J. G. NOLEN.

AUTOMATICALLY RELEASED ALARM BOX FOR FIRE EXTINGUISHER SYSTEMS.

APPLICATION FILED FEB. 29, 1904.

946,257. Patented Jan. 11, 1910.

3 SHEETS—SHEET 1.

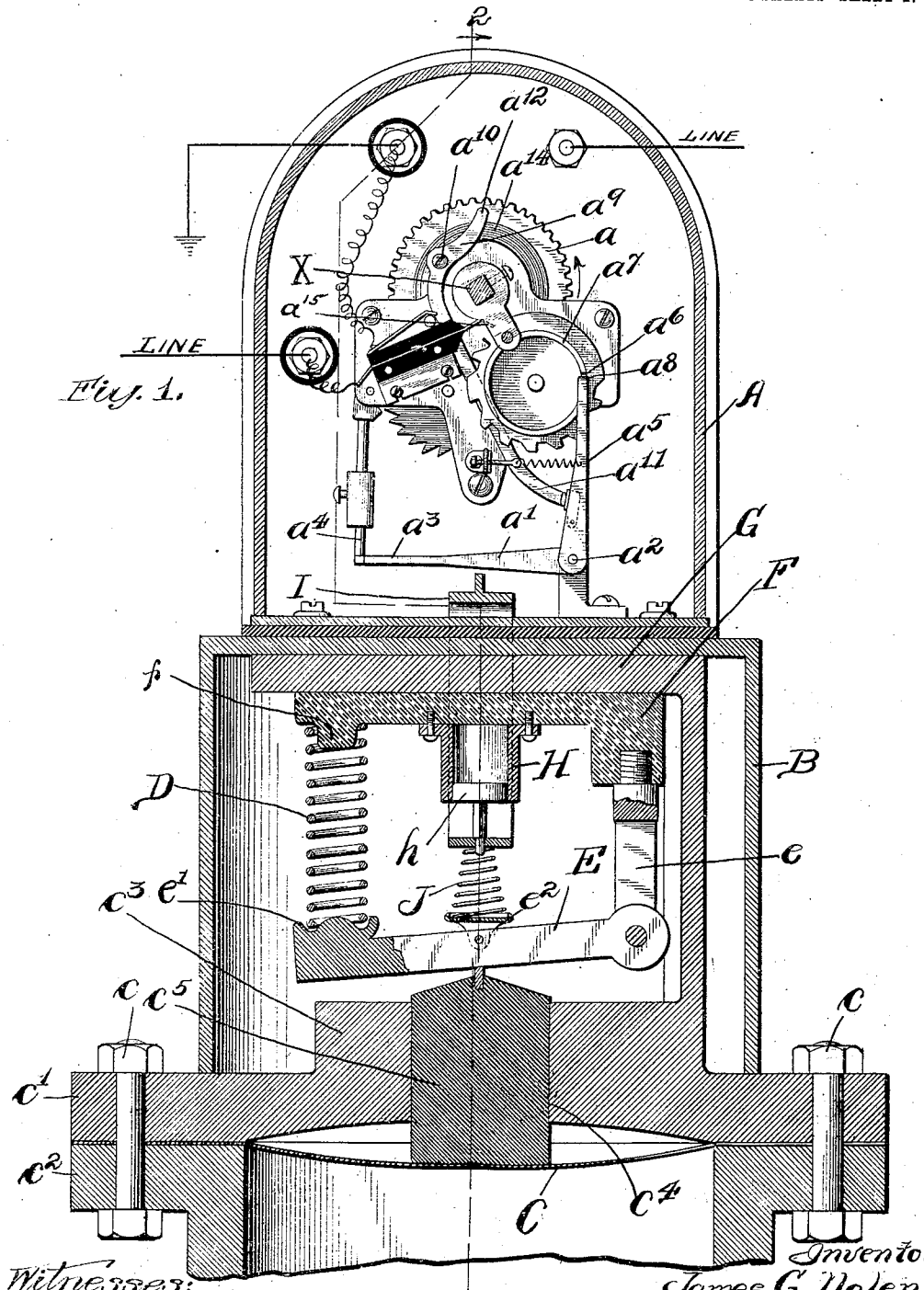

Fig. 1.

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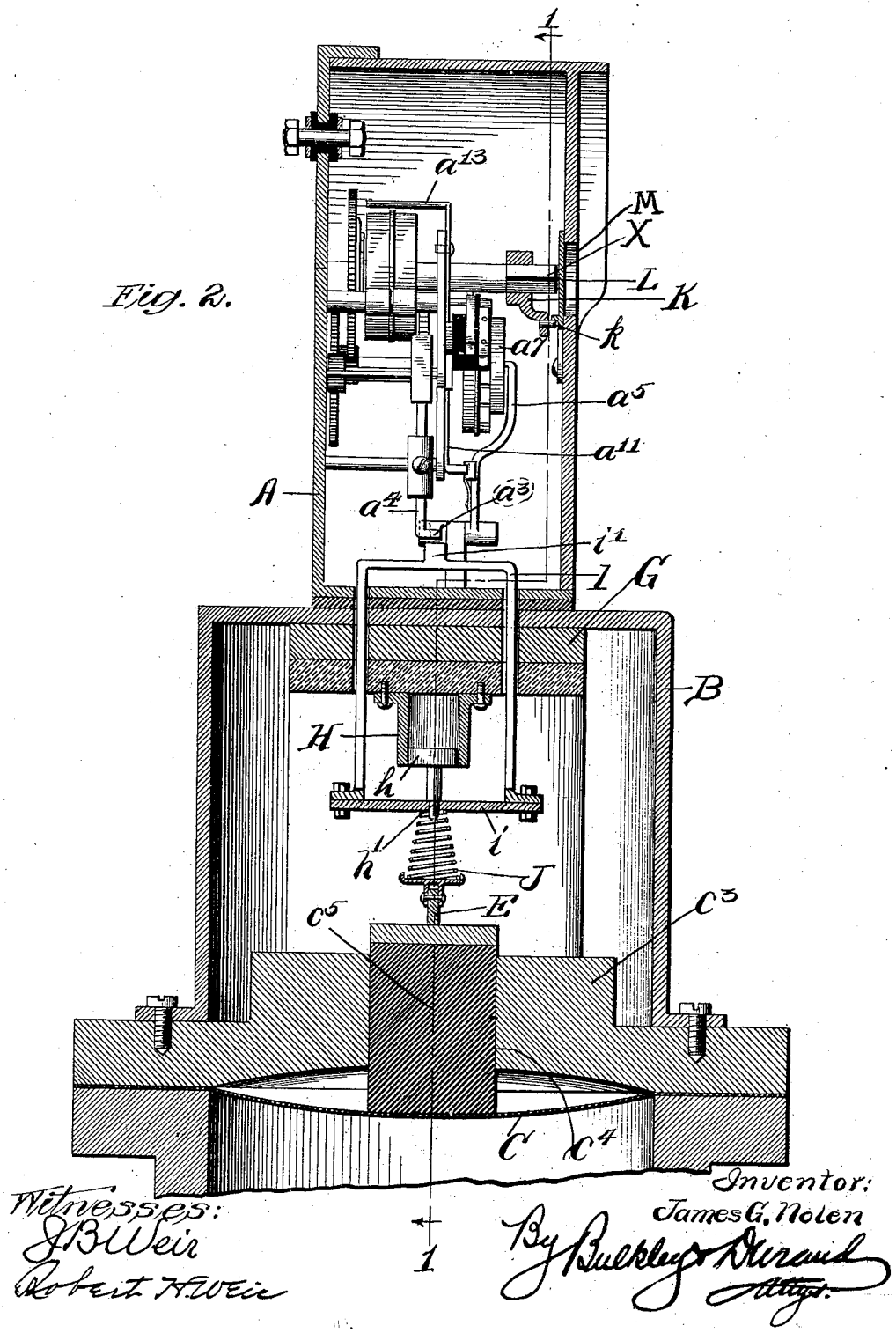
Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3

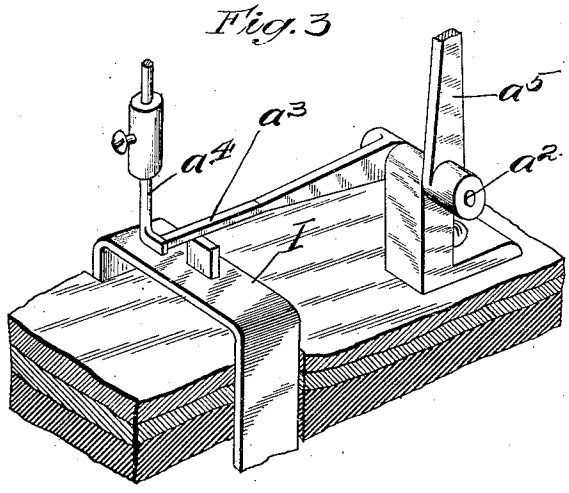


Fig. 4

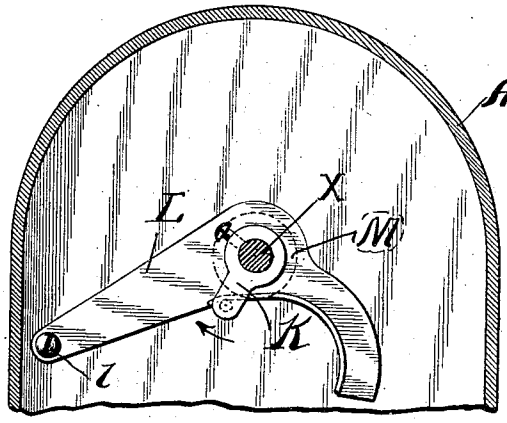


Fig. 5.

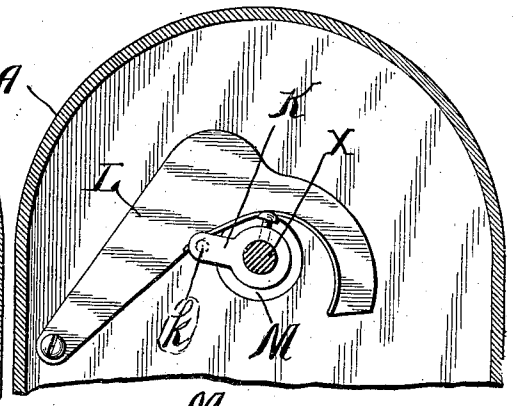
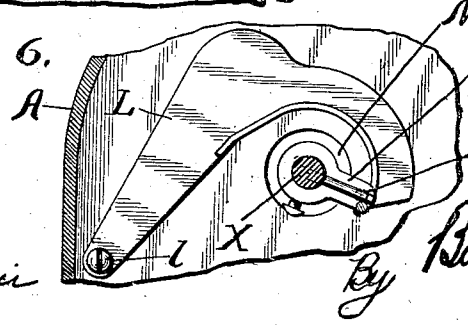


Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES G. NOLEN, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO FRANK B. COOK, OF CHICAGO, ILLINOIS.

AUTOMATICALLY-RELEASED ALARM-BOX FOR FIRE-EXTINGUISHER SYSTEMS.

946,257. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed February 29, 1904. Serial No. 195,713.

To all whom it may concern:

Be it known that I, JAMES G. NOLEN, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Automatically-Released Alarm-Boxes for Fire-Extinguisher Systems, of which the following is a specification.

It has been found desirable in connection with automatic fire extinguisher systems to provide means for automatically giving an alarm when the pressure in the distributing pipes is, from any cause whatever, increased and allowed to remain at a point more or less above the normal pressure, as, for example, in case of fire and the consequent opening of one or more of the sprinkler-heads connected with the distributing pipes.

My invention therefore relates to what are commonly known as variable-pressure alarm-signal apparatus—that is to say, it relates to signal-transmitting mechanism of that particular character in which an alarm is given when the pressure in the distributing pipes rises above a certain point; and an alarm-signal is only given when the pressure rises to and continues at a point above the normal. Thus a mere momentary rise in pressure above the normal would not result in the transmission of an alarm-signal.

Generally stated, the object of my invention is the provision of an improved construction and arrangement whereby a sustained increase in pressure above the normal will result in the transmission of an alarm-signal.

A special object is to provide an improved construction and arrangement whereby signal-transmitting mechanism may be conveniently and advantageously mounted upon the casing of one of the valves of an automatic fire extinguisher system.

Another object is the provision of an improved construction and arrangement whereby a dash-pot device may be effectively and efficiently employed as the means for preventing the giving of an alarm except in the case of a sustained increase in pressure.

A further object is the provision of an improved construction and arrangement whereby a flexible diaphragm may be advantageously and efficiently employed as an element of the means for tripping the normally wound-up clockwork of the alarm-box.

It is also an object to provide certain details and features of improvement tending to increase the general efficiency and serviceability of an automatically released alarm-box of this particular character.

To the foregoing and other useful ends, my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings,—Figure 1 is a vertical section through the casing of the alarm-box, and also through the casing inclosing my improved arrangement whereby the increase in pressure serves to release the normally wound-up clockwork of said box, and showing parts of said improved arrangement, also the adjacent portion of the valve casing, in vertical section; the clockwork and signal-transmitting devices of said box being shown in front elevation, and the said section being taken on line 1—1 in Fig. 2. Fig. 2 is a vertical section on line 2—2 in Fig. 1. Fig. 3 is a perspective of certain parts located in the bottom of the box, and whereby the normally wound-up clockwork is automatically released by an increase in pressure. Figs. 4, 5 and 6 are detail views looking toward the inner surface of the front wall of the box, and illustrating the different positions of the shutter-device for indicating the condition of the box.

As thus illustrated, the alarm-box A may be of any suitable known or approved construction. Said box comprises the usual clockwork *a*, which is preferably maintained in a normally wound-up condition by a locking-arm a^1. It will be observed that this locking arm is pivotally mounted at a^2, and is provided with a finger a^3 adapted to engage the lower end of the pendulum of the escapement device a^4. The box is also provided with the usual spring-shaft X, having its outer end squared to receive a key or crank for winding up the box. The said pendulum or escapement device controls the running down of the clockwork after the same has been released, in the usual and well understood manner. Preferably, the locking-arm a^1, which, after the box is wound up, normally engages the lower end of the pendulum or escapement device a^4, so as to maintain the box in condition to transmit an alarm-signal, is also provided with an upwardly extending arm a^5, adapted at its upper end to engage a notch a^6 in a laterally extending flange a^7 on the toothed

wheel a^8. It will also be seen that a lever a^9, preferably pivoted at a^{10}, has its lower end a^{11} adapted to normally bear against the arm a^5. The upper portion a^{12} of the lever a^9 may be provided with a pin or lateral projection a^{13}, adapted to extend over and just above the spring a^{14} of the normally wound-up clockwork, said spring being made in sections mounted side by side on the shaft. With this arrangement, it is apparent that the normally wound-up clockwork is maintained in such condition at two points—that is to say, at the point where the finger a^3 engages the escapement device, and also at the point where the arm a^5 engages the notch in the make-and-break or contact wheel a^8. Furthermore, with this arrangement the clockwork will be immediately released upon the breaking of the spring a^{14}; for the broken sections of the spring strikes the projection a^{13} and thereby causes the lever a^9 to push the arm a^5 to the right, thereby releasing the clockwork at both locking points. Also, consistent with its function of transmitting an alarm-signal, the said box may be provided with a spring-contact finger a^{15} adapted to engage the said toothed or contact-wheel a^8. It will readily be understood that the said box may include a plurality of these wheels and contact-fingers, if such is desirable, whereby the character of the signal transmitted may be varied for different purposes.

The devices shown inclosed by the casing B, also, in a general way, constitutes a part of the alarm-box apparatus. The flexible diaphragm C, employed in the manner illustrated, constitutes means for converting an appreciable and sustained rise in pressure into mechanical motion sufficient to release the normally wound-up clockwork of the box. This diaphragm may be clamped in position by means of the bolts c which extend through the marginal portions of the diaphragm, and also through the flanges c^1 and c^2 of the valve-casing structure. The upper portion c^3 of the valve-casing may be provided with an opening c^4. In this opening a plunger-like member c^5 is mounted for vertical reciprocation, the lower end of said member being adapted to rest upon the said diaphragm. Normally, this diaphragm is flexed or sprung in a downward direction, whereby an increase of pressure on its under surface will cause it to rise. This normally depressed condition of the diaphragm is preferably maintained by a spring D through the medium of a lever E; said lever having one end pivoted to a hanger e, and its other end provided with a seat e^1 for the lower end of said spring. It will also be understood that the middle portion of said lever rests upon the upper end of the plunger-like member c^5, and is provided with a pivoted seat e^2. The said hanger e can have its upper end secured to a plate F, preferably of insulating material, and preferably supported by an arm G, extending upwardly from the top of the valve-casing. This plate of insulation F may also be formed with a downwardly extending projection, adapted to provide a seat for the upper end of the spring D. In addition, the said plate F is provided on its under side with a cylindric or tubular member H, having its interior adapted to provide an air chamber. As illustrated, the bore of this hollow member H is adapted to receive the piston or plunger h, the two elements constituting an ordinary dash-pot.

The yoke I extends upwardly through the plate F and the top of the casing B, and also through the bottom of the box A. This yoke has a lower horizontal portion i, adapted to receive the reduced lower end portion h^1 of the stem on the piston or plunger h; and the upper end of said yoke is provided with a horizontal portion i^1, adapted, when raised, to engage the lever or pivoted arm a^1. It will also be seen that a spring J is interposed between the seat e^2 and the bottom portion i of the said yoke. Thus, with the parts in their normal positions, the tension of the spring D exerted on the plunger-like members c^5 through the medium of the lever E, is sufficient to resist the normal pressure on the lower surface of the diaphragm, thereby keeping the latter in its normally depressed position, as shown in the drawings. Suppose, however, that pressure on the bottom of the said diaphragm is suddenly increased, and that this increase in pressure continues for some time, as would be the case, for example, when one or more of the sprinkler-heads of a system are opened by fire. In such case, only water pressure from the pumps or other sources of pressure, exerted on the under side of the diaphragm, is sufficient to overcome the normal tension of the spring D, and to cause the member c^5 and the lever E to rise. In rising, the lever E produces a compression of the spring J, owing to the fact that the dash-pot plunger h is, of course, sluggish in action and slow to rise. But the increase in pressure below the diaphragm being, in such case, of a sustained character, the spring J exerts its pressure to gradually push the plunger h upwardly in the dash-pot cylinder H, thereby causing the yoke I to rise. When thus forced upwardly by the pressure of the spring J, the top portion i^1 of the said yoke engages the locking arm a^1, and in so doing releases the normally wound-up clockwork of the box; for it will be seen that when the arm a^1 rises, its finger a^3 disengages the escapement device a^4, and also that the upper end of the arm a^5 disengages the notch in the make-and-break or contact wheel a^8. The clockwork having been released in this manner

rotates the wheel a^8, and thus transmits a signal over the line to the central station, in the usual and wellknown manner. But suppose now that the normal pressure, either of air or water, on the under side of the diaphragm C, is only momentarily increased above the normal. In such case, the plunger-like member c^5 and the lever E are given an upward movement, thereby compressing both of the springs, in the manner previously described. However, the increase in pressure being only of a momentary character, the lever E is allowed to fall to its normal position before the spring J can overcome the yielding opposition of the dash-pot and raise the yoke. Consequently, when only a momentary increase in the pressure occurs, the dash-pot arrangement prevents the release of the normally wound-up clock-work and the consequent transmission of an alarm signal. In other words, it will be seen that with my improved construction and arrangement, involving an advantageous and efficient employment of springs and a dash-pot device, an alarm-signal will only be transmitted to the central station when the pressure is given a prolonged or sustained increase to a point more or less above the normal.

It will readily be understood that my improved alarm-box apparatus can be applied to any suitable or desired portion of an automatic fire-alarm system.

The box A, as illustrated, has its spring-shaft X preferably provided with a small removable crank-arm K, provided on its outer side and at its end with a lateral projection k. This projection k is adapted to engage the lower edge of a pivoted shutter or indicating member L, which latter is preferably pivoted at l upon the inner surface of the front wall of the box. Normally, the said shutter or indicating member L has its face or outer surface exposed by the opening M provided in the said front wall of the box at a point coincident with the outer end of the spring-shaft X. Thus, when the clockwork is wound up, the arm K and the shutter L are in the positions shown in Fig. 4. At such time, the face or surface of the shutter being exposed, it will be understood that the box is in its normal or wound up condition. When the clockwork is released, the arm K revolves with the shaft X, and in so doing causes the shutter L to rise and disappear from the opening M. Fig. 5 illustrates the condition of the said shutter just after the clockwork begins to unwind, while Fig. 6 shows the positions at which the shutter and arm come to rest when the clockwork is completely unwound. With this provision, it will be possible, as stated, to readily determine whether the box is in a wound or unwound condition.

It will be seen that the upper part of the vertically disposed arm of the locking lever is adapted, when released from the notch in the flange on the contact-wheel, to ride upon the smooth peripheral surface of said flange, and to thereby prevent the horizontally disposed arm of said lever from engaging the escapement device until after a complete rotation of the contact wheel and the consequent transmission of the desired signal.

What I claim as my invention is:

1. A variable-pressure alarm apparatus for automatic fire extinguisher systems, comprising normally wound-up clockwork, a member subject to the normal fluid pressure of said system, a spring normally holding said member in position against the said pressure, and means including a dash-pot and another spring whereby said clockwork is released upon a sustained or prolonged increase in said pressure sufficient to overcome the tension of said first-mentioned spring.

2. A variable-pressure alarm-apparatus for automatic fire extinguisher systems, comprising normally wound-up clockwork, a flexible diaphragm subject to the normal pressure in the distributing pipes of said system, a spring normally holding said diaphragm in position against the said pressure, and means including a dash-pot and another spring whereby said clockwork is released upon a sustained or prolonged increase in said pressure sufficient to overcome the tension of said first-mentioned spring.

3. A variable-pressure alarm apparatus for automatic fire extinguisher systems, comprising normally wound-up clockwork, a flexible diaphragm subjected to the normal pressure of the distributing pipes of said system, a spring normally holding said diaphragm in position against said pressure, and means including a dashpot whereby said clockwork will remain in its normally wound-up condition upon a momentary increase in said pressure sufficient to overcome the tension of said spring.

4. The combination of the casing of a valve of an automatic sprinkler system, normally wound-up clockwork suitably supported on said casing, a flexible diaphragm subject to the normal pressure above the valve, means including a spring for normally holding said diaphragm in position against said pressure, and mechanical connection between said diaphragm and clockwork, said connection including a dash-pot and another spring, whereby said clockwork is only released upon a sustained or prolonged increase in pressure sufficient to overcome the tension of said first-mentioned spring.

5. The combination of a suitable portion of an automatic fire-extinguisher system, normally wound-up clockwork supported by said portion, a flexible diaphragm subject to the normal fluid pressure in said portion, a

spring for normally holding said diaphragm in position against said pressure, and mechanical connection between said diaphragm and clockwork, said connection including a dash-pot and another spring whereby said clockwork is only released upon a sustained or prolonged increase in fluid pressure sufficient to overcome the tension of the first mentioned spring.

6. The combination of a suitable portion of an automatic fire-extinguisher system, normally wound-up clock work supported by said portion, a flexible diaphragm subject to the normal pressure in said portion, a reciprocating member engaging said diaphragm, a lever fulcrumed at one end and having its middle portion engaging said reciprocating member, a spring engaging the other end of said lever and thereby serving to normally hold said diaphragm in position against the pressure, and mechanical connection between said lever and clockwork, said connection including a dash-pot and another spring whereby said clockwork is only released by a sustained or prolonged increase in pressure sufficient to overcome the tension of said first-mentioned spring.

7. The combination of a suitable portion of an automatic fire extinguisher system, a flexible diaphragm subject to the normal fluid pressure in said portion, clockwork supported by said portion and provided with a locking device for maintaining the same in a normally wound-up condition, a reciprocating member engaging said diaphragm, another reciprocating member adapted to engage said locking device, a lever fulcrumed at one end and having its middle portion engaging said first-mentioned reciprocating member, a spring engaging the other end of said lever, and normally holding said diaphragm in position against the pressure, another spring interposed between the middle portion of said lever and the said other reciprocating member, and a dash-pot adapted to yieldingly oppose compression of said last-mentioned spring, whereby said clockwork is only released upon sustained or prolonged increase in pressure sufficient to overcome the tension of the spring engaging said lever.

8. The combination with a fire extinguisher system adapted to contain fluid, of a part movable under variations of fluid conditions in said system, a signaling device, instrumentalities controlled by the movable part for conditioning the signaling device to operate, and a dash pot for retarding the action of said instrumentalities.

9. The combination with a fire extinguisher system adapted to contain fluid under pressure, of a diaphragm movable under variations of fluid conditions in said system, a normally wound signal transmitter, instrumentalities controlled by the movable diaphragm for conditioning the transmitter for operation, and means for timing the action of said instrumentalities.

Signed by me at Chicago, Cook county, Illinois, this 25th day of February, 1904.

JAMES G. NOLEN.

Witnesses:

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WM. A. HARDENS.