May 27, 1930. G. C. HISS 1,760,359

METHOD OF EXTINGUISHING FIRE

Filed March 29, 1924

Fig. 1.

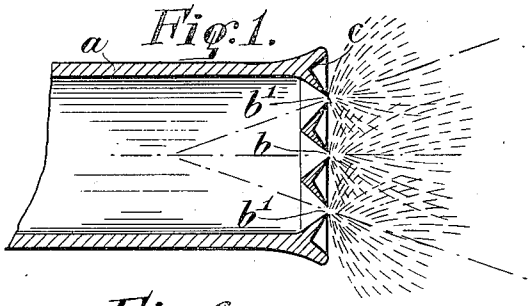


Fig. 2.

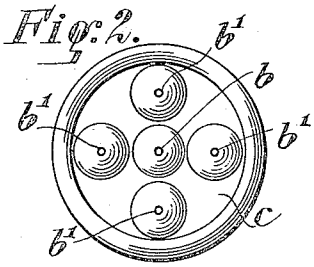


Fig. 3.

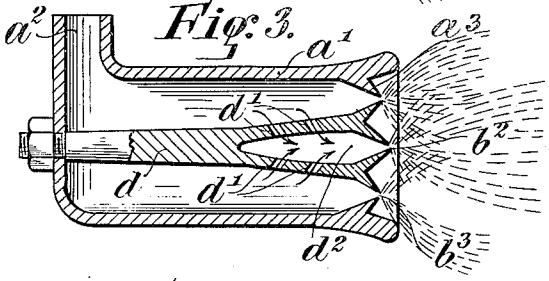


Fig. 4.

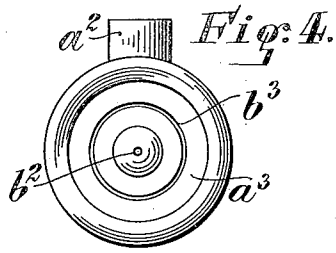


Fig. 5.

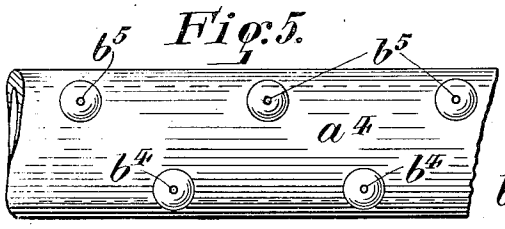


Fig. 7.

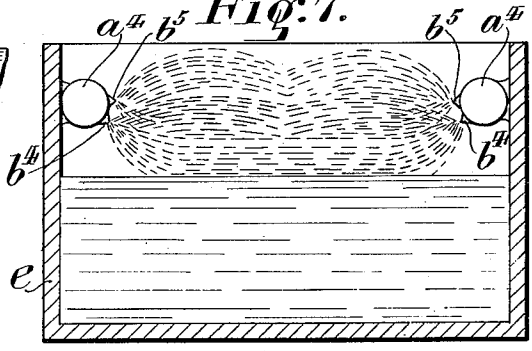


Fig. 6.

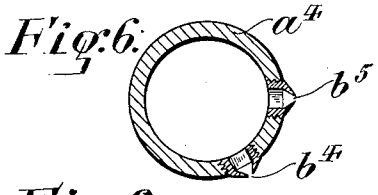


Fig. 8.

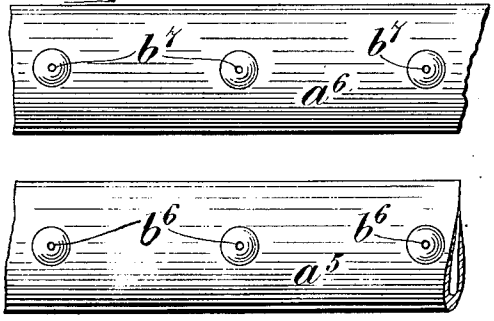
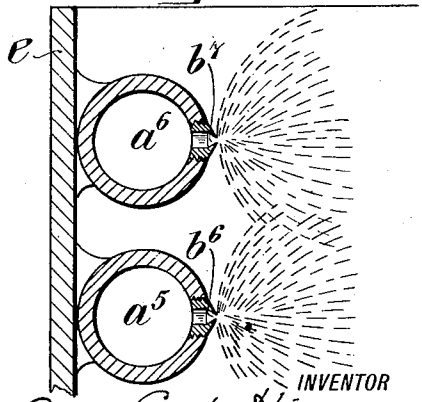


Fig. 9.



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UNITED STATES PATENT OFFICE

GEORGE CROSBY HISS, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO WALTER KIDDE & COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

METHOD OF EXTINGUISHING FIRE

Application filed March 29, 1924. Serial No. 702,724.

This invention relates to the use of non-combustible fluids, such as carbonic acid gas, in the extinguishing of fires, as described, for example, in Letters Patent of the United States No. 1,335,394, dated March 30, 1920. Such a fluid as carbonic acid gas is held in suitable containers in liquid form under high pressure and, when required for use in extinguishing fire, is discharged from the nozzle of the apparatus in gaseous form. The jet of gas, under the very high pressure of the liquid, is discharged at very high velocity and, of course, with more or less diffusion or coning. The result has been heretofore that much atmospheric air, surrounding or laterally adjacent to the jet or jets, is entrained with the gas, with the further result that the gas is so diluted with the oxygen of the atmosphere that its fire extinguishing quality is greatly reduced. This phenomenon has been clearly recognized but hitherto no satisfactory way of preventing the entrainment of atmospheric air with the gas has been found. The object of the present invention is, therefore, to prevent the entrainment of atmospheric air with the jet or jets of fire extinguishing gas and this object is accomplished by interposing between the jet of gas and the laterally adjacent atmospheric air and in close contiguity to the jet where the jet has its greatest velocity and therefore has the greatest aspirating action and its principal effect in entraining air, a protective shield or envelope which may be of the same or similar fire extinguishing gas in sufficient quantity to supply such gas as is entrained by the jet and to maintain a gaseous shield between the jet and the adjacent atmospheric air, such shield conforming closely to the main jet so long as its velocity is such as to entrain air. As the gas of the jet reaches a substantial distance from the nozzle its velocity is greatly reduced and its aspirating action is likewise reduced so that the gas of the jet reaches the fire in a practically pure state or so little diluted that its fire extinguishing property is substantially unimpaired. It will be understood that the described method can be practiced with various forms of apparatus, adapted for use under different conditions. Several such forms of apparatus are shown in the drawing in which—

Figure 1 is a view in longitudinal section and

Figure 2 is an end view of a nozzle by which the main or central jet of gas is surrounded by other jets which form an envelope of gas about the central jet.

Figures 3 and 4 are similar views but illustrating a nozzle of such construction that the central jet is surrounded by an annular envelope of gas.

Figures 5 and 6 are views in front elevation and transverse section of a form of gas delivering apparatus or nozzle particularly adapted for application of the invention in extinguishing fire on the surface of a combustible liquid, such as oil, in an open tank.

Figure 7 is a diagrammatic and sectional view illustrating the use of the form of nozzle shown in Figures 5 and 6.

Figures 8 and 9 are views in elevation and section illustrating a modification of the gas delivering means shown in Figures 5 and 6.

It will be understood that the fluid to be used is supplied from any source under such pressure that whether it is in liquid form or in gaseous form within the conductor, it issues from the discharge nozzle with considerable velocity. Since the source of supply of the fluid is common and well known and is not itself involved in the present invention, it is not necessary that it be shown in the drawing.

Referring first to the construction shown in Figures 1 and 2, the pipe *a* is the conductor through which is supplied, under pressure, the fluid, either in liquid form or in gaseous form, which has, in its gaseous form, the property of extinguishing fire. The fluid is discharged in gaseous form from the conductor *a*, the main jet being discharged from a central nozzle *b* in the head or end *c* of the conductor *a*. It is this central jet which is mainly depended upon to carry the extinguishing gas to the fire and it is this central jet which, by reason of its very high velocity, unless protected, would, by its aspirating action, entrain with it a considerable volume

of atmospheric air, by which the fire extinguishing gas would be diluted and lose something of its effectiveness. To prevent such entrainment of atmospheric air the main or central jet is protected by a shield which may be of the fire extinguishing gas and may be received from the same supply as the main jet, such shield conforming closely to the main jet so long as its velocity is sufficient to entrain air. For this purpose, in the construction shown in Figures 1 and 2, there are provided in the head c other orifices b' which may be choked more or less and disposed around the central orifice so that the gas which is discharged from the auxiliary orifices, being diffused, will form a shield between the main jet and the adjacent atmospheric air in close contiguity to the said jet so long as the velocity of the said jet is otherwise sufficient to entrain air to a harmful extent. If the auxiliary orifices are properly formed the gas which issues from them will form an envelope around the central jet, completely separating it from the surrounding atmosphere, although, as will be seen, such complete enveloping of the main jet is not essential in some instances. By reason of the provision of such a shield whether of fire extinguishing gas or otherwise the main jet will not entrain and carry on with it any such volume of atmospheric air, if any, as will dilute the gas of the central jet to such an extent as to impair its fire extinguishing property to any substantial degree.

In some cases it may be desired to insure the delivery of a complete envelope of shielding gas and in Figures 3 and 4 is shown a form of apparatus which accomplishes this result. In this embodiment of the invention the conductor member a' may receive its supply of fluid under pressure through a connection at a^2 and there may be secured within the conductor member a central spindle d which has a central discharge orifice at b^2, supplied with the fluid through ports d' and a central chamber d^2. The outer end of the spindle d, around the central orifice d', is so formed and related in size to the lip a^3 of the member a' as to form an annular slot b^3 through which a completely encircling envelope of gas is discharged around the main jet b^2.

Fire extinguishing devices of the class to which this invention relates are found particularly desirable for the protection of combustible liquids in open vats and for such uses the apparatus may be modified in form, as shown in Figures 5, 6 and 7 and also in Figures 8 and 9. In the embodiment of the invention illustrated in Figures 5, 6 and 7, the conductor a^4 is disposed within the tank e to be protected around and close to the sides thereof and is provided near its lower side with jet orifices b^4 and above them with other jet orifices b^5. From the orifices b^4 are discharged the main jets of gas which are chiefly relied upon for extinguishing fire and from the orifices b^5 is discharged the gas which forms a protecting shield between the gas of the main jets and the atmospheric air conforming closely to the gas of the main jets and in close contiguity thereto and preventing the entrainment of air with the gas of the main jets. The embodiment of the invention shown in Figures 8 and 9 is generally similar to that shown in Figures 5, 6 and 7 and is particularly adapted for the protection of inflammable liquid in a vat e but the main jets b^6 may be formed in one pipe a^5 and the auxiliary jets b^7 may be formed in another pipe a^6 placed above the pipe a^5, the result, however, being, as before, the discharge of a protecting shield of fire extinguishing gas between the gas of the main jets and the laterally adjacent atmospheric air.

It will be obvious that the invention may be practiced with other forms of apparatus and, except as pointed out in the claim, is not restricted to the particular forms of apparatus shown and described herein.

It will also be understood that while reference has been made to atmospheric air adjacent to the jet of fire extinguishing gas, the adjacent gaseous body might be any combustion supporting gas.

I claim as my invention:

The method of extinguishing fire which comprises projecting a jet of fire extinguishing gas at a high velocity and interposing in close contiguity to said jet a protective shield of fire extinguishing gas between the jet and the laterally adjacent atmospheric air so long as the velocity of said jet is otherwise sufficient to entrain air.

This specification signed this 24th day of March, A. D. 1924.

GEORGE CROSBY HISS.