E. L. THOMPSON.

AUTOMATIC SPRINKLER APPARATUS.

APPLICATION FILED NOV. 30, 1912.

1,246,798.

Patented Nov. 13, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

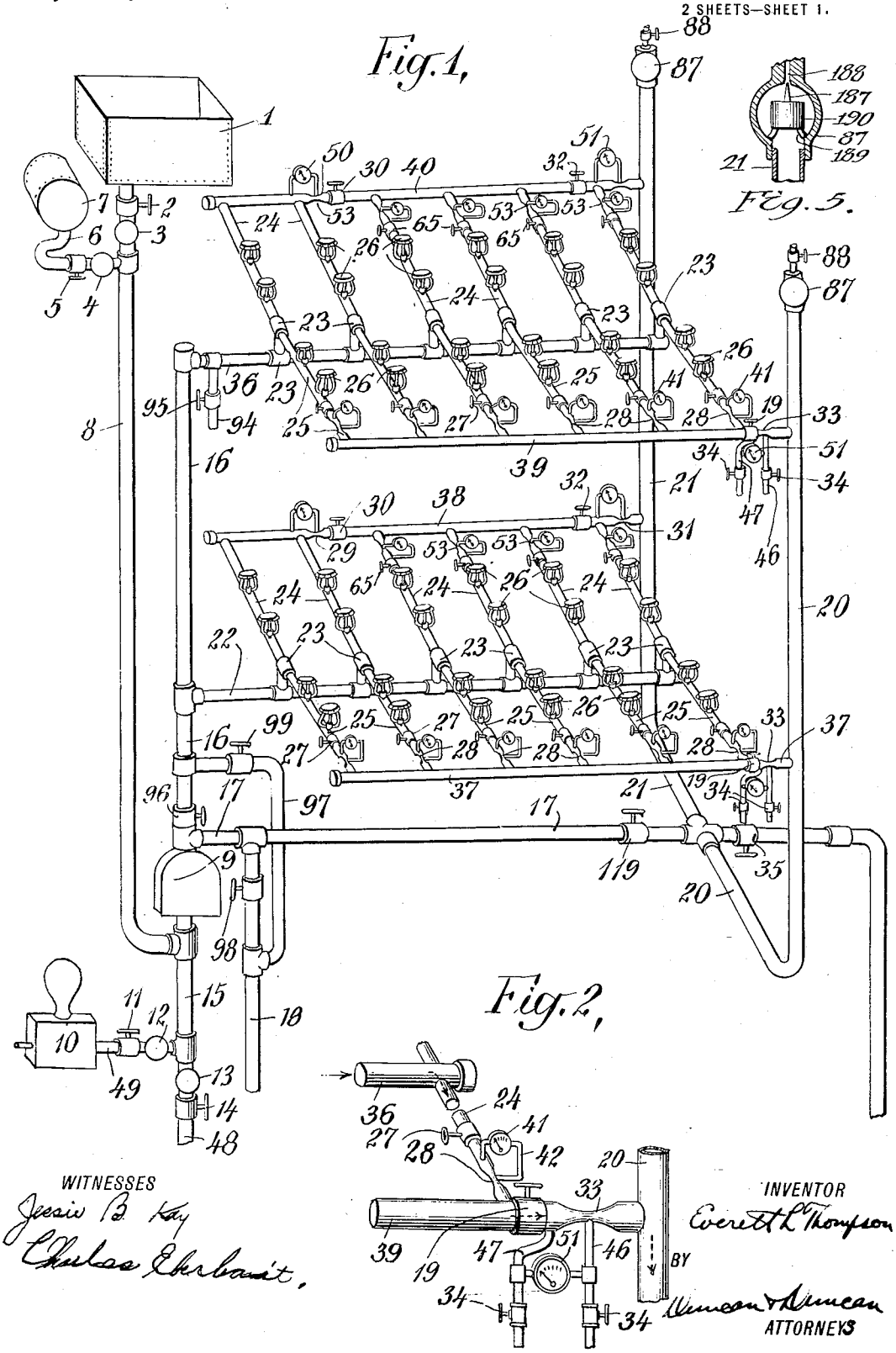


Fig. 5.

Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3,

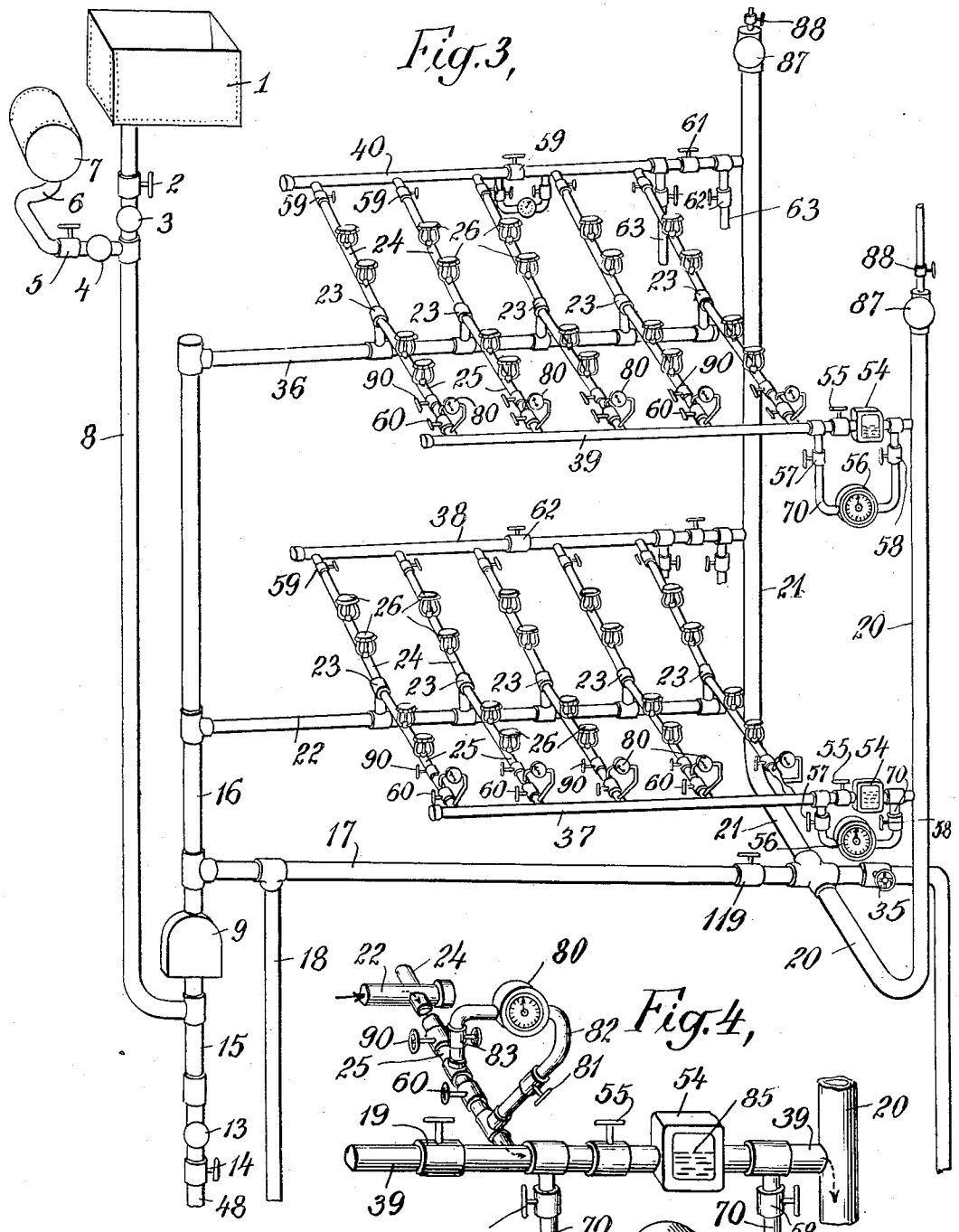


Fig. 4,

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AUTOMATIC SPRINKLER APPARATUS.

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To all whom it may concern:

Be it known that I, EVERETT L. THOMPSON, a citizen of the United States, and resident of Dover, Morris county, State of New Jersey, have made a certain new and useful Invention Relating to Automatic Sprinkler Apparatus, of which the following is a specification, taken in connection with the accompanying drawings, which form part of the same.

This invention relates to automatic sprinkler apparatus comprising a distributing system and coöperating feeding devices, such as a tank and outside main feed pipe connected to the feeding point of the distributing system which may be provided with a supply riser and connected sprinkler supply lines and a drain riser having automatic air venting means communicating with the sprinkler supply lines and connected at one or more upwardly venting points in the distributing system. The distributing system may also have suitable cross connections so as to simultaneously supply water to the sprinkler supply lines in both directions from the supply riser and drain risers under emergency conditions which makes the system more reliable and effective. Suitable Venturi or other measuring devices and connections may also be arranged in the distributing system and in connection with coöperating valved testing and discharge connections may be used to measure the flow through the different sprinkler supply lines or distributing units of the system and flushing valves and connections are also preferably installed to flush the separate sprinkler supply lines or distributing units out in the opposite direction, from the drain risers.

In the accompanying drawings showing in a somewhat diagrammatic way several illustrative embodiments of this invention,

Figure 1 is a perspective view showing a sprinkler system.

Fig. 2 is a similar enlarged view showing part of the same.

Fig. 3 is a perspective view showing another illustrative system.

Fig. 4 is a detail thereof.

Fig. 5 is a detail of the vent valve construction.

In the illustrative sprinkler system shown in Fig. 1 the distributing system arranged throughout the building may be connected with an alarm valve 9 of any desired construction and the feeding point or pipe 15 below the alarm valve may be connected with feeders of various kinds. For example, the tank feed pipe 8 may be connected with a tank 1 having a gate valve 2 and check valve 3 and may if desired also be connected with a suitable pressure tank 7 having a shut-off valve 5 in its connection 6 and also a suitable check valve 4 therein. If desired also the feeding point may be connected with the city main feed pipe or any outside main feed pipe 48 having, if desired, a suitable check valve 13 and gate valve 14 and an auxiliary pump feed pipe 49 may be installed if desired by which any desired pumping device 10 may feed water into the system past the check valve 12 when the shut-off valve 11 is open.

The distributing system is preferably upwardly pitched toward one or more venting points so as to automatically free the system from air which may if desired be automatically removed from the system through suitable automatic air vent valves of any desired description. In this way the entire distributing system may be kept free from air and since when solidly filled with water the system is relatively incompressible in proportion as trapped air is absent therefrom, surgings in the pipes due to water hammer and other causes are correspondingly minimized so that reliable alarm indications can be much more readily secured because the alarm devices are subjected to a less extent to the water hammer interference. The distributing system may comprise a supply riser 16 connected to the feeding point through the alarm valve and connected at the various floors of the building or distributing network with one or more cross mains, such as 22, 36 which preferably pitch upward from the vertical or inclined supply riser and are connected with upwardly pitched sprinkler lines such as 24, 25. These supply lines may be conveniently connected with the cross supply main 36 by the use of the T's 23 and interposed nipples illustrated, by which the sprinkler supply lines may be elevated a few inches above the cross supply main to make this part of the system more certainly air venting. Any desired number and form of automatic sprinkler heads 26 may be arranged at suitable intervals along the supply lines which

are preferably connected at their other ends with suitable cross drains 39, 40 which are preferably upwardly pitched to their points of connection with one or more drain risers 20, 21 which extend up through the building and are provided adjacent their upper ends with any desired form of air vent device. This air vent device may be in the form of an automatic float air vent valve 87 which may as indicated in Fig. 5 have the valve 187 mounted on the hollow or other float 190 so that this valve coöperates with the valve seat 188. When the pipe 21 is empty this vent valve falls until its float engages the projections or supports 189 in which position the valve is open and will remain so until liquid rises in the pipe sufficiently to raise this float and close the valve. This vent valve may if desired be used in connection with a manual vent valve 88 in the air discharge pipe or if desired the manual air vent 88 may of course be used alone in some instances. The automatic air vent valve 87 insures the release of air from the system and automatically closes the discharge opening when the water rises in the system into the valve. In this way when the system is filled the water drives the air ahead of it along the generally upwardly pitched supply cross main and sprinkler supply lines and connected cross drains so that the air is not trapped in the system, but is practically all forced ahead of the rapidly moving water into the drain risers from which it is automatically discharged, any further amounts of air or gas liberated within the distributing system or admitted thereto, being automatically vented in the same way so that the distributing system is thus maintained practically full of water under all normal conditions.

It is also desirable to effect the duplex feeding of the sprinkler supply lines so that under emergency conditions when one or more of the sprinkler heads open, water is supplied to them in both directions along each of the connected sprinkler supply lines which not only insures efficient operation but also enables a considerable saving to be made in the piping installation, since the sprinkler lines and supply system may be constructed of relatively smaller pipe and feed the same amount of water to the sprinkler heads. This may be conveniently effected by connecting the drain risers to the supply pipes as by connecting the lower portions of these drain risers 20, 21 as indicated to the cross connection 17 which may be joined to the supply riser adjacent the alarm valve and preferably upwardly pitched from that point for effective air venting. In this way when the valve 119 in this cross connection is open the water from the feeding point is supplied to the sprinkler heads both through the supply riser 16 and cross supply main 36, for instance, and through the cross connection 17, the drain risers 20, 21 and the cross drains 39, 40, so that each of the sprinkler heads on one of the sprinkler supply lines 24, for instance, is supplied with water in both directions from the connected cross main 36 and cross drain 40.

In order to insure the effectiveness of a sprinkler distributing system it is desirable to periodically test the supply pipes and also the entire distributing network consisting of the connected supply mains, sprinkler supply lines and so forth, on each floor and this may be conveniently effected by providing a suitable measuring device in each sprinkler network or unit which may comprise an entire floor or the desired smaller number of sprinkler supply lines so as to provide for the measurement of the water supplied therethrough under testing conditions which should approximate more or less the emergency operation of the system so as to determine the effectiveness of the pipes under these conditions and their freedom from clogging. Any suitable measuring devices may be installed at suitable points in, that is, connected to the distributing system, so as to separately test each sprinkler distributing unit or supply line and also preferably to test the whole or larger portions of the sprinkler distributing network. A convenient measuring device for this purpose is a Venturi measuring device such as shown in Figs. 1 and 2 as comprising a suitable Venturi passage or device somewhat diagrammatically indicated as 33 which may be interposed in or connected to the cross drain 39 between the drain riser 20 and a suitable cut-off valve 19 so that the flow of liquid through this Venturi throat may be measured in any desired way, as by the measuring connection 46 communicating with the constricted throat of the Venturi passage which may be used alone or in some cases in connection with the coöperating connection 47 with the full area piping system adjacent thereto or in some cases the measuring device may merely have the measuring connection communicating with the small area throat of the Venturi passage so as to show by the reduction of pressure in the measuring device the amount of flow which is taking place. The cut-off valves 34 in these measuring device connections allow the convenient attachment of a portable measuring device in the shape of a mercury or other pressure gage to one or both of such connections as 46, 47 as by flexible tubes, so as to be connected in this way to various points in the distributing system and effect a measurement by observation of the differential pressure of the amount of water flowing through the Venturi measuring device or throat 33, or if desired a pressure gage or measuring instru-

ment 51 may be permanently installed in connection with one or both of these measuring connections so as to be available at any time for such measurements. It is also desirable in many cases to install a similar Venturi measuring device in each of the sprinkler supply lines at any convenient point, as for instance, adjacent the connected cross drains 39 and 40. The Venturi measuring devices 28 are shown for this purpose in connection with the attached pressure gage measuring devices 41 and cut-off valves 27. In some cases, however, it is desirable to connect several sprinkler supply lines into a single sprinkler distributing unit, such as for instance, two of the supply lines 24, and install in this connection a Venturi measuring device 53 and 50 adjacent the control valve 30. Similar Venturi measuring devices are indicated as installed on the other separate sprinkler supply lines 24 in connection with cut-off valves 65. The other sprinkler distributing network indicated in Fig. 1 as arranged on a lower floor of the building may comprise the upwardly pitched cross supply main 22 and similarly connected sprinkler supply lines 24, 25 having the sprinkler heads 26 arranged at suitable intervals thereon. The other ends of these sprinkler supply lines may be similarly connected to the upwardly pitched cross drains 37, 38 connected to the drain risers 20, 21, and similar measuring devices, such as the measuring devices described may be connected at various points in this distributing network as in the case of the upper network so as to allow the various parts of the distributing system to be separately tested.

In making such tests water from the supply system may be run separately through one or more of the sprinkler supply lines or units and allowed to escape from the system, so that the amount of water flowing through the different sprinkler supply lines under these conditions can be measured and compared with the normal amount flowing therethrough, and the condition of the lines determined. In this sprinkler system the testing may be readily conducted by closing the cut-off valve 119 in the cross connection 17; and then after closing the shut-off valves communicating with all the cross drains such as the valves 19, 32, 27 and 65, a suitable discharge connection may be opened so as to allow water to discharge from the drain system in any desired way, as for instance, by opening the discharge valve 35 so that water can discharge from the drain system into the connected pipe forming the sewer or discharge connection. It is thus obvious that under these conditions the opening of any cut-off valve such as 19 at once allows water to be driven by the service pressure through the sprinkler supply lines controlled by this cut-off valve and escape from the system through the open discharge connection. In this case the water would flow in the manner indicated by the arrows in Fig. 2, assuming that the cut-off valves 27 and 19 were both open, so that the amount of water flowing could be readily measured by the Venturi measuring devices 33 and 28. In this case the flow would take place through the single opened sprinkler line 24 so that its condition could be readily tested and its freedom from clogging accurately determined. Then by closing this individual cut-off valve 27 and opening the corresponding cut-off valve on another of these separate sprinkler supply lines or units the various parts of the whole distributing net work could be quickly tested and any slight stoppage relieved in many cases by striking or shaking the defective pipe, or if such means proved ineffective by noting its position for more effective clearing or flushing operations subsequently. When one sprinkler network has been tested in this way another floor or network may be similarly tested and this periodic testing of the piping installation of the system may be thus accomplished in a very short time so that the efficiency of the system can be assured by periodic tests of this description every few months, for instance.

In case any of the sprinkler supply lines or units are found to be clogged or defective they may be effectively cleared of accumulations of dirt or foreign matter which is occasionally carried up from the supply pipes so as to become lodged or wedged in the smaller area supply lines of the distributing system. This clearing or flushing of the clogged or defective pipes may be conveniently effected in this system by providing suitable flush pipes or connections allowing the discharge of water from the supply pipes while water is forced into the sprinkler supply lines in the opposite direction through the drain risers and cross drains. For such flushing operations the supply riser valve 96 should be closed, cutting off the supply of water to the distributing system in this way, and the cross connection valve 119 opened so as to admit water to the drain risers which under these conditions would be the sole source of supply. The control valves such as 19, 27 and so forth, communicating with the defective or clogged sprinkler distributing unit or line should then be opened so as to admit water thereto from the connected cross drains and a suitable flushing pipe or connection opened to allow the discharge of water from the cross main or supply riser as through the flushing pipe 94 in the cross main 36 provided with the flushing valve 95 or the flushing pipe 97 connected with the sewer or discharge connection 18 so as to allow

escape of water when the flushing valve 99 is opened. In this way the water under the strong service pressure is forced backward through any clogged sprinkler supply lines and frequently can effectively loosen and remove any accumulated or clogged material especially when assisted by other clearing expedients, such for instance, as hammering on the pipes, although in extreme cases positive clearing methods are required. These clearing or flushing operations which carry any accumulations or obstructions backward through the progressively larger supply pipes and out of the system should be continued until a test of the flushed sprinkler supply lines or units shows by the connected measuring devices that they are restored to normal conditions.

Similar duplex feeding, testing or measuring and flushing devices and connections may also be used of course in connection with distributing systems having dry pipe valves, that is, in connection with suitable dry pipe systems.

Another somewhat similar arrangement is shown in Fig. 3 as comprising a distributing system which may be connected through any desired or suitable form of alarm valve 9 with a suitable feeding point fed in any desired way as by the tank feed pipe 8 and connected tank 1 and also if desired by the connected pressure tank 7 while the pipe 15 may also be fed under some conditions by water from the street or outside main feed pipe 48 when the valve 14 is opened. The distributing system may comprise the supply or supply riser 16 and connected cross supply mains 22, 36, which are preferably upwardly pitched from the feeding point and connected through upwardly pitched sprinkler supply lines 24, 25. The upper ends of these sprinkler supply lines are preferably connected through upwardly pitched cross drains 37, 38, 39 and 40 with suitable drain rises 20, 21 provided with similar automatic air vent valves 87 in wet pipe systems. In this case the measuring devices for measuring under testing conditions the flow occurring through various sprinkler supply lines or the desired larger units of the distributing network may be of different form, such as any desired form of meter 56 which as shown more in detail in Fig. 4 may be conveniently connected in a by-pass 70 extending around that portion of the cross drain 39 which is adjacent the drain riser 20. By closing the cut-off valve 55 and opening the valves 57, 58 any water flowing through the sprinkler supply line 25 and cross drain 39 would thus pass through the meter and its volume be readily measured. A similar meter 80 is shown as installed in a by-pass 82 in this sprinkler supply line so that on closing the cut-off valve 60 and opening the valves 81, 83 this testing stream of water would pass around the by-pass through the meter whenever the cut-off valve 90 was opened so as to give a simultaneous determination of its volume on both of these meters. Another observing or testing device which may be used in a somewhat similar way in testing the effectiveness of the piping systems is the observation or testing chamber 54 having a transparent front 85 of glass or the like, so that the amount of flow therethrough can be observed and approximately determined either in connection with one of the other measuring devices or when used separately. Instead of having a measuring or testing device permanently connected into the distributing system as above described a measuring connection may be provided therein such as the pipes 63 in the cross drain 40 adjacent the drain riser 21 so that any desired measuring or testing device may be connected in this by-pass as by flexible hose connections with the pipe 63 and operate in a similar way when the valves 62 are opened and the cut-off valve 61 closed, or, if desired, the water which is allowed to flow out of the cross main through the pipe 63 may be discharged outdoors or into any other desired discharge after measuring or otherwise testing or observing the amount of flow.

This invention has been described in connection with a number of illustrative embodiments, forms, proportions, materials, devices and arrangements, to the details of which disclosure the invention is not of course to be limited, since what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

1. The automatic sprinkler apparatus having a wet pipe distributing system comprising a supply riser and connected reduced area sprinkler supply lines and automatic sprinkler heads, and a drain riser communicating with said system, connections adapted to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system, and flushing valves and connections to flush the separate sprinkler supply lines or distributing units from said drain riser.

2. The automatic sprinkler apparatus having a distributing system comprising a supply pipe and connected reduced area sprinkler supply lines and automatic sprinkler devices, and flushing valves and connections to flush the separate sprinkler supply lines or distributing units of said distributing systems with liquid flowing back toward said supply pipe.

3. The automatic sprinkler apparatus having a wet pipe distributing system comprising a supply riser and connected sprinkler supply lines and automatic sprin-

kler heads, and a drain riser provided with an automatic air vent connected at one or more venting points in said distributing system and connections adapted to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system.

4. The automatic sprinkler apparatus having a wet pipe distributing system comprising a supply riser and connected sprinkler supply lines and automatic sprinkler heads, and a drain riser provided with an air vent connected at one or more venting points in said distributing system and connections adapted to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system.

5. The automatic sprinkler apparatus having a distributing system and feeding devices connected to the feeding point of said distributing system, said distributing system comprising a supply riser and connected sprinkler supply lines and a drain riser provided with an automatic air vent valve communicating with said sprinkler supply lines and connected at upwardly venting points in said distributing system, connections adapted to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system, and measuring devices and connections in said distributing system and coöperating valved testing and discharge connections to test the flow from said supply riser through separate sprinkler supply lines and distributing units.

6. The automatic sprinkler apparatus having a distributing system comprising a supply riser and connected sprinkler supply lines and a drain riser provided with an air vent communicating with said sprinkler supply lines and connected at upwardly venting points in said distributing system, connections adapted to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system, and measuring devices and connections in said distributing system and coöperating valved testing and discharge connections to test the flow from said supply riser through separate sprinkler supply lines and distributing units.

7. The automatic sprinkler apparatus having a distributing system comprising a supply riser and connected sprinkler supply lines and a drain riser communicating with said sprinkler supply lines, connections adapted to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system, and measuring devices and connections in said distributing system and coöperating valved testing and discharge connections to test the flow through separate sprinkler supply lines and distributing units.

8. The automatic sprinkler apparatus having a distributing system comprising a supply riser and connected sprinkler supply lines and a drain riser provided with an air vent connected with said distributing system, connections to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system, and Venturi measuring devices and connections in said distributing system comprising cooperating valved discharge connections to test the flow from said supply riser through separate sprinkler supply lines or distributing units and flushing valves and connections to flush said separate sprinkler distributing units from said drain risers.

9. The automatic sprinkler apparatus having a wet-pipe distributing system and feeding devices connected to the feeding point of said distributing system, said distributing system comprising a supply riser and connected sprinkler supply lines and a drain riser provided with an automatic air vent valve connected at one or more upwardly venting points in said distributing system, connections to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system, and measuring devices and connections in said distributing system and coöperating valved testing and discharge connections to test the flow from said supply riser through separate sprinkler distributing units.

10. The automatic sprinkler apparatus having a wet-pipe distributing system comprising a supply riser and connected sprinkler supply lines and a drain riser provided with an automatic air vent valve connected at one or more upwardly venting points in said distributing system, connections to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system, and measuring devices and connections in said distributing system and cooperating valved testing and discharge connections to test the flow through separate sprinkler distributing units.

11. The automatic sprinkler apparatus having a wet-pipe distributing system comprising a supply riser and connected sprinkler supply lines and drain riser provided with an air vent connected at one or more venting points in said distributing system, connections to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system, and measuring devices and connections in said distributing system and coöperating valved testing and

discharge connections to test the flow through sprinkler distributing units.

12. The automatic sprinkler apparatus having a distributing system comprising a supply riser and connected sprinkler supply lines and a connected drain riser, connections to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system, and measuring or testing devices and connections in said distributing system comprising coöperating valved testing and discharge connections to test the flow from said supply riser through separate sprinkler supply lines or distributing units, and flushing valves and connections to flush said separate sprinkler supply lines or distributing units from said drain risers.

13. The automatic sprinkler apparatus having a distributing system comprising a supply riser and connected sprinkler supply lines and a drain riser communicating therewith, connections to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system, and testing connections in said distributing system comprising discharge connections to test the flow from said supply riser through separate sprinkler supply lines or distributing units, and flushing valves and connections to flush the separate sprinkler supply lines or distributing units from said drain risers.

14. The automatic sprinkler apparatus having a distributing system comprising a supply riser and connected sprinkler supply lines and automatic sprinkler heads, and a drain riser communicating with said sprinkler supply lines, connections adapted to supply water to said sprinkler supply lines in both directions from said supply riser and said drain riser for emergency service of the system, and measuring devices and connections in said distributing system and coöperating valved testing and discharge connections to test the flow through separate sprinkler supply lines and distributing units.

15. The automatic sprinkler apparatus having a distributing system comprising a supply riser and connected sprinkler supply lines and automatic sprinkler heads, and a drain riser communicating therewith, and testing connections in said distributing system and flushing valves and connections to flush the separate sprinkler supply lines or distributing units from said drain risers.

16. The automatic sprinkler apparatus having a distributing system comprising a supply riser and connected sprinkler supply lines and automatic sprinkler devices, and flushing valves and connections to flush the separate sprinkler supply lines or distributing units of said distributing systems with liquid flowing back through said supply riser.

17. The automatic sprinkler apparatus having a distributing system comprising a supply and connected sprinkler supply lines and automatic sprinkler devices, and a flushing valve and connection to flush the distributing units of said distributing system with liquid flowing back through said supply.

18. The automatic sprinkler apparatus having a wet pipe distributing system comprising a supply and connected sprinkler lines and automatic sprinkler devices, connections adapted to supply water from the same feeding point in both directions to the active sprinkler lines during the emergency service of the system, and Venturi measuring devices and connections in said distributing system comprising coöperating valved discharge connections to test the flow through separate sprinkler distributing units.

19. The automatic sprinkler apparatus having a distributing system comprising a supply and connected sprinkler lines and automatic sprinkler devices, connections adapted to supply water from the said feeding point in both directions to the active sprinkler lines during the emergency service of the system, and measuring devices and connections in said distributing system comprising coöperating valved discharge connections to test the flow through separate sprinkler distributing units.

20. The automatic sprinkler apparatus having a distributing system comprising a supply and connected sprinkler lines and automatic sprinkler devices, connections adapted to supply water from the same feeding point in both directions to the active sprinkler lines during the emergency service of the system, and coöperating valved discharge connections to test the flow through separate sprinkler distributing units.

21. The automatic sprinkler apparatus having a distributing system comprising a supply and connected sprinkler lines and automatic sprinkler heads, duplicate connections adapted to supply water from the same feeding point in said supply in both directions into the active sprinkler lines during the emergency service of the system and flushing valves and connections to flush the separate sprinkler supply lines or distributing units of the distributing system with liquid flowing back toward said supply selectively through each of said duplicate connections.

22. The automatic sprinkler apparatus having a distributing system comprising a supply and connected reduced area sprinkler lines and automatic sprinkler devices, duplicate connections adapted to supply water from the same feeding point in said supply

in both directions into the active sprinkler lines during the emergency service of the system, coöperating valved discharge connections to test the flow through separate sprinkler distributing units and flushing valves and connections to flush the separate sprinkler distributing units with liquid flowing back toward said supply selectively through each of said duplicate connections.

23. The automatic sprinkler apparatus having a distributing system comprising a supply and connected reduced area sprinkler lines and automatic sprinkler devices, duplicate connections adapted to supply water from the same feeding point in said supply in both directions into the active sprinkler lines during the emergency service of the system, measuring devices and connections in said distributing system comprising cooperating valved discharge connections to test the flow through separate sprinkler distributing units and flushing valves and connections to flush the separate sprinkler distributing units with liquid flowing back toward said supply selectively through each of said duplicate connections.

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