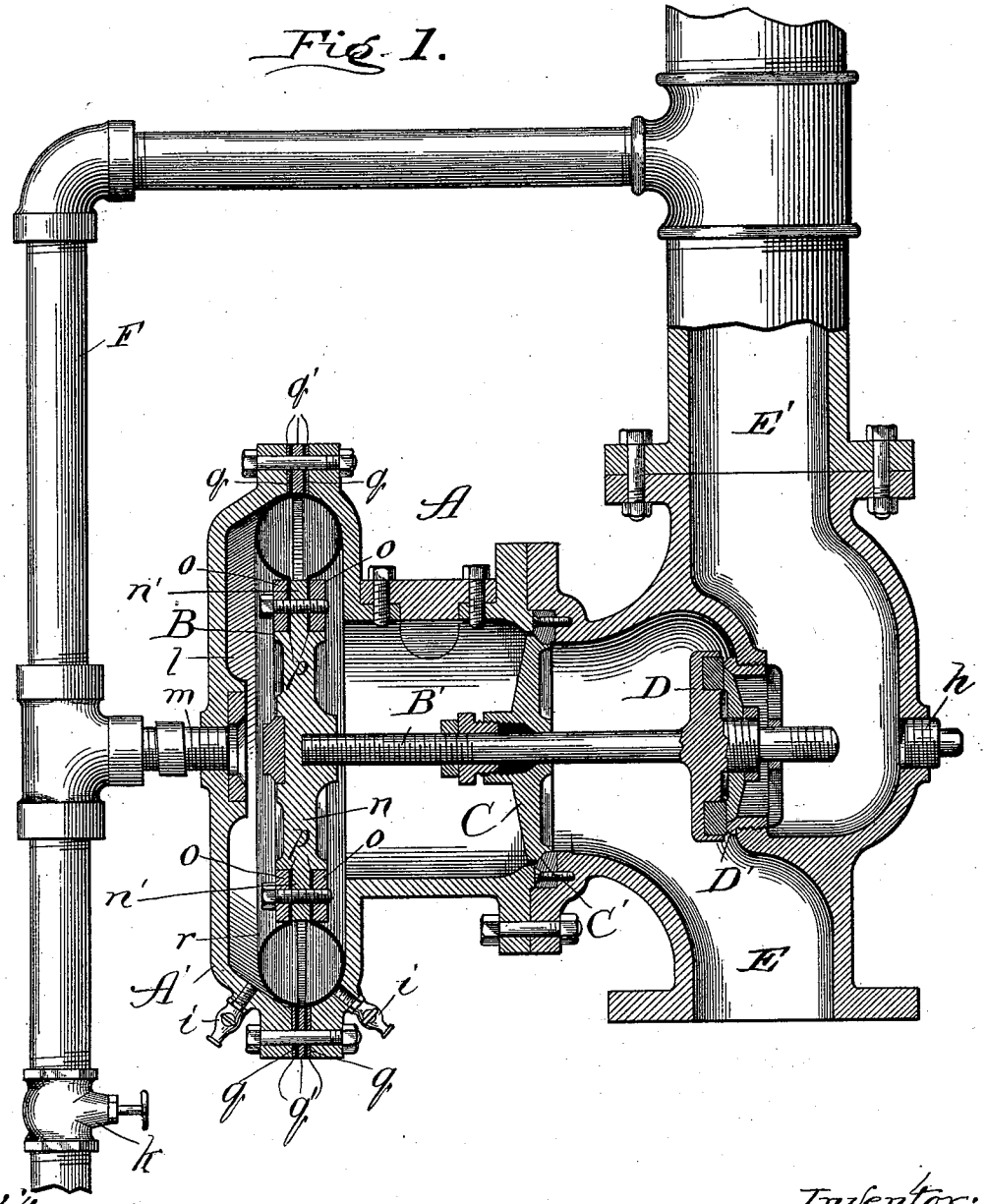
(No Model.) 2 Sheets—Sheet 1.

# C. W. KERSTETER.

## AUTOMATIC FIRE EXTINGUISHER.

No. 536,572. Patented Mar. 26, 1895.

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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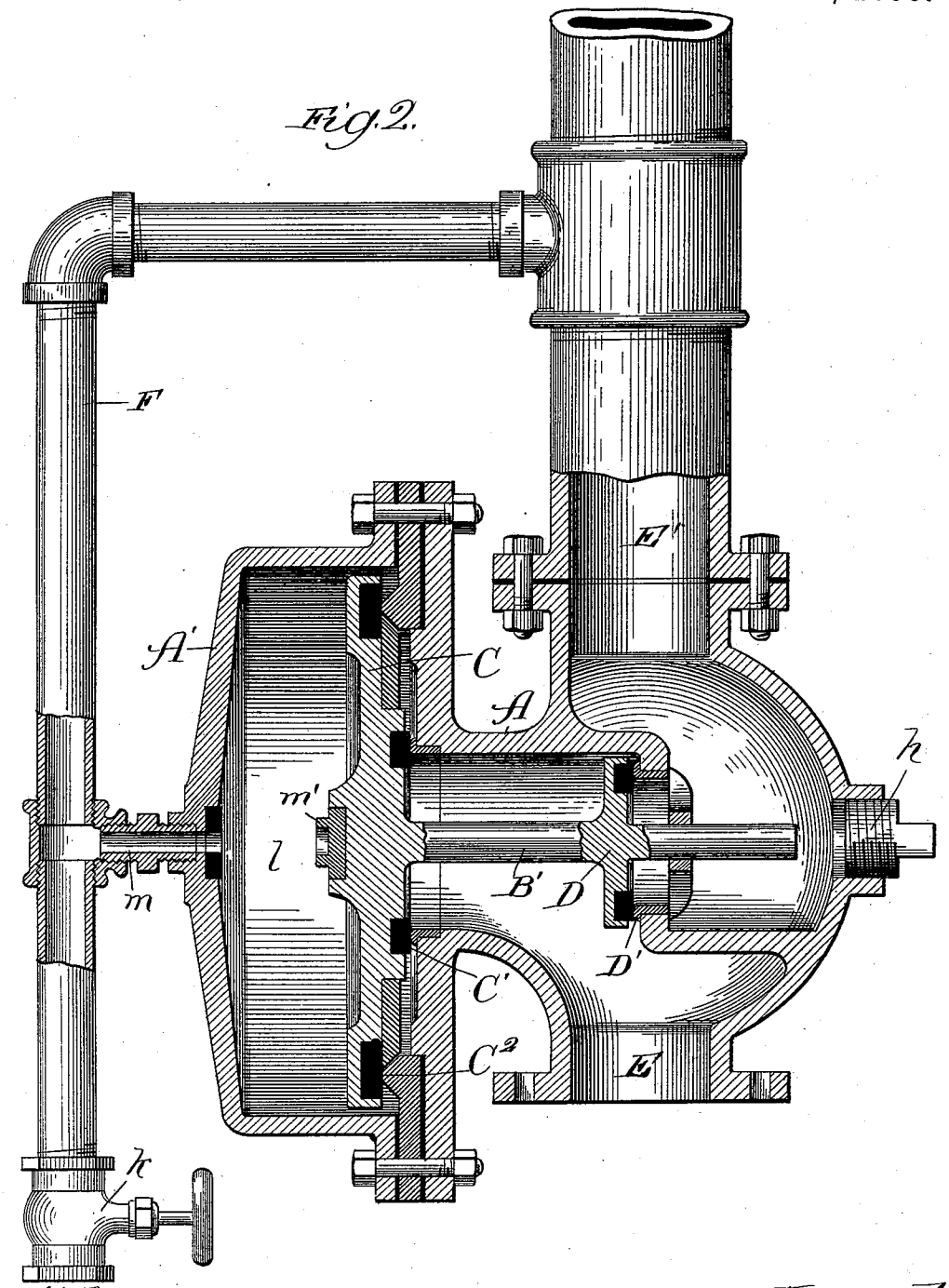
## AUTOMATIC FIRE EXTINGUISHER.

No. 536,572. Patented Mar. 26, 1895.

Fig. 2.

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# UNITED STATES PATENT OFFICE.

CHARLES W. KERSTETER, OF CHICAGO, ILLINOIS.

## AUTOMATIC FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 536,572, dated March 26, 1895.

Application filed January 27, 1894. Serial No. 498,252. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES W. KERSTETER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Automatic Fire-Extinguishers, of which the following is a specification.

My invention relates to an improvement in the class of apparatus provided in buildings for maintaining a supply of water under pressure normally sealed against discharge in the building, but adapted to release the water by the effect of the heat of fire on the apparatus in any part of the building provided therewith.

More definitely stated, my invention relates to an improvement in the so-called "dry-pipe" automatic sprinkling system, the generally stated construction of which is as follows: The system of pipes for conveying water throughout a building, and which are provided at intervals with sprinkler-heads adapted to have their valves released by the heat of fire, is normally maintained free of water and filled with air confined in the pipes under pressure exerted against a diaphragm having connected with it a valve which controls the water-supply to the pipes, the pressure being sufficient to hold shut, through the medium of the diaphragm, the valve against the force of the water pressure behind it. When the valve-sealing medium of one of the sprinkler-heads is fused by fire, required to be extinguished in the building, a vent is afforded for the air in the pipe-system, whereby the pressure therein is reduced below that of the water-supply against its controlling valve, which is thereupon opened by the pressure of water, which thus flows through the valve-seat and enters and fills the pipe-system, supplanting therein the air; and the outlet afforded by the vented sprinkler-head permits the escape through it of the water upon the fire.

The object of my invention is to provide a novel construction of the valve-mechanism normally controlled by the air-pressure, referred to, to hold shut off the water-supply to the pipe-system, whereby the flow of water, when released, shall not be through the valve-seat of the water-pressure controlling valve, thereby avoiding wear on the seat, but through a different course leading to the pipe-system, the entrance to which is normally closed by a valve connected with and controlled by the water-pressure controlling valve, and against which the water-pressure normally is exerted to maintain it closed.

My further object is to improve the construction of the valve-mechanism in matters of detail.

Referring to the accompanying drawings—Figure 1 shows my improved device by a broken view mainly in sectional elevation; and Fig. 2 shows, by a similar view, a modified construction.

A denotes a shell, in the head-end A′ of which is fastened a diaphragm B, preferably of the construction illustrated, comprising an annular tube *r* of metal, split through longitudinally and having straight annular flanges *q* and *p* respectively at its outer and inner sides, the former being clamped, between packing-rings *q′* between the bolted sections of which the head is formed, and the latter being clamped between rings *o* against the peripheral flange *n′* of a solid center *n* of the annular diaphragm-ring.

An advantage of the described diaphragm-structure is the more perfect elasticity it affords in the diaphragm.

Midway, or at any desired point, in the shell A, is formed a valve-seat C′, suitably packed, for a valve C, connected from its center with that of the diaphragm B, by a common stem B′, passing through the valve C and carrying at its end a valve D fitting against a seat D′ in the shell near the end thereof opposite that covered by the diaphragm and affording the connecting passage between the water-inlet passage E to the shell and the water-outlet passage E′ leading therefrom to the pipe-system, not shown but that referred to as being provided with sprinkler-heads.

F is a branch-pipe communicating at one end with the outlet-pipe E′, and between its ends, at *m*, with the chamber *l* afforded in the head A′ by the diaphragm; and toward its opposite end the branch-pipe F should be provided with a valve *k*.

The aforesaid pipe-system is normally filled with air under pressure, which may be introduced, by pumping, through the branch-pipe F; and, obviously, it exerts its pressure,

through the communication *m*, against the outer surface of the diaphragm, thereby causing the latter to resist the pressure against the valve C of the water-supply at the inlet E. The surface-areas of the diaphragm and valve C are so proportioned that owing to the excess of the former over the latter, a comparatively low degree of air-pressure will overcome that of a higher water-pressure against the latter; and, as will be seen, the normal seating of the valve C is assisted by the pressure of the water, which is always between the valves C and D, against the latter, the surface-area of which is still less than that of the valve C.

When the air-pressure escapes from the pipe-system, as by the opening of a sprinkler-head valve, the resistance of the diaphragm to opening of the valve C under the head of water against it, is removed; and when that valve is thus unseated it pulls the valve D open, thereby permitting the water to pass through the outlet E′ into and fill the pipe-system. Of course the branch-pipe F then also becomes filled with water, as also the shell A between the valve C and diaphragm; but this need not disturb the preponderance of pressure of the water against the inner or front side of the diaphragm, because that will, in the first instance of opening the water-valve, have forced a head *m′* on the center of the outer or rear side of the diaphragm against the mouth of the pipe-section *m* to close it; and as the surface-area of the head *m′*, then opposed to the water pressure in the pipe F, is very much less than that of the opposite side of the diaphragm, the preponderance of water-pressure accordingly exerted against the latter cannot be overcome by the pressure against said head, so that the water-valve remains open.

When it is desired to drain the pipe-system of water, this may be done by opening the valve *k;* and water in the chamber *l* and shell at the opposite side of the diaphragm may be drained off through the tap-cocks *i*, while that in the outlet E′ may be caused to escape on withdrawing the plug *h*.

As will thus be seen, my improved construction perfectly avoids the flow of the water-pressure about the valve employed for normally resisting its flow, with the undesirable wearing and other consequences, and it causes the valve-closing effect of the air-pressure to be supplemented by the pressure of the water against the outlet-controlling valve D, whereby additional safeguard is afforded against faulty operation of the device.

The foregoing description and the drawings set forth my invention as applied with a diaphragm as the medium through which to direct the air-pressure upon the common stem of the valves C and D for seating the former against the opposing water-pressure. The diaphragm, however, may be entirely dispensed with, without departure from my invention, by directing the air-pressure in the pipe-system immediately against the adjacent surface of the valve C, according to the construction illustrated in Fig. 2, wherein the head *m′* is shown to be provided in the rear side of the valve for the same purpose that it is provided, as described, on the diaphragm, and the area of that surface of the valve C should then be properly proportioned to exceed that of the opposite surface to cause the lesser degree of air-pressure to overcome the greater water-pressure. An additional seat $C^2$ should then also be provided for the valve C. The device then performs its function in substantially the same manner, and the construction presents the same advantages, as with the diaphragm—that is to say, when the air-pressure is released, the head of water against the valve C operates the stem B′ to unseat the valve D and open communication between the inlet E and outlet E′; the flow of water is avoided through the seat C′ of the primary controlling valve C; and the head of water between the two valves, by its pressure against the valve D, supplements the air-pressure seating effect on the valve C.

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

1. In a device for controlling, by air-pressure in the distributing pipes, the supply of water to the pipe-system of a fire-extinguishing apparatus, a shell having a water-inlet and a water-outlet, a valve for said outlet seated in the shell to open against the water-pressure, an opposing valve of larger area in said shell seating against the water-pressure under opposing air-pressure in said pipe-system, said valves flanking the water-inlet to the shell, and a pipe for conducting the opposing air-pressure, said pipe connecting the air-pipe system with the chamber back of the larger valve in the shell substantially as described.

2. In a device for controlling, by air-pressure in the distributing-pipes, the supply of water to the pipe-system of a fire-extinguishing apparatus, a shell having a water-inlet and a water-outlet, a valve for said outlet seated in the shell to open against the water-pressure, an opposing valve of larger area in said shell seating against the water-pressure, and a diaphragm controlling both valves and exposed to air-pressure from said system to maintain the two valves closed, substantially as described.

3. In a device for controlling by air-pressure the supply of water to the pipe-system of a fire-extinguishing apparatus, a shell containing a diaphragm exposed at one side to air-pressure in said pipe-system, and comprising an annular flanged split tube of springy metal and a solid center in the annulus, a water-inlet, a valve of lesser surface-area than and connected with the diaphragm and seating against the water-inlet pressure, and a water-outlet provided with a valve of lesser surface-area than and connected with the water-pressure opposing valve, substantially as and for the purpose set forth.

4. In a device for controlling by air-pressure the supply of water to the pipe-system of a fire-extinguishing apparatus, a shell A containing a diaphragm, a water-inlet E, and a water-outlet E′ communicating through a valve-seat D′, a valve D on one end of a stem B′ connected at its opposite end with the diaphragm, a valve C interposed between the valve D and diaphragm on said stem and having a seat C′ and a branch-pipe F communicating with the said water-outlet and opening into the shell against the outer surface of the diaphragm, the whole being constructed and arranged to operate substantially as described.

CHARLES W. KERSTETER.

In presence of—
M. J. FROST,
W. N. WILLIAMS.