipples to constitute a by-pass around any two of said valves in the standpipe riser; a remote control station; means at the control station for controlling the segregating means; and signal means at the control station for indicating what section of the system is segregated.

12. A fire protection system comprising a standpipe; a valve for controlling the flow of water from the standpipe; hydraulic operating mechanism for the valve; positive signal means at the valve for indicating whether the valve is in open or closed position; a remote control station; means at the control station for controlling the operation of said hydraulic mechanism; and signal means at the control station for indicating the position of the valve.

13. A fire protection standpipe system for buildings including conduits for distributing water throughout the system; a plurality of valves at spaced points in the system for controlling the flow of water; hydraulic mechanism for operating the respective valves; a positive signal device at each valve for indicating whether the valve is in open or closed position; a central control station; and means at the central control station for indicating whether liquid is being supplied to the respective hydraulic mechanisms.

WILLIAM F. CONRAN.