(No Model.) 2 Sheets—Sheet 1.

D. C. STILLSON.

FIRE EXTINGUISHER.

No. 306,708. Patented Oct. 14, 1884.

Fig. 1.

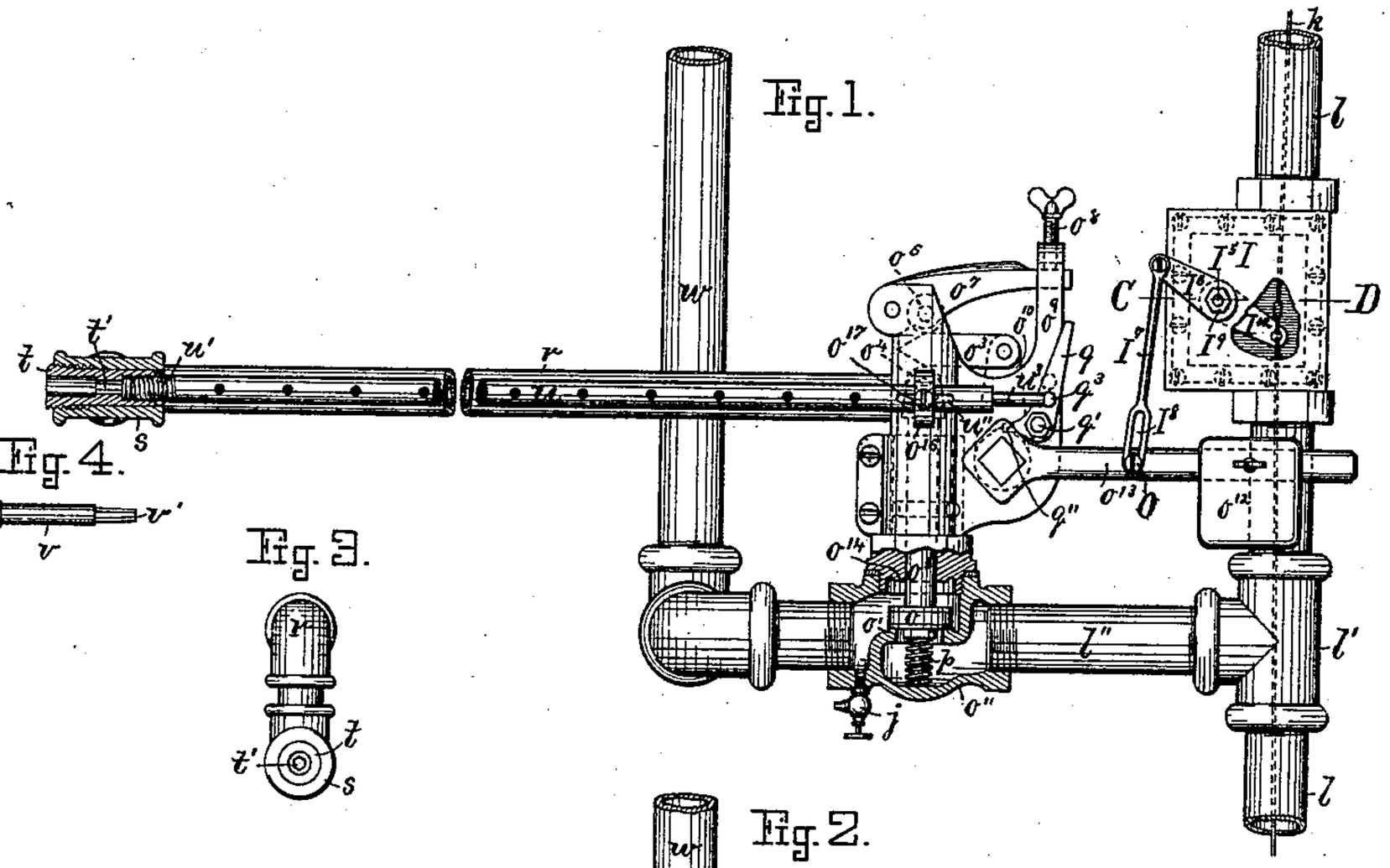

Fig. 4.

Fig. 3.

Fig. 2.

Fig. 9.

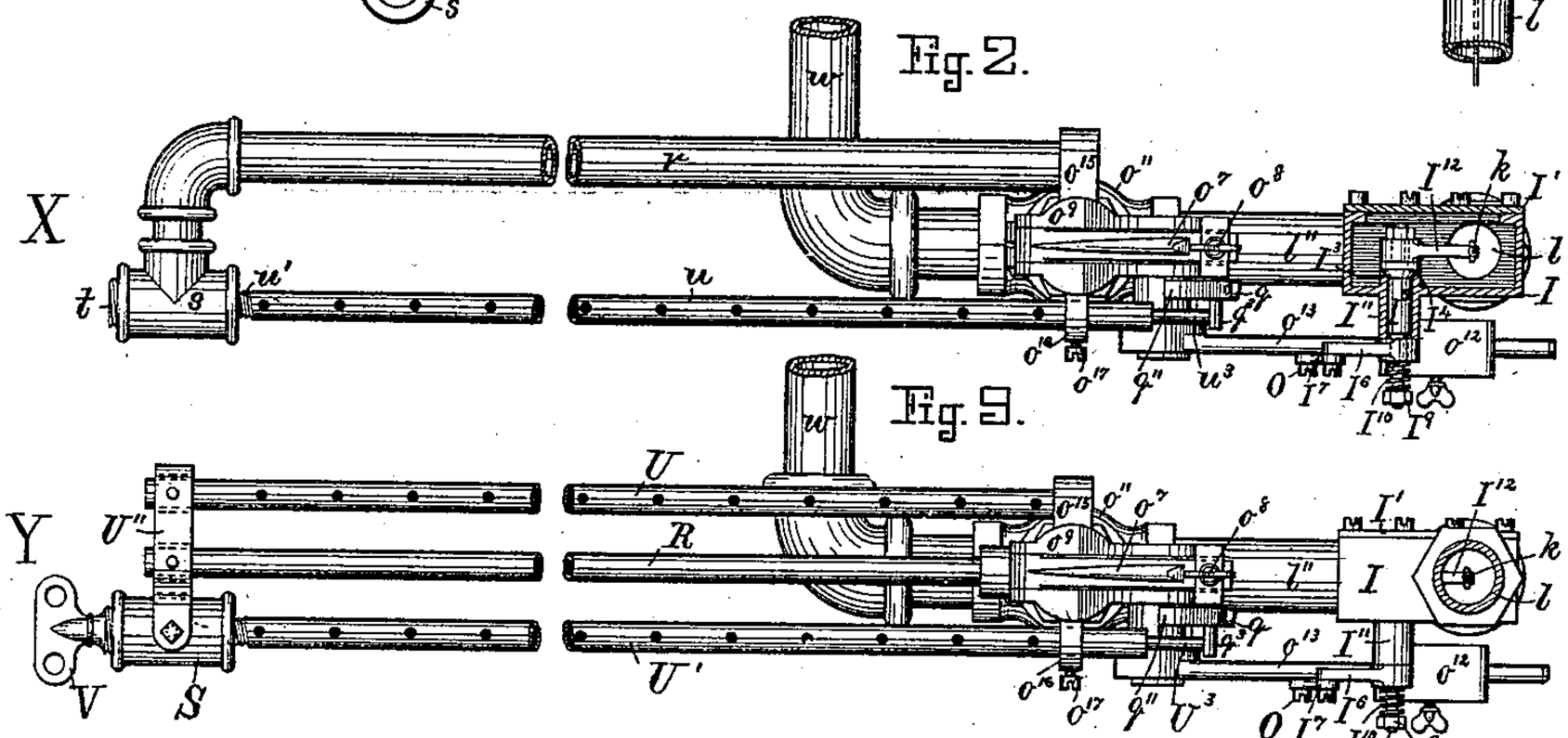

Fig. 10.

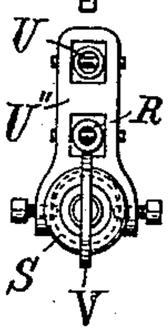

Fig. 5.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 7.

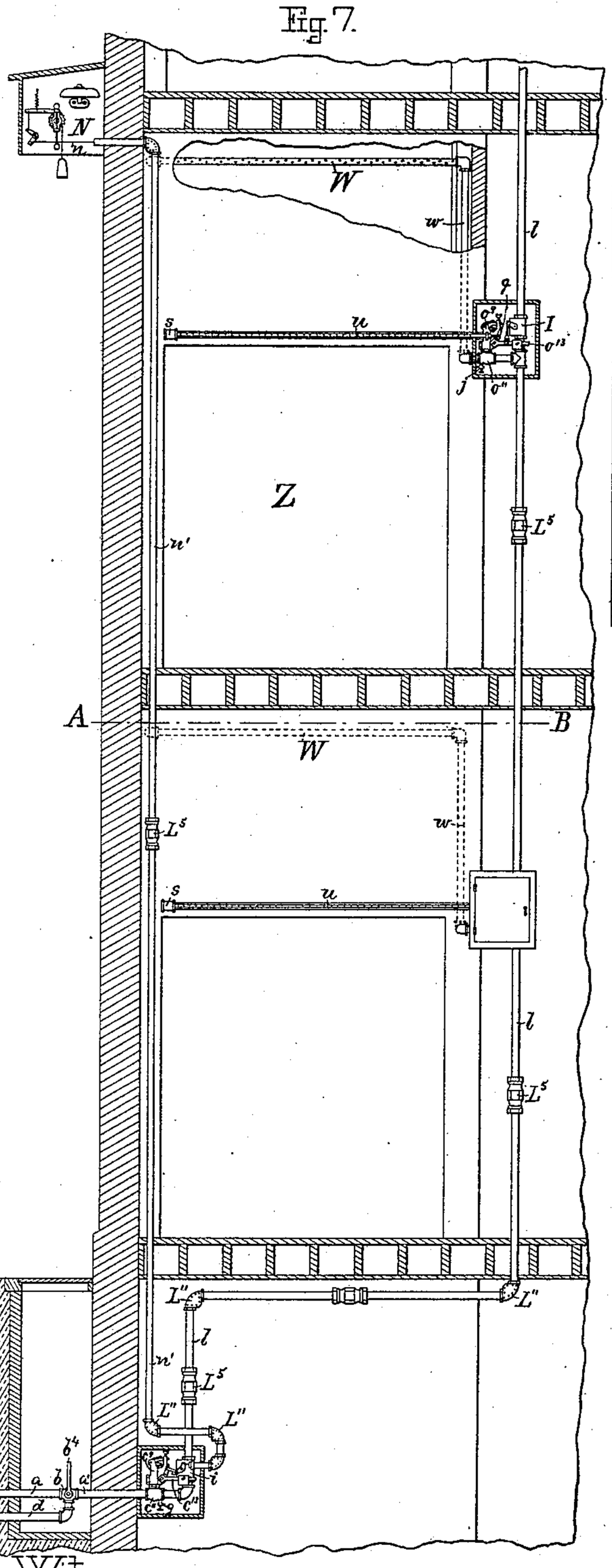


Fig. 8.

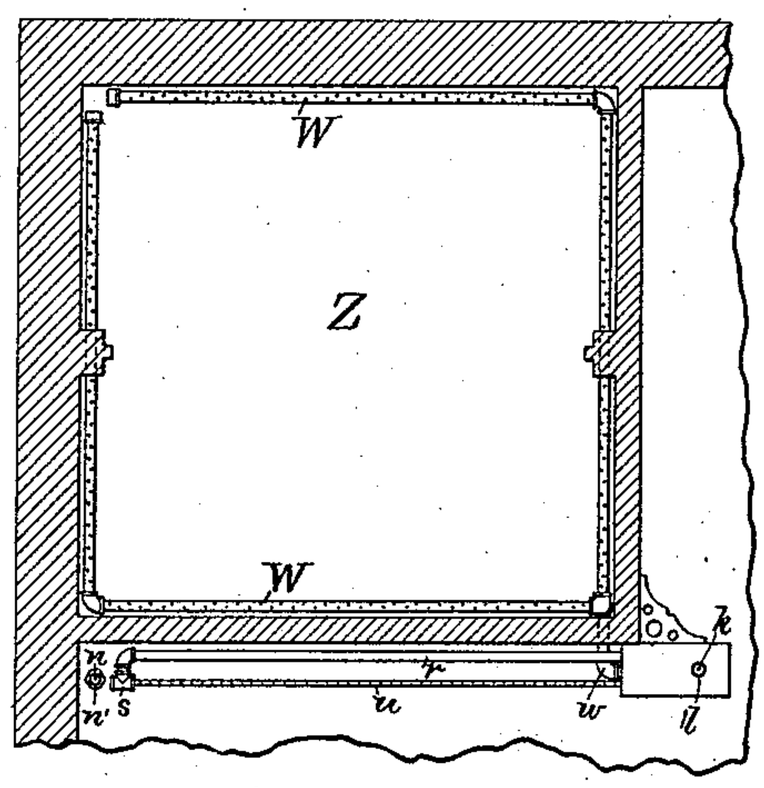
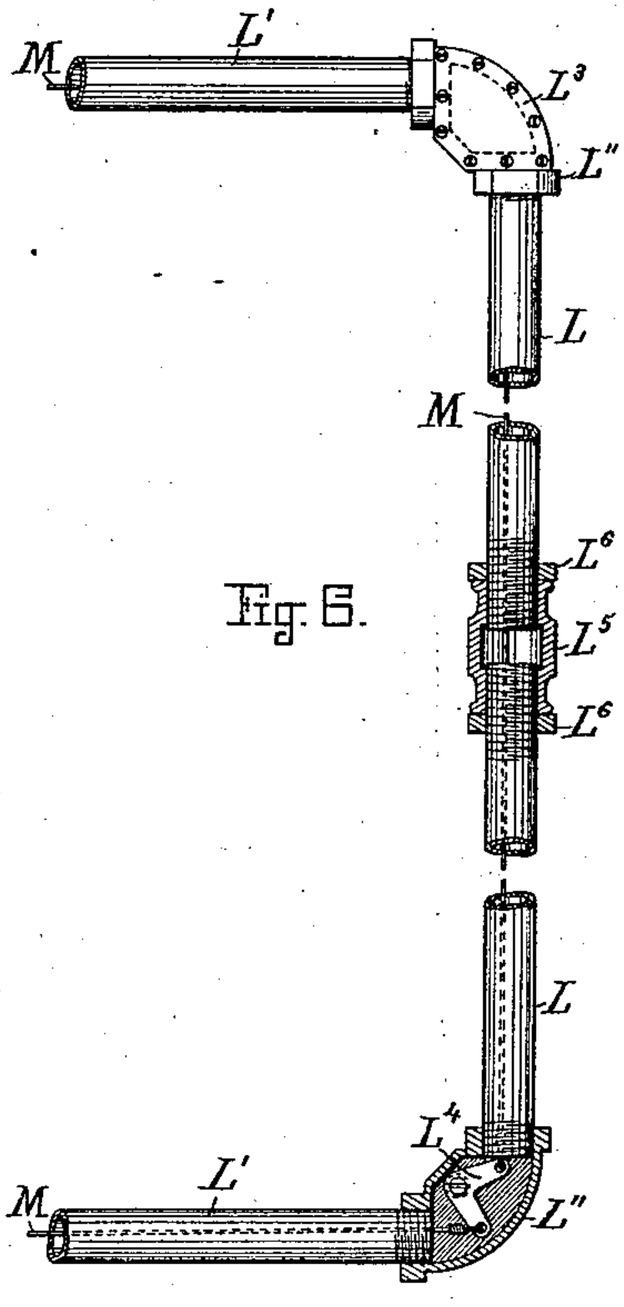


Fig. 6.



Witnesses
Henry Chadbourn.
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UNITED STATES PATENT OFFICE.

DANIEL C. STILLSON, OF SOMERVILLE, MASSACHUSETTS.

FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 306,708, dated October 14, 1884.

Application filed May 5, 1884. (No model.)

To all whom it may concern:

Be it known that I, DANIEL C. STILLSON, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Automatic Fire-Extinguishers; and I do hereby declare that the same are fully described in the following specification and illustrated in the accompanying drawings.

This invention relates to improvements in automatic fire-extinguishers of that class in which the heat from the fire expands a metallic bar or tube, and thus causes a valve to be automatically opened, and allowing the water to escape in the form of jets, sprays, &c., into the room where the fire is, for the purpose of automatically extinguishing the fire in a room or building as soon as the temperature caused by such fire rises above the one for which the device is regulated.

Letters Patents of the United States were granted to me January 4, 1881, No. 236,378, and June 27, 1882, No. 260,252, for fire-extinguishers; and my present invention is an improvement on the aforesaid inventions, and it is carried out as follows, reference being had to the accompanying drawings, where—

Figure 1 represents a sectional side elevation of one of the automatic valve-openers. Fig. 2 is a sectional plan view on the line C D, shown in Fig. 1. Fig. 3 represents an end view as seen from X in Fig. 2. Fig. 4 represents a side view of the key for adjusting the position of the expansive tube. Fig. 5 represents a sectional side elevation of the lower valve on the supply-pipe, with its three-way main cut-off and waste-pipe. Fig. 6 represents a detail view of pipe-connections and inclosed wire for operating the valves and the alarm mechanism. Fig. 7 represents a sectional elevation of the device as applied to an elevator-well. Fig. 8 represents a cross-section on line A B, shown in Fig. 7. Fig. 9 represents a modification of the automatic valve-opener, showing two expansive tubes applied to one valve; and Fig. 10 represents an end view as seen from Y in Fig. 9.

Similar letters refer to similar parts wherever they occur on the drawings.

In Figs. 5 and 7, *a* represents the water-supply pipe leading from the main pipe in the street or other place.

On the pipe *a*, I locate the three-way cock or cut-off *b*, having branch *b'* attached to supply-pipe *a*, branch *b''* attached to pipe *a'*, that leads to lower valve, *c*, and branch b^3 attached to waste-pipe *d*, as shown in Fig. 5.

b^4 is the handle attached to plug b^5 on the three-way cock *b*, and when said handle is placed in the position shown in Fig. 5 the plug of the cock is in its normal position, with direct communication from the main supply-pipe to the lower valve, *c*. After a fire it is essential that the system of pipes should be thoroughly drained, so as to prevent freezing in cold weather, and for this purpose I turn the handle b^4 one-quarter turn to the right, thus shutting off the main supply from pipe *a*, and establishing open communication from pipe *a'* to waste-pipe *d*, and leave the cock in such a position until the system of connecting-pipes are properly drained, and after the apparatus has been reset and adjusted I move the handle b^4 to its normal position, as shown in Fig. 5. The valve *c* is normally made to rest on the lower valve-seat, *c'*, in the shell *c''*, and is kept on said seat against the pressure of the water by means of the wedge-block c^3, located between the roll c^4 on the upper end of the valve-spindle c^5 and roll c^6 on the hinged arm c^7, that is secured in place by means of adjustable set-screw c^8 on bracket c^9, in substantially the same manner as shown and described in my Patent No. 236,378, and the wedge-block c^3 is hinged to a lever, c^{10}, located in bearings in bracket c^9, and provided with a weighted lever, c^{13}, having a weight, c^{12}, made adjustable upon it, as shown and described in said patent.

e is the locking-pawl, as usual hinged at *c'* to the bracket c^9, and having its lower end, *e''*, resting against a pin projection, or resting in a notch on the hub of the weighted lever c^{13}. Below the valve *c* is located, within the shell *c''*, a coiled spring, *f*, to aid in lifting the valve *c* upward, and to force it against the upper valve-seat, c^{14}, (shown in Fig. 5,) as soon as the wedge-block c^3 is withdrawn from between the rolls c^4 c^6, and thus to prevent

leakage of the water where the valve-spindle c^5 passes through the cap of the valve-shell.

To effectually drain the valve-shell c'', and the pipe to which it is connected, of water that may be contained below the valve-seat c', I provide said shell c'' with a drain-cock, g, as shown in Fig. 5. The lower valve-shell, c'', is in communication with conduit or pipe h, elbow h', and pipe h'', leading to the lower lever-box, i, the particular construction of which will be more fully described by reference to the upper lever-boxes, which all are made similar.

In box i is journaled the pin or shaft i', having secured to it, inside of the box i, the rock-lever i'', connected to the wire k, that is inclosed within the stand-pipe l, (shown in Fig. 5,) and said wire leads to the respective levers in succeeding boxes in the different stories or parts of the building.

On the outside of box i, to shaft i', is secured the rock-lever m, the upper end of which is connected to wire n, inclosed within pipe n', and leading to a suitable electric or mechanical alarm, N, preferably located outside of and near the top of the building, or in any other suitable and desirable locality, as may be required according to circumstances.

To the lower end of rock-lever m is hinged the link m', (shown in Fig. 5,) the other end of which is hinged to the locking-pawl e, as shown in said Fig. 5. The lever m terminates in its lower end as a projection, m'', adapted to strike against the weighted lever c^{13} when the pawl e e'' is tripped, so as to impart a starting jar to said lever in case it should happen to be stuck in its bearing, and thus facilitate its descent and the automatic opening of valve c. The stand-pipe l is connected to a T-branch, l', in or near the next story above the lower valve, c, or at any other desirable distance above it, according to the construction of the building that is to be protected against fire. The horizontal end of branch l' is attached to pipe l'', leading to upper valve-shell, o'', having valve o, valve-seat o', wedge-block o^3, roll o^4 on valve-spindle o^5, roll o^6 on lever o^7, and set-screw o^8 on bracket o^9. The wedge-block o^3 is hinged to lever o^{10}, having secured to its spindle the lever o^{13}, on which the weight o^{12} is adjusted precisely in the same manner as set forth in the description of the lower valve and its operating parts. The valve-shell o'' in a similar manner is also provided with upper valve-seat, o^{14}, and has a spring, p, located below in said shell o'', below the valve o, for the purpose of forcing the valve o against said upper seat, o^{14}, and to hold it against it when the automatic tripping mechanism is released.

j is the drain-cock in the rear end of valve-shell o'', to aid in draining said shell from water that may remain in it and in the pipe connected to it, in the same manner as described relative to lower shell, c'', and its drain-cock g.

q is the locking-pawl, as usual hinged at q' to the bracket o^9, and having its lower end, q'', resting against a pin projection or resting in a notch on the hub of the weighted lever o^{13}.

To the rear of the main portion of bracket o^9 is cast a lug or projection, o^{15}, to which is secured, as usual, one end of the iron rod or pipe r, to the other end of which is secured the sleeve s, the latter having in its outer end an internal screw-thread, in which is adjustable the correspondingly-screw-threaded sleeve t, which latter has an internal screw-thread of a different pitch in its inner end, as shown in Fig. 1, into which is screwed the outer screw-threaded end, u', of the expansive, perforated, and hollow tube u, the inner end of which is loosely supported in a bearing, o^{16}, on the front of the bracket o^9, as shown in Figs. 1 and 2, and to prevent said expansive pipe from turning around in its bearing o^{16} I provide the latter with a set-screw, o^{17}, the inner end of which is made to project into a slotted perforation, u'', in the hollow pipe u, or in a similar or equivalent manner. The inner end, w^3, of the tube u is made to rest loosely against the projection q^3 on the locking-pawl q in the usual manner, as shown in Figs. 1 and 2.

The object of the adjustable screw-threaded sleeve t is to adjust the expansive pipe u in a longitudinal direction, so as to set it with great nicety and to secure it in such position to the less expansive rod or pipe r, according to the desired temperature at which it is desired to have the tube u act on the releasing mechanism for the valve o, and I effect such accurate and nice adjustment by means of the key v, (shown in Fig. 4,) such key having a polygonal or similarly shaped end, v', adapted to fit into a corresponding recess or bore, t', in the interior of the adjustable sleeve t, as shown, respectively, in Figs. 4 and 1. As in my previous patents, by the expansion of the hollow tube u the pawl q q'' is tripped when the heat in the room reaches a temperature for which the apparatus is regulated, and the valves o c automatically opened by the action of weighted levers o^{13} c^{13} and connecting-wires k, causing the water to pass up from pipe a to pipe l and through the now open valve o to the pipe w, leading to the extinguisher or sprinkler, as usual.

In Figs. 9 and 10 is shown my improved manner of arranging the expansive mechanism for actuating the valve-releasing mechanism, so as to obtain great sensitiveness and accuracy in its operation. Instead of one single expansive pipe or rod for each valve, I use a pair of such expansive pipes, U and U', the former attached in one end to lug o^{15} on bracket o^9, and hinged in its free end to the yoke U'', as shown in Figs. 9 and 10. To the bracket o^9 is secured, between the expansive pipes U and U', the iron pipe or rod R, the outer end of which is hinged to the yoke U'', and to the forward end of the latter is hinged the sleeve S, provided internally with an adjusting device connected to outer end of expansive pipe U', and provided with a suitable key, V, as shown in Figs. 9 and 10. The forward end

of expansive pipe U′ passes loosely through bearing o^{16}, and has its extreme end U^3 resting loosely against projection q^3 on the pawl q, as shown in Fig. 9, by which arrangement the rapidity and accuracy of the action is doubled.

I in Figs. 1, 2, and 9 represents one of the upper lever-boxes located on the stand-pipe l, and provided with a packed detachable cover, I′, as shown in Figs. 2 and 9. In one piece with one face of said box I is cast the valve and bearing-sleeve I″, having in its inner end a conical valve-seat, I^3, for the conical valve I^4 on the spindle I^5, which latter passes outward through sleeve I″, where it is provided with a lever, I^6, the outer end of which is hinged to the link I^7, having lower slotted end, I^8, jointed to stud O on the weighted lever o^{13}, as shown in Figs. 1, 2, and 9.

To hold the valve I^4 onto its seat I^3, and at the same time hold the hub of lever I^6 against the outer end of sleeve I″, for the purpose of preventing leakage of water at this point, I provide the outer end of spindle I^5 with a nut or head, I^9, and locate a spring, I^{10}, between said nut or head and the outside of the hub of lever I^6, as shown in Figs. 2 and 9.

To the inner end of spindle I^5 is secured the lever I^{12}, to the end of which is connected the wire k, leading to a corresponding internal lever, i'', in the lower lever-box, i, as shown in Figs. 1 and 9.

The object of the link I^7 and its slot I^8, jointed to stud O on weighted lever o^{13}, is to permit levers I^6 and I^{12} within box I to be tripped when one of the expanding-rods in a story overhead is acted on to open its valve and communicate motion by means of wire k to open the lower valve, c, without tripping the lever o^{13}, and without releasing the valve o in shell o''. In other words, in case a fire occurs in an upper story without fire below, only the expander and valve at such place shall be actuated to let on the water through the corresponding sprinkler without letting on water throughout the whole series of sprinklers above or below such place where the fire occurs, and thus permit each individual valve to be operated independent of the action of the others in the series.

In Fig. 6 I have shown my device for conducting the connecting-wire M within the pipes L L′ L′ in going at right angles or other angles, and means for tightening, releasing, or adjusting the said wire. This consists of bends or angles L″, as shown, each one being provided with a detachable packed cover, L^3, and having pivoted within such angle-piece the knee-lever L^4, to the ends of which the wire M is connected, as shown, and to adjust the length of said wire M, I make the pipe L in two parts, as shown, with respective right and left handed threads in their abutting ends, over which is screwed a correspondingly right and left handed screw-threaded thimble, L^5, and check-nuts L^6 L^6, as shown. By turning said thimble to the right or left the wire M may be tightened or loosened, as the case may require, without taking any portion of the structure apart.

In Figs. 7 and 8 is shown my invention as applied to an elevator-well, Z, and having each sprinkler W located a little above its corresponding expander, u, so as to cause the water from each such sprinkler to act upon the fire below it.

The wires for connecting the various releasing mechanisms are all shown inclosed within the pipes, whether such pipes are water-supply pipes or casings leading to the alarm mechanism N, as hereinbefore set forth and described.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent, and claim—

1. In a fire-extinguisher, the valve-shell C″, formed into two chambers, as shown, and provided with the two valve-seats c^{14} c', in combination with the valve c, located in the upper chamber and adapted to play between its two seats, and the lower spring, f, substantially as and for the purpose set forth.

2. In a fire-extinguisher, the stationary rod or pipe r, having attached to its free end the screw-threaded sleeve s, in combination with the screw-threaded regulating-sleeve t, the key v, and an expansive tube, u, as and for the purpose set forth.

3. In a fire-extinguisher, the lever-box I, having sleeve I″ and valve-seat I^3, combined with spindle I^5, its valve I^4, and the internal and external levers, I^{12} and I^6, and spring I^{10}, all arranged in a manner and for the purpose set forth and described.

4. In a fire-extinguisher, the lever-box I, its sleeve I″, valve-seat I^3, and spindle I^5, with valve I^4, combined with levers I^{12} and I^6, the slotted link I^7, and the weighted lever o^{13} of the valve-releasing mechanism jointed to the line I^7, substantially as set forth and described.

5. In a fire-extinguisher, the upper box, I, provided with the spindle I^5 and lever I^{12}, and the lower box, i, provided with the spindle i' and lever i'', in combination with the stand-pipe l, and the inclosed wire k, connecting levers I^{12} and i'', substantially as and for the purposes described.

6. In a fire-extinguisher, the combination of the pipes L′, the angles L″, provided with covers L^3, the knee-levers L^4, pivoted within the angles L″, the wires M, connected to said levers, the pipe L, made in sections and connected to the angles L″, and the thimble L^5 and nuts L^6, for moving the sections of pipe L to and from each other for adjusting the wire M, substantially as and for the purpose set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

DANIEL C. STILLSON.

Witnesses:
ALBAN ANDRÉN,
HENRY CHADBOURN.