(No Model.)

C. E. BUELL.

FIRE EXTINGUISHING APPARATUS.

No. 582,896. Patented May 18, 1897.

Fig. 1.

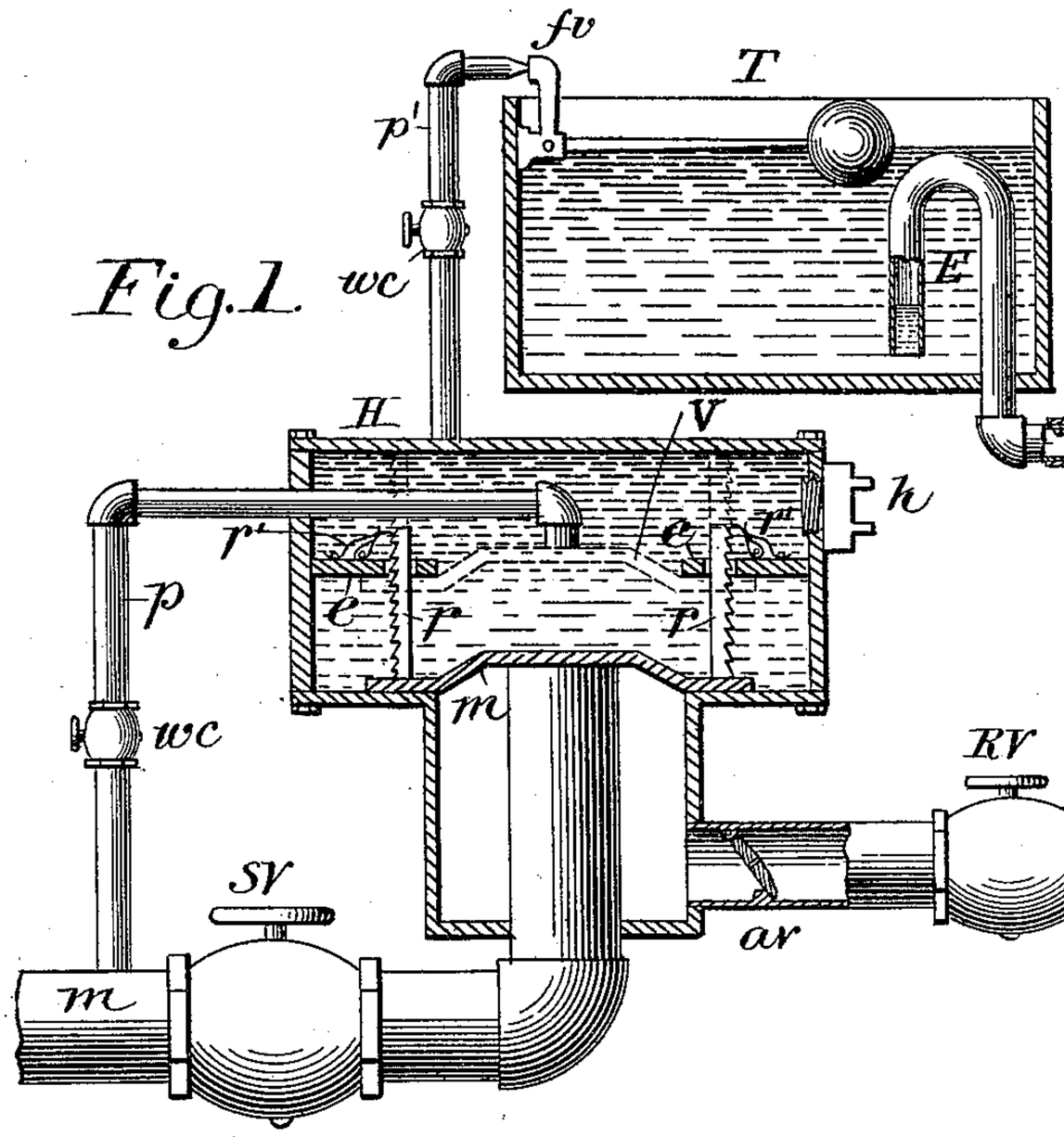


Fig. 3.

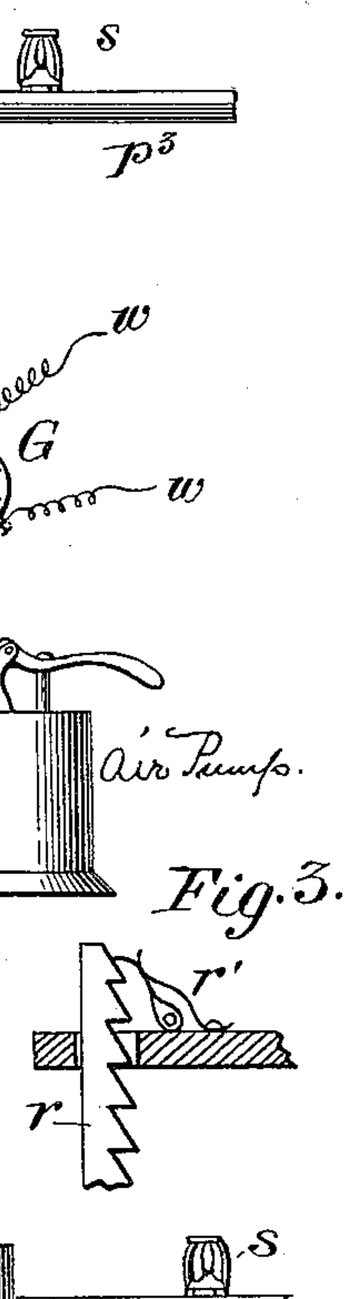


Fig. 2.

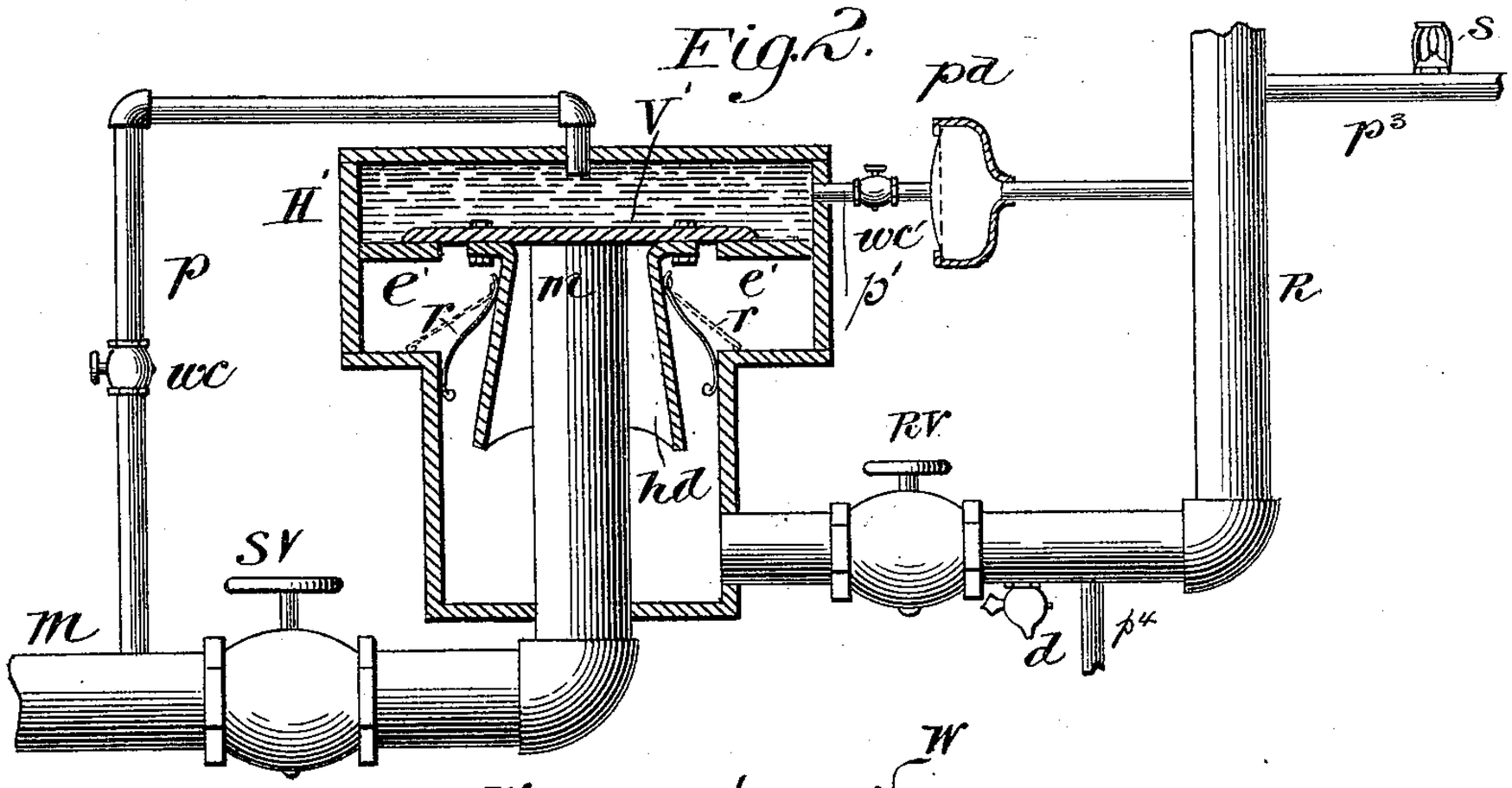
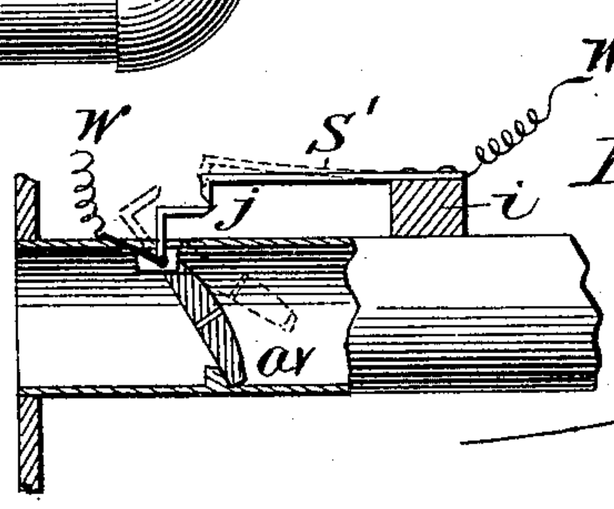


Fig. 1a.



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FIRE-EXTINGUISHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 582,896, dated May 18, 1897.

Application filed August 13, 1896. Serial No. 602,620. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BUELL, of North Plainfield, Somerset county, State of New Jersey, have invented Improvements in Fire-Extinguishing Apparatus, of which the following is a specification.

In the accompanying drawings, Figures 1, 2, and 1ª represent valve mechanism and details thereof for carrying out my invention.

Referring to Fig. 1, there is shown the casing H, in which there is a main valve V, normally closing the inlet of the supply-main M, which enters the casing through the eduction portion thereof.

The main-riser of the sprinkler system R is shown as entering to within the casing H below the inlet of main M.

The supply-main M is provided with a controlling-valve S V and a pipe *p*, connecting the supply-main M with the casing H, that enters the supply-main M at a point between the said valve S V and the source of water-supply, and by this location of the entrance of pipe *p* into the main M admitting of the introduction of water into the casing H when the valve S V is closed.

The riser R is provided with a controlling-valve R V, a drip *d*, a branch pipe p^3, with sprinkler S attached, a gage G for indicating the pressures in the system and for operating an alarm-circuit by the connections *w w*, and there is also an air-pump connected to riser R for producing air-pressure in the system. A flap-valve *a v* is shown in riser R for alarm purposes, to be hereinafter more fully described.

The valve R V is a necessary part of the apparatus, and without which the resetting of the valve V would be difficult, as it admits of closing the riser R from the casing H during the resetting of the valve V. Above the casing H there is shown a tank T, having a float-valve *f v*, normally closing the outlet of the pipe *p'*, which pipe is a vent for the casing H. There is also shown a siphon E, connecting the tank T with the riser R, the said siphon being provided with a check-valve *c v* for preventing backflow from the riser to tank T when water is admitted to the riser R and system. The drip *d* is located at a point in the system where it will allow the water therein to be drawn off for resetting the valve and for repairs.

The valve *b* is provided with guides *r r*, passing through the partition or web *e e*, and there are shown the dogs *r' r'* for interlocking with the ratchet-teeth on guides *r r* to prevent the valve V from again closing the inlet of pipe M after it has been raised until it has been released by the hand of a person entered through the hand-hole *h*, which is normally closed. The valve V, when raised to the position shown in dotted lines, can be made to close the inlet of the pipe *p*, the said pipe also being provided with a way-cock *w c* for controlling the flow of water therethrough. The guides *r r*, with the catch *r'*, are illustrated in enlarged view. In the enlarged view a spring is shown to cause the dog to catch in the teeth of the guide *r*.

The apparatus being arranged, as shown, with the valve V closing the inlet of main M and water holding valve V to close said inlet, and with the tank T filled so as to close the outlet of vent-pipe *p'*, the valves S V and R V being open and a pressure of air in the sprinkler system holding the water from rising in siphon E, the system is adapted to automatically turn on a water-supply to be discharged at the sprinklers when any one of such sprinklers becomes open by the heat of an incipient fire and to exclude the water from the pipes of the system until such opening of the sprinkler occurs. The pressure of air from the air-pump being confined in the riser R and pipes of the system until a sprinkler opens acts to hold the water in tank T from rising in the siphon E, and the outlet of pipe *p'* is held closed by the float-valve *f v*, thereby confining the entrapped water in the casing H, which by its pressure on the enlarged surface of the valve V prevents the flow of water from the inlet of the supply-main M, holding the waterway between main M and riser R closed until the air-pressure in the system is destroyed by the opening of a sprinkler, as described.

To reset the apparatus after it has been operated by the opening of a sprinkler, it is necessary to close the valve S V and drip the water out of the system and to close the way-cock *w c* in pipe *p*. After replacing the sprinkler that opened with a new sprinkler, the valve R V is closed, the air pumped into the riser R and system, the valve V replaced to close the inlet of main M, water introduced

through pipe p to fill the casing H and through pipe p' to fill tank T and cause float-valve $f\,v$ to close the outlet of pipe p'. When this is done, the valves S V and R V are opened to give a free waterway from the supply-main M to the system of pipes and are thus left open.

There are advantages in being able to change a "dry-pipe" system into a "wet" system during the summer months, as the water requires an appreciable time to enter a system of pipes in which air is held under pressure until a sprinkler opens, and by having the water standing in the pipes this valuable time is saved and water is delivered at once upon a fire by the opening of a sprinkler. This can be accomplished by leaving the valves S V and R V open and closing the way-cocks $w\,c$ and $w\,c'$ and check-valve $c\,v$.

The valve V is preferably a flexible metal plate, which will conform to the inlet of main M when forced down by the pressure of the entrapped water in casing H. Being unattached and free to move, the valve V has advantages in its use over those valves that are attached to diaphragms or fit closely in a cylinder and is not liable to be impeded in its movements and to fail to properly operate, as are those valves which are attached to a diaphragm or which fit a cylinder.

In Fig. 2 there is shown a casing H′ with the inlet of the supply-main M on a level with the web or partition $e'\,e'$ of said casing and the valve V′ pressed to close the opening in the partition and to close the inlet of main M by water that is entrapped in the casing H′ through pipe p. There is shown a hood $h\,d$, attached to and moving with the valve V′, which is of advantage in directing the water which enters from main M to the outlet of riser R. The hood $h\,d$ carries the elastic guides $r\,r$, that are adapted to spring outward and engage with the ledge in the casing H′ and prevent an accidental resetting of the valve V′. A hand-hole may be provided for resetting the valve V′, as shown in Fig. 1 and described.

The vent of casing H′ through pipe p' is shown as being controlled by a diaphragm $p\,d$, which is forced outward by air-pressure in riser R, thus holding the outlet of pipe p' closed until the air-pressure in the system is destroyed by the opening of a sprinkler S. It will be observed that the pipe p in this form of the valve apparatus enters the supply-main M between the valve S V and the source of water-supply, and that it is provided with a way-cock $w\,c$, as in Fig. 1, and it is due to state that this location of the entrance of pipe p into the main M is an essential feature of this apparatus.

The valves for controlling the pipes p and p' allow of the use of this apparatus, like the one shown in Fig. 1 and described, in a wet system or a dry-pipe system, and the alarm apparatus shown in Fig. 1 and described can be used with the apparatus shown in this figure.

In Fig. 1ª the valve $a\,v$ is shown enlarged and consists of a pivoted or hinged valve in the main-riser and is provided with connections j, that normally rest in contact with the spring s, which is insulated on block i. Electric connections are attached to s and j, and by separating the parts s and j an electric circuit is interrupted and an alarm given by any desired and well-known apparatus for indicating and sounding alarms. It is obvious that the motion derived by the piece j, so attached to the valve $a\,v$ as to move with it, can be made to start a wound-up train or otherwise operate an alarm that is not electrical.

The advantage of an alarm operated by a valve that is raised only by water flowing into a system and cannot move when changes take place outside of the system is great. The ordinary alarm apparatus for use with sprinklers, and which depends for its operation on a lowering of pressure in the pipes when the sprinkler opens, if used with a wet system and attached to the ever-fluctuating pressure of a city water-supply, has been found to be wholly unreliable.

By the connections fixed to the valve $a\,v$ the lowering of pressure in the city supply will not disturb the alarm, and by the employment of the valve $a\,v$ the use of the gage G with electrical connections is made more effective for denoting when a sprinkler has opened, and by employing two independent means for producing a signal when a sprinkler opens the certainty of obtaining alarms is enhanced. It is obvious that the connections for the valve $a\,v$ can be made within the riser R and wires enter the said pipe, or the said connections can be upon the exterior, as shown in Fig 1ª.

What I claim is—

1. A valve mechanism for normally closing the waterway between a supply-main and a main-riser of a sprinkler system that comprises a casing, a valve within the casing that is held to its seat by pressure within the casing, and is adapted to be dislodged and removed from its seat by the discharge of said pressure, a vent for discharging said pressure that is controlled by a release that has connections to said vent and to the pipes of the sprinkler system; a controlling-valve in the main-riser, and a by-pass connecting the casing to the main-supply pipe at a point in said main between the valve S V and the source of supply.

2. A valve mechanism for normally closing the waterway between a supply-main and a main-riser of a sprinkler system that comprises a casing, a valve within the said casing that is held to its seat by entrapped water and is adapted to be dislodged and removed from its seat by the release of the entrapped water, a pressure-actuated release having connections from said riser and to a vent in said casing, a connection from said riser, or sprinkler system, to a source of gaseous pressure,

and a by-pass connecting said casing with the supply-main, and a valve S V between the said by-pass and said casing.

3. A valve mechanism for normally closing the waterway between a supply-main and a main-riser of a sprinkler system that comprises a casing the supply-main entering to within the said casing through the eduction portion of the casing, a valve covering the inlet of the supply-main that is held to its seat by pressure within said casing acting upon a greater area than the area of said inlet, a vent for said casing, automatic releasing mechanism made operative by the opening of a sprinkler for discharging the pressure within said casing, and a by-pass connecting the casing with the supply-main, and a valve S V in the supply-main between the casing and the point where the by-pass enters the supply-main.

4. A valve mechanism for normally closing the waterway between a supply-main and the main-riser of a sprinkler system that comprises a casing, a partition in said casing an opening through said partition, the supply-inlet in proximity to said opening, a valve covering the said opening and closing said inlet, entrapped water forcing said valve to its seat, an eduction-port below said partition, and means for introducing and withdrawing the water from the said casing, substantially as described.

5. A casing a valve within said casing that is of elastic material, an inlet of a supply-main within said casing, entrapped water holding said valve to close said inlet, a hood attached to said valve, an eduction-port located below and around said inlet, and an automatic release for venting the entrapped water.

6. A valve mechanism adapted to control the waterway between a supply-main and a main-riser pipe that consists of a casing, a partition in said casing, an inlet of the supply-main in proximity to the partition and at the opening therein, a valve adapted to cover the said inlet and said opening, and suitable means for introducing and withdrawing water in and from said casing, for controlling the said valve.

7. A casing, a partition in said casing, and an opening in the said partition, a supply-main having its inlet entering into said casing through the eduction-passage, and to a level with said partition, a valve closing the opening in the partition and closing the inlet of the supply-main, entrapped water normally holding said valve to its seat, a by-pass connecting said casing to the supply-main, a valve in the supply-main located between the point where the by-pass enters said main, and the casing, a controlling-valve in the main-riser, a vent connecting said casing and the main-riser that is adapted to control said vent by air-pressure in said riser, and connections from said system to a source of gaseous pressure.

8. A valve mechanism comprising a chamber, a supply-main and a main-riser pipe connected with said chamber, the main-supply entering said chamber through the eduction-passage to which the main-riser is connected, a valve for closing the inlet of the main-supply, and the eduction-passage, a vent for said chamber that empties into the main-riser, and devices for normally closing said vent by pressure in the system.

9. A casing, a partition in said casing, an inlet of the supply-main, and the outlet of the main-riser pipe entering said casing, a valve in the same that is adapted to close the opening in the partition, and to close the inlet of the supply-main, and that is provided with means for preventing the reseating of the valve, when, in its normal operation, it is raised.

10. An incased valve for closing the waterway between a supply-main and a main-riser of a sprinkler system that is detachably placed in said casing, and is provided with guides that are adapted to retain the said valve in its raised position, an intake from the main-supply pipe that enters the supply-main between its controlling-valve and the source of water-supply, and that is adapted to introduce water within said casing, a controlling-valve in the intake; a vent for said casing that includes valve devices for preventing the flow of water from the main-riser into said casing, and connections from said apparatus to a source of supply of gaseous pressure.

11. A valve mechanism for controlling the waterway between a supply-main and a main-riser, of a sprinkler system that comprises a casing, a partition in said casing, a valve device held to normally close the said opening in the partition, and to close the waterway between the supply-main and the riser, by entrapped water, a by-pass from the supply-main to the casing, and a vent from said casing that has connections to the main-riser.

12. A valve mechanism for normally closing the waterway between a supply-main and a main-riser, of a sprinkler system that comprises a casing, a valve within the casing that is held to its seat by pressure within the casing, and is adapted to be dislodged and removed from its seat by the discharge of said pressure, a vent for discharging said pressure that is controlled by a release that has connections to said vent and to the pipes of the sprinkler system; a controlling-valve in the main-riser, and a by-pass connecting the casing to the supply-main at a point in said main between the valve S V and the source of supply, and an alarm apparatus having connection to the main-riser that is adapted to respond only to variations in the pressure within said riser.

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