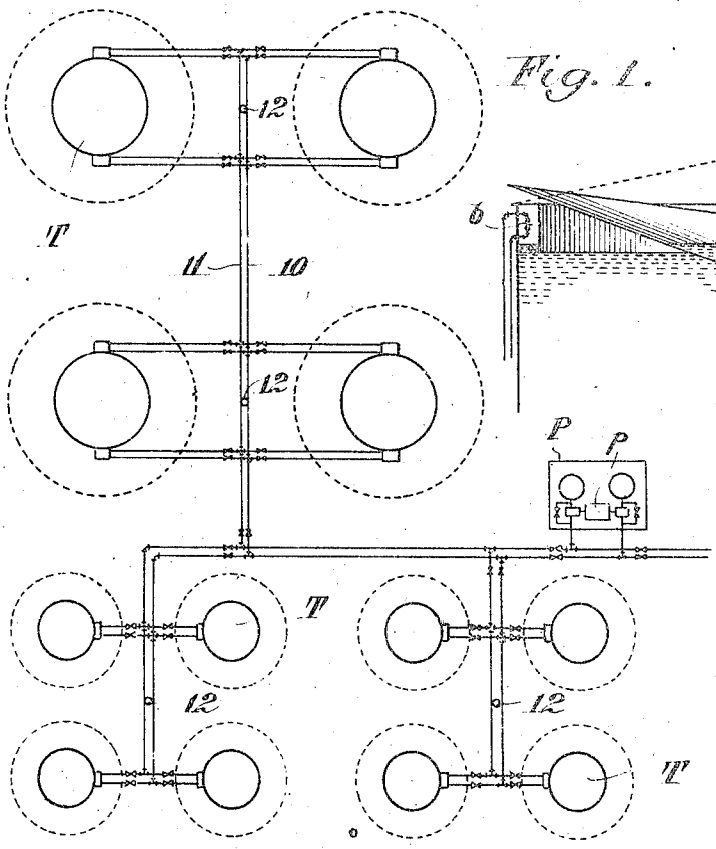
C. H. MEIGS.

FIRE EXTINGUISHING APPARATUS.

APPLICATION FILED JULY 25, 1917.

1,282,905. Patented Oct. 29, 1918.

Fig. 1.



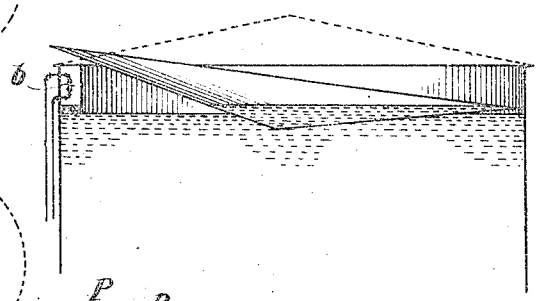
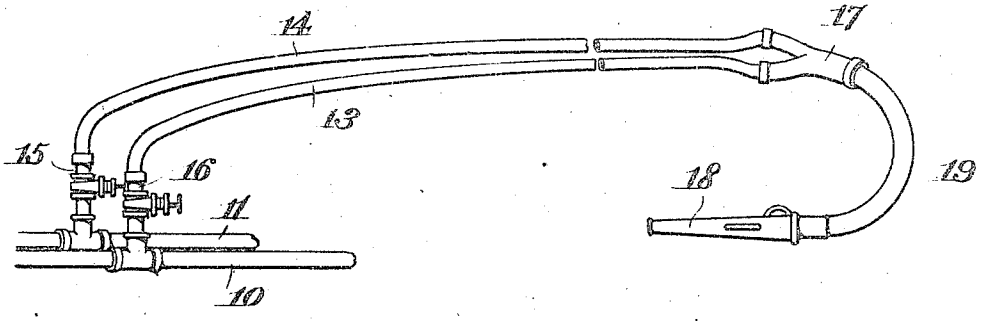


Fig. 2.

Fig. 3.



Inventor,
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By his Attorneys,
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UNITED STATES PATENT OFFICE.

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FIRE-EXTINGUISHING APPARATUS.

1,282,905. Specification of Letters Patent. Patented Oct. 29, 1918.

Application filed July 25, 1917. Serial No. 182,754.

To all whom it may concern:

Be it known that I, CHARLES H. MEIGS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Fire-Extinguishing Apparatus, of which the following is a specification.

This invention relates to improvements in fire extinguishing apparatus, pertaining more particularly to apparatus operated under foam-extinguishing principles.

The foam-extinguishing process embodies the use of two solutions normally kept separate and brought together to produce a compound which is noxious to combustion, the foam produced forming a deterrent against the escape of the gas. These solutions are of various types, as for instance those known as "Foamite" solutions made in accordance with the patents to Walker Nos. 1,161,090 or 1,219,509.

These solutions, when brought together, produce the extinguishing compound, this being brought about by the chemical reactions of the ingredients contained in the solutions, the rapidity of development depending more or less upon the rapidity of commixture of the solutions. After development, the foam bubbles tend to maintain themselves for a period and then break down and become useless for the particular purpose. In order, therefore, that the stream of the compound being delivered may be at its maximum efficiency at the point of application, the solutions should be brought together and carried in composite stream form for a sufficient time to produce the desired commixture, and the stream then be brought to the point of application as rapidly as possible in order that the compound may be delivered and put to service before material deterioration of the compound takes place. For these reasons it is desirable that the travel of the composite stream within an inclosed conduit, such as a pipe or in hose connections, be restricted in length to that actually required to provide for a desired commixture. And since the rapidity of the development of the compound by the commixture of the solutions will necessarily vary with the cross sectional size of the stream, the cross-sectional area and the length of the conduit in which the commixture is provided should vary accordingly. It is understood, of course that the commixed solutions are discharged in stream form and under a pressure sufficient to carry the stream contents to the point of application; hence the solutions travel through the conduit at comparatively high speed.

The foam-extinguishing process, while usable in other relations, is particularly adapted for service in extinguishing burning inflammable substances, such for instance, as oils, gasolene, etc., thus making the process particularly adaptable for use in protecting oil tanks, as for instance is referred to in the patents to Walker, Nos. 1,186,249 and 1,186,251.

As is shown in these patents, the commixed solutions are delivered onto the surface of the burning oil in the tanks, acting to smother the fire therein. In the apparatus shown in these patents, the commixture takes place in a mixing head attached to the tank, the solutions being separately brought to the head and permitted to commix therein, suitable means being provided for automatically limiting the time of delivery of the solutions to the mixing head to periods when fire conditions raise the temperature to an extent sufficient to trip releasing mechanism. This form of apparatus is adapted more particularly for use with single tanks in which the quantity of solutions required is comparatively small so that the cross sectional area of the solution pipes or conduits need not be large. Furthermore, the mixing head arrangement is such that the solutions are not immediately discharged therefrom and hence sufficient length of time for proper commixture is permitted, the compound welling up and passing out over a ledge into the tank.

While the general arrangement disclosed in these patents to Walker is adapted for isolated tanks, the cost of installation and maintenance may be materially reduced where the system is installed in connection with a central oil station or where a comparatively large number of tanks are arranged in close proximity, as for instance at an oil refinery, or at a field collecting station. In such installations it is possible, by the use of a system of the type disclosed in an application of Duncan W. Patterson, filed March 13, 1917, serially numbered 154,471, to connect the mixing chambers

of each tank to a common solution supply source with the connections so arranged as to practically regulate the delivery of solutions to an individual tank, although all of the tanks protected by the system are connected to the supply. In this system the delivery of the solutions is at high pressure —for instance two hundred pounds—and since the connections must have a capacity for concurrently supplying the solutions required in protecting all of the tanks to meet possible conditions, the connections are necessarily of larger capacity than those required for the individual installations. For instance, where an individual installation may have the solution connections of less than one inch in diameter, a system operating with a large number of tanks will require its solution connections of a diameter probably exceeding one and one-half inches, thus largely increasing the cross-sectional area of the stream being delivered from the solution pipes into the mixing heads.

One of the difficulties which may be encountered when the contents of a tank are ignited is the explosive effect which tends to blow off the top of the tank, possibly scattering the burning oil and igniting other materials which may be in the vicinity of the burning tank. Where the tank top is completely blown off of the tank and the latter left entirely exposed, the apparatus heretofore referred to will smother the fire in the tank since the entire oil surface is accessible to the foam-extinguishing compound.

Where, however, the falling top returns to the tank, probably in an inverted position, it may gather up some of the burning oil which is thus segregated from the oil in the tank and is inaccessible to the compound being delivered.

Where the tank is one of a number of tanks in the field, the inability to smother the oil which is burning outside of the tank is more or less of a menace to the remaining tanks, and it is essential that the compound be rapidly brought to these scattered oil burning sections.

The present invention is designed more particularly to take care of the conditions produced by these scattered burning areas inaccessible to the permanent system. While it is possible to use hand extinguishers, the location of the burning areas may be such that considerable delay will occur in bringing the compound to bear on the burning surfaces. The present invention, therefore, contemplates providing the permanent connections of the system with flexible auxiliary delivery structures leading from hose stations connected to the solution conduits and having suitable manual valve control. The connections preferably are such as to maintain the individuality of the solutions to a point in proximity to the nozzle structure, the mixing chamber being located immediately in the rear of the nozzle—the nozzle itself may form the discharge end of the chamber. By this arrangement a flexible conduit system is provided which will enable the hose nozzle to be quickly carried to any desired point within the limits of the connections.

However, certain difficulties are present in the use of a hose connection in this manner, these difficulties being more or less due to the time required in developing the compound from the solutions. Owing to the increased cross-sectional area of the solution streams, and the fact that delivery from the nozzle must be under pressure, it is practically required that the mixing chamber be of considerable cross sectional area, and, in addition, the length of such chamber must be materially increased in order that proper development of the compound may be had before being discharged from the nozzle, the discharge being in stream form and under pressure in order to deliver the stream at a point distant from the nozzle.

Service conditions have shown that in large installations, such as indicated, a mixing chamber for proper development of the compound should be not less than five feet in length. While it is possible, with solution streams of small cross sectional area, to obtain the desired development within the limits of a nozzle having a length capable of being readily moved about, such arrangement is not possible where the required length of the mixing chamber is in excess of five feet, manipulation of a nozzle of this length to produce any efficient result being practically impossible.

It is, therefore, the object of the present invention to provide an arrangement which will meet these service conditions, viz., a flexible conduit arrangement for the separate solutions practically having the cross sectional capacity of the permanent connections and having a nozzle discharge for the developed compound, the whole being adapted to be quickly brought into service.

To this 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 is a diagrammatic view showing a general and permanent system for serving a plurality of tanks representing a tank field, the view indicating approximate stations for the flexible auxiliary delivery connections.

Fig. 2 is a diagrammatic view of a tank showing the top as inverted and illustrating

a service condition which the present invention is designed to meet.

Fig. 3 is a perspective view showing a simple form in which the present invention may be embodied.

Referring more particularly to Fig. 1, in which the independent lines for the solutions are indicated generally at 10 and 11 these solution lines are connected up to sources of supply located in a pumping station P, the solutions being delivered to the solution lines by the action of a pump structure *p*, the system being generally on the lines of that disclosed in the application to Patterson heretofore referred to, the several tanks being indicated at T.

12 indicates stations where the solution conduits 10 and 11 may be tapped to feed the flexible auxiliary connections, indicated more particularly in Fig. 3.

In Fig. 2, I have shown a condition arising under fire conditions at a tank, the initial explosion having blown off the top of a tank which top, in its return, has fallen into the tank in an inverted position and taken up a portion of the buring contents. As will be seen, the permanent discharge element *b* is capable of delivering the compound to the surface of the burning oil below the top, but this surface will not place any of the compound on the burning oil within the top, the result being, to prevent spreading of the fire, this burning oil must be smothered by other means. And similar conditions arise with respect to the burning oil which was scattered by the initial explosion.

To provide this auxiliary flexible structure, I preferably employ separate flexible conduits 13 and 14, which are connected to supply conduits 10 and 11. Conduits 13 and 14, which may be in the form of individual hose connections, or in the form of twin hose, are of suitable length, these conduits being connected to conduits 10 and 11 by valve structures 15 and 16. The outer ends of the conduits 13 and 14 are connected by a suitable Y connection 17 by means of which the separate solutions are delivered into a single channel, this providing the entrance to the mixing chamber. The nozzle is indicated at 18, this being of any desired type, preferably tapered, and of a size to permit ready handling by the operator. The main mixing chamber is in the form of a flexible hose section 19 which connects the nozzle and Y-member 17, this section 19 being of a length sufficient to permit proper development of the compound without, however, retaining the compound a length of time such as would materially reduce the period of inactivity of the developed foam before it begins deteriorating. The advantage of this will be readily understood from the fact that in use the nozzle is not brought directly to the point of application, the issuing stream traveling a considerable distance before reaching the point of application; in some cases this distance has been forty feet or more. Since the conditions present in the travel of the stream through the air are such as may tend to further commix the streams, the issuing stream may be slightly under-developed with respect to the foam and thus reach the point of application in proper developed condition and therefore able to maintain the integrity of the foam at the point of application for a greater length of time. Obviously, if the stream is required to travel a considerable distance within the conduit before complete development is had, the normal time limit of activity of the foam before deterioration sets in is so reduced when the stream reaches the point of application as to greatly decrease the effectiveness of the compound.

Hence, section 19 is of limited length, the limitation in this respect being practically controlled by the time required in developing the compound, this section being designed as a mixing head within which the compound is developed rather than as a conduit or carrier for the developed compound.

As will be clear, the object in forming section 19 flexible, is that its larger cross sectional capacity and length will not materially affect the portability of the structure or its ready manipulation by an operator, so that the stream can be quickly placed in action at a point of application.

While I have herein more particularly described the use of the invention as an auxiliary appliance to a permanent system and in connection with oil tank fields, it is to be understood that the invention is not limited to this particular form of installation, since it may obviously be used in other connections.

While I have herein shown and described a preferred arrangement of apparatus, it will be readily understood that changes and modifications therein may be found necessary or desirable to meet the exigencies of use, and I desire to be understood as reserving the right to make any and all such changes or modifications as may be considered essential without departing from the spirit of the invention or exceeding the scope of the appended claims.

What I claim is:

1. In foam-producing fire-extinguishing apparatus, the combination with the sources of supply of the different component solutions of foam-producing media, of a freely-movable duplex conduit structure having independent passages for conducting the different solution components and maintaining them separate, means for coupling one end of the conduit structure to the said

sources of supply, a flexible hose section connected to the outlet end of said conduit structure into which the component solutions may pass, said section being of sufficient length and cross-sectional area to permit proper commixture of the foam-producing components passing therethrough, and a delivery nozzle at the end of the said hose section for directing the foam as desired.

2. A solution-conducting and delivery apparatus for foam fire-extinguishing systems comprising a freely-movable duplex conduit structure having independent passages for separately conducting the different solution components of foam-producing media, means for coupling one end of the conduit structure to separate sources of supply of said media, a flexible hose section connected to the outlet end of said conduit structure, said hose section being of sufficient length and cross-sectional area to permit proper commixture of the foam-producing components passing therethrough, and a delivery nozzle at the end of said hose section.

3. A solution-conducting and delivery apparatus for foam fire-extinguishing systems comprising a freely movable duplex conduit structure having independent passages for separately conducting the different solution components of foam-producing media, coupling means carried by one end of said conduit structure, a Y-shaped fitting connected to the other end of said structure, a flexible hose section connected to said Y-shaped fitting, said hose section being of sufficient length and cross-sectional area to permit proper commixture of foam-producing components passing therethrough, and a delivery nozzle at the end of said hose section.

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

CHARLES H. MEIGS.

Witnesses:
WILLIAM J. WELSH, JR.,
FRANK J. TADLANEK.