Oct. 7, 1924. 1,510,649

H. H. BOYCE

FIRE EXTINGUISHER

Filed July 24, 1919 2 Sheets-Sheet 1

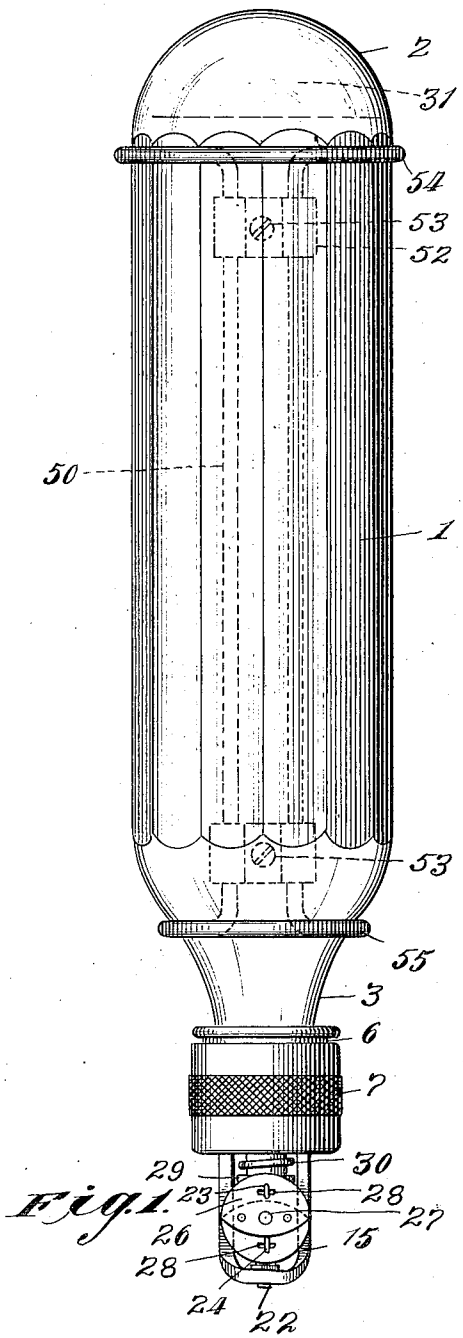

Fig. 1.

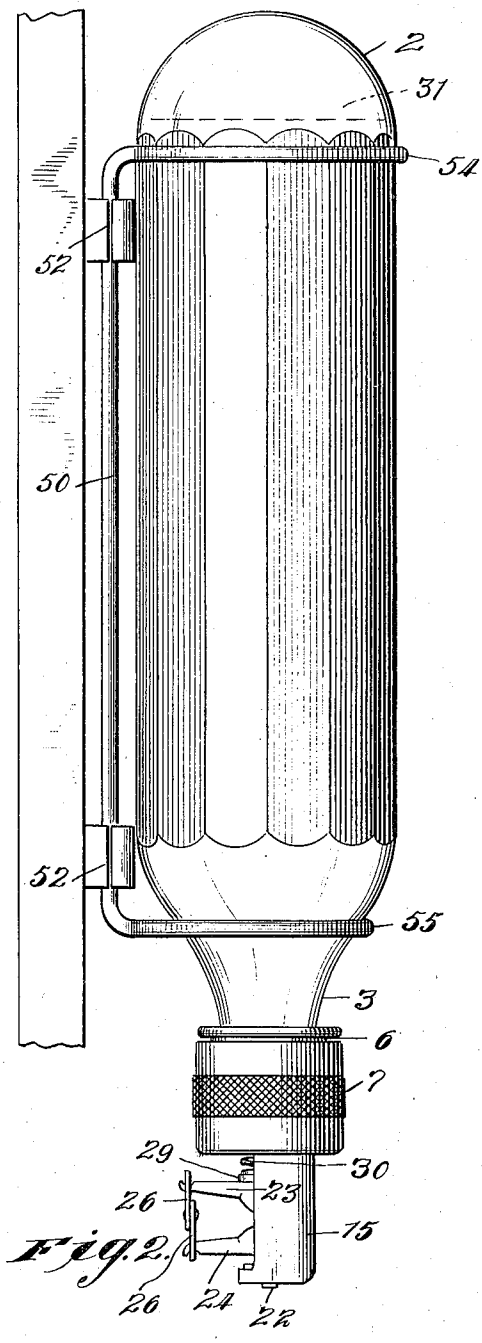

Fig. 2.

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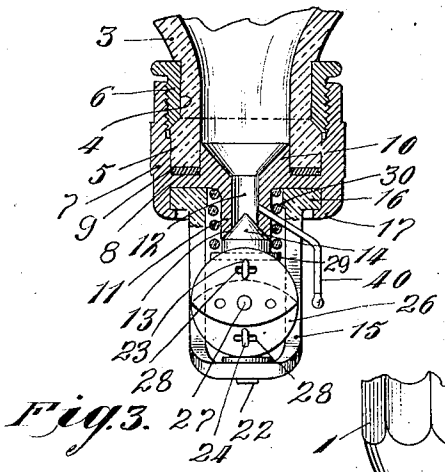

Fig. 3.

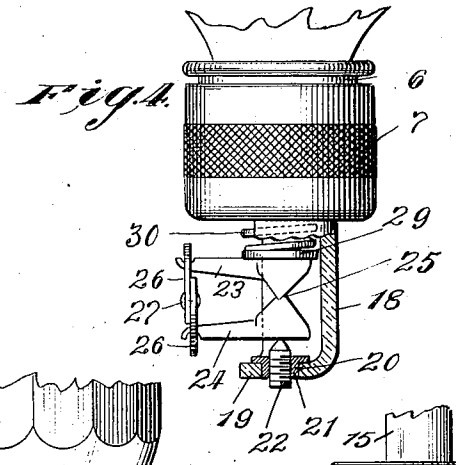

Fig. 4.

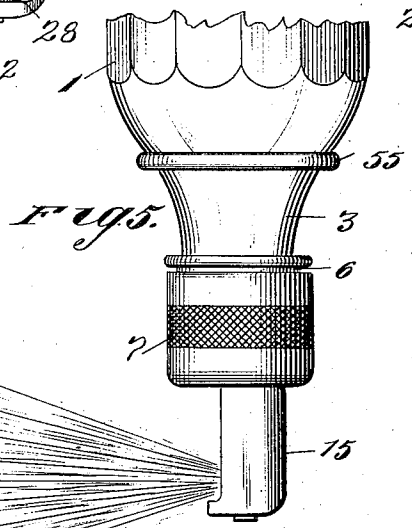

Fig. 5.

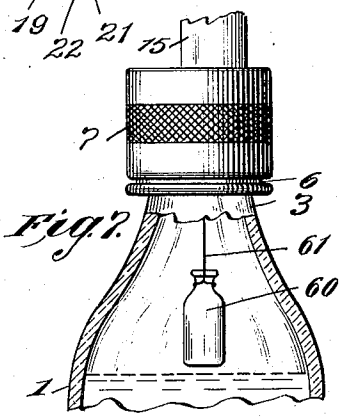

Fig. 7.

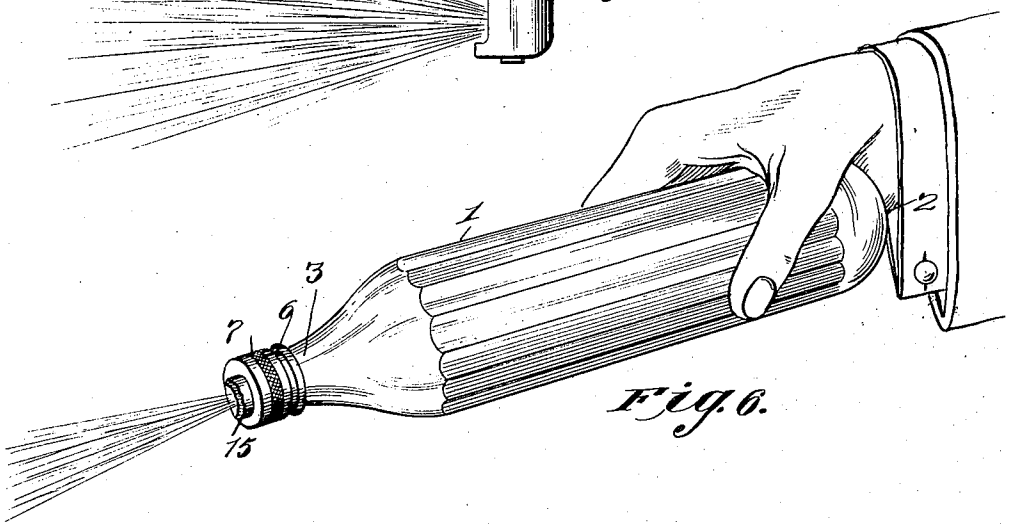

Fig. 6.

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Patented Oct. 7, 1924. 1,510,649

UNITED STATES PATENT OFFICE.

HARRISON H. BOYCE, OF FOREST HILLS, NEW YORK.

FIRE EXTINGUISHER.

Application filed July 24, 1919. Serial No. 313,034.

To all whom it may concern:

Be it known that I, HARRISON H. BOYCE, a citizen of the United States, residing in Forest Hills, county of Queens, and State of New York, have invented certain new and useful Improvements in Fire Extinguishers, of which the following is a specification.

This invention relates to fire extinguishers and especially to extinguishers of the portable or self-contained type. An important object of the invention in its preferred form consists in the provision of an extinguisher adapted to operate automatically upon the occurrence of fire in the vicinity thereof, and which is also capable of manual operation at any time. Other objects of the invention include the provision of an extinguisher in which the extinguishing fluid is adapted to be expelled by pressure either stored within the extinguisher or generated from the extinguishing fluid and which is so designed as to effectually retain the pressure, where stored initial pressure is to be utilized. The invention also has for objects the provision of an extinguisher which shall be economical to manufacture and which shall present an attractive appearance so that it may be placed without unsightliness in any desired location, such as in a drawing room, office, limousine, railway car or elsewhere.

The extinguisher of the present invention is especially useful for mounting under the hood of an automobile or other motor vehicle where it will operate automatically in case of a fire under the hood and extinguish the fire without requiring the raising of the hood and the consequent danger of increasing the conflagration by the free admission of air to the hood; and it may also be conveniently removed from its position under the hood and be operated as a hand extinguisher in case of fire in any other part of the vehicle.

Mounting of the extinguisher under the hood of the motor vehicle is not specifically claimed in this application, as this invention forms the subject matter of another application filed by me September 29, 1920, Serial No. 413,528.

In the accompanying drawings, which form a part of this specification, and in which I have shown one preferred embodiment of the invention as illustrative of the principle thereof, and the best mode now known to me for performing the same,

Figure 1 is a front view of the extinguisher mounted in an improved form of supporting bracket adapted to be attached to a wall, automobile dash or other support;

Figure 2 is a side elevation of the extinguisher;

Figure 3 is a front view partly in vertical section of the lower part of the extinguisher showing the fuse or valve mechanism adapted to be released by heat;

Figure 4 is a side elevation partly in section of the same parts;

Figure 5 is a side view of the lower part of the extinguisher showing the action of the same when released automatically by rise in temperature;

Figure 6 is a perspective view showing the mode of operating the extinguisher manually;

Figure 7 is a view in vertical section illustrating a modified arrangement for charging the extinguisher with gas pressure.

Referring to the drawings in detail, in the particular construction illustrated the body of the extinguisher comprises a stout glass bottle 1 having a closed, preferably dome-shaped end 2, and a neck 3 of reduced diameter. The neck 3 is formed with a recess 4 and a shoulder 5, a ferrule 6 preferably of metal being fitted in the recess and bearing against the shoulder. This ferrule is externally threaded or otherwise suitably formed for engagement with the cap 7 preferably of metal and having a seat 8 between which and the end of the bottle neck is placed a suitable packing 9 adapted to make a tight joint between the cap and the bottle. The cap 7 in the construction shown has an inwardly projecting flange 10 and an outwardly projecting nipple 11 through which extends the nozzle opening 12. The outer end of the nipple 11 is provided with a beveled seat 13 adapted to be engaged by a conical valve member 14 which fits the same with a tight ground joint. The fuse or thermal release device for holding the valve member 14 against its seat until a predetermined temperature is reached may be of any suitable construction, but as shown includes a support or bracket 15 which is preferably made of glass or other readily frangible material. The bracket has at its base a flange 16 adapted to be secured to the cap by a flange 17 spun over upon the same, and an arc shaped vertical wall portion 18 terminating in a head 19 formed with a hole 20 therein in which rests an internally

threaded bushing 21. Screwing in the latter is a conically pointed adjusting screw 22. Mounted between the valve 14 and the screw 22 are a pair of levers 23 and 24 which bear upon one another at the fulcrum point 25, such fulcrum point being located at one side of the axis of the screw 22 and valve. The ends of the levers 22 and 23 are normally held in fixed relation to each other by the links 26 which are secured together by the fusible solder 27 and are provided with perforations 28 through which the ends of the levers project. The valve 14 is provided with a flange 29 against which bears a spring 30 tending to throw the valve away from its seat. So long as the levers are held in their normal position by the joined links 26, this spring is compressed and the valve held firmly against its seat by the levers which are forced against the valve by the pressure of the screw 22. Upon the subjection of the fuse to a temperature sufficient to melt the solder 27, however, it will be seen that the links 26 will separate, thus permitting the levers to pivot on one another so as to release the valve and spring 30 which forces the valve from its seat, the links, levers, valve and spring dropping out of the way and permitting the extinguishing fluid to flow out of the opening 12. The particular arrangement of the levers, links and valve described, is not essential and is merely illustrative of one suitable construction of fuse which may be employed in carrying out the invention. Any other suitable device may be substituted, however.

The bottle 1 is preferably filled nearly full with a fire extinguishing liquid, a gas pressure space 31 being however left in the upper end of the bottle above the level of the liquid. Any suitable fire extinguishing liquid may be employed, preferably one having a low freezing point, and a boiling point such that it will begin to vaporize so as to generate pressure in the bottle at a temperature about that at which it is desired to release the fuse, or slightly below such temperature. I find that carbon-tetrachloride is a very desirable fluid for this purpose, as it freezes only at extremely low temperatures and has a boiling point very near the temperature at which it is customarily desirable to release the fuse, this boiling point at atmospheric pressure being in the neighborhood of 169° F. With the construction described, therefore, assuming, for instance, that a fusible solder is utilized having a melting point of 185° F. and that the bottle is filled with carbon-tetrachloride at atmospheric pressure, upon the occurrence of a fire the bottle will be heated to a temperature above the boiling point of the carbon-tetrachloride which will vaporize and cause a considerable pressure in the bottle before the fuse is released. When the latter event occurs, the liquid will at once be forced out in a jet which will squirt upon the end wall 19 of the support and the screw 22 and so be effectually sprayed laterally from the extinguisher as indicated in Figure 5. Where the fuse support is formed with a vertical wall 18 at one side, the spray will be projected laterally to one side only which is usually found desirable where the extinguisher is supported upon a wall or other vertical surface. With the inverted arrangement of the extinguisher described, even if there is a failure of pressure within the vessel, the liquid will tend to flow out by gravity and so aid in the extinguishing of the fire in any case. The extinguisher filled with carbon-tetrachloride or other liquid adapted to generate pressure when subjected to moderate heat and provided with the automatic thermal fuse is especially useful for mounting under the hood of an automobile or other motor vehicle for the automatic extinguishing of fires occurring in the carbureter or elsewhere under the hood, for the reason that the normal temperature under the hood, due to the proximity to the engine, is considerable, so that the liquid is maintained at a temperature usually not far below the boiling point, and upon the occurrence of the fire it will be quickly heated to such a point as to produce the desired pressure within the extinguisher. Carbon-tetrachloride is especially useful in an extinguisher to be mounted in this location as the average temperature under an automobile hood is somewhat, but not greatly lower than the boiling point of the liquid. For this reason the temperature is normally insufficient to vaporize the liquid, and therefore the danger of excessive pressure is avoided, while the necessary pressure will be created quickly when required, by a slight rise in temperature.

Preferably I do not rely only upon the pressure generated by heat, but charge the bottle with an initial pressure which is stored therein at all times, this being accomplished by forcing in a suitable gas, such as carbon dioxide, when the extinguisher is filled at the factory. For introducing this pressure I preferably utilize a capillary tube of copper or the like, indicated at 40 in Figure 3, and which passes through the metal cap at a suitable point. After the bottle is filled with liquid and the cap sealed in position, gas is forced through this capillary tube until the desired pressure is reached, whereupon the capillary is pinched off and sealed by fusing. The construction described provides a very tight closure capable of holding the gas pressure indefinitely, any possibility of leakage once the extinguisher is mounted in position for use being effectually prevented by the mode of supporting the

extinguisher in inverted position, as shown in Figures 1 and 2, in which case the gas is contained within the chamber 31, closed at the top by the integral glass end 32 of the bottle and beneath by the liquid-extinguishing agent. There is thus no access from the gas chamber to any of the joints and no possibility of leakage so that the pressure is permanently retained until the fuse is released and the fire extinguishing liquid utilized. The liquid is then forced out by the pressure and sprayed as already described, the initial stored pressure being reinforced by the pressure generated by the vaporization of the liquid, if a sufficiently high temperature has been reached. The use of the extinguisher containing the liquid and stored pressure, as described, renders the device particularly effective when employed as a hand extinguisher, the method of operation being for the user to remove the extinguisher from the bracket and strike the fuse against any rigid object so as to break off the frangible fuse support 15 thereby releasing the valve 14 and permitting the liquid to be projected from the nozzle in a jet by the pressure stored within the bottle, the operator directing the jet at the fire, as indicated in Figure 6. In case for any reason the pressure within the bottle may be insufficient for fully ejecting the contents thereof, the operator may still utilize the extinguisher by swinging or shaking it so as to throw the contents of the bottle out of the nozzle, at the fire. In an emergency the bottle may even be used as a grenade and thrown bodily into the fire, the breakage of the glass quickly releasing the contents.

The use of an initial pressure forced into the bottle affects the boiling point of the liquid therein and may be utilized as a means of controlling the boiling point so as to regulate the same in accordance with the temperature at which the fuse releases the valve. In this way the liquid may be caused to boil so as to generate additional pressure at a temperature as close to that at which the fuse releases the valve as may be desired. Thus, by forcing pressure of 70 lbs. per square inch into the bottle the boiling point of the carbon-tetrachloride, if that be the fire extinguishing liquid employed, is raised from about 169° F. to about 179° F., whereby the pressure generated prior to the release of the valve is controlled and the generation of excessive pressure which might tend to burst the bottle prior to the release of the valve is avoided.

In Figure 7, I have shown a modified arrangement for producing a stored pressure within the extinguisher. In accordance with this modification, instead of forcing pressure into the filled bottle through a capillary tube or the like, I provide means for producing the pressure by chemical reaction after the bottle is sealed. Any suitable combination of chemicals may be utilized; for instance, soda may be dissolved in the tetrachloride or other fire extinguishing liquid. A small vial 60 filled with a suitable acid, such as sulphuric acid, may be suspended by stiff wire 61 looped about its neck and attached to the bottle cap. After sealing the extinguisher, it is inverted whereupon the acid will run out and will re-act with the soda to produce carbondioxide, which will produce the necessary pressure to be retained within the sealed extinguisher.

Any suitable means for supporting the extinguisher may be utilized, a simple and effective form of bracket being shown comprising a wire having parallel vertical portions 50 adapted to be secured to the wall or other support 51 by means of the clips 52, each of which may be attached to the wall by a single centrally disposed screw 53. The wire is bent into a large horizontal loop 54 at the top, the diameter of which is sufficient to encircle the body of the bottle while at the lower end the wire is bent into a smaller loop 55 adapted to encircle the neck of the bottle and support the bottle. The bottle may be readily withdrawn from the bracket by merely lifting the same upwardly and slipping it out of the larger loop 54.

While I have illustrated and described in detail one preferred embodiment of my invention, it will be understood that various modifications may be made therein, and I do not therefore desire to limit myself to the specific construction set forth, but intend to cover my invention broadly in whatever form its principle may be employed.

Having thus described my invention, I claim:

1. In a fire extinguisher of the character described, a container for the extinguishing liquid having a discharge orifice therein, a closure for said orifice, thermally sensitive means for holding said closure in position until subjected to a predetermined temperature, and a support for said thermally sensitive means adapted to be broken to render said thermally sensitive means inoperative for holding said closure and to permit the extinguishing fluid to be released when manual operation of the extinguisher is desired.

2. In a fire extinguisher of the character described, a container for the extinguishing liquid having a discharge orifice therein, a support attached to said container and having its outer end spaced from said orifice, and thermally controlled means interposed between the outer end of said support and said orifice adapted automatically to release the extinguishing fluid upon the occurrence of a fire, said support being breakable to permit the contents of the container to be released when manual operation is desired.

3. In a fire extinguisher of the character described, a container for the extinguishing liquid having a discharge orifice therein, a valve for closing such orifice, and means for holding said valve closed including a fusible element adapted to release the valve at the occurrence of a specified temperature and a frangible element adapted to release the valve when broken.

4. In a fire extinguisher of the character described, a container for the extinguishing liquid having a discharge orifice therein, a valve for closing such orifice, a frangible support attached to said container, and means including a fusible element interposed between said support and said valve for holding said valve normally closed.

5. In a fire extinguisher of the character described, a container for the fire extinguishing liquid having a discharge orifice therein, a closure for said orifice, a glass support attached to said container, and means carried by said glass support for holding said closure in its operative position.

6. In a fire extinguisher of the character described, a glass container for the fire extinguishing liquid, a metal cap attached thereto having an orifice therein, a valve for closing said orifice, a frangible support carried by said cap, and means including a fusible element carried by said frangible support and adapted normally to maintain said valve closed.

7. In a fire extinguisher of the character described, a container for the fire extinguishing liquid having a discharge orifice therein, a valve for closing such orifice, fusible means for normally maintaining said valve closed but adapted to release the same upon a specified rise in temperature, and a support for the valve holding means, said support forming a shield at one side of the orifice for directing the liquid discharged to the opposite side.

8. A fire extinguisher of the character described comprising a glass container for the fire extinguisher liquid having a metal cap attached thereto, said metal cap having a discharge orifice therein, a glass support carried by and projecting from said metal cap, and means for closing said discharge orifice carried by said glass support.

9. In a fire extinguisher of the character described, a glass container for the fire extinguishing liquid having a neck formed with a recess, a metal ferrule fitted in said recess and provided with a screw thread, a cap screwed on said ferrule having a discharge orifice therein, a frangible support carried by said cap, and means carried by said support for closing said orifice.

10. In a fire extinguisher of the character described, a container for the extinguishing liquid having a discharge opening therein, and means for automatically releasing the extinguishing liquid upon the occurrence of a fire and for causing the liquid to be discharged in a lateral direction, said means being removable to permit the extinguisher to be manually operated and to permit the liquid to be discharged in a longitudinal direction.

11. In a fire extinguisher of the character described, a container for the extinguishing liquid having a discharge opening therein, means normally preventing the discharge of the extinguishing liquid except when subjected to a predetermined temperature, and a support for said means serving to cause the liquid to be discharged in a lateral direction, said support being removable to permit the liquid to be discharged in a longitudinal direction when manual operation is desired.

HARRISON H. BOYCE.