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AUTOMATIC SPRINKLER SYSTEM.

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998,934.

Patented July 25, 1911.

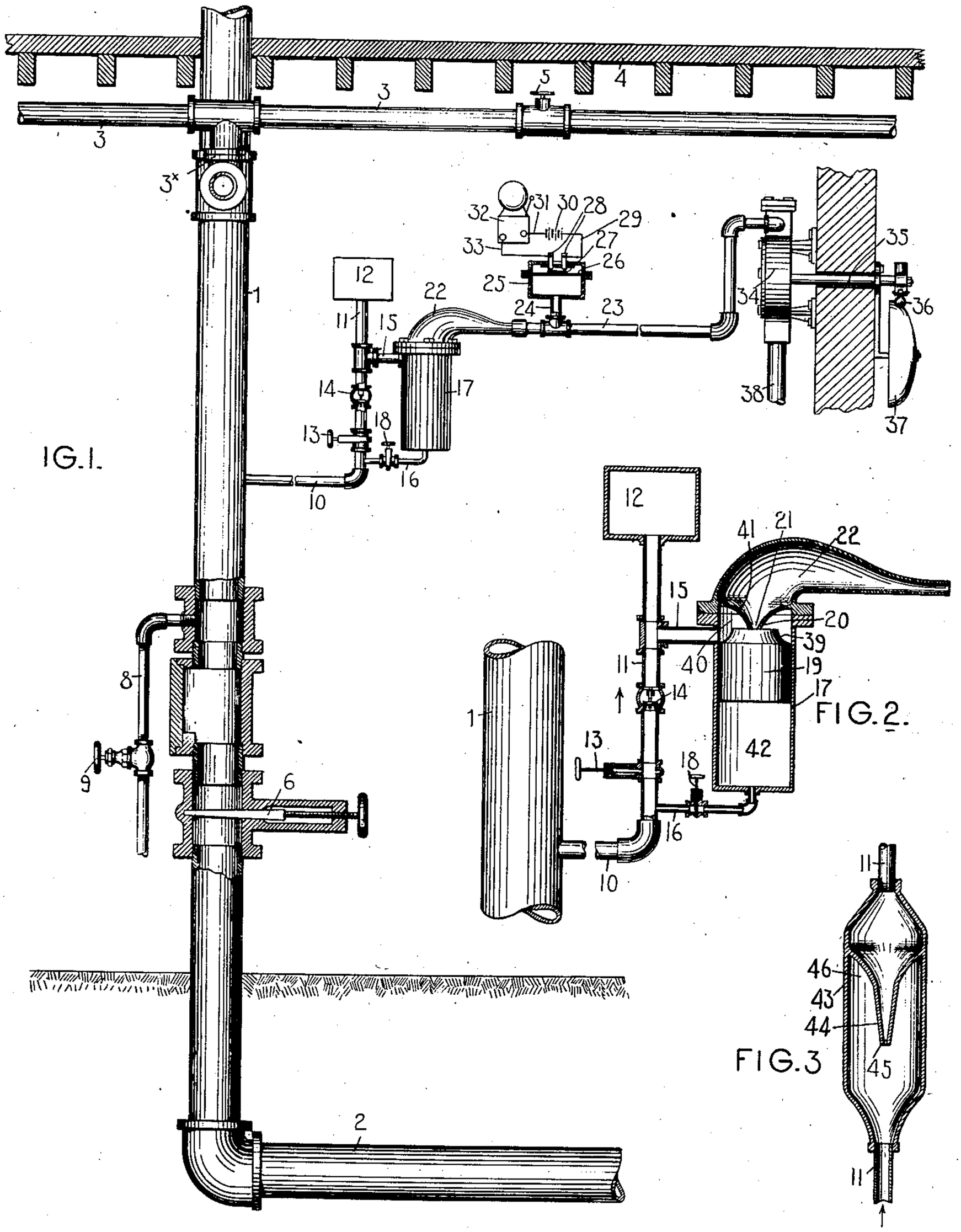

FIG. 1.

FIG. 2.

FIG. 3

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AUTOMATIC SPRINKLER SYSTEM.

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Application filed April 17, 1902. Serial No. 103,281.

To all whom it may concern:

Be it known that I, EVERETT L. THOMPSON, citizen of the United States, and resident of Bensonhurst, borough of Brooklyn, city of New York, in the county of Kings and State of New York, have invented certain new and useful Improvements in Automatic Sprinkler Systems, of which the following is a specification.

My invention relates to automatically operated means for controlling the alarm mechanisms of fire extinguishing systems and more particularly of wet pipe sprinkler systems.

Heretofore it has been common to employ a check valve in the supply main or stand pipe of a sprinkler system to control the operations of the alarm mechanism but this is objectionable first, because there is a liability of a false alarm being sounded by leakage in the sprinkler system, by a varying water pressure or by a water hammer; secondly, because the employment of such a check valve offers an obstruction to the free flow of water through the main or stand-pipe which supplies the system; and thirdly, because of the liability of such valve to stick to its seat and prevent the water from entering the sprinkler system, thus leaving the latter inoperative and useless in the event of a fire. Attempts have heretofore been made to prevent a false operation of the alarm mechanism by water hammer or varying pressure by providing for the flow of a small quantity of water past the valve in the main or stand-pipe, (insufficient however to actuate the alarm mechanism) and by carrying off such water through a drip pipe; but this mode of curing the defects encountered in the employment of a check valve in the main or stand pipe of the sprinkler system proper is objectionable and undesirable as it causes a constant loss of water when there is a varying pressure or where a water hammer occurs.

One of the main objects of my invention is to dispense with the check valve in the main or stand pipe and to provide a simple and efficient alarm controlling mechanism which is not open to the objections existing in other systems or constructions.

To these and other ends which will hereinafter appear, my invention consists in the novel construction, arrangement and combinations of parts hereinafter more fully described and particularly pointed out in the appended claims.

In the accompanying drawing, wherein like reference characters represent like parts in the various views: Figure 1 is a fragmentary front elevation, with parts broken away, of a wet pipe sprinkler or fire extinguishing system illustrating my alarm mechanism applied thereto. Fig. 2 is an enlarged detail vertical sectional view with parts in elevation of the alarm controlling device. Fig. 3 is an enlarged detail vertical or longitudinal sectional view of a so-called choke-water device to be hereinafter described.

In Fig. 1, which illustrates a sufficient number of parts of a wet pipe fire extinguishing system to show my invention in its application thereto, 1 designates the stand pipe which may be supplied from a tank on the roof of the building or may be supplied from any suitable source through a pipe 2 connected therewith. This stand pipe extends from bottom of the building to or above the highest point where sprinkler pipes 3 are to be located. The sprinkler pipes are supported near the ceiling 4 of each story and are each connected to the stand pipe as indicated at $3^{\times}$ and suitable thermostatic nozzles 5 are located at intervals throughout the pipes 3. A hand-operated gate valve 6 may be employed in the stand pipe to control the flow of water thereto from the source of supply and a drip pipe 8 may be connected to the stand pipe and provided with a valve 9 to drain the system when desired.

Connected to the stand pipe 1 at any desired point therein is a comparatively small pipe 10 which connects by an upright pipe 11 with a closed pressure chamber 12. A hand-operated gate valve 13 may be located in the upright pipe 11 to cut off communication between the stand pipe and the pressure chamber and a check valve 14 is located in the pipe 11 between the valve 13 and the pressure chamber and this check valve closes to prevent the flow of water in the direction opposite to that indicated by the arrow in Fig. 2. Branch pipes 15 and 16 extend from the pipe 11, on opposite sides of the check valve to a cylinder 17 and a hand-operated gate valve 18 may be located in the pipe 16 to cut off communication between the stand pipe and the cylinder. Contained

within the cylinder 17 is an automatically operated controlling valve 19 whose face is adapted to a seat 20, the opening 21 in which communicates with a chamber or outlet 22 that is connected to a pipe 23 which leads to the various alarm devices. Thus upon reference to Fig. 1 it will be seen that the pipe 23 communicates by a branch pipe 24 with a chamber 25 which is provided with a diaphragm 26 that carries a contact 27 which is adapted to bear upon the two contact studs 28, one of which is connected by a wire 29 to one pole of an electric battery 30. A wire 31 leads from the other pole of the battery to an electric bell 32. A wire 33 extends from the other contact stud 28 to the electric alarm device 32 and completes the circuit. This alarm is sounded when water is admitted to the chamber 25 and moves the diaphragm so as to bring the contact 27 thereon to bear upon the contact studs 28, thus closing the circuit. The pipe 23 leads to a suitable water motor 34 which is adapted to rotate the shaft 35 that carries a bell-hammer 36 and the hammer during the rotation of the shaft strikes a bell 37, and thus mechanical means are provided for sounding an alarm, in addition to the electric means already described, when water flows through the pipe 23, and after the water passes the water wheel or motor it may be conveyed off through a pipe 38.

From an inspection of Fig. 2, it will be observed that the upper and outer edge of the valve 19 is cut away at 39 so as to form a tapering neck and so as to reduce the area of the upper portion of the valve and that when the valve is seated a chamber 40 is formed within the cylinder between the upwardly and outwardly flaring walls 41 of the conical valve seat 20 and the valve 19, and that the inlet of the pipe 15 to the cylinder 17 is to this chamber 40. It will likewise be seen that when the valve 19 is seated all communication is cut off between the pipe 15 and the chamber or outlet 22.

When the system is to be set or prepared ready for operation (and assuming that it has been drained,) the valve 18 will be opened and the valve 13 closed. The valve 6 or other valve which controls the admission of water from the source of supply to the stand pipe is then opened to admit water thereto. Water will then fill all of the sprinkler pipes 3 and will flow through the pipes 10 and 16 and into the cylinder beneath the piston valve 19 and the pressure of water thereon will close it and maintain it against its seat 20. The valve 13 may then be opened and water will flow into and compress air within the pressure or storage chamber 12 and it will likewise flow through the pipe 15 into the chamber 40 but the water pressure being equal upon opposite sides of the piston valve 19 it will not be moved from its seat but on the contrary will be pressed and maintained there by reason of the fact that the effective surface area of the valve 19 which is exposed within the chamber 40 is less than that contained on the lower side of the valve.

When a fire occurs and one or more of the thermostatic nozzles 5 are opened, water will flow therefrom and there will be a reduction of pressure in the entire system proper, of say five pounds. This reduction of pressure will result in a corresponding reduction in the chamber 42 beneath the piston valve 19 because this chamber is in open communication with the system proper. The check valve 14 will, however, prevent a corresponding reduction of pressure above the valve 19 so that as the pressure is reduced in the chamber 42 beneath said valve 19, the stored pressure in the pressure chamber 12 will be exerted upon the upper face of this valve through the pipe 15 and chamber 40, thus moving the valve down off its seat. When the valve 19 is unseated in this manner, the water will flow through the opening 21 in the valve seat from the pipes 11 and 15 and from the pressure chamber 12, the check valve 14 being opened by the pressure of water from the stand pipe, and water will thus flow through the outlet 22 and pipe 23 to actuate the electrical and mechanical alarm mechanisms.

When the water supply is taken from a tank on the roof or where a steady pressure is maintained, the check valve 14 is employed, but when city or other water is supplied through the pipe 2, and wherein there is liability of a varying pressure or water hammer, I prefer to substitute the choke water device shown in detail in Fig. 3 for the check-valve 14. This choke-water device comprises a casing 43 which is of greater diameter than the pipe 11 with which it is connected. Contained within this casing is a nozzle 44 which is extended downwardly and in the direction of incoming water from the sprinkler system or stand pipe. This nozzle is centrally arranged, is tapering or funnel-like in shape and has a small or contracted opening 45. The enlarged upper end of the nozzle is attached to or made integral with the bore of the casing 43 and is supported thereby and owing to the form of the nozzle there is provided a space or chamber 46 between the outer surface of the nozzle and the inner surface of the casing which is adapted to confine air during the movement of the water in the direction of the arrow in Fig. 3. The effect of this air chamber and of the choke water device is to break efficiently any water hammer that may occur and prevent any variation of pressure or water hammer in the system from being transmitted to the upper face of the valve 19 and which would cause the valve to be un-

seated. The contracted opening 45 in the nozzle 44 is so small that when one or more sprinkler heads 5 are opened a reduction of pressure in the main system will not permit a rapid falling of the pressure above the choke device, and hence when the pressure in the chamber 42 beneath the piston valve 19 is reduced the stored pressure in the chamber 12 will unseat said valve and the main body of water from the pressure tank 12 will flow through the outlet 22 to actuate the alarm mechanism and water flowing from the stand pipe or from the sprinkler system proper will pass through the contracted opening 45 and be added to that passing from the pressure tank to actuate the alarm mechanism.

It will be understood that where the choke water device is employed the mode of setting the parts or system is the same as that previously described where the check valve 14 is used, but it will take a longer time to store the pressure in the tank 12 by reason of the fact that the water must pass through the small opening 45 in the choke device from the system proper.

I prefer to use a check valve as 14 instead of a choke water device where there is employed in the system an overhead supply tank and where there is a steady pressure of water and no liability of water hammer, because such a valve permits of a larger flow of water to actuate the alarm mechanism; but where the supply for the sprinkler pipes is taken from the street main or from a pumping station where there is apt to be considerable variation of pressure at any time, or a water hammer, and a consequent false alarm, I prefer to substitute for the check valve the choke water way and thus prevent the ringing of a false alarm when a variation of pressure or water hammer occurs.

It will be seen that by my improvements I avoid the use of check valves in the sprinkler system proper for controlling or causing the operation of the alarm mechanism and thus get rid of certain well-known objections to the use of such valves either in the main or the stand pipe or riser of such system. It will also be seen that according to my invention the means for controlling the alarm mechanism are arranged in a branch circuit of the sprinkler system proper, thus avoiding any obstruction to the free flow of the water in said system and enabling me to use in such branch either a check valve as a part of the means for controlling the alarm mechanism or a choke water way for the same purpose, according as to whether the water supply is steady as from an overhead tank or is unsteady as from a street main or pumping station. If the alarm controlling mechanism were in the sprinkler system proper the choke water way could not be substituted for the check valve because in such case it would obstruct the free flow of water in the sprinkler system to such an extent as to render it practically useless, and hence it will be perceived that there is a great advantage in arranging the alarm controlling mechanism exteriorly of the sprinkler system proper because I am enabled to use either the check valve or the choke water way, as circumstances may demand. It will also be seen that whether the check valve or the choke water way be used, the piston-like valve 19 which directly controls the flow to the alarm giving devices is operated automatically to sound the alarm, by a reduction of pressure in the sprinkler system, as by the opening of one or more sprinkler heads or nozzles 5. It will likewise be seen that the construction is such that there is a relatively freer movement of fluid on one side of the valve 19 than on the other. That is to say, the choke water device or check valve 14 prevents a free movement of the water from the storage or pressure tank so that the pressure thereof will be exerted upon the upper face of the valve, whereas the water at the opposite side of the valve 19 is in open communication with the system and a freer movement thereof takes place when the pressure in the system is reduced.

Many changes in detail construction and arrangement may be made without departing from the spirit of my invention. Thus for instance it is immaterial what character of alarm mechanism is employed and either an electrical or mechanical alarm mechanism or both may be employed in connection with the controlling mechanism, and while I have shown a vertically movable piston valve wherein the weight of the valve itself may assist in the unseating movement, the valve may be otherwise constructed and arranged for instance as shown in the companion application No. 103,282, filed concurrently, which has matured into Patent No. 782,531 of October 14th, 1905. Also in place of a bodily movable piston or plunger valve, of course a diaphragm valve adapted to a seat and operating on the principle of said bodily movable valve, may be employed instead.

What I claim as new and desire to secure by Letters Patent, is:—

1. In sprinkler systems, the combination of a main wet pipe sprinkler system having a supply pipe provided with a substantially unobstructed portion, a valve chamber provided with a seat and located outside of the main sprinkler system, a controlling valve coöperating with said seat, operating connections between said chamber and said substantially unobstructed portion of said supply pipe to exert a substantially equal pressure on the opposite sides of said valve and

hold the same seated during the normal condition of said system, means connected with said chamber adjacent said seat to store fluid pressure when said valve is seated, and means for affording a freer release of pressure on one side of said valve than on the other to unseat said valve on the emergency operation of said system without the necessity for any obstruction in the main sprinkler system.

2. In a sprinkler system, the combination with the main wet pipe sprinkler system, of a valve chamber provided with a seat, a piston controlling valve in said chamber and coöperating with said seat, branch pipe connections leading from an unobstructed portion of said main system and connecting with said valve chamber on opposite sides of said valve, pressure storing means connected with said chamber adjacent said valve seat, a check valve located in one of said connections between said main system and said valve chamber adjacent said seat, alarm mechanism comprising electrical devices connected with said chamber and operating when said valve is unseated on the emergency operation of said system.

3. In a sprinkler system, the combination with the main sprinkler system, of a valve chamber provided with a seat, a controlling valve operating in said chamber and coöperating with said seat, said controlling valve having unequal effective areas on opposite sides when seated, operating connections between an unobstructed portion of said main system and said valve chamber on opposite sides of said valve, means to store fluid pressure in said valve chamber adjacent said seat and means to check its release into the main system, and alarm mechanism connected with said valve chamber and operating when said valve is unseated on the emergency operation of said system.

4. In sprinkler systems, the combination with a main sprinkler system, of a valve chamber provided with a seat and located outside of said main system, a piston valve operating in said chamber and engaging said seat and having when seated a greater effective area on one face than on the other, operating connections between said main system and said chamber on opposite sides of said valve to maintain a substantially equal pressure on opposite sides thereof, alarm mechanism connected with said chamber and operating when said valve is unseated, and checking means in one of said operating connections to prevent the release of pressure from said chamber adjacent to said seat and to thereby unseat said valve on the emergency operation of said system.

5. In a sprinkler system, the combination with the main sprinkler system, of a valve chamber provided with a seat located outside of said main system, a differential piston controlling valve in said cylinder and coöperating with said seat, operating connections between said system and said chamber to maintain said valve seated during the normal condition of said system by having substantially equal pressures operating on both faces thereof, a check valve in the operating connection adjacent said seat, and alarm mechanism comprising electrical devices connected with said valve chamber and operating when said valve is unseated on the emergency condition of said system.

6. In sprinkler systems, the combination with a main sprinkler system having a supply pipe provided with a substantially unobstructed portion, of alarm mechanism comprising electrical devices and movable alarm controlling means located outside of the main sprinkler system, operating connections between said supply pipe and said means to maintain said means in inoperative position during the normal condition of said system and bring said means into operative position and effect the actuation of said alarm mechanism on the emergency operation of said system by the freer release of pressure through one of said operating connections than through the other.

7. In sprinkler systems, the combination of a main wet pipe sprinkler system, having a supply pipe provided with a substantially unobstructed portion, alarm mechanism, and alarm controlling means connected with but located outside of the main sprinkler system, said alarm controlling means comprising a valve, operating connections between said means and said substantially unobstructed portion of said supply pipe to exert a substantially equal pressure on both sides of said valve and hold the same seated during the normal condition of said system and to allow a freer release of pressure on one side of said valve than on the other to unseat the same and effect the actuation of said alarm mechanism on the emergency operation of said system.

8. In sprinkler systems, the combination of a main wet pipe sprinkler system, having a supply pipe provided with a substantially unobstructed portion, of a valve chamber provided with a seat, a controlling valve in said chamber coöperating with said seat, alarm mechanism connected with said chamber and operating when said valve is unseated, operating connections between said substantially unobstructed portion of said supply pipe and said chamber to exert a substantially equal pressure on opposite sides of said valve and hold the same seated during the normal condition of said system, and means to allow a freer release of pressure on one side of said valve than on the other to unseat said valve on the emergency operation of said system.

9. In sprinkler systems, the combination

with a main sprinkler system, having a supply pipe provided with a substantially unobstructed portion, of alarm mechanism, and alarm controlling means located outside of the main sprinkler system and operating independently of any substantial obstruction therein, operating connections between said supply pipe and said means to maintain said means in inoperative position during the normal condition of said system and to bring said means into operative condition and effect the actuation of said alarm mechanism on the emergency operation of said sprinkler system.

10. In a sprinkler system, the combination of the main sprinkler system, having a substantially unobstructed supply pipe, of a valve chamber provided with a seat, a piston valve operating in said chamber and engaging said seat, a single connection pipe leading from said substantially unobstructed supply pipe of said system and communicating by branch connections with said valve chamber on opposite sides of said valve, a pressure storage tank communicating with said valve chamber adjacent said seat, a checking device interposed in one of said branch connections leading to said valve chamber adjacent said seat to check the movement of fluid from said storage tank and alarm mechanism connected to said chamber and operated when said valve is unseated by reduction of pressure in the main system.

11. In a sprinkler system, the combination of a main wet pipe sprinkler system having a substantially unobstructed supply pipe, of a valve chamber provided with a seat, a valve coöperating with said seat, means to seat said valve by water pressure and to maintain a substantially equal pressure on both sides of said valve when seated, said means comprising operating connections leading from said supply pipe to said chamber on opposite sides of said valve, checking means in the connection adjacent said seat, means connected with said chamber adjacent said seat to unseat said valve when the pressure on the opposite side of said valve is relieved on the emergency operation of said system.

12. In sprinkler systems, the combination of a main wet pipe sprinkler system, a valve chamber provided with a seat, a valve cooperating with said seat and having unequal effective areas on opposite sides when seated, alarm mechanism connected with said chamber and operating when said valve is unseated, operating connections between said system and said chamber on opposite sides of said valve, the connection adjacent said seat being provided with a check-valve to prevent the release of pressure toward said system, said valve being held seated by pressure from said system during the normal condition thereof and being unseated on the emergency operation of said system independent of any substantial obstruction in the sprinkler system proper.

13. In sprinkler systems, the combination of a main sprinkler system, a valve chamber provided with a seat, a controlling valve coöperating with said seat, alarm mechanism connected with said chamber and operating when said valve is unseated, operating connections between said system and said chamber on opposite sides of said valve, the connection adjacent said valve seat being provided with checking means and the connection on the opposite side of said valve comprising a small area passageway having an adjustable valve therein and limiting the passage of fluid therethrough, said controlling valve being held seated by pressure from said system during its normal condition and being unseated on the emergency operation of said system.

14. In sprinkler systems, the combination of alarm mechanism, movable controlling means to control the operation of said alarm mechanism and operating connections leading from said controlling means to be connected with a sprinkler system to maintain said controlling means in inactive condition during the normal condition of said sprinkler system and to effect the actuation of said controlling means and the operation of said alarm mechanism on the emergency operation of said system, said connections comprising a passageway of adjustably small area allowing fluid to move therethrough at a limited rate for such actuation.

15. In sprinkler systems, the combination of a main sprinkler system comprising a supply pipe, an alarm mechanism, movable controlling means to control the operation of said alarm mechanism and operating connections with said means connected with said sprinkler system to effect the actuation of said controlling means and allow the operation of said alarm mechanism on the emergency condition of said system, said operating connections between said controlling means and said system including a device to limit the rate of movement of said controlling means during its actuation.

16. In sprinkler systems, the combination of a main sprinkler system having a supply pipe, a valve chamber provided with a seat, a controlling valve in said chamber and cooperating with said seat, alarm mechanism connected with said chamber and operating when said valve is unseated, operating connections between said system and said chamber on opposite sides of said valve, the connection adjacent said valve seat being provided with checking means and the connection on the opposite side of said valve comprising a passageway of adjustably small area allowing fluid to move therethrough at a limited rate to cause the unseating of said

controlling valve on the emergency condition of said system.

17. In sprinkler systems, the combination of alarm mechanism, a chamber, movable controlling means in said chamber to control the operation of said alarm mechanism and operating connections leading from said chamber to be connected with a sprinkler system and to effect the actuation of said controlling means and the operation of said alarm mechanism on the emergency operation of said system, said connections comprising a small area passageway allowing fluid to move therethrough at a limited rate for such actuation.

18. In sprinkler systems, the combination with a main wet pipe sprinkler system, a valve chamber provided with a seat and located outside of said system, a piston valve coöperating with said seat and having unequal effective areas on its opposite faces when seated, alarm mechanism comprising electrical devices connected with said chamber and operated on the unseating of said valve and discharge of fluid through said seat, operating connections leading from said chamber on opposite sides of said valve and connected to said system to maintain said valve in seated inactive position during the normal condition of said system and to unseat said valve and effect the operation of said alarm mechanism on the emergency operation of said system.

19. In sprinkler systems, the combination of a main sprinkler system, of alarm mechanism, a chamber, movable controlling means in said chamber to control the operation of said alarm mechanism and operating connections between said sprinkler system and said chamber, to maintain said controlling means in inactive position during the normal condition of said sprinkler system and to effect the actuation of said controlling means and the operation of said alarm mechanism upon the emergency operation of said system, said connections comprising a normally open small area passageway limiting the rate of movement of fluid therethrough for such actuation.

20. In sprinkler systems, the combination of a main sprinkler system, a valve chamber provided with a seat, a piston controlling valve coöperating with said seat and having unequal effective areas on opposite sides when seated, alarm mechanism connected with said chamber and operating when said controlling valve is unseated, operating connections leading from said chamber to said sprinkler system, a pressure storage chamber communicating with the connection leading from said chamber adjacent said seat and checking means between said storage chamber and said system to unseat said valve and effect the operation of said alarm mechanism on the emergency operation of said system.

Signed at the borough of Manhattan, city of New York, in the county of New York, and State of New York, this 15th day of April, A. D. 1902.

EVERETT L. THOMPSON.

Witnesses:

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