(No Model.)

D. C. STILLSON.

AUTOMATIC FIRE EXTINGUISHER.

No. 311,088. Patented Jan. 20, 1885.

Fig 1.

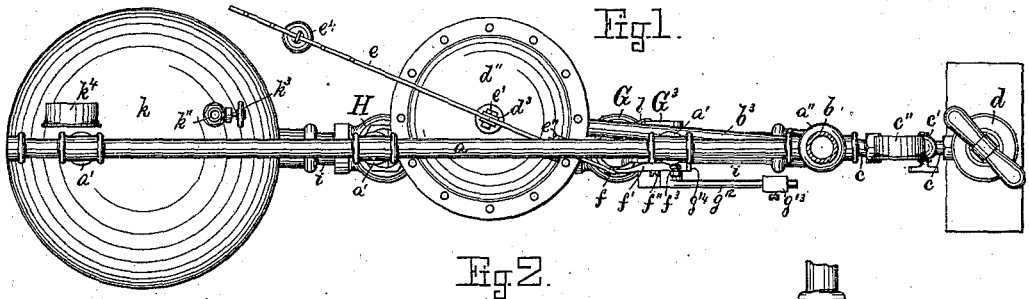


Fig 2.

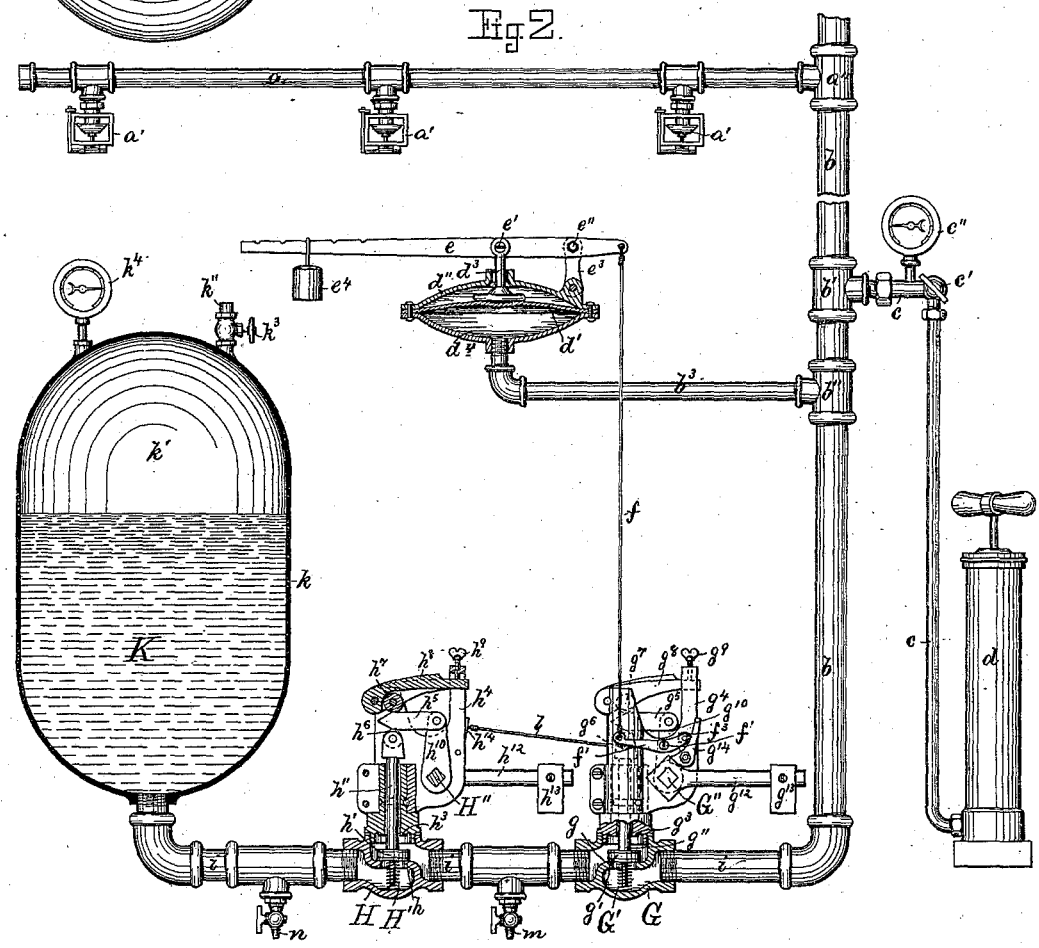
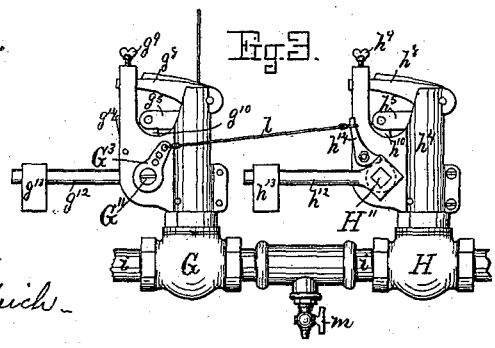


Fig 3.



Witnesses

Henry Chadbourn.

Sarah M. Goodrich.

Inventor

Daniel C. Stillson

by Albert G. Davis

his atty.

UNITED STATES PATENT OFFICE.

DANIEL C. STILLSON, OF SOMERVILLE, MASSACHUSETTS.

AUTOMATIC FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 311,088, dated January 20, 1885.

Application filed July 10, 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; and it is carried out as follows, reference being had to the accompanying drawings, where—

Figure 1 represents a plan view of the invention. Fig. 2 represents a sectional side elevation, and Fig. 3 represents a rear view, of the valves.

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

A represents one of the usual sprinkler-pipes, located in a suitable and desirable part of the room in the building, and it is provided with a number of sprinklers, a' a' a', held onto their seats by means of fusible metal in the ordinary way. The pipe a is in communication with the stand-pipe b by means of T a'', as shown in Fig. 2. From a T, b', on pipe b leads a smaller pipe, c, to the air-pump or air-compressor d, such pipe c being provided with a suitable valve or cut-off, c', and also with a pressure-gage, c'', located on pipe c between the T b' and the cut-off c'.

b'' is another T on pipe b, to which is connected the small pipe b^2, that leads to the chamber d, that is closed at top by means of a flexible diaphragm, d', and provided with a cover, d'', the flange of which is bolted to the flange of chamber d, with the exterior edge of the diaphragm d' held air-tight between them. As a substitute for the diaphragm d' may be used an inverted cup or a float, submerged in mercury or other liquid, if so desired. The center of diaphragm d' has a stem, d^3, attached to it, the upper end of which, after projecting loosely through a perforation or sleeve in cover d'', is hinged at e' to the lever e, the forward end of which is hinged at e'' to the link e^3 on the cover d'', or in any other suitable or equivalent manner.

e^4 is a weight suspended from rear end of lever e to cause the diaphragm d' to be pressed downward when the air-pressure from below is relieved. The forward end of lever e extends beyond the link e^3, and has connected to it at this place a wire or rod, f, leading to the releasing mechanism on the back-pressure air-valve, as will be further described.

G is the cut-off for the air-pressure, and H is the cut-off from the liquid-pressure. These cut-offs are located on the horizontal pipe i, the right end of which is connected to stand-pipe b, and its left end is connected to bottom of tank or holder k, or to the main water-supply pipe, if so desired. The cut-off G has the internal valve-seat, g, onto which the valve g' is normally held by mechanism applied to its valve-stem g'' against the compressed-air pressure in pipes a and b. The stem g'' passes loosely through the top of cut-off G, without any packing at such place, so as to permit the valve g' to move with the utmost freedom when its locking mechanism is released, and to provide for an air-tight connection at the place where the spindle or stem g'' passes through the cover of cut-off G, I provide it with an upper internal and inverted valve-seat, g^3, against which the upper portion of the valve g' is forced when acted on by the compressed air as soon as its locking mechanism is released. The said locking mechanism is made in a similar manner to that already shown and described in my patent of January 4, 1881, No. 236,378, and consists of bracket g^4, secured to cut-off G, such bracket serving as a bearing-sleeve for the stem g''. The valve g is normally held onto its lower seat, g, against the air-pressure on its under side by means of wedge-block g^5, located between the roll g^6 on the upper end of stem g'' and roll g^7 on the hinged arm g^8, that is secured in place by means of adjustable set-screw g^9 on bracket g^4. The wedge-block g^5 is hinged to a lever, g^{10}, located in bearings in bracket g^4, and provided with a weighted lever, g^{12}, having a weight, g^{13}, made adjustable upon it, as shown and described in my aforesaid Letters Patent.

g^{14} is the locking-pawl hinged to the bracket g^4, and having its lower end resting against a pin or projection, or in a notch or recess in the hub of the weighted lever g^{12}, and to enable the locking-pawl g^{14} to be tripped with a minimum of frictional resistance to release it

from lever g^{12}, when the air-pressure in pipes a b b^3 and chamber d is relieved by the automatic opening of sprinklers a', I attach the lower end of wire f to the lever f', that is hinged to the bracket g^4 at f'', and provided in its other end with a roll, f^3, bearing loosely against the locking-pawl lever g^{14}, as shown in Fig. 2, so that when air-pressure in diaphragm-chamber d is relieved, and the weight e^4 causes the opposite end of lever e to rise that the wire f shall trip the lever f', and make its roll f^3 to press on upper end of locking-pawl lever g^{14}, by which the weighted lever g^{12} is relieved, and the wedge-block g^5 withdrawn from between the rolls g^6 and g^7, causing the valve g' to be forced upward against its upper seat, g^3, by the influence of the spring G', located in the cut-off G below said valve g', by which the latter is made to close air-tight against such upper seat, g^3.

G'' is the rock-shaft on which the weighted lever g^{12} and wedge-block lever g^{10} are secured, and to the rear end of such shaft is secured an additional lever, G^3, connected by means of wire l to the locking-pawl lever h^{14} on the bracket h^4 for cut-off H, as shown in Fig. 3. Like the cut-off G, the cut-off H has a valve-seat, h, valve h', stem h'', upper valve-seat, h^3, bracket h^4, wedge-block h^5, roll h^6 on upper end of stem h'', and roll h^7 on the hinged arm h^8, secured in place by means of adjustable set-screw h^9 on bracket h^4, and also the weighted lever h^{12} on shaft H'', to which latter is secured the hinged arm h^8, in the same manner as described relative to cut-off G.

h^{13} is the weight on lever h^{12}, and h^{14} is the locking-pawl to hold said lever locked until released by the releasing mechanism on cut-off G and connecting-wire l.

H' is the spring below valve h', corresponding in location, action, and purpose to the spring G' in cut-off G.

On pipe i, between the cut-offs G and H, is located the petcock m, for the purpose of ascertaining from time to time if the apparatus is in its normal condition—that is, containing air in pipe i between cut-offs G and H.

n is another petcock located on pipe i, between cut-off H and tank k, containing the fire-extinguishing liquid K, as shown in Fig. 2.

When the apparatus is in working order, by opening the petcock n liquid should come out at this place, and by trying the said petcocks m and n from time to time the proper condition of the apparatus may be ascertained. The vessel k is a closed one, and its upper part, k', serves as an air-pressure chamber, in which air is compressed from a suitable air-compressor connected to pipe k'', that is provided with a stop-cock, k^3, which is closed after the desired pressure is obtained in vessel k, which may be ascertained by looking at the pressure-gage k^4, attached to upper end of vessel k.

The vessel k is shown in the drawings as a closed one, and the fire-extinguishing liquid compressed within it; but, if so desired, an open tank or receptacle may be employed and located at any desired height above the sprinklers a' a', so as to obtain the desired pressure to force the liquid out through the sprinklers without the need of compressing the liquid in a closed vessel.

Where water is to be used for extinguishing the fire, the vessel k is dispensed with and the cut-off H connected directly to the water-supply pipe from the street or otherwise.

The operation of the invention is as follows: The valves g' and h' are locked against their lower seats, g h, by raising the weighted levers g^{12} and h^{12}, and locked in positions by means of pawls g^{14} and h^{14}, as usual. The air within the pipes a b b^3, that portion of pipe i between cut-off G and pipe b, as well as the diaphragm-chamber d^4, is compressed by means of the air-compressor d and its pipe c until the diaphragm or float d' is raised sufficiently to hold the weighted lever e in its normal position, (shown in Fig. 2,) after which the cut-off c' on pipe c is closed. The pressure necessary for this purpose need not amount to more than four pounds to the square inch, and considerable less will suffice. Both valves g' and h' are now held onto their respective seats against pressure from below, air-pressure on the former and liquid-pressure on the latter. If a fire takes place in the room, when the heat reaches the melting-point of the fusible metals on sprinklers a' a', the latter are automatically opened, as usual, allowing the compressed air in pipes a b b^3, as well as in chamber d, to escape, causing the diaphragm or float d' to be pressed down by the influence of weight e^4 on lever e, which pulls wire f upward, and in so doing causes lever f' to act on locking-pawl g^{14} and to release lever g^{12}, which is then swung downward by the influence of weight g^{13}, and in so doing withdraws the wedge-block g^5 from between rolls g^6 g^7, and thereby liberates the valve g' from its lower seat, g, and it is automatically forced upward against its upper seat, g^3, by the influence of the lower pressure-spring, G', at the same time as the wedge-block h^5 is acted on by the connecting-wire l to liberate the valve h' and to force it upward against its upper seat, h^3, by the influence of pressure-spring H', allowing the fire-extinguishing liquid K to be forced through pipe i, cut-offs G H, pipes b and a, and out through the now open sprinklers a' a'. By having the diaphragm d' of proper size a very small air-pressure is required to operate the releasing mechanism, and consequently the fusible metal on caps or sprinklers a' a' has only a very slight pressure to withstand while the apparatus is in its normal condition. By having the two cut-offs on pipe i, one receiving the slight air-pressure on the under side of its valve g', and the other receiving the liquid-pressure on the under side of its valve h', and both cut-offs having their valve-releasing mechanism connected together and operated together, so as to be released at the same time, great accuracy and efficacy in the operation of the apparatus is effected.

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

1. In an automatic fire-extinguisher, the combination of cut-offs G and H, each provided with a stem-valve and a spring acting on the valve from below, a holding and releasing mechanism acting on each valve-stem, comprising a weighted lever having a block acting on the valve-stem connected therewith, a pawl to lock said weighted lever, the pawls of the two levers being connected together, a lever to bear against one of said pawls, a pneumatic-actuated releaser connected with the latter lever, a liquid-supply pipe connected with one of said cut-offs below its valve, an air-supply pipe connected with the other cut-off below its valve, and a fusible sprinkler having a connection with said air-supply pipe, substantially as described.

2. In a fire-extinguisher, the combination of cut-off G, provided with a stem-valve and a spring for acting on the same from below, a weighted lever provided with a block, g^5, to act on the valve-stem, and a pawl to act on said lever, substantially as described.

3. In an automatic fire-extinguisher, the combination of air-supply pipe *b*, a liquid-supply reservoir, horizontal pipe *i*, communicating with both the air-supply pipe and liquid-supply reservoir, cut-offs G and H, connected with pipe *i*, and provided, respectively, with pressure-regulated valves g' h', and constructed, substantially as described, to permit an air-pressure on the under side of the valve and a liquid-pressure on the under side of the other, a petcock, *m*, on pipe *i*, between the two cut-offs, and a petcock, *n*, between one cut-off and the liquid-supply reservoir, substantially as described.

4. In an automatic fire-extinguisher, the combination of the cut-off G, provided with the stem-valve g' and spring G, acting on the same from below, the weighted lever having the block g^5 connected therewith to act on the stem of the valve, the pawl g^{14}, to bear against the weighted lever, the pivoted lever f', to release the pawl, the pneumatic releaser provided with a lever, *e*, and a connection, *f*, between said lever and the pawl-releasing lever, substantially as described.

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

DANIEL C. STILLSON.

Witnesses:
ALBAN ANDRÉN,
HENRY CHADBOURN.