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H. W. DOUGHTY

FIRE EXTINGUISHER

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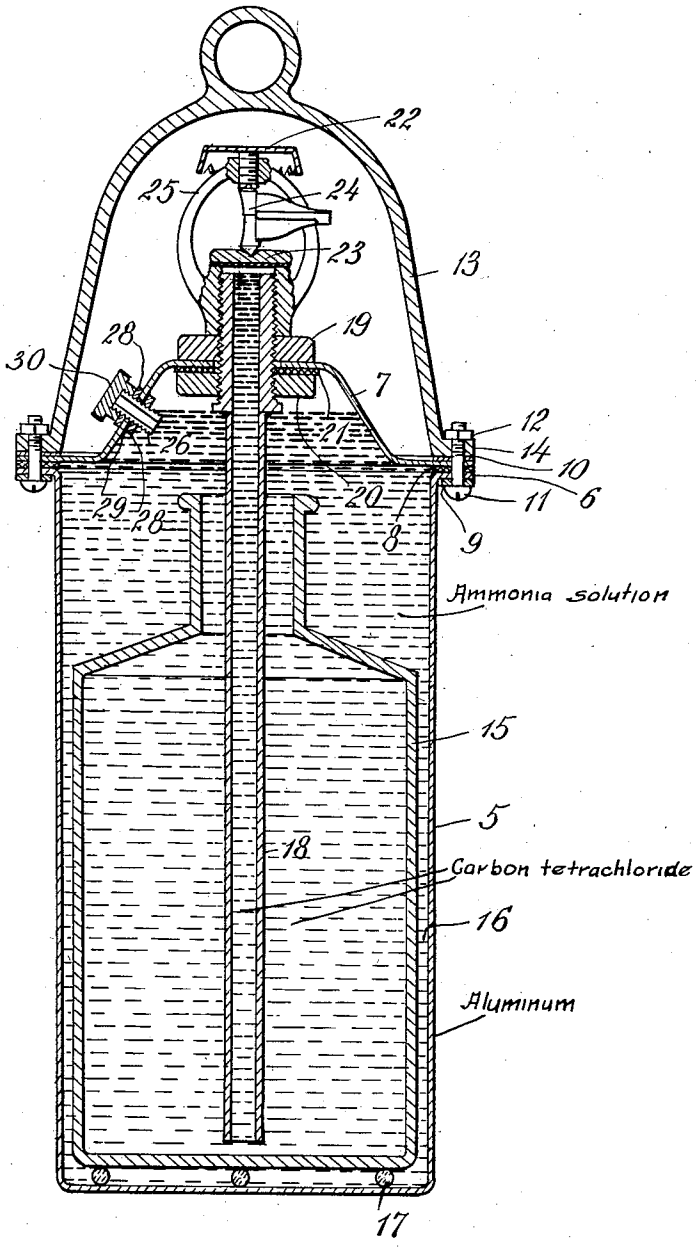

INVENTOR

Howard Waters Doughty

BY

Pennie Davis Marvin & Edmonds

ATTORNEYS

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HOWARD WATERS DOUGHTY, OF AMHERST, MASSACHUSETTS.

FIRE EXTINGUISHER.

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This invention relates to fire extingushers, and particularly to a self-contained fire-extinguishing unit which is adapted to function automatically when the temperature in the vicinity thereof rises beyond a predetermined point for the purpose of spraying a fire-extinguishing liquid over surfaces in the vicinity of the extinguisher.

In Letters Patent No. 1,157,090 I have described a fire-extinguishing unit including inner and outer containers, the inner container being adapted to hold a supply of a non-inflammable liquid having a relatively low boiling point, such as carbon tetrachloride, while the space between the inner container and the wall of the extinguisher contains a solution which when heated is adapted to release gas and to create sufficient pressure so that the contents of the extinguisher may be ejected. A concentrated ammonia solution, by which is meant the concentrated ammonia water solution of commerce containing both ammonium hydroxide and ammonia gas and which is made by dissolving ammonia gas in water, is a suitable gas-generating agent because when the solution is heated the ammonia gas becomes insoluble and the development of pressure in the extinguisher is, therefore, comparatively rapid.

The common metals, such as iron and copper which are frequently used in manufacturing receptacles for fire extinguishers, are not affected materially by carbon tetrachloride or ammonia in the absence of air but are attacked by ammonia and carbon tetrachloride together and hence are not available for extinguishers of the type herein described. These metals can be protected to a certain extent by coating them with metals such as tin, nickel or silver, which resist the action of ammonia and carbon tetrachloride. Inevitably, however, the coating is not complete, that is to say, it contains pin holes or the surface is not covered completely at the joints so that the metal forming the body of the container is gradually attacked by the corrosive solutions and the casing is eventually weakened. While extinguishers may be made from coated metals their life is relatively short and they are not entirely satisfactory because of the danger of deterioration and possible weakening of the walls to a point which precludes the development of a satisfactory pressure or results in premature rupture of the extinguisher.

It is the object of the present invention to provide a fire extinguisher of the type described which is not affected by the liquids employed therein and which, therefore, will not deteriorate although permitted to stand for long periods.

Metals such as tin, nickel and silver, which resist the action of ammonia and carbon tetrachloride, are much too expensive to permit the use thereof as containers for fire extinguishers. I have discovered, however, that aluminum is not attacked by carbon tetrachloride and ammonia solutions and that it is well suited, therefore, for use in manufacturing containers for fire extinguishers of the type described. Furthermore, it is light in weight, can be easily shaped by drawing or otherwise and can be finished attractively so that the fire extinguisher may be produced and finished by simple operations and at a minimum cost.

In carrying out the invention the outer container alone may be made of aluminum with an inner container of glass or earthenware, or, if lightness is essential, the inner container may be made also of aluminum. Glass or earthen-ware is used preferably for the inner container because of the low heat conductivity of such materials. Premature vaporization of the carbon tetrachloride in the inner container is thus avoided. The containers are disposed one within the other so that their walls are spaced apart and they are of such relative dimensions as to form a space having the required capacity for the ammonia solution. The inner receptacle is intended to receive the fire-extinguishing liquid such as carbon tetrachloride which is ejected under the influence of the pressure developed through a tube extending from the top of the extinguisher to a point adjacent the bottom of the inner receptacle. The outlet from the tube may be closed by a thin diaphragm of metal foil, such as tin or aluminum foil, which is adapted to be ruptured when the pressure within the extinguisher reaches a predetermined point. When the diaphragm is ruptured the liquid is ejected and spreads over the adjacent surface. Preferably, however, the extinguisher is closed by a cap which is held in place by a fusible link in the manner well known in fire-extinguishing sprinkler systems. The link is made of a metal which fuses when the temperature in the vicinity rises above the normal temperature to a predetermined extent, that is to say, when the atmosphere is heated by the pres-

ence of fire in the vicinity. The increased temperature simultaneously causes the ammonia in the solution thereof to be vaporized with a consequent rise in pressure within the extinguisher. When the fusible link is thus fused the pressure already developed within the extinguisher will cause the cap to be lifted from the end of the discharge tube or nozzle and will discharge the liquid therefrom upon the adjacent surface.

Among the advantages of aluminum as a material for fire extinguishers of the type described in addition to the advantages already noted is its relatively high heat conductivity. Since the efficiency of the extinguisher depends primarily upon the rapid heating of the ammonia solution to release ammonia gas therefrom, it is apparent that the sensitiveness of the extinguisher is increased materially by the rapidity with which heat in the atmosphere surrounding the extinguisher will be transmitted through the wall of the extinguisher when the latter is made of aluminum.

It will be understood that the dimensions and form of the extinguisher may be varied considerably and that the device as illustrated in the accompanying drawing is merely an example of an extinguisher embodying the invention. In the drawing the figure is a vertical section through the extinguisher.

Referring to the drawing, 5 indicates a casing of aluminum which may be relatively thin-walled and may be produced, therefore, by a drawing operation. It is provided with a flange 6 at the top which is adapted to receive a cover 7 also preferably of drawn aluminum. A gasket 8, preferably of paper coated, for example, with shellac to make a tight joint, is disposed between the cover and the flange 6 and the parts are held in assembled relation by rings 9 and 10 preferably made of a hard metal such as steel, brass, aluminum bronze, duralumin etc., and by screws 11 having nuts 12 thereon. A bail 13 is likewise secured to the extinguisher by the screws 11 at opposite sides thereof which extend through flanges 14 on the bail.

The inner receptacle 15 may be of glass or earthen-ware but preferably it is also made of drawn aluminum. It is of sufficient size to form a space 16 between it and the wall of the shell 5 with ample capacity for the quantity of ammonia solution which is required to effect the discharge of the carbon tetrachloride or other liquid contained in the inner receptacle. Spacers 17 may be disposed in the bottom of the shell to support the inner receptacle 15.

A tube 18 extends through the cap 7 to which it is secured by nuts 19 and 20 and a gasket 21 preferably of paper coated with shellac. The tube is sufficiently long to reach substantially to the bottom of the inner receptacle 15 and carries on its outer end a sprinkler-head 22 comprising a cap 23, a fusible link 24 and a support 25 therefor. The link is designed to hold the cap 23 normally upon the end of the tube 18 and thus to prevent escape of any liquid from the extinguisher by evaporation or otherwise. The fusible link is made of a metal having a melting point which may be only a few degrees above the highest normal atmospheric temperature so that in the event of an increase in temperature above the normal point the link will fuse, thus releasing the cap and permitting the discharge of the liquid contents of the extinguisher under the influence of the pressure developed by the simultaneous heating of the ammonia solution.

A tube 26 is secured in the cap 7 by nuts 28 and a gasket 29 and a knurled cap 30 is threadedly supported thereon. This cap is normally in place and prevents the escape of any liquid through the tube. When the extinguisher is filled the cap 30 is removed to permit egress of the air therein contained. The proper amount of ammonia solution is then introduced to the tube 18. The carbon tetrachloride in proper proportion to fill the inner receptacle 15 is then introduced through the tube. The ammonia solution, being lighter, will overflow into the space between the shell and the inner receptacle. The cap 30 is then replaced and the cap 23 is placed in position and secured therein by the fusible link. The extinguisher is then in condition for use. It may be hung at a convenietn point by means of the bail 13 and may remain there until such time as it may be required for fire-extinguishing purposes. Should the temperature of the surrounding atmosphere rise at any time by reason of the presence of fire in the vicinity of the extinguisher, the fusible link will melt and the ammonia solution will at the same time release ammonia for the purpose of ejecting the fire-extinguishing liquid from the extinguisher.

Owing to the resistance of aluminum to the corrosive effect of carbon tetrachloride and ammonia solution, the extinguisher may remain indefinitely in the position assigned to it without danger that deterioration will effect its usefulness or availability. Experiments have shown that the liquids employed in the extinguisher do not attack aluminum to any substantial extent and that consequently the extinguisher will remain in a condition for substantially instantaneous use during long periods without attention. The reason that the aluminum is not attacked to any substantial extent is probably due to the fact that it is very quickly superficially oxidized and the oxide, being insoluble in water, remains permanently on the surface of the aluminum as a closely adhering film which protects the metal against further action.

While the structure of a suitable extinguisher has been described in more or less

detail, it will be understood that various changes may be made therein to adapt it to any particular conditions without departing from the invention or sacrificing the advantages thereof.

I claim:—

1. In a fire extinguisher the combination of inner and outer receptacles respectively containing carbon tetrachloride and a solution of ammonia, the outer receptacle being of aluminum to resist the corrosive action of the liquid contents of the extinguisher, an outlet through which the carbon tetrachloride is ejected by pressure developed when the ammonia solution is heated and means for normally closing the outlet.

2. In a fire extinguisher the combination of inner and outer receptacles of aluminum respectively containing carbon tetrachloride and a solution of ammonia and to resist the corrosive action of those liquids, an outlet through which the carbon tetrachloride is ejected by pressure developed when the ammonia solution is heated and means for normally closing the outlet.

3. In a fire extinguisher the combination of an inner and outer receptacle of aluminum respectively containing carbon tetrachloride and a solution of ammonia, an outlet through which the carbon tetrachloride is ejected by pressure developed in the receptacles when the ammonia solution is subjected to heat, means for covering the outlet, and a fusible member for holding the means normally closed against said pressure until fused by the heat at a predetermined temperature.

4. In a fire extinguisher containing carbon tetrachloride and a solution of ammonia, a receptacle of aluminum to resist the corrosive action of the liquid contents of the extinguisher, an outlet through which the carbon tetrachloride is ejected by pressure developed when the ammonia solution is heated, and means to normally close the outlet.

In testimony whereof I affix my signature.

HOWARD WATERS DOUGHTY.