D. W. PATTERSON.

FIRE EXTINGUISHING SYSTEM OF THE SPRINKLER HEAD TYPE.

APPLICATION FILED JUNE 8, 1917.

1,259,903.

Patented Mar. 19, 1918.

Fig. 1.

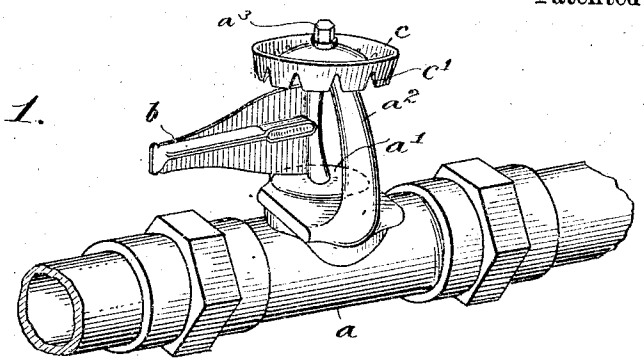


Fig. 2.

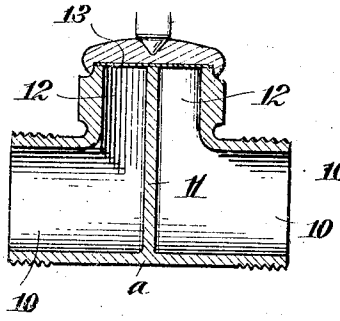


Fig. 4.

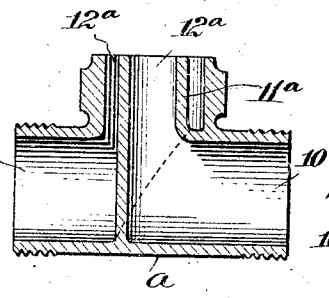


Fig. 6.

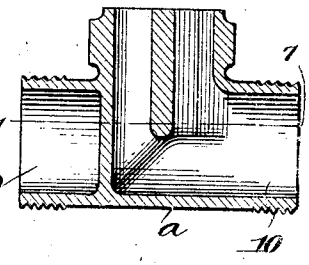


Fig. 3.

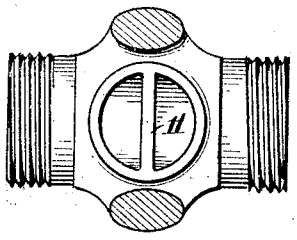


Fig. 5.

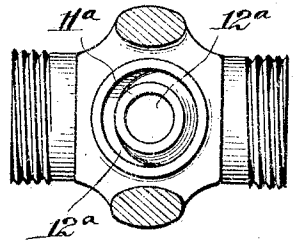
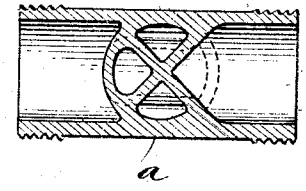


Fig. 7.



Inventor,

Duncan W. Patterson.

By his Attorneys,

Meyer, Carothers & Rea

UNITED STATES PATENT OFFICE.

DUNCAN W. PATTERSON, OF CRANFORD, NEW JERSEY, ASSIGNOR TO MacANDREWS AND FORBES COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

FIRE-EXTINGUISHING SYSTEM OF THE SPRINKLER-HEAD TYPE.

1,259,903. Specification of Letters Patent. Patented Mar. 19, 1918.

Application filed June 8, 1917. Serial No. 173,517.

To all whom it may concern:

Be it known that I, DUNCAN W. PATTERSON, a citizen of the United States, residing at Cranford, in the county of Union and State of New Jersey, have invented new and useful Improvements in Fire-Extinguishing Systems of the Sprinkler-Head Type, of which the following is a specification.

This invention relates to improvements in fire extinguishing systems, pertaining more particularly to the construction and arrangement of sprinkler-head units usable in such systems.

In installing fire extinguishing apparatus in buildings, etc., where the extinguishing medium is brought directly into an overhead position in a room, it is the general practice to employ one or more sprinkler-head units which normally retain the conduit for the medium closed against discharge of the medium, with the unit arranged in such manner that in the presence of higher temperatures, such for instance as are produced by fire conditions, the holding means for the closure will be automatically released to permit discharge of the medium. By employing a plurality of units in a conduit header, a comparatively large amount of extinguishing medium can be delivered at the point where the temperature conditions open up the conduit.

So far as I am aware, sprinkler-head systems have been confined entirely to apparatus where a single medium is used, being either water or solution of some fire extinguishing salt in water, thus limiting this type of installation to the use of a particular form of extinguishing medium. While such system—the sprinkler-head system—is particularly advantageous by reason of its being permanently located at the point where needed and ready for operation, it has the disadvantage of limiting the fire extinguishing operation to practically the use of water or a single solution of water and a fire extinguishing salt in comparatively large amounts.

Developments in the fire extinguishing art made in recent years provide a more efficient extinguishing medium by what is known as the foam-extinguishing process, this process employing individual solutions which, when brought together, produce a gas which is noxious to the fire flame, one or both of the solutions carrying an ingredient which produces a foam effect when the solutions are commixed. Various ways of utilizing the foam-extinguishing process have been contemplated, but, so far as I am aware, the possibility of utilizing such process in connection with a sprinkler-head system, has not been contemplated, due probably to several difficulties which are inherent in connection with the use of the process. For instance, the solutions must normally be kept separate, the product resulting from the commixture spending itself, thus decreasing the value of the commixed solutions. This practically prevents maintaining the headers filled with the commixed solutions ready to be discharged. A somewhat similar effect is present where an attempt is made to provide the commixture of the solutions at a single point and then carry the commixed solutions through the lines to the open sprinkler-head unit, since the travel of the commixed solution tends to reduce the efficiency.

The present invention is designed to meet these and other objections and permit of the use of the foam type of extinguishing medium in connection with sprinkler-head systems. This is made possible by maintaining the solutions separate within the conduit system, and commixing the solutions after they have passed from the conduits. This result I obtain by the use of a sprinkler-head unit in which the several solutions are discharged in proximity to each other in a more or less stream-like manner, and obstructing the flow path of the stream to force the component elements of the stream into a commixed relation, whereupon the chemical reactions immediately take place and the medium distribution is practically at its greatest efficiency owing to the fact that it is put into service immediately upon its formation, the commixing taking place in the open air and under the most favorable conditions.

To these and other ends, therefore, the nature of which will be readily understood as the invention is hereinafter disclosed, said invention consists in the improved construction and combination of parts hereinafter fully described, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

In the accompanying drawings,

Figure 1 shows a sprinkler-head unit mounted on a conduit header, with the solu-

tion discharge openings closed by the holding means for the closure.

Fig. 2 is a sectional view taken through a portion of a unit, showing one way in which the discharge member may be formed.

Fig. 3 is a diagrammatic view showing the configuration of the solution discharge portion of the member.

Figs. 4 and 6 are views similar to Fig. 2 showing other forms of solution discharge elements.

Fig. 5 is a diagrammatic view showing the arrangement of the discharge openings of the structure of Fig. 4.

Fig. 7 is a sectional view taken on line 7—7 of Fig. 6.

In illustrating the invention, a single unit is shown, it being understood that each unit is connected to each of the solution lines, the latter being independent of each other, so that when the system is inactive, and each of the units are closed, the several solutions will be maintained free from admixture. So far as the present invention is concerned, the several solutions may be held within the pipe lines, or may be normally maintained out of such lines and brought into the lines when needed, as for instance is referred to in the patent to Walker, 1,186,249, June 6, 1916, or in my companion application filed March 13, 1917, Ser. No. 154,471.

While the solutions employed may be of any desired type, I prefer to employ what is known as the "foamite" solution, in which one of the solutions is formed of aluminum sulfate and water, while the other solution is formed of sodium bi-carbonate, water and "foamite", these solutions, when commixed, producing the desired foam-extinguishing medium.

The present invention comprises primarily a solution discharge element a having a closure a' and a yoke a^2 carrying a member a^3, (which may be threaded or otherwise secured to the yoke) the inner end of the member a^3 being opposite the exposed face of closure a'. b designates the holding means for the closure, this member extending between the inner end of member a^3 and the closure a', and being preferably formed of two members which are normally held in proper relative position by a suitable fusible metal connection, this being a well-known form of holding means; when the temperature has been raised by fire conditions to a sufficient extent, the fusible metal melts and permits the two members to separate, as by gravity, by the pressure of the solutions on the closure, or by both, the cap being released and permitting the solutions to be discharged.

c designates a combined commixing element and distributer, this being carried by the yoke in a position to intersect the flow path of the discharging stream or streams, thus breaking up the stream formation and causing the solutions to be commixed. If desired, the element c may be provided with notches c' through which the commixing solutions may pass, and, the notches may be arranged more or less inclined to radii of the element, and the element may be loosely mounted, in which case the notch formation may tend to set up a rotating effect on the element when the commixed solution is being discharged. If desired, the element may be provided with openings leading from the notches through the web.

As will be understood, commixing of the solutions is entirely in the open air. A small amount of commixing action may take place while the solution streams are passing from the discharge element to element c, but the main commixing action is provided by the action of element c in intersecting the streams or composite stream, breaking up the stream flow and causing the desired amount of commixture of the solutions.

Discharge element a may be of different types, each type, however, having independent inlets for the individual solutions, these inlets being preferably in axial alinement, although, it will be obvious, they may be arranged angularly to each other, the several inlets being arranged to permit connection to the pipes of the conduit system.

In Figs. 2 and 3 I have shown a simple arrangement in which the inlets, indicated at 10, are maintained separate by a web or partition 11 leading to the plane of the discharge opening, thus dividing the latter into discharge ports 12—12, the closure a' being located over these ports, a suitable sealing element 13, which may be a disk, washer, or gasket of oiled paper, being interposed between the closure and the body of element a. In this form, the several ports are located on opposite sides of the wall 11 which extends diametrically, as indicated in Fig. 3.

In Figs. 4 and 5, the discharge ports 12^a—12^a are shown as concentrically arranged, the division wall being in the form of a tubular member 11^a which practically forms an L with one of the inlets, the other inlet having an annular discharge port. It is preferred that the areas of the two ports be approximately equal. In this form, the composite stream is made up of an annular stream of one solution with an internal stream of the other solution.

In Figs. 6 and 7, element a has its discharge ports arranged to provide for the discharge of the solutions in four streams, the discharge ports each being somewhat triangular in contour with the ports so connected with the inlets that alternate ports will discharge the same solution, while adjacent ports will discharge different solutions. This latter form of element a is preferred, since the streams are discharged in

such manner as to produce a quicker commixture and more rapid development of the fire extinguishing medium at the time when rapidity of development is of the greatest value.

As will be seen, each of the forms is so arranged that while each solution is discharged through a separate port, the direction of the discharge is such that the separate streams are in such close relation that they form, after discharge, practically a composite stream, the travel of the stream being of sufficient length to provide the commixture at a point spaced from the port outlets, reducing liability of the developed mixture tending to shut off discharge through the ports, and at the same time the distance is not of such length as would cause stream dispersion to an extent which would carry the stream out of intersection with element *c* to any material extent. Furthermore, the length of travel between the discharge port and element *c* will not materially reduce the pressure of the stream below the discharging pressure of the individual streams. And since the length of movement of each of the discharged streams is substantially the same, due to the particular arrangement, it will be understood that the solutions will be delivered in practically predetermined proportions so as to produce a proper development of the extinguishing medium, thereby insuring for maximum efficiency.

Element *c* has its active face more or less concave so that the streams or composite stream—projected under considerable pressure—will be properly commixed and thrown out in a more or less canopy-like formation carrying the developed medium away from the path of the streams being delivered. Hence there is little likelihood of the developed medium interfering with the passage of the solutions to the medium developing position. Obviously, the arrangement practically provides for dispersion at the time when the solutions are brought into commixing relation, and the more or less violent intermingling of the broken up streams serves to produce a condition where the chemical reactions may take place with rapidity and, if necessary, during the movement of the broken up elements through the air in passing from element *c* to the fire. Hence the medium is at maximum efficiency, none of the ingredients having become spent through travel in conduit or header under conditions where chemical reaction can take place therein.

As will be readily understood, the discharge ports of the several forms shown are so arranged relatively to each other that each solution is discharged through its port or ports in stream form, with the path of travel of the streams adapted to place the streams in juxtaposition after discharge, the arrangement causing individual discharged streams to form zones of a composite stream, the juxtaposed zonal boundary portions of the streams being formed from different solutions. As a result, the general arrangement provides for compactness, and at the same time provides for efficient commixing action, in that the several solutions are in such close relation at the time when the stream formation is broken up that the desired chemical reaction may take place with rapidity.

While I have herein shown and described various ways in which the invention may be carried into effect, it will be obvious that variations, changes or modifications therein may be desirable or be required in meeting the needs of individual installations, and I desire to be understood as reserving the right to make any and all such changes or modifications as may be found desirable or essential, in so far as the same may fall within the spirit and scope of the invention as expressed in the accompanying claims when broadly construed.

Having thus described my invention, what I claim as new, is:

1. As a means for extinguishing fires by the foam-extinguishing process, a delivery system of the sprinkler-head type, said system including independent lines for the several component solutions, and a sprinkler-head unit common to said lines, said unit comprising individual discharge ports for the solutions, and means for maintaining the ports closed in the absence of fire conditions, said means being automatically releasable in the presence of fire conditions to permit free discharge of the individual solutions concurrently, each solution passing through its discharge port in stream form and in a direction to place the streams in juxtaposition and in substantially commixing relation after discharge.

2. As a means for extinguishing fires by the foam-extinguishing process, a delivery system of the sprinkler-head type, said system including independent lines for the several component solutions, and a sprinkler-head unit common to said lines, said unit comprising individual discharge ports for the solutions, means for maintaining the ports closed in the absence of fire conditions, said means being automatically releasable in the presence of fire conditions to permit free discharge of the individual solutions concurrently, each solution passing through its discharge port in stream form and in a direction to place the streams in juxtaposition after discharge, and means intersecting the path of travel of the discharged streams for affecting the individual stream formations to produce commingling and commixing of the components of the solutions, whereby commixing of the solutions to pro-

duce the extinguishing medium is provided solely after solution discharge.

3. A sprinkler-head unit adapted for foam-extinguishing systems and comprising an element having independent inlets for the individual solutions and also having individual discharge ports communicating with the respective solution inlets, whereby communication between solutions will be prevented within the element, closure means for the discharge ports, and means for normally holding the closure means in port-closing position and being automatically releasable in the presence of fire conditions to permit free discharge of the individual solutions through the respective ports in stream form, the discharge ports being relatively arranged to cause individual discharged streams to form zones of a composite stream with juxtaposed zonal boundary portions formed from different solutions.

4. A sprinkler-head unit adapted for foam-extinguishing systems and comprising an element having independent inlets for the individual solutions and also having individual discharge ports communicating with the respective solution inlets, whereby communication between solutions will be prevented within the element, closure means for the discharge ports, and means for normally holding the closure means in port-closing position and being automatically releasable in the presence of fire conditions to permit free discharge of the individual solutions through the respective ports in stream form, the discharge ports being relatively arranged to cause individual discharged streams to form zones of a composite stream with juxtaposed zonal boundary portions formed from different solutions, said unit carrying an element positioned to intersect the flow path of the composite stream and located at a point spaced from the discharge ports.

5. A sprinkler-head unit adapted for foam-extinguishing systems and comprising an element having independent inlets for the individual solutions and also having an internal configuration for producing individual discharge ports communicating with the respective solution inlets with the discharge ports in juxtaposed relation, said ports extending to a common plane, whereby communication between solutions will be prevented within the element, closure means for the discharge ports, and means for normally holding the closure means in port-closing position and being automatically releasable in the presence of fire conditions to permit free discharge of the individual solutions through the respective ports in stream form, said ports being relatively positioned to cause individual discharge streams to form zones of a composite stream with juxtaposed zonal boundary portions formed from different solutions.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

DUNCAN W. PATTERSON.