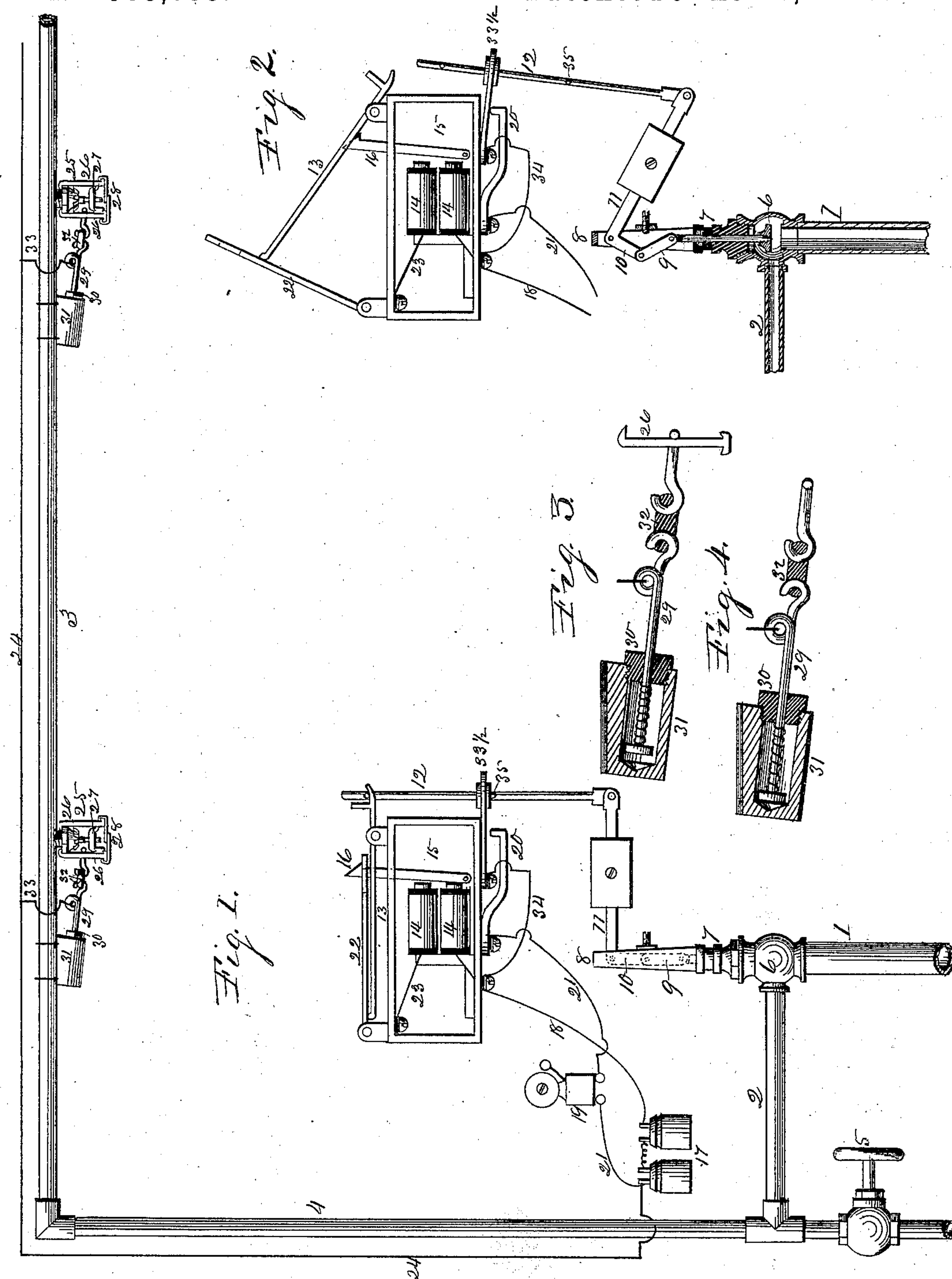


C. H. SHAFFER.
FIRE EXTINGUISHER.

Patented June 28, 1887.



WITNESSES.
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UNITED STATES PATENT OFFICE.

CHARLES H. SHAFFER, OF ROCKFORD, ILLINOIS, ASSIGNOR OF ONE-HALF
TO JONES, WOODRUFF & CO., OF SAME PLACE.

FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 365,639, dated June 28, 1887.

Application filed September 25, 1886. Serial No. 214,556. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. SHAFFER, a citizen of the United States, residing in the city of Rockford, in the county of Winnebago and State of Illinois, have invented a new and useful Improvement in Fire-Extinguishers, of which the following is a specification.

This invention relates to automatic fire-extinguishers, known as the "dry-pipesystem," employed mainly in buildings, and in which a system of pipes is distributed through the building to supply water when required, and in which automatic sprinklers controlled in their operation by heat are connected with the distributing-pipes at proper intervals.

The object of this invention is to produce a more efficient fire-extinguishing apparatus of its class, and for this purpose I employ electromagnetism in the form known as the "open electric circuit." This application of electromagnetism in connection with the dry-pipe system, its construction and operation, will be hereinafter more fully described.

In the accompanying drawings, Figure 1 is an elevation of portions of a fire-extinguishing apparatus embodying my invention, and sufficient to illustrate its construction and application. Fig. 2 is an elevation, partly in section, showing the position of some of the parts when the electric circuit is closed. Fig. 3 is a vertical central section of the circuit-closing mechanism, showing the open-circuit position of the parts; and Fig. 4 is also a vertical central section of the circuit-closing apparatus, showing the closed-circuit position of the parts.

In this instance the several parts—consisting of the water-supply pipe 1, the distributing-pipes consisting of the horizontal branches 2 and 3, the vertical branch 4, the outlet-valve 5, the valve 6 to close the water-supply pipe, the stuffing-box 7, the yoke 8, toggle-levers 9 and 10, their connection with the yoke and with the valve-stem, the weighted lever-arm 11, the connecting-rod 12, trip-lever 13 and their connections with each other and with the magnet-case, the magnets 14 and their containing-case 15, hook-latch armature 16, the battery 17 and its electric-wire connection 18 with the magnets, also the electro-magnetic alarm-bell 19, the circuit-closing arm 20, and

its electric connection by a wire, 21, with the alarm-bell and with the battery—are in every essential feature substantially identical with like parts shown, described, and claimed in a former application for improvements in fire-extinguishers executed by me September 15, 1886, and now on file in the United States Patent Office and pending Office action; and therefore I do not deem a more detailed description of the designated parts necessary in this application.

A lever, 22, is pivotally connected at one end to the magnet-case 15 in position to overlap the free end of the trip-lever 13, and its free end is slotted to receive the hook-latch end of the armature 16, and, in connection with the trip-lever 13, forms a compound trip-lever mechanism, which in its connection with the weighted arm serves to hold the valve against the water-pressure in the water-supply pipe while the electric circuit is open. A wire, 23, connects the electro-magnets 14 with the compound trip-lever mechanism, and, in connection with the wire 18 and the connection of the trip-levers with the valve mechanism, forms an electric connection of the battery with the system of water-pipes. A line-wire, 24, is connected with the battery, and in this instance extends substantially parallel with the water-distributing pipes, and is supported in position by suitable insulating-bearings; but this line-wire may be placed in any convenient position relatively with the pipes.

Sprinklers 25, of any of the known varieties capable of use in connection with my improved apparatus, are connected with the distributing-pipes at proper intervals. The sprinklers employed in this instance are held in their closed position to prevent the escape of water by means of a detachable yoke mechanism, consisting, essentially, of hangers 26, depending from the sprinklers, which furnish supports to the bridge-tree support 27 of the sprinkler, and are held in place by means of a clasp-bar, 28, connecting the lower ends of the hangers, and have a solder connection fusible at a low temperature to liberate the sprinkler in case of fire. An automatic circuit-closer, consisting, essentially, of a spring-actuated piston-rod, 29, having a free support in an insulated head-end bearing, 30, in the cylinder 31, and

a spring surrounding the piston-rod within the cylinder, is so arranged that when the piston-rod is partially withdrawn to compress the spring within the cylinder, as shown in Fig. 3, the electric connection of the piston-rod with the cylinder will be broken, and when the piston-rod is liberated the action of the spring within the cylinder will force the piston-rod inward and cause its inner end to engage the head end of the cylinder, as shown in Fig. 4, and form an electric connection of the piston-rod with the cylinder. This automatic circuit-closer is fixed to the distributing-pipes in a suitable relation to the sprinkler, and the outer end of the piston-rod, with spring compressed, as in Fig. 3, has a link-connection with the yoke-support to the sprinkler; and in this connection the link 32 is insulated from the links with which it connects and forms a connection of the piston-rod with the sprinkler electrically disconnected. A wire, 33, serves to form an electric connection of the piston-rod with the line-wire. In this arrangement of the parts the weighted arm 11 of the toggle-lever is elevated to a horizontal position, and the connecting-rod 12 is placed in connection with the outer end of the trip-lever 13. The overlapping lever 22 of the trip-lever mechanism is then lowered upon the free end of the trip-lever 13, and its slotted free end engages the hook-latch end of the armature 16, as shown in Fig. 1, which holds the valve closed to its seat to prevent the admission of water to the distributing-pipes. The outlet-valve by means of the hand-wheel 5 is then opened to permit the water contained in the distributing-pipes to escape, after which the outlet-valve is closed, which fits the apparatus for use as a fire-extinguisher. A spring circuit-closer, 33½, is fixed at one end to the magnet-case, and is electrically connected with the magnets and with the battery by means of a branch wire, 34, connecting it with the wire 18, which connects the battery with the magnets. The spring action of this circuit-closing spring 33½ tends to hold it in electrical contact with the free end of the circuit-closing arm 20. The free end of the circuit-closing spring 33½ is provided with a perforated insulating-bushing, through which the connecting-rod rises to its connection with the trip-lever mechanism. In the upward movement of the connecting-rod to close the valve against the admission of water to the distributing-pipes, a tappet, 35, fixed to the connecting-rod engages the insulated bushing of the spring circuit-closer and lifts it from its electrical connection with the circuit-closing arm and holds the electric circuit open.

In use, the separation of the clasp-bar 28 by heat or otherwise will open the sprinkler, liberate the spring-actuated circuit-closing piston-rod, close the electric circuit with the battery and the electro-magnets, disengage the hook-latch armature from its connection with the trip-lever mechanism, break or open the electric circuit connecting the trip-lever mech-

anism with the magnets and with the battery, liberate the weighted arm and permit it to descend, open the valve, and admit water to the distributing-pipes, to be discharged through the open sprinkler, and permit the spring circuit-closer to engage the circuit-closing arm to close the electric circuit through the alarm-bell, to give notice of the action of the apparatus.

I claim as my invention—

1. The combination, with the electro-magnet and a system of compound levers adapted to be held in equilibrium by the armature of the magnet, of a weighted valve-controlling lever and an alarm-circuit-closing arm independent of the armature, both the valve-controlling lever and the circuit-closing arm being held against a normal pressure by the said armature, substantially as set forth.

2. The combination, with an electro-magnet adapted to be automatically energized and a valve adapted to control the admission of water to distributing-pipes, of a weighted lever connected with the valve and a system of compound levers forming, when the circuit is open, a continuous connection between the armature of the magnet and the valve, one of the elements of which is detachably connected with the said weighted lever and another with the armature of the magnet, substantially as set forth.

3. In a normally-open-circuit fire-extinguisher, an automatic circuit-closer, a separable electric connection between the magnet and the supply-valve, the armature of the magnet constructed to lock the parts of the separable connection in contact when the circuit is open and to release them when the circuit is closed, and a spring-actuated alarm-circuit closer connected with a movable portion of the said separable connection, substantially as set forth.

4. The combination, with a weighted valve-controlling lever suspended from one of the elements of a system of compound levers, of a spring alarm-circuit closer held out of contact by the rod connecting the weighted arm and system of compound levers, substantially as set forth.

5. The combination, with a sprinkler-stopper located permanently out of circuit, of a spring-actuated circuit-closer connected with the stopper-support and adapted to close the circuit simultaneously with the release of the stopper, substantially as set forth.

6. In circuit-closing mechanism, the combination, with a cylinder electrically connected with one pole of a battery, of a spring-actuated piston-rod electrically connected with the opposite pole of the battery, the piston-rod having a free support in the insulating-head of the cylinder, the piston being adapted to close the circuit by contact with the cylinder when the spring-actuated piston-rod is released, substantially as set forth.

7. The combination, with a sprinkler-closing cap and a spring-actuated circuit-closing

rod held, respectively, in closed adjustment and out of contact by cap-supporting devices, adapted to be released when the temperature rises above a normal degree, of a water-supply valve adapted to be opened by the closing of the circuit, substantially as set forth.

8. The combination of a circuit-closing arm electrically connected with the alarm-bell and with the battery, a circuit-closing spring to engage the circuit-closing arm and electrically connected with the battery, and a tappet to lift the circuit-closing spring from its connection with the circuit-closing arm automatically, as and for the purpose set forth.

9. In a fire-extinguisher, the combination, with a water-supply pipe and a valve for regulating the flow of water, of a valve-controlling

lever having a toggle-connection with the valve, an armature of an electro-magnet adapted to actuate the lever, and means for automatically energizing the magnet, substantially as set forth.

10. The combination, with the electro-magnet in the normally-open circuit and the casing forming a support for the magnet, of the system of valve-controlling compound levers fulcrumed on the casing, and the alarm-controlling arm secured to the casing, substantially as set forth.

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Witnesses:

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A. O. BEHEL.