

(No Model.)

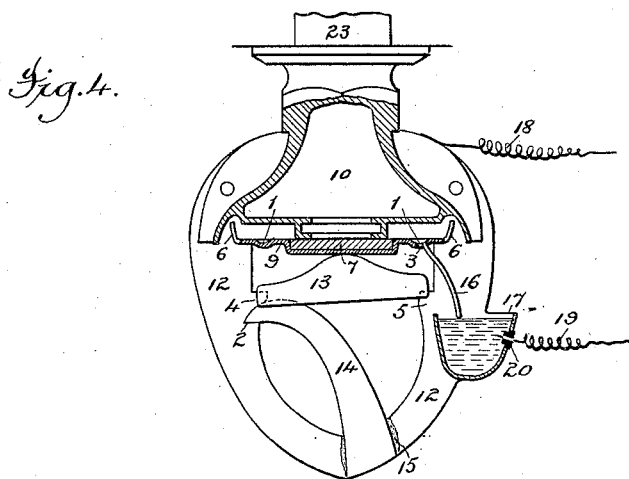
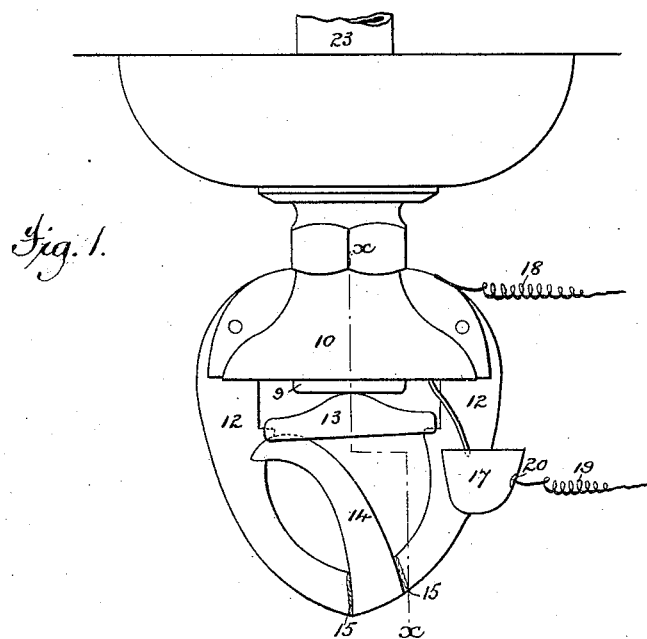
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C. C. WORTHINGTON.

ALARM APPARATUS FOR AUTOMATIC FIRE EXTINGUISHERS.

No. 306,202.

Patented Oct. 7, 1884.



Attest:

Geo. H. Graham

A. H. Jasbera

Inventor:

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Attys.

(No Model.)

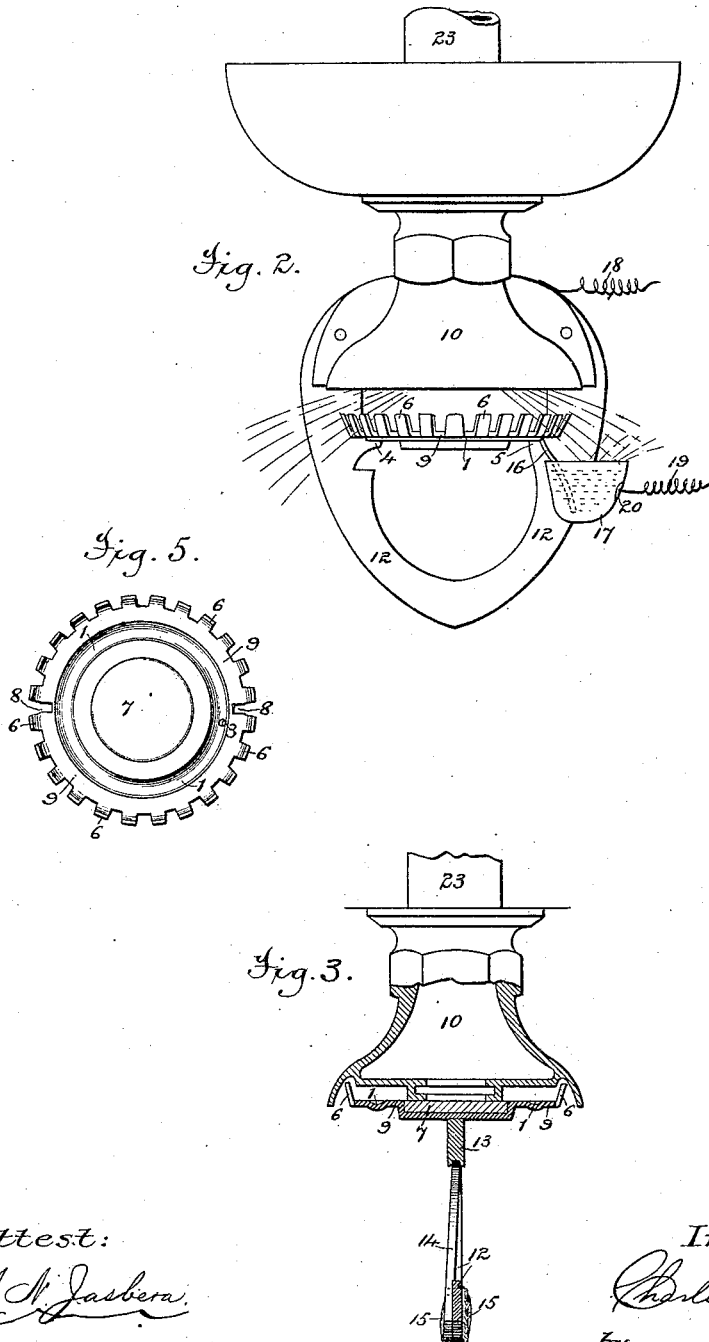
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ALARM APPARATUS FOR AUTOMATIC FIRE EXTINGUISHERS.

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Patented Oct. 7, 1884.



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3 Sheets—Sheet 3.

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Fig. 6.

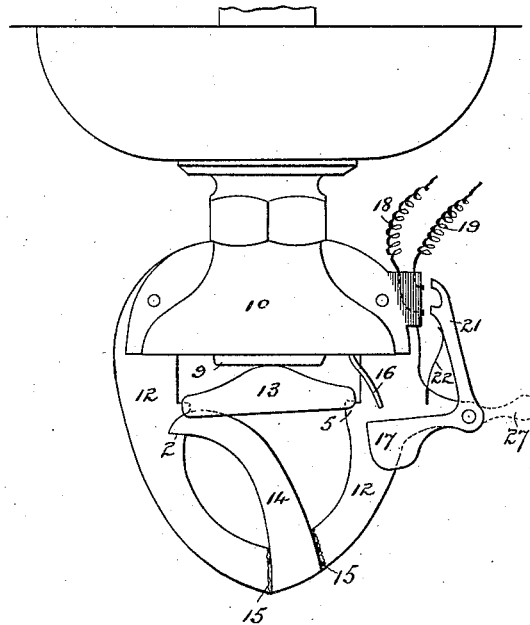
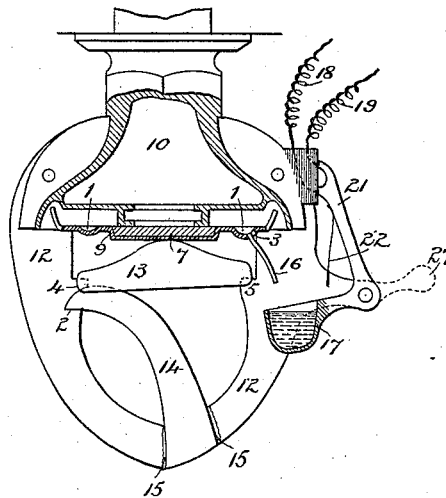


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES C. WORTHINGTON, OF IRVINGTON, NEW YORK.

ALARM APPARATUS FOR AUTOMATIC FIRE-EXTINGUISHERS.

SPECIFICATION forming part of Letters Patent No. 306,202, dated October 7, 1884.

Application filed March 25, 1884. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. WORTHINGTON, a citizen of the United States, residing in the city of Irvington, county of Westchester and State of New York, have invented certain new and useful Improvements in Alarm Apparatus for Automatic Fire-Extinguishers, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to an alarm mechanism which is designed for use in connection with what are known as "automatic fire extinguishers or sprinklers"—that is to say, that class of devices which are so constructed and arranged that the heat occasioned by the breaking out of a fire in their vicinity will operate to release a valve or other similar device controlling a water-supply and permit the water to be ejected in the form of a shower over a considerable area surrounding the sprinkler, and thus extinguish any fire which may be within the range of such shower. These devices, although differing greatly in form and construction, have all or nearly all consisted, essentially, of a nozzle which is connected to a water-supply pipe and closed by a valve or other similar device, which is held in place, either directly or through suitable connections, by an alloy which is fusible at a comparatively low temperature, so that whenever a fire was lighted in the vicinity of one of these sprinklers, so as to raise the temperature of the surrounding air above the melting-point of the alloy, the valve would be released, so as to permit the water to flow, as just stated. These devices have proved very successful in practice for the purpose intended, and have gone into extensive use in those places where little or no damage would result from the discharge of water; but a very serious objection exists to their use in dry-goods stores and other like places where great damage is sure to result from any unnecessary use of water in this manner; first, because, owing to the necessarily frail nature of the means by which the valve or other device which confines the water in the sprinkler is held in place, it is liable to become dislocated, so as to cause the water to flow when no fire exists; second, because, even when the valve is not entirely released so as

to set the sprinkler in full operation, it is liable to become slightly dislocated or get out of order to such an extent so as to permit a small amount of water to leak from the sprinkler, and even a small leak, if not detected at once, is liable to cause great damage in establishments of this class; and, third, because when the sprinkler is once set in operation it will continue to operate until the water is shut off from the supply-pipe, which, if notice is not given of the fact, may, and in most instances will, be long after the fire is extinguished, and this continual flow of water would in such places be sure to cause a very great amount of damage.

It is the object of the present invention to obviate these difficulties and to provide devices of this class with an automatic alarm mechanism, by which notice of any escape of water from the sprinkler, occasioned either by the entire displacement of the valve, as in case of a fire or the breaking of the valve-retaining devices, or by any slight displacement or disorder of the valve which will occasion a leak, will be instantly communicated to the watchman or other person having charge of the building in which the sprinkler is located, or to the fire department, or to any other desired point, so that measures may be at once taken to shut off the water from the supply-pipe and thus prevent damage to the contents of the room or building, or to the building itself in which the sprinkler is located.

To this end the invention consists, broadly, in providing fire-extinguishers or sprinklers of this class with electrical-circuit connections and means whereby the water escaping from the sprinkler, whether in large or small quantity, will make operative the electrical circuit and through a suitable alarm mechanism give notice of the fact at any desired point.

The invention also embraces various details of construction and combinations of parts in an apparatus of this character, all of which will now be fully explained, and particularly pointed out in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of a sprinkler provided with the connections for operating an alarm mechanism, the parts being shown in their normal position. Fig. 2 is a side

elevation showing the valve released and the sprinkler in operation. Fig. 3 is a vertical section of the same, taken upon the line *x x*. Fig. 4 is a like view taken at right angles to the Fig. 3. Fig. 5 is a plan view of the plate carrying the valve. Fig. 6 is a side elevation showing a modified form of circuit-closing mechanism, and Fig. 7 is a vertical section of the same.

As before stated, these sprinklers differ greatly in form and construction; but the present invention, as will hereinafter appear, is equally applicable to any of these forms, one of the most common of which has been selected for illustrating the principle and application of the invention.

This sprinkler consists, essentially, of a nozzle, 10, which is attached in any convenient manner to a water-supply pipe, 23, and is provided with a downwardly-extending yoke, 12, within which is placed a plate, 9, which is provided upon its opposite sides with recesses 8, in which lie the arms of the yoke, the recesses 8 being of such size that the plate can move freely up and down between the arms of the yoke. The center of the plate 9 is provided with a suitable packing, 7, forming a valve, which, when the plate is in its raised position, as shown in Figs. 1 and 3, is pressed against the nozzle 10, so as to close it tightly and prevent the escape of the water. The valve-plate 9 is also provided upon its edge with an upwardly-extending flange, in which are formed a series of vertical slots, 6, which act, when the valve is unseated, as shown in Fig. 2, to divide the water issuing from the nozzle into a large number of small streams, and cause it to fall in the form of a shower around the sprinkler. The valve-plate 9 is held in position to close the nozzle by means of a cross-bar, 13, one end of which rests upon a lug or projection, 5, formed upon one side or arm of the yoke 12, while its opposite end is slotted, so as to embrace a similar lug, 4, formed upon opposite arm of the yoke, the free end of the bar 13 being supported by a curved lever, 14, the upper end of which rests in a notch, 2, formed in the yoke, while its opposite end is secured to the bottom of the yoke by means of fusible alloy 15.

In order to provide suitable means by which the electric circuit can be made operative, so as to give notice of any flow of water from the nozzle 10, the plate 9 is provided upon its upper side with an annular groove or depression, 1, which is provided with an opening, 3, to the edge of which is secured a wire or other suitable substance, 16, leading downward and outward and terminating over a cup, 17, secured to one arm of the yoke 12. The cup 17 is of such depth that the wire 16 will not interfere with the downward movement of the valve-plate 9 when the latter becomes released so as to drop to the position shown in Fig. 2.

To the yoke 12, or to some other convenient

part of the sprinkler or its water-supply pipe, there is attached one of the wires 18 19 of an electric circuit, while the other wire of said circuit enters and terminates in the cup 17, it being surrounded by a plug, 20, of some insulating material, so as to be insulated from the sprinkler. These two wires are provided with suitable battery-power, and are connected to any suitable form of alarm mechanism, which is located, as before stated, at any point where it is desired that notice of the escape of water from the sprinkler shall be given.

The action of the sprinkler thus equipped will be as follows: When the parts are in their normal positions, as shown in Fig. 1, no connection will be formed between the wires 18 19, so as to complete the circuit through the alarm mechanism, and consequently no alarm will be given. If, however, for any reason the plate 9 fails to entirely close the end of the nozzle 10, so that more or less water is allowed to escape, the water escaping will pass into the recess 1, and thence through the opening 3, from which it will be conducted by the wire 16 downward into the cup 17, where it will accumulate until the cup has been filled above the point at which the wire 19 enters, or until it touches the wire, as indicated in Fig. 4. As soon as this takes place the water in the cup, being a good conductor, will complete the circuit between the wires 18 19 and through the alarm mechanism, so as to give the alarm and indicate to the watchman or other person that water is escaping from the sprinkler. If, instead of leaking slightly, as just stated, the plate 9 becomes entirely detached, so as to fall to the position shown in Fig. 2, which will be the case when the lever 14 becomes displaced either by the melting of the alloy 15 or from other cause, the water issuing through the nozzle will immediately fill the cup 17 and give the alarm in the same manner so that the watchman or other person can visit the room in which the sprinkler is located and turn off the water from the supply-pipe, so as to prevent unnecessary damage.

In the construction shown in Figs. 6 and 7, the circuit through the wires 18 19 and the alarm mechanism, instead of being completed by connecting these wires through the water accumulated in the cup 17, is completed by a contact-plate, 21, which forms one arm of a bell-crank lever, to the other arm of which is secured the cup 17. In this case the wires 18 19 can be both insulated from the sprinkler, so that the latter need not form any part of the circuit.

The operation of the apparatus thus constructed is substantially the same as that already described. When the valve-plate 9 is in its normal position, as shown in Fig. 6, the light spring 22 or an equivalent balancing weight, 27, as shown in dotted lines, operates to hold the contact-plate 21 away from the wires 18 19, or one of them, so as to keep the circuit through the alarm mechanism broken.

As soon, however, as the cup 17 becomes filled with water, either from a slight displacement of the valve-plate 9, so as to cause a leak from the nozzle, or by reason of the displacement
 5 of the lever 14, so as to permit the valve-plate to drop entirely away from the nozzle, the weight of the water accumulated in the cup will overcome the tension of the spring 22 or the weight 27, so as to rock the lever to the position shown in Fig. 7, and connect the wires
 10 18 19 and complete the circuit through the alarm mechanism.

It will, of course, be seen that many modifications may be made in the details of the
 15 apparatus just described without departing from or losing the advantages of the invention.

In the construction shown in Figs. 1 to 4, inclusive, the wire 18, instead of being attached to the sprinkler, may be introduced through an insulating-plug into the cup 17, the same as the wire 19, so that the filling of said cup with water will connect the wires directly instead of indirectly, as just described;
 25 or the wire 18 may be entirely dispensed with and the water-connection used to take the place of the wire. This latter plan will be particularly advantageous where it is desired to connect a series of sprinklers with the same alarm
 30 mechanism, which will usually be the case, as it seldom happens that only a single sprinkler is used in a room or building.

Where sprinklers are used in a number of rooms in the same building, and it is desired
 35 to indicate in which particular room the water is leaking or flowing from the sprinkler, an alarm mechanism similar to a hotel-annunciator may be employed to indicate the particular room; and the same style of alarm mechanism
 40 may be used to indicate in which one of a number of buildings the water is leaking or flowing from a sprinkler.

Instead of employing a wire, as 16, to conduct the water from the opening 3 to the cup
 45 17, a small tube, or a piece of lamp-wick or other conducting substance, may be used.

With the construction shown in Figs. 6 and 7 the operation may, if preferred, be reversed, so that the alarm mechanism will be operated
 50 by the breaking instead of the closing of the

electric circuit; and in this case, also, the two wires forming the circuit may, if preferred, be connected through the sprinkler, as just described in connection with Figs. 1 to 4 inclusive, either by connecting one of the wires
 55 to some portion of the sprinkler or by using the water-connections in place of one of the wires.

What is claimed is—

1. The combination, with an automatic fire-
 60 extinguisher or sprinkler, of electrical circuit-connections for operating an alarm mechanism, a cup, as 17, arranged to be filled by the water escaping from the sprinkler, and connections whereby the water in the cup makes
 65 operative said electrical circuit to give an alarm, all substantially as described.

2. The combination, with an automatic fire-
 70 extinguisher or sprinkler provided with a cup, as 17, arranged to be filled by the water escaping from the sprinkler, of an electrical circuit for operating an alarm mechanism, and connections whereby the water in the cup closes said circuit to give an alarm, all sub-
 75 stantially as described.

3. The combination, with an automatic fire-
 80 extinguisher or sprinkler, of a cup, as 17, arranged to receive the water escaping from said sprinkler, and an electrical circuit passing through or into said cup and connected to
 85 an alarm mechanism and so arranged that the water in said cup will complete said circuit and cause an alarm to be given, substantially as described.

4. In an automatic fire-extinguisher or
 85 sprinkler, the combination, with the nozzle 10 and the valve-plate 9, for closing the same, of the cup 17, means for conducting any water which may leak from said nozzle into said cup, and an electric circuit for operating an alarm
 90 mechanism, which circuit is arranged to be made operative by the water thus accumulated, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing
 95 witnesses.

CHAS. C. WORTHINGTON.

Witnesses:

JOSIAH HEDDEN,

STILLMAN H. STORY.