(No Model.)

C. L. HORACK.

AUTOMATIC FIRE EXTINGUISHER.

No. 381,376. Patented Apr. 17, 1888.

Fig. 1.

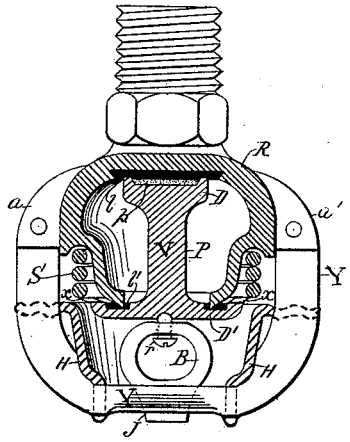


Fig. 2.

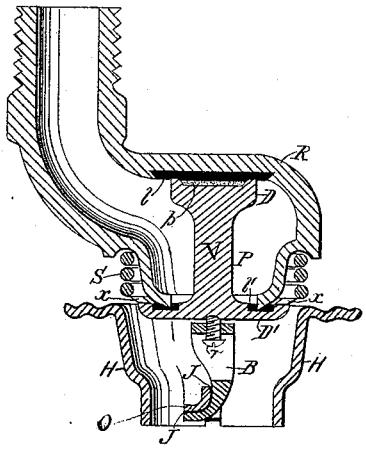
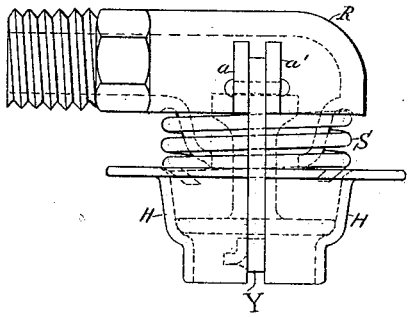


Fig. 3.



Witnesses.
John Buckler.
Waldorf H. Phillips

Inventor.
Chas. L. Horack.

UNITED STATES PATENT OFFICE.

CHARLES L. HORACK, OF BROOKLYN, NEW YORK.

AUTOMATIC FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 381,376, dated April 17, 1888.

Application filed October 27, 1882. Serial No. 75,287. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. HORACK, a citizen of the United States of America, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Automatic Fire-Extinguishers, of which the following specification is a full, clear, and exact description.

My invention relates to that class of fluid-distributing nozzles for fire-extinguishing purposes which are adapted to open upon being subjected to the heat of a fire.

The object of the present invention is to produce a distributing-nozzle of the class specified which shall embody in its organization features whereby the injurious effects of water-hammer resulting from varying pressure in the pipe system will be neutralized, or nearly so; also, to produce a distributer simple in construction and not liable to become obstructed by impurities contained in the extinguishing-fluid or by dust and flyings in the air; also, to provide such a form of fusible joint, whereby the valve of the distributer is held to its seat to confine the extinguishing-fluid until the occurrence of a fire, as shall best guard against its becoming broken or disrupted accidentally before a fire occurs, and against its yielding gradually to any extent during the first stages of a fire, thus preventing the escape of any of the extinguishing-fluid upon the fusible joint while the process of fusing said joint is going on, and consequently insuring the complete rupturing of said sustaining-joint simultaneously with the initial movement of the valve from its seat; and, finally, to provide a suitable protection for the fusible joint and for the connecting-piece between the valve and said joint.

The features of novelty for which I desire protection are pointed out in the claims at the end of this description.

Referring to the accompanying drawings, in which like parts are indicated by like letters, Figure 1 represents a vertical section of a distributer embodying my improvements and showing the elements as they appear before the occurrence of a fire. Fig. 2 is a similar section at right angles to that shown in Fig. 1; and Fig. 3 is a side view showing the distributer in the condition in which it will appear after its valve has been relieved by the heat of a fire. In the latter view the supply-port is shown in the side wall of the casing, while in the other views it is arranged above said casing.

In the drawings, the letter V represents the valve, which consists of two disks, D D′, connected by a standard or post, P. Each of the two disks rests against a seat, the upper one being inside of and on the upper wall of the extinguisher-casing R, while the lower seat is outside of and upon the lower wall of said casing. Where the disks and the walls of the casing R meet layers of soft metal *l l′*—such as lead or rubber, or other yielding material used for valve-seats—are employed, as shown in Figs. 1 and 2. Besides, a packing, *p*, of wax, paraffine, or similar material, is applied between the upper disk, D, and the upper wall of the casing R for the purpose of preventing a cavity existing at that point. If this cavity were not thus avoided, it might become filled with the extinguishing-fluid, which would exert a downward pressure upon the disk D, and thus cause the valve V to leak.

It will be readily understood that when in a closed position the upper disk, D, will receive an upward pressure from the extinguishing-fluid, while the lower disk receives a downward pressure, and as the two disks are rigidly connected together these opposed fluid-pressures will fully or partly balance each other, according as to whether the effective areas receiving these two pressures are equal or not. In this instance the two seats are round and as nearly as practicable of the same diameter, thus providing for the equalization of the fluid-pressure upon the valve V.

Y is a yoke attached to the casing R by means of the lugs *a a′*. The brace B and screw *r*, contained within said brace, combined form the bracing mechanism for adjusting and holding the valve in position until released by the heat of a fire. The brace B is attached to the yoke by means of the fusible soldered joint J. The upper end of brace B contains the screw *r*, which is made to rest against the lower disk, D′, and is used to force the valve V to its seats.

A permanent yoke constructed and attached to the casing, as shown, is a desirable supporting device for the valve, owing to the fact that

if constructed of sufficiently-rigid material it will furnish a reliable and unchangeable rest for the brace which intervenes between the yoke and said valve, and will at the same time permit of placing the joint, which restrains the valve, directly underneath the body of the casing R and of the valve, thus permitting the pressure on said valve while the restraining-joint is fusing to be transmitted to said joint in a direct manner, and, where a fusible joint of the form or nature of the one employed by me is used, to permit the parting of the brace B from said yoke with the least danger of the one binding upon the other. The fact that the upper part of the brace B is not attached to the valve also greatly facilitates this parting of the brace from the yoke. It will be seen that the upper part of said brace B is made of sufficient thickness to surround or protect said screw in such a manner that after the fusible joint J has been ruptured by the heat of a fire the brace, with said screw, can move downward and drop off without the screw catching on any part of the device. The general outlines of said brace B are rounding, and are made so for the purpose of facilitating the dropping off of the same under the circumstances mentioned.

The form of the fusible soldered joint J is peculiar. The fusible solder generally used for the joints for holding valves to their seats in automatic fire-extinguishers when applied in a thin film between two metallic surfaces is less able while in its normal condition and before it becomes affected by the heat of a fire to resist a force applied to it at or near right angles to the joint than it is to resist a force or strain applied in the direction in which two parts would have to become separated by one of them sliding on the other, and in factories—such as cotton-mills, &c.—where automatic sprinklers are principally used, accidental strokes are frequently applied to the sprinklers while the ceilings of the rooms are being swept off, or while the shafting and belting are being changed and adjusted. Now these facts make it important to so shape the fusible joint that it will offer, when in a cold condition, a sufficient resistance to an accidental blow, no matter from what direction the blow may be applied, and this is accomplished by making the same of a conformation adapted to be separated, as hereinafter explained. When the fusible solder is affected by the heat of a fire, the joint that separates by strain that produces a sliding motion is the most easily broken, although when cold it offers the most resistance to a blow in the direction of the strain, while a joint which separates by strain applied at right angles thereto offers the most resistance under the influence of the heat of a fire, although such a joint when cold is easily broken by a blow or pressure applied thereto in the direction of the strain. The most reliable joint, therefore, for an automatic extinguisher is one which offers some sliding resistance to strain applied in whatever direction, not only because it is less liable to be damaged by an accidental blow, but because when properly constructed it is not liable to permit the valve to prematurely leak, and thus interfere with the fusing process. The joint shown at J in the drawings embodies all of the desirable features mentioned. Solder such as is usually employed in automatic sprinklers for confining a valve will practically cease to resist the sliding by each other of the surfaces joined together as soon as it begins to soften and before it assumes a fluid condition, while it will continue to resist the tearing apart at right angles to the surfaces thus joined together until it has reached a fluid condition. I take advantage of this fact by so constructing my joint that I make the heat during the first stages of a fire overcome the resistance of its vertical part, while the lower horizontal part still remains strong and reliable. The horizontal part of the joint J, therefore, serves to bridge over the dangerous period of the fusing process, during which a slow sliding motion of the vertical part of the joint J would occur if the same were not re-enforced by the horizontal part, as described. It will be observed that joint J is composed of two portions at right angles, or substantially so, to each other. The lower or horizontal portion receives the strain which the brace B transfers from the valve at right angles to the plane of that portion of the joint, while the vertical portion of said joint receives the strain in a line corresponding to the movement which that portion of the joint assumes in separating. The joint is consequently fortified against accidental blows. Now in fusing, as the horizontal portion of said joint is more difficult to separate under the influence of heat than the vertical portion, which separates by a sliding motion, the said horizontal portion will resist the opening of the valve after the vertical portion has ceased to do so. When, finally, the horizontal portion has ceased to offer resistance, the joint is then in such condition as to open suddenly and completely, thus avoiding the liability of the extinguishing-fluid leaking at the first stages of the fusing process, which circumstance often results in resealing the joint after it has partially fused, thereby preventing the extinguisher from operating.

A joint fully as strong in every direction could be constructed by making the lower end of the brace B assume the form of an eye passing around and attached to a vertical projection on the under side of the yoke; but in order to have the yoke and brace separate when thus constructed after the solder has fused the two parts would have to slide by each other for some distance, thereby giving the solder a chance to become chilled and be formed into a new joint, and thus preventing the discharge of the extinguishing-fluid; but the separation of the metallic surfaces thus joined together, particularly in the case of the temperature rising slowly, while beginning earlier would be

a more gradual one, and would not be completed until the fusing process had proceeded far enough to permit the sliding by each other of the two metallic surfaces for their entire depth, thus permitting leakage and resetting of the solder.

From Fig. 2 it will appear that while the vertical part of the joint J is directly under the center of the valve, or nearly so, the part of the brace directly above said joint curves outward slightly and easily, so as to have its left-hand outer surface assume a position above that part of the yoke which contains the upper part of the joint J. It will be seen that in case the valve is permitted to assume a very slow motion while the upper and upright parts of the joint J are sliding by each other during the first stages of the fusing process, this part of the surface of the brace would be a source of danger, as it would be apt to slide down into a position adjoining that part of the yoke-surface that had contained the upright part of the joint before, thus tending to perpetuate the vertical part of the joint, the water having already begun to escape. On the other hand, it will be seen that in case the brace B could be kept in its position until the solder had become entirely fluid, thus ceasing to resist to any considerable extent the sliding by each other of the upright parts of said joint, as well as the separation of its horizontal parts, the form of the surface of the brace B above the joint, as described, would, when motion downward was imparted to said brace by the spring or the pressure of the extinguishing-fluid, have a tendency to sufficiently force apart sidewise the vertical parts of the joint J, so as to do away with any remaining danger of resetting the joint, owing to the escape of extinguishing-fluid.

In my device that part of the yoke Y which is placed directly under the valve is shown to be bent sidewise sufficiently to bring the upper part of the soldered joint directly under the center of the valve.

By placing the fusible joint, as in my structure, beneath the body of the valve, I do away with the tendency of the parts joined together in different ~~flames~~ to bind that would otherwise exist during the movement of those parts incident to the fusing of the joint. This construction also insures the valve, including the disk-deflector D, against any dipping motion while in the act of moving downward. The lower edge of the yoke at this point is shown to point outward, as appears at *o* in Fig. 2. It will therefore be seen that in case the brace B or yoke Y should receive an accidental blow from any direction the joint J could not be broken without some of the parts joined together being made to slide by each other, which the fusible solder generally used is able to resist, especially in the form of joint which I have devised. On the other hand, it will be seen that as soon as the solder has entirely fused the brace B is at liberty to move sidewise or downward and to drop off without any danger of the solder composing the joint becoming chilled and forming another joint.

S is a spiral spring placed around the lower part of the casing R. It is made to exert a downward pressure on the valve V, while the same is used to close the outlet to the casing R, as shown. The arms *x x* are used to convey the pressure from the spring to the edge of the disk D′. Said arms are connected to the spring, but are made to rest only on the valve. They might, however, be dispensed with by so coiling the lower part of the spring as to make it rest directly on the outer part of the disk D′.

It is important to locate the spring on the outside of the extinguisher-casing, in order that it may always be in view, so that its condition may readily be inspected at any time.

It is also desirable that said spring should not surround the valve itself, as the structure will then be less complicated and all the parts more easily adjusted and more open to inspection.

The lower disk, D′, it will be observed, extends beyond the circumference of the valve-seat for the twofold purpose of furnishing support for the spring S and the better to adapt it for use as a deflector.

H is a hood or basket-shaped device, the bottom being open. It is made to rest on the yoke Y, which supports said hood in position and prevents it from moving sidewise or downward by being made to pass through its upper and lower edges, as shown, and in addition thereto the yoke and hood might be soldered or wedged together to give the hood a firmer position.

In case of fire the heat will break the soldered joint J, and the brace B, with screw *r*, will drop off through the lower opening in the hood H, and the spiral spring will force the valve V downward, the spring coming to rest on the upper part of the hood H, while the valve V, owing to its own weight and the force of the escaping fluid, will continue on its downward course until it reaches the position shown in dotted lines in Fig. 3, where its under side will serve to close the lower opening in the hood H, thereby forming with said hood a cup.

It is important that the supporting device should be entirely disconnected from the deflector, so that said supporting device will not interfere with the deflector in assuming its proper position for deflecting the extinguishing-fluid. The extinguishing-fluid will then be deflected outward by the upper surface of the disk D, and will only have an opportunity to escape sidewise above the sides of the hood and between the coils of the spring S. This will cause the discharge of the extinguishing-fluid upon a fire in a spray. The upper part of the hood H is represented in the form of a corrugated deflector. This is for the purpose of securing an ample discharge of extinguishing-fluid toward the ceiling, although ordinarily the spiral spring alone, acting as a dis-

tributer or deflector, will be sufficient to accomplish this.

The hood H, before a fire occurs, serves to protect the brace B and the soldered joint J against being accidentally struck, and will also prevent the soldered joint J from being kept cool by fluid discharged by neighboring sprinklers.

The only part of the valve V which is outside of the sprinkler-casing, and which, therefore, may require protection while in its normal position, is the disk D′, and the hood H provides such protection for the same; and so far as this function of the hood H is concerned, it is obvious that the disk D′ need not be provided with the stem P.

Instead of the brace B being used to confine the valve V to its seat, a lever might be employed for that purpose, and a joint, as described, be made to secure said lever until released by the heat of a fire.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The casing of an automatic fire extinguisher, having a disk closing its outlet, in combination with a fusible joint holding said disk to its seat until released by the heat of a fire, and a hood independent of said casing and furnishing protection for said disk as well as for the fusible joint, substantially as set forth.

2. The casing of an automatic fire-extinguisher, having a disk closing its outlet, in combination with a hood surrounding said disk and supported in close proximity to said outlet and of a diameter less at bottom than at top, whereby the disk when released from its seat adjusts itself within said hood, substantially as and for the purpose set forth.

3. The casing of an automatic fire-extinguisher, having a disk closing its outlet, in combination with a protecting-hood surrounding said disk, and a yoke rigidly supporting said hood in position, substantially as set forth.

4. The casing of an automatic fire-extinguisher, having a valve held to its seat by a device fusible under the influence of a fire, in combination with a yoke and a hood, said yoke supporting the fusible device as well as the hood, and the hood protecting the fusible device, substantially as set forth.

5. In an automatic fire-extinguisher, the combination, with a valve closing the outlet and adapted to move downward after having been released by the heat of a fire, of bracing mechanism supporting the valve and secured to a yoke by fusible solder in a substantially vertical plane, and a spring adapted to expand downward while actuating the valve and bracing mechanism, part of the bracing mechanism intermediate the valve and yoke and above the part of the yoke containing said vertical plane being provided with a surface deflected laterally from said vertical plane for the purpose of converting thrust of the spring after the fusing of the solder into motion of the bracing mechanism lateral to said vertical part of the yoke, substantially as set forth.

6. In an automatic fire-extinguisher, the combination, with the valve closing the outlet, of bracing mechanism supporting the valve and secured to the yoke by fusible solder substantially in two planes and a spring for releasing the solder-joint, part of said bracing mechanism being deflected laterally for the purpose of converting thrust exerted by the spring into motion of that part of the bracing mechanism to which said solder had been applied lateral to both said planes on said yoke, substantially as set forth.

7. In an automatic fire extinguisher, the combination, with a valve closing the outlet, of bracing mechanism supporting the valve and secured to a yoke by fusible solder in two planes substantially at right angles to each other, a spring for releasing the solder-joint, part of the bracing mechanism being provided with a surface deflected laterally for the purpose of converting after the fusing of the solder the thrust of the spring into motion of that part of the bracing mechanism which contains said deflected surface, and also contains such surfaces to which the fusible solder had been applied in a direction lateral to both the planes on the yoke to which the bracing mechanism was attached, substantially as set forth.

8. In an automatic fire-extinguisher, in combination with a valve closing its outlet, a bracing mechanism supporting said valve and secured to a yoke by fusible solder substantially in two planes, whereby said solder upon its softening, owing to the heat of a fire, is subject in part to sliding strain and in part to tearing strain, part of the bracing mechanism being provided with a surface deflected laterally to both planes for the purpose of directing after the fusing of the solder, and under the influence of the thrust of the spring, the part of the bracing mechanism containing the surfaces to which the solder had been so applied in a direction lateral to both the planes on the yoke, substantially as set forth.

9. In an automatic fire-extinguisher, in combination with a valve, V, closing its outlet, a spring, S, resting on said valve, bracing mechanism supporting said valve and secured to a yoke by fusible solder substantially in two planes and constructed with a deflected surface on the brace B, forming part of said bracing mechanism, for the purpose of converting thrust of the spring into motion of said brace lateral to both planes on said yoke, substantially as set forth.

CHARLES L. HORACK.

Witnesses:
CHAS. J. SUMMERSON,
WALDORF H. PHILLIPS.

Correction in Letters Patent No. 381,376.

It is hereby certified that in Letters Patent No. 381,376, granted April 17, 188 upon the application of Charles L. Horack, of Brooklyn, New York, for an improv ment in "Automatic Fire-Extinguishers," an error appears in the printed specificatic requiring correction, as follows: In line 49, page 3, the word "flames" should l stricken out and the word *planes* inserted instead; and that the Letters Patent shou be read with this correction therein that the same may conform to the record of tl case in the Patent Office.

Signed, countersigned, and sealed this 1st day of May, A. D. 1888.

[SEAL.]

D. L. HAWKINS,
Assistant Secretary of the Interi

Countersigned:

BENTON J. HALL,
Commissioner of Patents.