No. 801,922. PATENTED OCT. 17, 1905.

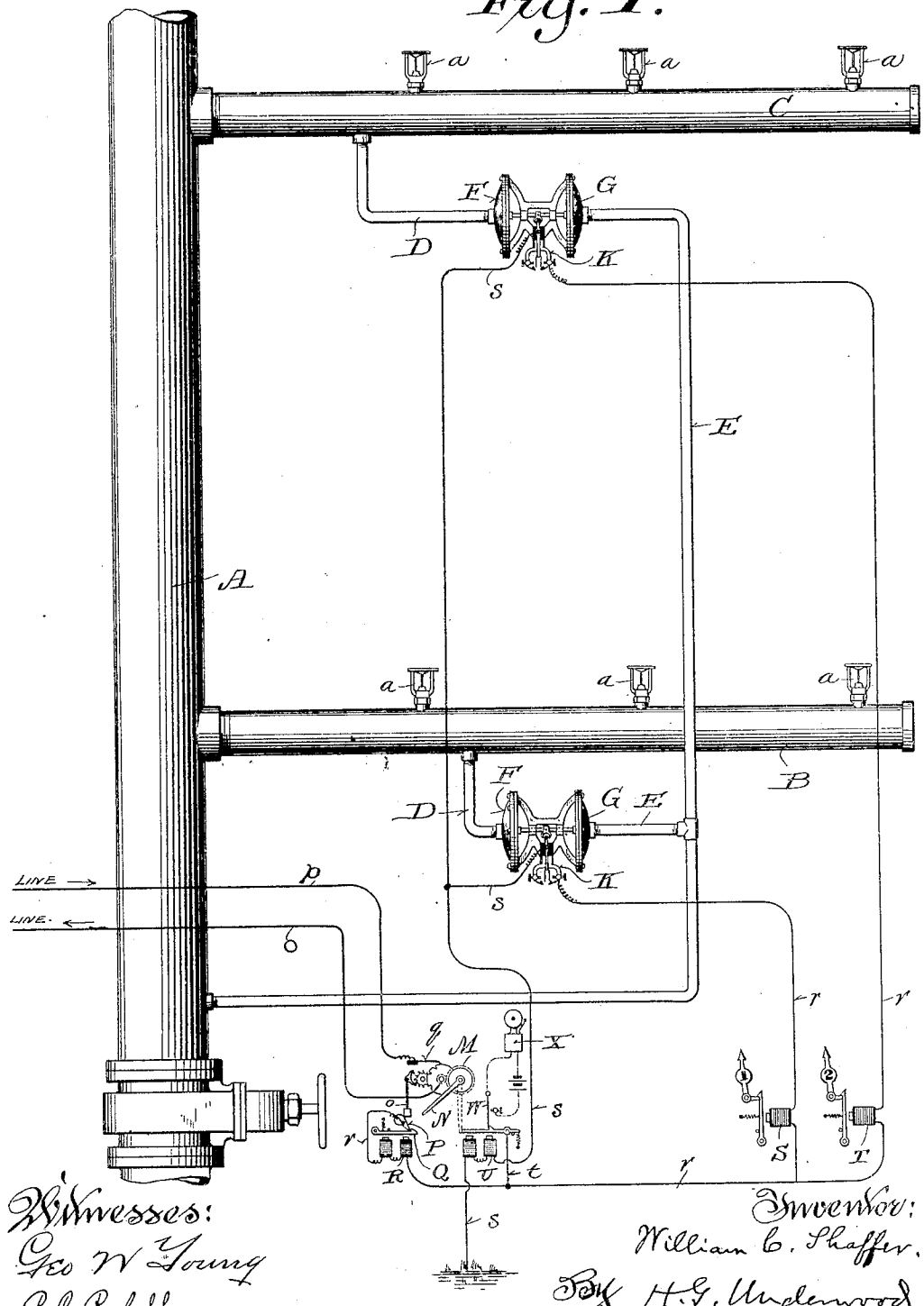
W. C. SHAFFER.

AUTOMATIC SPRINKLER SYSTEM.

APPLICATION FILED JUNE 5, 1902.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Geo W Young
B. C. Roloff.

Inventor:
William C. Shaffer.
By H. G. Underwood
Attorneys

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

No. 801,922. PATENTED OCT. 17, 1905.

W. C. SHAFFER.

AUTOMATIC SPRINKLER SYSTEM.

APPLICATION FILED JUNE 5, 1902.

3 SHEETS—SHEET 2.

Fig. 4.

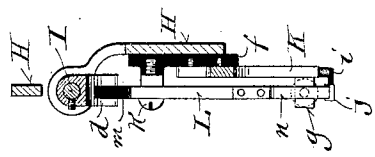
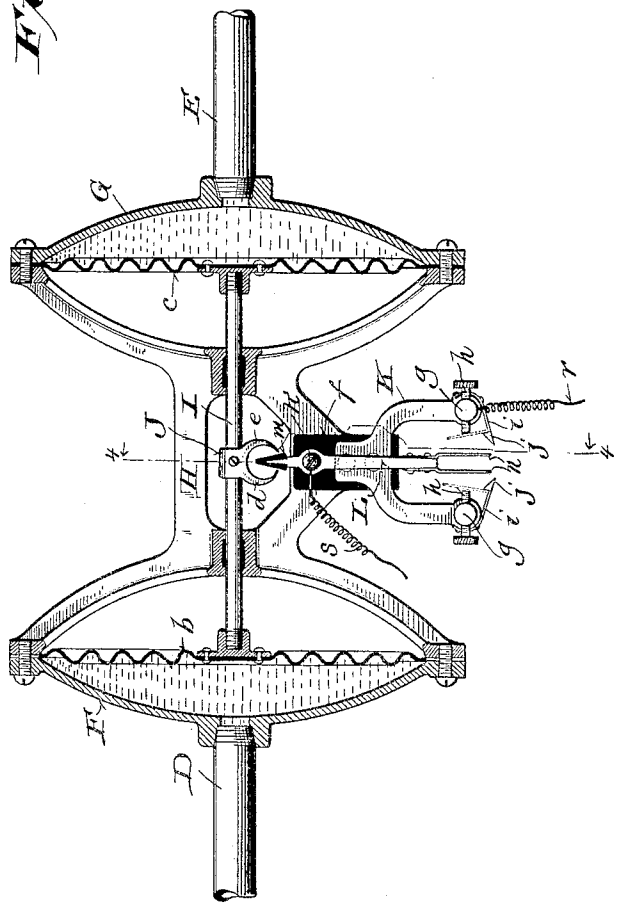


Fig. 2.



Witnesses:
Geo. W. Young.
B. C. Roloff.

Inventor:
William C. Shaffer
By H. G. Underwood
Attorneys

ANDREW B. GRAHAM CO. PHOTO-LITHOGR. PRESS, WASHINGTON, D. C.

No. 801,922. PATENTED OCT. 17, 1905.

W. C. SHAFFER.

AUTOMATIC SPRINKLER SYSTEM.

APPLICATION FILED JUNE 5, 1902.

3 SHEETS—SHEET 3.

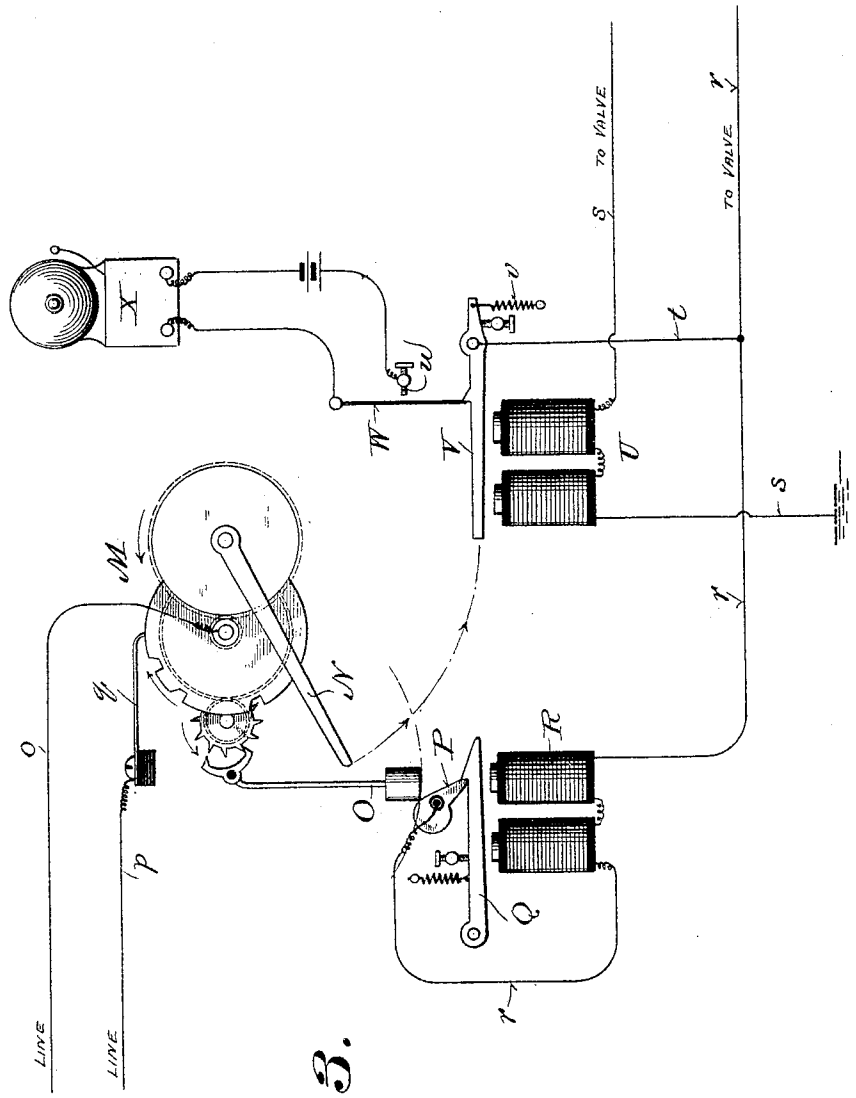


Fig. 3.

Witnesses
Geo. W. Young.
B. L. Roloff.

Inventor
William C. Shaffer
By H. G. Underwood
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM C. SHAFFER, OF MILWAUKEE, WISCONSIN.

AUTOMATIC SPRINKLER SYSTEM.

No. 801,922. Specification of Letters Patent. Patented Oct. 17, 1905.

Application filed June 5, 1902. Serial No. 110,266.

To all whom it may concern:

Be it known that I, WILLIAM C. SHAFFER, a citizen of the United States, and a resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Automatic Sprinkler Systems; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to automatic sprinkler systems; and it consists in the means for sending in alarms whenever the equilibrium of the fluid in the pipes of the system is disturbed, either by the intended action of the apparatus in the case of fire or by the accidental action of a leak from any other cause, all as will be fully set forth hereinafter and subsequently claimed.

In the drawings, Figure 1 is a view, partly in diagram, showing the application of my invention in an automatic sprinkler system. Fig. 2 is a sectional view of the essential portion of my apparatus drawn to an enlarged scale. Fig. 3 is an enlarged diagrammatic view of portions of the apparatus shown in Fig. 1. Fig. 4 is a detail sectional view on the line 4 4 of Fig. 2.

Referring to the drawings, A represents the main supply-pipe or riser of a sprinkler system, and B C represent two cross-feed or distributing pipes for two sections or floors, these pipes being placed in practice adjacent to the ceilings, and *a a a* represent automatic sprinkler-heads of any approved construction on said distributing-pipes.

D D are pipes connecting the distributing-pipes B C with one chamber F of the double-balanced expansible fluid-chambers F G, (shown best in Fig. 2,) and E E are pipes connecting the other chamber G thereof with the riser A near the point of supply. These two chambers F G are supported and connected together by a frame H, which frame is further perforated to form a guide for the rod I, whose ends are connected to the expansible diaphragms *b c* of the two chambers F G. To the center of this rod I there is attached a claw J, with two fingers *d e* having inwardly-bent knife-edges.

K is a yoke secured to a block *f*, of insulating material, on the frame H, and from the lower end of each arm of this yoke there extends a pin or lug *g*, through which passes a contact-screw *h*, and secured to the ends of said yoke-arms are inwardly-projecting springs *i i*, each having a latch-shaped head *j*.

L is a lever pivoted, as shown at *k*, upon the insulating-block *f*, the upper end of this lever above its pivot being covered with insulating material, as shown at *m*, while to the opposite sides of the lower end of this lever there are secured downward-projecting springs *n n*.

Referring now to Figs. 1 and 3, M designates the break-wheel mechanism of known construction, the break-wheel shown in the drawings being cut to indicate "21" in the ordinary manner and said mechanism being shown as wound up. From the central station the two circuit-wires *o p* enter this mechanism, as shown, the wire *o* leading to the hub of the break-wheel and the wire *p* leading to the spring *q*, which engages with the notches in said wheel. The winding-up wheel, which meshes with the pinion on the hub of the break-wheel, has rigidly secured thereto a metallic non-insulated handle N, and the escapement-pallet of the break-wheel mechanism has an ordinary metallic pendulum O suspended therefrom, held from movement in the relative position of parts shown in the drawings by the weighted lever P, the forward end of said lever being in turn held stationary by the latch on the armature Q. From the weighted lever P a wire *r* extends through the starting-magnets R of the break-wheel and through the annunciator-magnets S T to the yokes K K on the frames H of the described fluid-chambers F G on the two stories shown in the drawings. From the levers L L on said frames H the wires *s* pass down through the ground-magnets U of the break-wheel to ground. From the wire *r* a branch wire *t* leads to armature V of the said ground-magnets U. W is a spring held by a latch on the armature V from contact with the circuit-wires of the local alarm X, and in this position the said armature V is in the path of the described handle N of the winding-up wheel of the break-wheel mechanism. The local alarm X and break-wheel mechanism may be located in any convenient place inside the building protected by the sprinkler system in question, and the annunciators (marked 1 and 2) are usually placed outside the building at some point convenient for the inspection of the fire-department.

The operation of my invention is as follows: When there is no disturbance of the system, the pressure of the fluid in the pipes is exerted equally against the expansible diaphragms of the chambers F G and the parts adjacent

thereto remain in the relative positions shown in Fig. 2. Should one of the sprinkler-heads *a* operate by fire or otherwise, the oscillations of the fluid in the pipes and chamber F of the fluid-chambers adjacent to the distribution-pipe on which said sprinkler-head is located occasioned by this sudden outlet through the sprinkler-head will cause the flexible diaphragm *b* of said chamber F to yield under the constant pressure of the fluid in and back of the chamber G, the diaphragm *c* in said chamber G being thereby expanded and the rod I forced forward, whereby the finger *e* on said rod will press against and move the upper end of the lever L, causing the spring *n* to make contact with the contact-screw *h* on the side of the yoke nearest the chamber G, the said spring *n* passing over the latch-head *j* of the spring *i* and being caught and held fast by said latch-head, thus closing the circuit at that point and actuating the annunciator-magnets S or T and the break-wheel magnets R and U simultaneously, the circuit being completed through the pendulum O, weighted lever P, wire *r* through magnets R, and annunciator-magnets, yoke K, spring *n*, lever L, wire *s*, through magnets U to ground, one of the wires from the break-wheel mechanism being grounded at the central station. As the break-wheel magnets are energized their armatures Q and V are drawn down, thereby freeing the weighted lever P and spring W, thus setting in motion the break-wheel mechanism and sounding the local alarm X as the spring W makes contact with the contact-point *u*. The pendulum O begins to oscillate the moment the weighted lever P escapes from its path by the attraction of the armature Q to the magnets R, thus opening the circuit at that point, and the break-wheel moves and its notches send in one alarm ("21") to the central station. The contact of the armature V with its magnets U is only momentary, and the spring *v* instantly restores said armature to its original position in the path of the handle N, and as the winding-up wheel continues its movement the said handle N comes against the end of the armature V and closes the circuit through the armature V, branch wire *t*, wire *r*, and annunciator-magnets, yoke K, spring *n*, lever L, and wire *s* and magnet U to ground. As this circuit is thus closed the armature V is again pulled down by magnets U out of the path of the handle N, and the break-wheel mechanism again begins to move until the predetermined number of signals has been sent in to the central office.

My described double-balanced expansible fluid-chambers are not affected by any water-hammer occurring in any part of the water-supply outside of the system.

Whenever the described oscillations of the fluid in the pipes and fluid-chambers are caused by a sudden leak rather than by the opening of a sprinkler-head, the operation of my devices will be the same, except that if the leak occurs in one of the pipes E it will be the diaphragm *c* in chamber G that will yield, and hence of course the lower end of the lever L will then be thrown to the side of the yoke K opposite to that heretofore described.

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

1. In an automatic sprinkler system, the combination of a main supply-pipe and series of distributing-pipes, and equalizing-pipes connecting the before-named pipes, with a pair of balanced expansible fluid-chambers interposed between said equalizing-pipes, a rod connecting the expansible diaphragms of said fluid-chambers, a lever for engagement with said rod, and an alarm situated in an electric circuit having contact-points in the path of said lever, whereby, when said fluid-chambers are actuated by oscillations of the fluid in said system, the lever will be actuated by said rod and electrical contact be made thereby to cause an operation of said alarm.

2. A pair of balanced fluid-chambers, each having an expansible diaphragm, a supporting-frame connecting said chambers, and a device connecting the said diaphragms, in combination with an electric alarm, whereby a movement of one diaphragm in either direction will cause a corresponding movement of the other diaphragm, and will simultaneously close an electric circuit and actuate said alarm.

3. In a system of fluid-distributing pipes, the combination of two yielding fluid-confining chambers balanced against each other and arranged to work together upon the disturbance of the equilibrium maintained between them, and an electric alarm actuated upon any movement of the fluid in either chamber.

4. In a system of fluid-distributing pipes, the combination of two yielding fluid-confining chambers balanced against each other, and arranged to work together upon the disturbance of the equilibrium maintained between them, and a break-wheel mechanism adapted to be actuated by the operation of said fluid-confining chambers.

5. In an automatic sprinkler system, the combination of a main supply-pipe and series of distributing-pipes, and equalizing-pipes connecting the before-named pipes; with a pair of balanced fluid-chambers interposed between said equalizing-pipes; an expansible diaphragm in each chamber; a supporting-frame connecting said chambers; a block of insulating material on said frame; a yoke secured to said insulating-block; a pair of opposed contact-screws, one extending through each arm of said yoke; latch-headed inwardly-projecting springs secured to the ends of said yoke-arms; a lever pivoted on said insulating-block, the upper end of this lever being covered with insulating material, and the lower

end carrying a pair of downward-projecting springs; an alarm electrically connected to said lever and yoke; a rod connecting the expansible diaphragms of said fluid-chambers; and a claw on said rod having inwardly-bent fingers extending on each side of the upper end of said lever, whereby a movement of either diaphragm will move said lever to close an electric circuit and actuate said alarm.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

WILLIAM C. SHAFFER.

Witnesses:
H. G. UNDERWOOD,
B. C. ROLOFF.