(No Model.)

C. L. HORACK.

AUTOMATIC FIRE EXTINGUISHER.

No. 270,801. Patented Jan. 16, 1883.

FIG. 1.

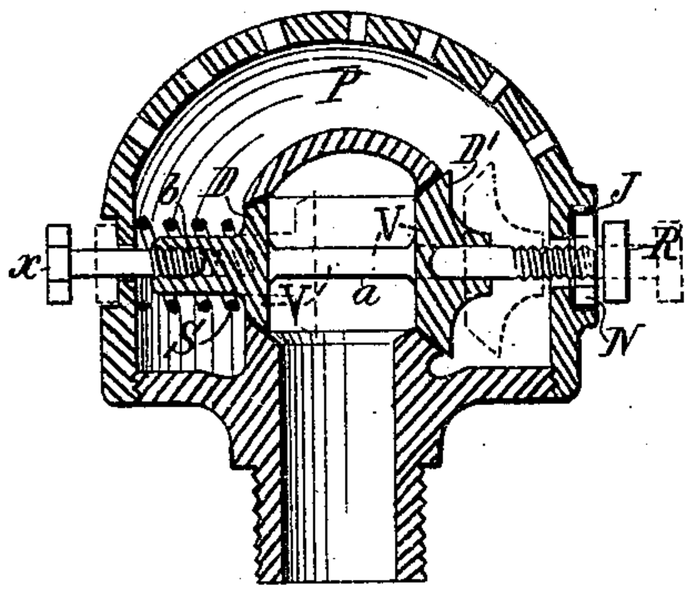


FIG. 2.

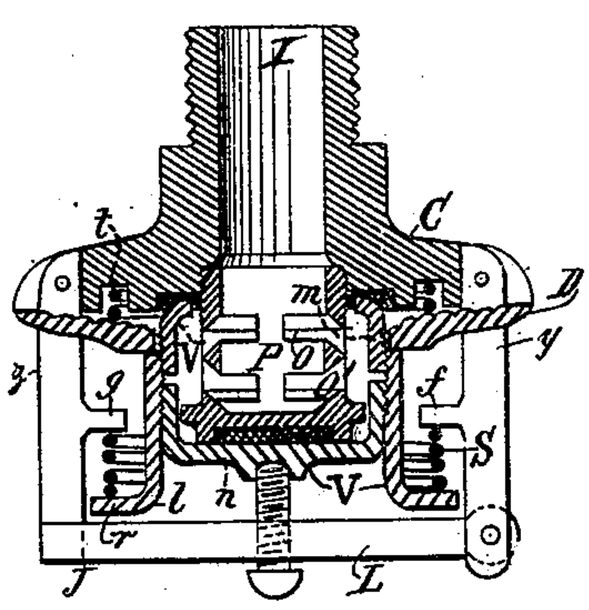
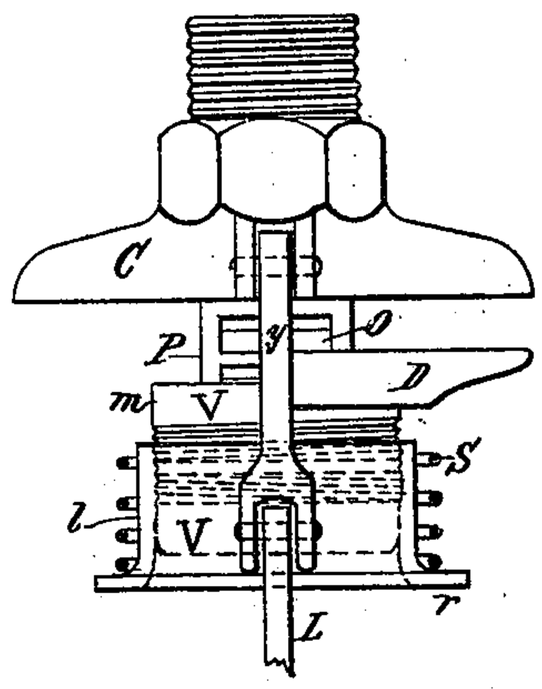


FIG. 3.



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UNITED STATES PATENT OFFICE.

CHARLES L. HORACK, OF BROOKLYN, NEW YORK.

AUTOMATIC FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 270,801, dated January 16, 1883.

Application filed August 22, 1882. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. HORACK, of Brooklyn, Kings county, New York, a citizen of the United States, have invented a new and useful Improvement in Automatic Fire-Extinguishers, of which the following is a specification.

My invention relates to automatic fire-extinguishers in which a cap placed over an outlet prevents the discharge of the extinguishing-fluid until said cap has become relieved, owing to the heat of said fire.

The object of this invention is to avoid the difficulties attending the changing pressure on a valve closing the outlet or outlets in an automatic fire-extinguisher, and thereby doing away with the danger of leaking generally attending the use of valves in such cases. When city-water pressure or pump-pressure is used in pipes supplying automatic sprinklers with extinguishing-fluid, very considerable changes in pressure are apt to occur in the same. Such changes produce a sudden shock, called "water-hammer," which frequently causes leaking of the valves, as stated above. I am aware that several remedies have been suggested to overcome this. Valves closing outlets in automatic fire-extinguishers have been constructed to partly balance the pressure of the extinguishing-fluid; but while this reduces the water-hammer on said valves, it does not entirely overcome it. Valves secured by fusible solder have also been held against their seats by the pressure of water, by so constructing the device as to make the pressure of the extinguishing-fluid hold the valve against a seat until relieved by the heat of a fire. This has been accomplished by making the extinguishing-fluid produce on said valve a greater pressure in a direction opposite to that in which it would have to move in order to open an outlet than is produced at the same time on said valve in the direction in which it would have to move in order to become relieved; but it will be seen that in this case the pressure on such a valve is changing with the pressure in the pipes. This is an objectionable feature, which I overcome by my invention. I do this by giving the valve such a shape as to make it balance exactly the pressure of the extinguishing-fluid, and by so proportioning that part of its surface which is exposed directly to said pressure as to make the resulting pressure on it which has a tendency to open it exactly equal to that which has a tendency to close it. It will readily be seen that this does away with water-hammer and its consequences as far as said valve is concerned, and in fact makes said valve entirely independent of the pressure of the extinguishing-fluid. On the other hand, it appears that the water-pressure cannot be depended upon to any extent to open said valve after a soldered joint holding it in position, or any other device performing the same function, has been relieved, and I therefore provide a spring to open or assist in opening said valve in case of fire. I also make use of the weight of the valve to assist in opening it.

A further object of this invention is to provide, in combination with said valve, a suitable fastening device to hold the valve in position until a fire occurs, and to construct a proper distributer in combination with said valve.

In the accompanying drawings, Figure 1 shows a vertical section of a device embodying some of the leading features of my invention. Fig. 2 represents a vertical section, and Fig. 3 a side view, of a device constructed according to my invention.

In Fig. 1, V is a valve having two tapering disks, D and D′, at the ends of the stem *a*, arranged to close the outlets leading to the perforated distributer P. The inner area of the disk D, which is exposed to the pressure of the extinguishing-fluid, is made of exactly the same size and area as the inner surface of the disk D′, which also receives the pressure of said fluid. Consequently the pressure of said fluid, which is confined by the valve V, is fully balanced by said valve. The distributer P is screwed to the casting containing the valve-seats. The disks D and D′, while they might be soldered to their seats, in this case simply rest against suitable packing at said seats.

N is a nut, through which passes the screw R, which is used to force the valve V to its seats. Said nut N is secured to the distributer by means of a joint, J, made of solder fusible at a low temperature.

S is a spiral spring placed around the pro-

jection *b*, which is a continuation of the stem *a*. The spring is made to rest against the inner surface of the distributer P.

x is a pin passing loosely through an opening in said distributer, and is screwed into the projection *b*.

It will readily be seen that after the soldered joint J has been released, owing to the heat of a fire, the spring S will force the valve V to the right, the screw R and pin *x* serving as guides for said valve.

I show in dotted lines the position the disks D and D′ would assume, owing to the action of the spring S, after a fire had broken out. The openings into P would then be freed and would allow the passage of the extinguishing-fluid to the distributer P. It might be well to use screw-thread arrangement for lengthening or shortening the stem *a*, or the distance between the inner surfaces of the disks D and D′, thereby securing a close fit at both valve-seats. However, I do not show such screw-thread arrangement in Fig. 1. The details of this device might be varied. Particularly, instead of a distributer, P, having a series of perforations, any other suitable device for spreading the water over a large area might be used, such as a deflector fed from one or more outlets in the distributer P. As I propose to make the peculiar form of the valve shown in this device, and its connection with the reservoir containing the extinguishing-fluid and with a distributer, the subject of another application for a patent, I do not claim the same here.

Fig. 2 represents a distributer, P, provided with outlets *o o′* in its outer walls, arranged to produce intersecting streams. V is a valve placed over said distributer for the purpose of preventing the discharge of the extinguishing-fluid until a fire occurs. The peculiarity of this cap-shaped valve is that the horizontal projection of that part of the inner surface of the valve which receives upward pressure is of exactly the same area as the horizontal projection of that part of said surface which receives downward pressure, the inner diameter of the upper edge of the valve being made of exactly the same size as the outer edge of the lower valve-seat. Between the two seats for said valve the outlet or outlets for the extinguishing-fluid are located. A suitable packing is placed between the lower part of the distributer and the corresponding part of the inner surface of the valve V. Wax, paraffine, or any similar substance would best answer the purpose. The purpose of placing a yielding packing—such as wax or paraffine—there, is to fill out any cavity which might exist between distributer and valve, thereby preventing the extinguishing-fluid from entering such space or cavity, and so producing a pressure tending to open said valve and causing leakage. Besides, as wax and paraffine will soften and even assume a fluid condition under the influence of heat, it will be seen that by using the same or similar substances for packing, as indicated, any danger of the distributer and the valve adhering to each other after the heat of a fire has broken the fusible seal confining the valve is done away with. The inlet I to the distributer P might be made vertical, as shown on drawings, or horizontal, as circumstances may require. The valve V is made of three separate pieces, *l*, *m*, and *n*. *m* is a ring-shaped piece made to rest on the upper valve-seat; *n*, a cap-shaped piece resting on the lower valve-seat. *m* has on its outer surface screw-thread, so has also *n*, running, however, in the opposite direction. *l* is a connecting-piece having on its inner surface two series of screw-thread, corresponding with the screw-threads on *m* and *n*. It will be seen that by turning said ring-shaped piece *l* to one side or another after it has been connected with the pieces *m* and *n*, the distance between said pieces can be regulated, and the valve V can either be lengthened or shortened, as may be required to make it fit closely both its seats.

y and *z* are posts attached to the casting C, conveying the fluid to the distributer P. The spiral spring S is made to rest against projections *f* and *g* on said posts, as well as on a rim, *r*, projecting from the piece *l*, forming part of the valve V.

While it will be seen that the spring S will insure a prompt and speedy removal of the valve V after the soldered joint has been broken, it is apparent that the weight of the valve alone and unaided will cause the same to move downward, thereby releasing the extinguishing-fluid in case of fire.

It will also be seen that as soon as the valve has started on its downward movement the part of it formerly resting against the lower valve-seat also receives pressure by said fluid, which will further hasten the movement of said valve downward.

The lower end of the post *y* contains a pivot for one end of the lever L, while the other end of said lever is attached to the lower end of the post *z* by a joint, J, made of solder fusible at a low temperature. The screw or brace R, passing through the lever, forces the valve to its seats. After the joint J (shown in Fig. 2) is relieved by the heat of a fire, the lever L, and with it the brace or screw R, swings downward and out of the way, and the valve V is forced from its seats and drops into the position shown in Fig. 3.

D is a ring-shaped piece, intended to serve as a deflector for the extinguishing-fluid after the valve has dropped. One-half of said deflector is shown in Fig. 3. When in said position it rests on the projections *f* and *g*. It then serves to further distribute the extinguishing-fluid discharged through the openings *o o′*. A small spring, *t*, (shown in Fig. 2,) helps to force the deflector D downward in case it should need such additional force. Ordinarily, as the deflector D rests on a projection of the valve V before a fire occurs, as shown in Fig. 2, as soon as said valve drops into the position shown

in Fig. 3 the deflector, owing to its own weight, will drop also. That part of the deflector-surface against which the extinguishing-fluid is made to strike I have shown to be provided with concentric corrugations on a convex surface, although said surface might instead be made concave or sloping straight, with or without corrugations. Other details might be varied. The lever L might be made to contain several soldered joints, and each of its ends might be arranged to swing around a pivot. The distributer P might be made with only one outlet.

I claim as my invention and wish to secure by Letters Patent—

1. In an automatic fire-extinguisher, the combination, with a distributer, of a valve preventing the discharge of the extinguishing-fluid until released by the heat of a fire, said valve being so constructed as to balance the pressure produced upon it by the extinguishing-fluid, substantially as set forth.

2. In an automatic fire-extinguisher, the combination, with a distributer, of a valve closing one or more outlets in the same, said valve being constructed to balance the pressure produced upon it by the extinguishing-fluid until released by the heat of a fire, and a spring arranged to open or assist in opening said valve, substantially as set forth.

3. In an automatic fire-extinguisher, the combination, with a distributer, of a valve balancing the pressure produced upon it by the extinguishing-fluid until released by the heat of a fire, said distributer having two valve-seats and said valve having two seating-surfaces, substantially as set forth.

4. In an automatic fire-extinguisher, the combination, with a discharge-nozzle, of a valve balancing the pressure produced upon it by the extinguishing-fluid, and of a connecting-piece placed between said valve and a soldered joint arranged to be broken by the heat of a fire, substantially as set forth.

5. In an automatic fire-extinguisher, the combination, with a distributer, of a valve balancing the pressure produced upon it by the extinguishing-fluid, said valve being forced to its seat by screw-thread arrangement, substantially as set forth.

6. In an automatic fire-extinguisher, the combination, with a distributer, of a valve balancing the pressure produced upon it by the extingnishing-fluid, said distributer having two valve-seats and said valve having two seating-surfaces, and being constructed so as to allow an adjustment in length of that part of it lying between the two seating-surfaces, substantially as set forth.

7. In an automatic fire-extinguisher, the combination, with a discharge-nozzle, of a valve balancing the pressure produced upon it by the extinguishing-fluid, and held in position by means of a single soldered joint, substantially as set forth.

8. In an automatic fire-extinguisher, a cap-shaped valve balancing the pressure produced upon it by the extinguishing-fluid, combined with a distributer containing one or more perforations directed toward the circumference of said valve, substantially as set forth.

9. In an automatic fire-extinguisher, a cap-shaped valve balancing the pressure produced upon it by the extinguishing-fluid, combined with a distributer containing a number of perforations directed toward the circumference of said valve and arranged to produce intersecting streams, substantially as set forth.

10. In an automatic fire-extinguisher, a valve balancing the pressure produced upon it by the extinguishing-fluid, combined with a lever holding said valve in position until relieved by the heat of a fire, substantially as set forth.

11. In an automatic fire-extinguisher, the combination, with a distributer, of a valve balancing the pressure produced upon it by the extinguishing-fluid, and a deflector arranged to move with said valve, substantially as set forth.

12. In an automatic fire-extinguisher, the combination, with a discharge-nozzle, of a valve balancing the pressure of the extinguishing-fluid until relieved by the heat of a fire, and a deflector for distributing said fluid, substantially as set forth.

13. In an automatic fire-extinguisher, a valve balancing the pressure produced upon it by the extinguishing-fluid, said valve being arranged to become removed from its seat by its own weight after having been relieved by the heat of a fire, substantially as set forth.

14. In a distributer for fluids, the combination, with a discharge-nozzle, of a deflector provided with corrugations on its face, substantially as set forth.

15. In an automatic fire-extinguisher, the combination, with a distributer having one or more outlets, and a valve closing said outlet or outlets, of a device adapted to enter the space in front of said outlet or outlets after the valve has been relieved by the heat of a fire, there to act as a deflector, said device being provided with a spring for forcing it from the position which it occupied before the valve had been removed, substantially as set forth.

16. In an automatic fire-extinguisher, the combination of a discharge-nozzle having two seats with a valve provided with two seating-surfaces and a yielding packing, which softens under the influence of heat, located between valve and distributer, substantially as set forth.

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Witnesses:
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