F. A. EPPS.

APPARATUS FOR EXTINGUISHING FIRE.

APPLICATION FILED JAN. 9, 1917

1,296,937.

Patented Mar. 11, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

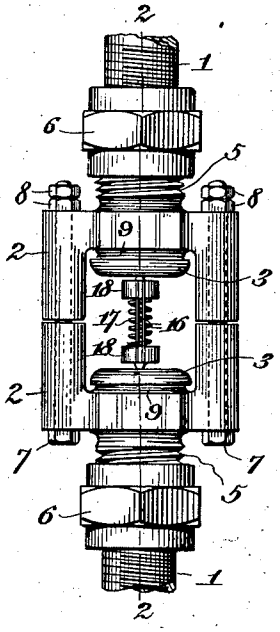


Fig. 2.

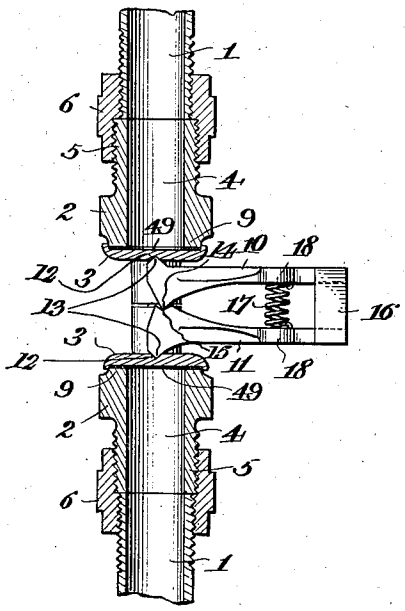


Fig. 4.

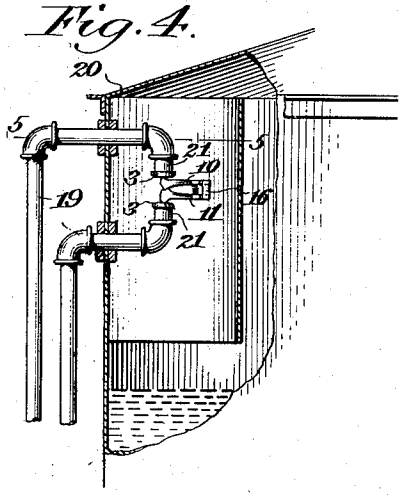


Fig. 3.

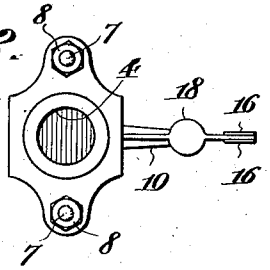
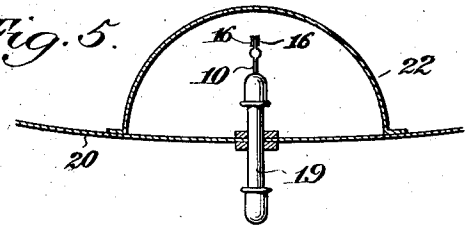


Fig. 5.



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2 SHEETS—SHEET 2.

Fig. 6.

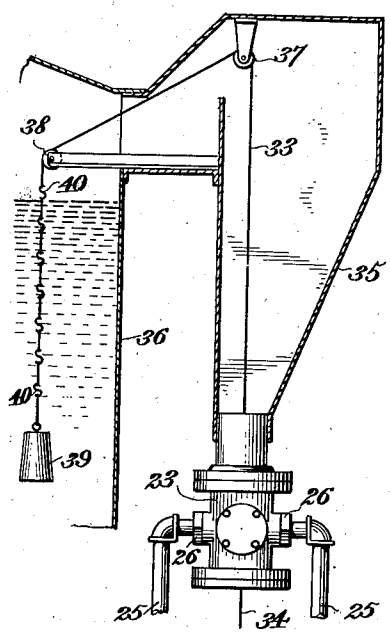


Fig. 7.

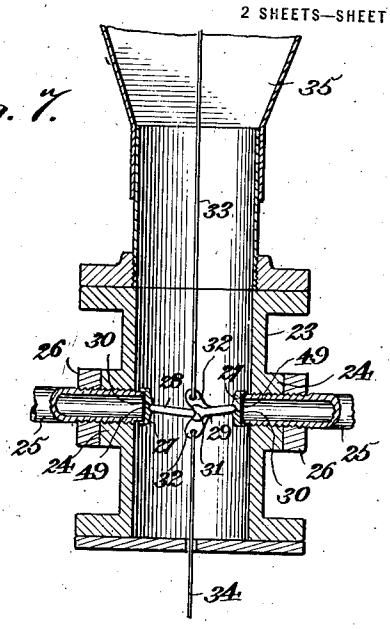


Fig. 9.

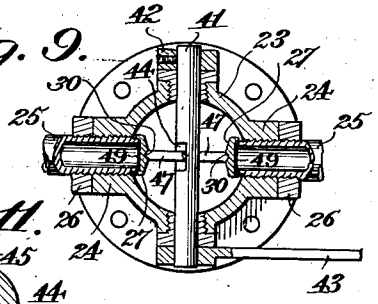


Fig. 8.

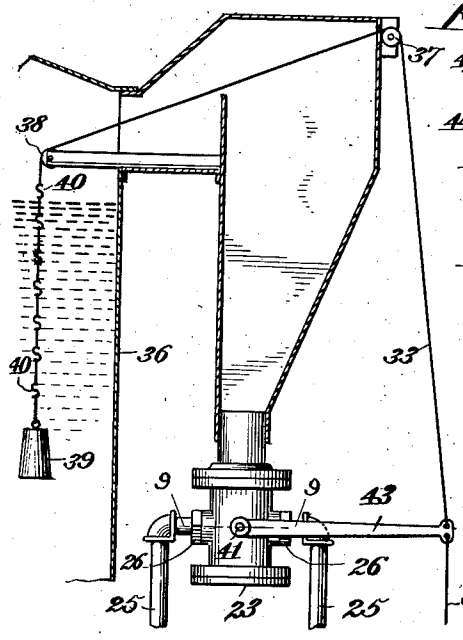


Fig. 11.

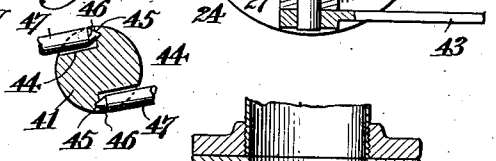
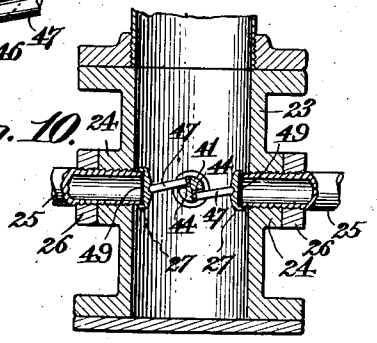


Fig. 10.



Inventor,

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By his Attorneys,

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UNITED STATES PATENT OFFICE.

FRANK A. EPPS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS TO FOAMITE FIREFOAM COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

APPARATUS FOR EXTINGUISHING FIRE.

1,296,937. Specification of Letters Patent. Patented Mar. 11, 1919.

Application filed January 9, 1917. Serial No. 141,374.

To all whom it may concern:

Be it known that I, FRANK A. EPPS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Extinguishing Fire, of which the following is a specification.

This invention relates to apparatus for extinguishing fire.

The principal purpose of this invention is to create from different solutions an aqueous blanket consisting of foam and a gas inimical to fire, which is retained by the foam, by directing separate streams in intersecting flow paths to provide an intermixing relation between them, the streams passing into forcible contact with each other as from opposing directions. It might be well to mention that where I have used the word "opposite" or "opposing" to define the relative position of the outlet ends of the solution-conducting pipes, I do not wish to be limited to the arrangement shown as such ends may be arranged in other positions to bring about the desired result.

The principal object of this invention is to provide an appropriate apparatus by combining certain elements so that the solutions utilized in accordance with this invention will be normally held against flow by preventing their release, such release preferably occurring automatically and producing distribution of the solutions and extinguishment of the fire.

Another object of this invention is the production of apparatus of various forms to permit of their arrangement in various places, such for instance, as stationary oil tanks, oil tank steamers, dwellings, shops, factories, in fact, they could be arranged anywhere for the automatic production and distribution of the fire extinguishing agent in the novel manner mentioned to extinguish fires of incendiary, unforseen or other origin.

Several preferred forms of the apparatus have been illustrated in the accompanying drawings and I wish it to be understood that such showing made is only to illustrate the object of the invention as no limitation is necessarily made to the precise details therein exhibited, but further changes, alterations and modifications within the scope of the claims may be resorted to without departing from the spirit of the invention.

In the drawings which accompany this specification,

Figures 1, 2 and 3 illustrate one form of apparatus with which the fire extinguishing solutions are mixed and distributed; Fig. 1 is a side elevation of the device; Fig. 2 is a vertical sectional view taken on the line 2—2 in Fig. 1; Fig. 3 is a plan view of the mated heads and their correlated parts.

Figs. 4 and 5 illustrate a different application and embodiment of my invention; Fig. 4 is a sectional elevation showing the application of the apparatus to a stationary oil tank, the conducting pipes and the solution controlling means being shown in elevation; Fig. 5 is a horizontal sectional view taken on the line 5—5 in Fig. 4.

Figs. 6 and 7 illustrate a further application and embodiment of my invention; Fig. 6 is a sectional elevation, an oil tank being equipped with the apparatus for directing the solutions toward each other from opposing points of a mixing head which forms a part of the apparatus for their commixture therein, the commixed solution passing upwardly through a conducting fixture attached to and in communication with the tank; Fig. 7 is a vertical sectional view through the mixing head.

Figs. 8 to 11 illustrate a further application and embodiment of the invention; Fig. 8 is a sectional elevation of a mixing apparatus similar to that shown in Figs. 6 and 7 with the exception of the toggle for retaining the pipe closure means, the apparatus being shown applied to an oil tank; Fig. 9 is a horizontal sectional view taken on the line 9—9 in Fig. 8; Fig. 10 is a central vertical sectional view through the mixing head and Fig. 11 is a detail view of a portion of the toggle for retaining the pipe closure means.

On reference to the drawings, it will be seen that the apparatus, generally, consists of closure means, for the outlet ends of the solution-conducting pipes, means for retaining the closure means in closed position upon said pipes and means for indirectly holding the closure means against movement and for automatically releasing the solutions. Referring now to Figs. 1 to 3 inclusive, one form of apparatus has been shown. The numeral 1 designates the outlet end of the solution-conducting pipes. The closure means employed in this particular instance, prefer-

ably consists of mated heads 2—2 and disk-like caps 3. Each of the said heads 2—2 is provided with a bore 4 and a nipple 5, through which the bore 4 extends. The outlet ends 1 of the solution conducting pipes are coupled to the nipple 5 by couplings 6. I have found that best results are obtained by locating the solution-conducting pipes close together and in opposition to each other but obviously they could be otherwise arranged to bring about the desired result. In the present instance the conducting pipes are disposed preferably in vertical alinement. The mated heads 2—2 are held together by bolts 7 and nuts 8. The bolts and their nuts as well as the coupling 6 permit of a relative adjustment of the heads 2—2, for reasons to appear hereinafter. The heads 2—2 are substantially U-shaped and each is provided with a boss or seat 9. The seats 9 surround the bores 4 and accommodate the disk-like caps 3. Retaining means for holding the caps 3 in their closing position upon the seats 9 are employed, in the nature of a toggle. In the present instance the toggle preferably consists of companion levers 10 and 11. Each of the caps 3 is provided with a conical depression 12, which receives a projection 13 on each of the companion levers mentioned. The lever 10 is provided with a projection 14 which is adapted to be received by recess 15 of the other lever 11, as best shown in Fig. 2. Seals readily destructible by heat, in the nature of fusible plates 16, soldered to levers 10 and 11, temporarily hold the companion toggle levers 10 and 11 together at their ends opposite to those that engage the caps 3. The ends of the levers 10 and 11 having the projections 13 thereon may be very readily positioned between the caps 3, since as stated, the heads 2—2 are relatively adjustable through manipulation of the couplings 6. When the levers are arranged in proper position the nuts 8 are brought down to hold the heads 2—2 against movement, which in turn holds the outlet ends of the solution-conducting pipes in opposed relation. The closure-retaining means in the present instance, also includes an expansible spring 17 which is interposed between the enlargements 18, of the levers for a purpose to appear.

As heretofore pointed out, two different solutions are to be directed toward each other from opposite points, and it will be obvious that such action may be accomplished automatically by the apparatus described, for the creation of an "aqueous blanket" consisting of foam and a gas inimical to fire, which gas is retained by the foam. The apparatus may be arranged in a suitable place where a fire is most apt to break out, so that at a predetermined temperature the plates 16, or the solder that holds said plates to the levers 10 and 11, will melt. This permits spring 17 to act to break the toggle relation, and levers 10 and 11 will be cast aside by action of caps 3 under the pressures of the released solutions. As the solutions come together they will commix with such thoroughness, and in a manner so as to spray outwardly through the space formed by the U-shaped heads 2—2, to cover and extinguish burning surfaces. The apparatus just described is particularly adapted for arrangement in rooms throughout shops and factories or in dwellings. It is analogous to the sprinkler head, the construction of which is well known and approved by fire underwriters.

In Figs. 4 and 5 another application of the invention is shown; the pipes 19 conducting the solutions under pressure to a point within an oil tank 20. The pipes 19, are fitted in a manner so that the nipples 21 will be opposed to each other, preferably in vertical alinement. The closure means employed in the present instance consists solely of the disk-like flanged caps. The retaining means therefor and the automatic solution-releasing means are identical to those used in connection with the apparatus shown in Figs. 1 to 3, therefore further description as to construction and operation may be omitted. A shield or baffle plate 22 is disposed adjacent to the mixing point against which the inflowing released solutions will be dashed for their thorough commixture and discharge onto the burning surface of the oil.

In Figs. 6 and 7 another application of the invention is shown. A mixing head 23 having a chamber therein is provided with bosses 24 at opposite points on the mixing head 23. Solution-conducting pipes 25 are adapted for threading engagement with the internally threaded bores of the bosses. Lock-nuts 26 hold the outlet ends of the pipes 25 properly extended within the chamber of said mixing head. The closing means for the outlet ends of the pipes 19 again consist of disk-like flanged caps 27. The retaining means however, in the present instance, for holding the caps is in the nature of a toggle, but consists of companion members 28 and 29. The caps 27 are provided with depressions 30 which invite and receive the ends of the members 28 and 29. The member 29 is formed in its construction with a recess 31, which accommodates an end of the member 28. The member 29 is also provided with ears 32 having apertures therein, adapting the member 29 to be connected by the automatic solution releasing means. In the present instance, the solution releasing means consists of wire ropes 33 and 34, the wire rope 34 having to do with the manual release of the solution, whereas the wire rope 33 extends upwardly through a conducting

fixture 35, attached to the side of the oil tank 36 and passes over pulleys 37 and 38. The wire suspends a weight 39 at the end thereof, which is an equivalent to the spring 17 shown in Figs. 1 to 3 and fusible links 40 are inserted in the wire rope, these links being the equivalent to the destructible or fusible plates 16. The wire rope 33, the fusible links 40 and the weight 39, in this instance constitute the retaining means for holding the caps or closure means in position upon the outlet ends of the solution conducting pipes. It will therefore be manifest that when the links or a link 40 melts, the weight 39 will drop, hence the companion members 28 and 29 will be automatically deranged, thereby permitting the influx of the solutions which commix and rise up into and which pass through the conducting fixture 35, into the tank 36, with which it communicates to cover the burning surface of the oil. A release of the solutions may be effected manually by a pull on the wire rope 34 as will be understood. Here again we have different solutions directed toward each other from opposite points which solutions are temporarily held and automatically released upon the outbreak of a fire for the extinguishment thereof.

In Figs. 8 to 11 inclusive, another form of toggle or means for retaining the closure means in their closing position upon the outlet ends of the solution-conducting means is shown in connection with the apparatus described in Figs. 6 and 7. The toggle in this instance consists of a shaft 41 arranged transversely of the mixing head 23, relatively to the outlet ends of the conducting pipes 25. The said shaft is held in place by a collar 42 and by the enlarged end of a lever 43 which is secured to said shaft. Notches 44—44 in the shaft have one of their walls provided with a depression 45. The depressions 45 accommodate the pointed ends 46 of short rods 47 and the depressions 30 in the caps 27 accommodate the other ends of the rods 47. The wire ropes 33 and 34 connect with the free end of the lever 43, in this instance.

When the wire rope 33 is parted by the melting of any of the links 40, the influence of the weight 39, which normally tends to exert a turning pull on the shaft 41 causing the short rods 47 to impinge against the caps 27, will be dispelled. Consequently, the caps and rods 47 will be cast away by the solutions under pressure which will gush forth and be commixed. The commixing solutions will rise in the conducting fixture 35, which as stated, is attached to and in communication with the oil tank 36, allowing the passage of the commixed solutions to the tank to cover the blazing surface of the oil for its extinguishment. The release of the solutions may also be accomplished manually in this particular instance by a pull on the wire rope 34.

Suitable waxed paper gaskets 49 are interposed in each instance, between the confronting faces of the closure caps and their seats, to prevent corrosion and the resultant coalescing of the metal during the time the apparatus remains inactive.

As will be seen, each of the forms shown in the drawings has the discharge ends of the separate supply channels so arranged as to direct the flow of one stream in a flow path which intersects the flow path of the other stream in such manner as to produce a forcible contact between the two streams. In the drawings this is shown as produced by having the outlet ends facing each other so as to place the streams in direct opposition, but it will be understood that this may be varied to a greater or less extent, since the general action will still be obtained where the outlets are not in direct opposition.

As will be understood, an exceedingly advantageous action results from this general arrangement. Each solution is retained in its stream form after leaving its outlet, but when contact is had between the opposing streams, this stream form is instantly destroyed or disintegrated, thus placing the solutions in the best form for producing rapid reaction of the chemicals which are brought together to produce the extinguishing medium. Consequently maximum efficiency will be had through the fact that no delay in completion of the reaction is had; the maximum effect, of course, is produced where the streams are in direct opposition; but this breaking up of the stream form is still had where the intersecting directions of flow are such as to produce a contact between the streams sufficient to tend to forcibly break up the stream form of the solutions.

I do not specifically claim herein the process of extinguishing fires disclosed herein, such claims forming the subject-matter of a divisional application filed May 3, 1918, Ser. No. 232,191.

What I claim is:

1. As a means for extinguishing fires by the foam-extinguishing process and wherein the component solutions are normally maintained separate and are brought into commixing relation substantially at the point of application and under fire conditions, a delivery system including independent lines for the several component solutions, said lines having their discharge ports substantially at the point of application, with the ports adapted to deliver the solutions in stream formation, and means for controlling the commixture of the solutions, said means including restraining means for the discharge ports, and a releasing structure rendered active under fire conditions and adapt-

ed to concurrently release the streams, said discharge ports being relatively positioned to cause stream discharge in substantially opposite and intersecting directions to produce forcible break-down of the stream formations and substantially overcome the stream pressures, whereby reaction of the component solution elements of the commixed and broken-down streams will be rapidly developed.

2. Apparatus of the class described, and in combinations, sources of supply of different solutions, pipes each conducting one solution, the outlet ends of said pipes being disposed in opposition to each other, closure means for the outlet ends of said pipes, a toggle for retaining the closure means to prevent the flow of said solutions, and means for automatically releasing the solutions for their commixture to produce a foam and generate a gas non-supporting to combustion.

3. Apparatus of the class described, and in combination, sources of supply of different solutions, pipes each conducting one solution, the outlet ends of said pipes being disposed in opposition to each other, closure means for the outlet ends of said pipes, a toggle for retaining the closure means to temporarily prevent the flow of said solutions, and means associated with the toggle for automatically releasing the solutions for their commixture to produce a foam and generate a gas non-supporting to combustion.

4. In fire-extinguishing apparatus of the foam extinguishing type, individual sources of supply of the solution components having their outlets substantially at the point of application and in opposition, removable closures for the several outlets, and means for normally retaining the closures seated, said means being active in the absence of fire conditions and automatically rendered inactive in the presence of such conditions.

5. In fire-extinguishing apparatus of the foam extinguishing type, individual sources of supply of the solution components having their outlets substantially at the point of application and in opposition, removable closures for the several outlets, toggle means coöperating with the several closures and adapted to retain the closures seated when a toggle is unbroken, inactivity of the toggle means permitting free release of the closures, and means for normally maintaining such toggle unbroken, said latter means being active in the absence of fire conditions and rendered inactive to retain the toggle unbroken in the presence of such conditions, said toggle means being operative to break the toggle when said maintaining means is inactive.

In testimony whereof I affix my signature in the presence of two witnesses.

FRANK A. EPPS.

Witnesses:
JAMES HAY SIMMS,
FINN A. COHEEN, Jr.