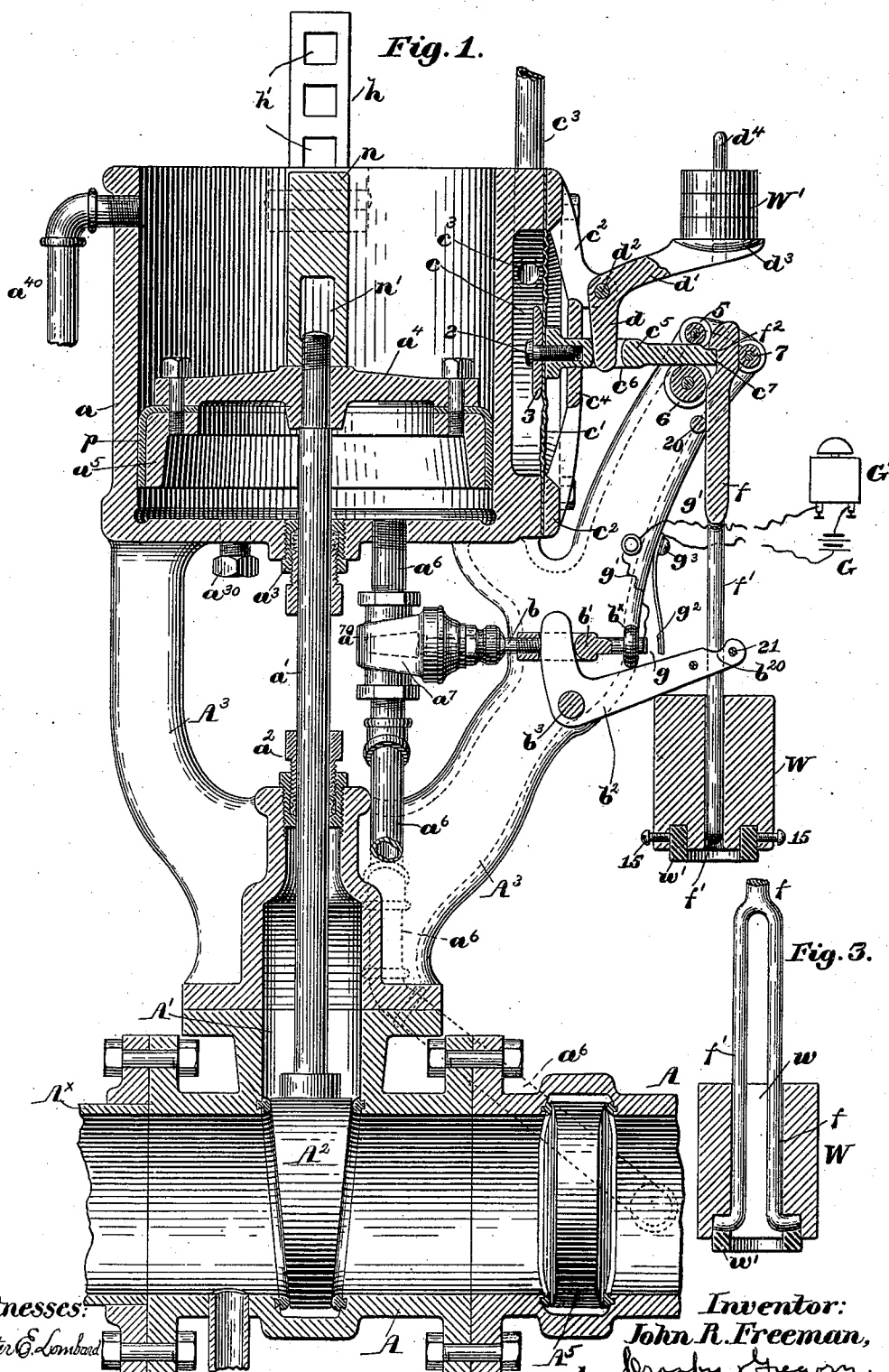


J. R. FREEMAN.

VALVE CONTROLLING MECHANISM FOR SPRINKLER SYSTEMS.

No. 568,343.

Patented Sept. 29, 1896.



(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

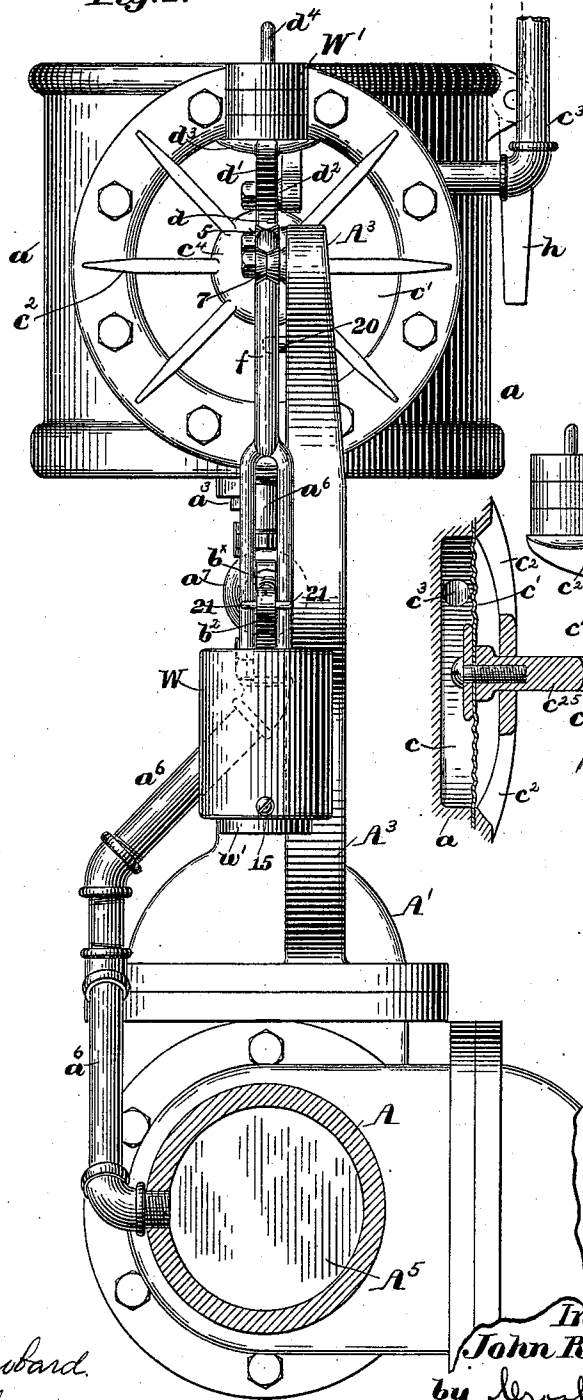
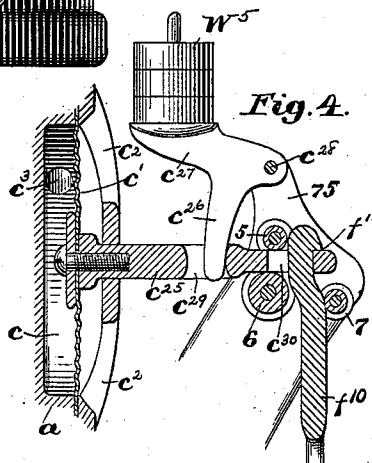


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN R. FREEMAN, OF WINCHESTER, MASSACHUSETTS.

VALVE-CONTROLLING MECHANISM FOR SPRINKLER SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 568,343, dated September 29, 1896.

Application filed December 27, 1895. Serial No. 573,442. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. FREEMAN, of Winchester, county of Middlesex, State of Massachusetts, have invented an Improvement in Valve-Controlling Mechanism for Sprinkler Systems, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object the production of means for instantly and effectively controlling the main inlet-valve for sprinkler systems, whereby an undue variation in the normal pressure maintained in the pipes of the system will automatically open the connections between said system and the main source of water supply.

The invention hereinafter to be described is adapted for use with either the "wet" or "dry" sprinkler systems, but as the latter system is in many respects and under certain conditions preferable I have shown my invention as applied thereto.

In the dry system the pipes leading through the various rooms of the building, and which are provided with sprinkler-heads of any desired construction, may be normally filled with air under small pressure, or a more or less partial vacuum may be maintained, and various means have been devised for opening the main valve in the water-supply pipe when one or more of the sprinkler-heads have opened, as by a fire, so that the pipes of the system may be filled with water with the least possible delay, such opening of the sprinkler-head causing a change or variation of pressure in the pipes of the system.

In my efforts to improve the valve-controlling mechanism I have, by a simple combination of weights and levers, provided a direct-acting and rapidly-moving valve-actuator, herein shown as a hydraulic piston, governed as to its operation by variation of normal pressure in the sprinkler-pipes of the system.

Figure 1, in side elevation and partial section, represents a valve-controlling mechanism embodying my invention, with the parts in normal position, arranged for the normal maintenance of an air-pressure in the sprinkler system. Fig. 2 is a right-hand end ele-

vation of the mechanism shown in Fig. 1. Fig. 3 is a sectional detail to be described, and Fig. 4 is a partial detail of the controlling mechanism arranged for operation with a "dry-pipe" sprinkler system wherein is normally maintained a pressure below that of the atmosphere.

The water-supply pipe or main A has a valve-casing A, provided with preferably a straightway valve A², of suitable construction, interposed between the main source of supply (not shown) and the sprinkler system, to which system the main A is connected by a suitable pipe A^x, Fig. 1.

A suitable framework A³ is bolted or otherwise secured to the valve-casing A', supporting a cylinder a, having an open upper end, the valve-stem a' extending through suitable packing-boxes a² and a³ in the valve-casing and cylinder-bottom, respectively, as clearly shown in Fig. 1.

A head a⁴ is secured to the end of the valve-stem within the cylinder, to which is bolted a flanged ring a⁵, between which and the head a⁴ a suitable packing p is securely held, the packing being overturned between the cylinder-wall and flange of the ring, forming a water-tight piston for the cylinder.

The annular space between the cylinder-wall and the head will preferably be filled with oil to maintain the packing soft and in tight condition.

The area of the under side of the piston is preferably considerably larger than the area of the valve A², and when the latter is seated the piston is near the bottom of its cylinder, as shown in Fig. 1.

A pipe a⁶ connects the cylinder a beneath the piston with the supply-main at that side of the main inlet-valve A² farthest from the sprinkler system, a suitable valve a⁷ (see dotted lines, Fig. 1) within the casing a⁷⁰ normally cutting off communication between the cylinder and water-supply pipe A.

The stem b of the cut-off valve is provided with a slotted extension b', the outer end being movable longitudinally in a guide b^x on the frame or bracket A³, while the shorter arm of an elbow-lever b², fulcrumed at b³, is extended into the slotted extension, so that depression of the long arm of said lever will

move the valve-stem b and its attached valve outwardly to establish communication between the cylinder a and supply-pipe A .

On the exterior of the cylinder I have formed
5 a chamber c , closed by a suitable flexible diaphragm c' , held in place on the cylinder by a spider c^2 , having an annular base and bolted in place, a suitable pipe c^3 leading from the pipes of the sprinkler system (not shown) to
10 the chamber c , so that the pressure in the chamber and sprinkler system will be the same.

Through the bearing c^4 of the spider is loosely extended a spindle c^5 , rigidly secured
15 to the diaphragm c' , as by a screw 2 and washer 3, Fig. 1, said spindle being longitudinally slotted at c^6 and preferably rounded at its outer end to run between antifriction guide-rolls 5 and 6.

The spindle forms a detent and is stepped
20 at its outer end at c^7 for a purpose to be described, the pressure of the fluid in the chamber c acting on the diaphragm c' to move the detent outwardly, while the downturned end
25 d of a lever d' , pivoted at d^2 on an ear of the spider c^2 , moves the detent in the opposite direction, said lever being shown as widened at d^3 to form a seat for one or more weights W , slipped over an upright pin d^4 . So long
30 as the weight W , acting through its lever d' on the detent c^5 , is counterbalanced by the pressure on the inner side of the diaphragm c' the detent will be maintained stationary, it being understood that air under pressure is
35 normally maintained in the sprinkler system, but any diminution of such pressure in the chamber c will immediately destroy the equilibrium and the weight will drop quickly, turning the lever d' to move the detent c^5 instantly
40 to the left, Fig. 1, into inoperative position.

The cut-off-valve actuator is shown as a heavy weight or mass of metal W , slotted at
45 w to receive the bifurcated end f' of a bar f , a suitable cushion w' , of rubber or other cushioning material, being secured to the bottom of the weight W by screws 15 to act as a buffer in the fall of the weight, the buffer at
50 such time resting upon the pipe A to relieve the various parts from shock and danger of breakage. At its upper end the bar f is bent and rests against a guide-roll 7, while a notch
55 f^2 on its inner side receives the stepped end of the detent c^5 , the top of the notch resting firmly yet easily on the step c^7 , so that the actuator is held suspended while the cut-off valve is closed.

A projection 20 on the bracket guides the inner side of the bar f , and the bifurcated
60 portion f' of the latter straddles the long upturned end of the valve-lever b^2 , a pair of guide-pins 21, extended transversely through the lever-arm, serving to prevent lateral displacement of the bar f when it descends, the
65 lever being preferably slightly notched at b^3 to receive it.

In operation, when the detent c^5 is moved

to the left, by diminution of pressure in the chamber c , due to the opening of one or more
sprinkler-heads, for instance, the stepped end
70 of the detent is withdrawn from the notch f^2 of the actuator-bar and the weight W falls, the bar f striking the lever b^2 with a quick heavy blow, instantly turning it to open the
75 cut-off valve, thus overcoming most effectively any corrosion or sticking of the parts.

As soon as the cut-off valve is opened the water from pipe A rushes through the pipe a^6
into the cylinder a , beneath its piston, and causes the latter to rise, taking with it the
80 stem a' , forming a hydraulic piston or actuator to gradually open the main valve A^2 , so that the water can pass directly to the sprinkler system.

By making use of gravity to operate the
85 cut-off-valve actuator and its detent, I am always sure of the operation of the mechanism whenever the occasion arises, and not only that, but the weights act in a much
90 quicker and more positive manner than can be attained with springs and other devices.

A drip-valve a^{30} is fitted in the bottom of the cylinder to discharge water therefrom
when resetting the controlling mechanism, and a second drip-tube or overflow a^{40} is provided
95 near the upper end of the cylinder for testing or other purposes.

In order to conveniently operate the valve
 A^2 by hand, the retaining-nut n on the end of the stem a' is upturned, extending almost to
100 the cylinder-top when the piston is down, said nut having a slot n' therein, through which a pinch-bar may be passed to raise or lower the stem and valve.

On the cylinder-wall, opposite the slot n' ,
105 is pivoted an arm h , having one or more slots h' and adapted to be upturned, as shown in Fig. 1, so that by resting a bar on the nut n , with one end in a slot h' , and depressing the other end, the piston and valve may be forced
110 down to seat the main valve A^2 .

Inasmuch as it is very desirable to test the valve-controlling mechanism from time to time without filling the sprinkler system with water, I prefer to insert in the supply-pipe A
115 a test-valve A^5 , between the main valve A^2 and the end of the pipe a^6 , so that by shutting the test-valve A^5 the whole valve-controlling mechanism may be tested under normal conditions without filling the sprinkler
120 system.

Of course the test-valve will be open except when such a test is to be made, and it is to be understood that the omission of such
125 test-valve does not change the spirit and scope of my invention, nor is my invention limited to the precise construction and arrangement herein shown and described.

The guide-rolls 5, 6, and 7 tend to eliminate
130 friction of the movable parts, while serving as guides, and the differences in the lengths of the various lever-arms increase the rapidity and precision of operation of the controlling mechanism.

If it is desired to give an alarm when the valve mechanism is operated, it may be accomplished in many ways, one simple way being herein shown for giving an alarm by changing the normal condition of an electric circuit.

The extension b' of the cut-off-valve stem has secured to its outer end and insulated therefrom a contact g , forming one terminal of a wire g' , forming part of an electric circuit, including a battery G and a bell G' , the other terminal, g^2 , of the circuit being shown as a spring-contact, secured, as by a screw g^3 , to the frame A^3 and insulated therefrom.

When the cut-off valve is operated, the terminals g and g^2 contact, closing the circuit and ringing the bell.

Obviously electrical contacts might be opened or closed by the movement of other parts of the controlling mechanism to operate an alarm at any desired point.

By reversing the lever d' the apparatus can be adapted for use when a pressure less than that of the atmosphere is maintained in the sprinkler system.

In Fig. 4 the apparatus is somewhat changed to adapt it to a sprinkler system wherein a pressure less than that of the atmosphere is normally maintained in the pipes of the system, the adaptation shown being substantially a reversal of some of the parts. The hydraulic cylinder a has formed in its exterior the chamber c , as heretofore described, closed by a flexible diaphragm c' , retained by a ring or spider c^2 , (only partially shown,) said chamber communicating with the sprinkler-system pipes by the opening c^3 , substantially as has been heretofore described. A spindle c^{25} is secured to the diaphragm c' in suitable manner, and an elbow-lever $c^{26} c^{27}$, pivoted at c^{28} on an extension 75 of the frame A^3 , is provided with a weight W^5 , one arm c^{26} of the lever entering a slot c^{29} in the spindle, the action of the weight tending to draw the spindle outward. This is resisted under normal conditions by the pressure of the atmosphere on the exterior of the diaphragm, it being understood that a pressure less than the atmosphere is maintained in the sprinkler system. The spindle c^{25} is guided between the rolls 5 and 6, as before, but it is slotted at c^{30} to receive therein the notched end f^{12} of the bar f^{10} , the notch being turned outwardly and normally resting on the outer end of the slotted part of the spindle. Now when the pressure in the sprinkler system is increased, as by the opening of a sprinkler-head, the air-pressure between the two sides of the diaphragm tends to equalization, and the weight W^5 then

throws the arm c^{26} of the lever to the right, Fig. 4, moving the spindle c^{25} in the same direction, carrying the outer end of the slot c^{30} out of the notch f^{12} of the bar f^{10} , allowing the latter to drop, it being understood that with the exception of the parts noted by different reference letters and figures the apparatus as a whole is such as shown in Figs. 1 and 2.

There are substantial advantages obtained by the maintenance of a pressure less than that of the atmosphere, one of which advantages is that the rush of water into the sprinkler system is not retarded by the expulsion of air under pressure, even if it be low.

Any reduction of the time necessary to place the sprinkler system in operation is material, inasmuch as it is thereby increased in efficiency and consequently in value.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an apparatus of the class described, a main valve, and means, including a hydraulic piston, to operate it, a slotted projection extending from said piston, a slotted arm connected to a stationary part to cooperate with said projection, substantially as set forth, combined with a controlling-valve for said piston, an actuator therefor, and a releasing device for said actuator, controlled by the pressure in the sprinkler system, to operate said device and release the actuator, substantially as described.

2. In an apparatus of the class described, the main inlet-valve, a hydraulic motor therefor, and a controlling-valve for the motor, combined with a gravity actuator, a connecting-lever between it and the valve, a sliding detent to normally engage and maintain the actuator elevated, a gravity device for releasing the detent from the elevated actuator, a pressure-chamber connected with the sprinkler system, and a diaphragm-cover for said chamber, connected to and to normally maintain the detent operative, said gravity actuator, when disengaged from said sliding detent, being free to fall into contact with said connecting-lever to release said controlling-valve by the resulting blow, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN R. FREEMAN.

Witnesses:

JOHN C. EDWARDS,
AUGUSTA E. DEAN.