

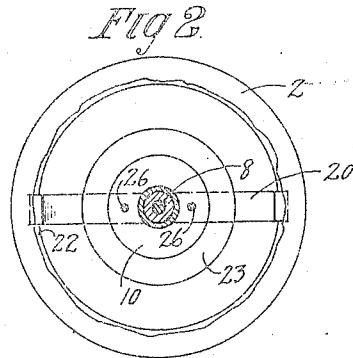
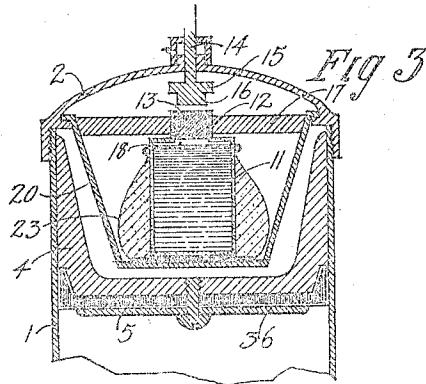
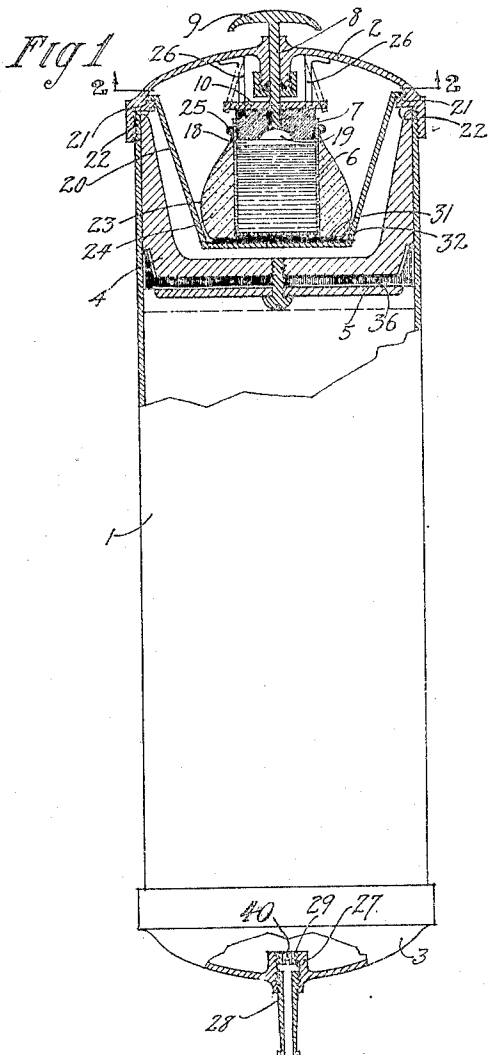
W. F. LAUTERBACH, U. J. RAPPEL AND M. G. KOPF.

FIRE EXTINGUISHER.

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1,302,679.

Patented May 6, 1919



INVENTORS

W. F. LAUTERBACH

BY U. J. RAPPEL

M. G. KOPF

ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM F. LAUTERBACH, ULRICH J. RAFFEL, AND MELROSE G. KOPF, OF DAYTON, OHIO, ASSIGNORS TO THE HALKO PRODUCTS COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO.

FIRE-EXTINGUISHER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, WILLIAM F. LAUTERBACH, ULRICH J. RAFFEL, and MELROSE G. KOPF, citizens of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful improvements in Fire-Extinguishers, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to fire extinguishers and more particularly to that type of fire extinguisher from which the fire extinguishing liquid is expelled by the pressure of gas generated within the extinguisher.

The object of the invention is to provide a fire extinguisher of this type which will be simple in construction and operation, and which can be produced and maintained at a small cost.

A further object of the invention is to provide means for supporting the substances from which the gas is to be generated within the casing, that they can be thoroughly intermingled to quickly produce a maximum amount of gas; and to provide the means for thoroughly shattering the container for one of the substances to permit the contents thereof to quickly escape.

It is also an object of the invention to so construct the supporting devices and the piston that they will occupy but little space within the casing.

It is also an object of the invention to provide means for indicating whether or not the fire extinguisher is charged and ready for service.

It is also an object of the invention to provide means for preventing the casing from being completely filled with the liquid, and thus providing an air space to permit the expansion of the liquid.

It is also an object of the invention to provide the fire extinguisher with a closure for the discharge opening which will be displaced by the pressure of the gas within the extinguisher.

Other objects of the invention will appear as to the construction as described in detail.

In the accompanying drawings, Figure 1 is an elevation, partly in section, of a fire extinguisher embodying our invention. Fig. 2 is a section taken in line 2-2 of Fig.

1, and Fig. 3 is a sectional view of the upper portion of a fire extinguisher showing a slightly modified form of the invention.

In these drawings we have illustrated one embodiment of our invention and have shown the same as comprising a casing which consists of the cylindrical body portion 1 closed at its ends by cylinder heads 2 and 3, which in the present instance are screw threaded to the ends of the body portion 1. Mounted within the body portion is a piston 4 which may be of any suitable material which will not be affected by the chemical character of the fire extinguishing solution or by the gas generating substances. Preferably the piston is formed of lead and lapped into the cylinder so as to form a snug fit which will prevent any leakage about the piston, but will permit the latter to have free movement within the cylinder. If desired, the piston may be provided with a suitable packing, for example, a cup leather as shown at 5, which leather is here shown as provided with a covering of tinfoil 36, to render it immune from the action of the fire extinguisher solution.

The gas generating substances are supported within the casing near one end thereof, and, where a piston is employed, between the piston and the end of the casing. However, the use of the piston is not essential to the invention, as the pressure of the gas might be applied directly to the liquid. Any suitable substances may be utilized for producing the gas, usually the substances consist of a liquid and a powder, or other dry substance, such, for example, as sodium carbonate and sulfuric acid, or calcium carbide and water. The liquid is confined within a suitable frangible container, such for example as a glass vial, and the powder or dry substance is so supported with relation to the container that, when the latter is broken, the liquid will come in contact with the powder and generate gas. In the construction shown in Fig. 1, we have utilized a cylindrical vial 6 of thin glass which is open at one end only. This vial or container is filled with the liquid to a point near the top thereof, and a stopper 7 is fitted into the open end thereof and brought into contact with the liquid. The stopper, which may be of cork treated with paraffin, or any other suitable substance, projects beyond

the upper end of the container and is connected with a device extending to the exterior of the casing and by means of which the stopper may be forced into the vial or
 5 container and caused to exert sufficient pressure on the liquid to burst the container. The pressure thus applied to the container will shatter the same very thoroughly, and will permit the rapid escape of all the liquid.
 10 The actuating device here illustrated is in the form of a plunger or rod 8 slidably mounted in the cylinder head 2 and provided on its outer end with a knob or button 9 and having secured to the inner end thereof
 15 a plate or disk 10 which bears against the outer end of the stopper 7 and serves to force the same into the container when the plunger is driven inwardly. Preferably the plunger or rod 8 is screw threaded into
 20 the plate and extends beyond the same into the stopper so as to unite these two parts into a single structure.

The device shown in Fig. 3 employs a container operating upon the same principle,
 25 but of a slightly different construction. In this latter construction, the container, which is shown at 11, has a reduced upper portion, 12, which is closed by a stopper 13 which also bears against the liquid but need not
 30 extend beyond the top of the container, and the plunger or actuating device, which is shown at 14, has at its inner end a plate or disk 15 provided with an inward extending portion 16 of such a size that it can enter
 35 the neck of the container. The container is supported in alinement with the plunger and may be held in this position by a disk of wood, or other suitable material, 17 which has an aperture to receive the neck of the
 40 container. When the plunger is forced inwardly the stopper will be forced into the container and will shatter the same as in the case of the other device.

In both forms of the device I prefer to
 45 place a thin film of oil 18 on the liquid in the container to prevent the same from coming in contact with the stopper or from working its way about the edge of the stopper. It is also desirable that an air
 50 space be provided within the container to permit the expansion of the liquid. In the form shown in Fig. 1, the stopper 7 is provided with a recess 19 and the stopper is inserted in the container such a distance that
 55 this recess will not be filled with liquid or oil. Likewise, in the form shown in Fig. 3, the stopper 13 terminates above the lower end of the neck 12 thus leaving an air space in the neck.

60 The container may be supported within the casing in any suitable manner, but is preferably supported independently of the piston 4 and is here shown as carried by the cylinder head 2 as this permits the mechanism as a whole to be withdrawn when the

cylinder head is removed and renders the same readily accessible. The supporting structure is secured to the casing, and preferably to the cylinder head as explained, and extends lengthwise of the casing, but
 70 is spaced some distance from the cylindrical wall thereof, thus permitting the piston 4, which is recessed, to extend upwardly about the walls of the supporting structure. This enables the piston to be provided with
 75 a relatively long bearing surface, which will prevent it from twisting or binding in the casing, without causing it to occupy any considerable amount of space within the casing, and renders the structure as a whole
 80 very compact. The supporting structure in the present instance consists of a bar 20 extending transversely of the casing and bent into a U-shape, and having its upper end secured to the cylinder head 2 and its trans-
 85 verse portion extending into the casing and forming the support proper for the container. The supporting bar may be secured to the cylinder head 2 in any suitable manner. The upper portions thereof are here
 90 shown as provided with lateral projections or lugs 21 which engage shoulders or flanges 22 extending inwardly from the cylinder head. The resiliency of the U-shaped bar
 95 will be sufficient to retain the lugs in engagement with the shoulders, but if desired a positive fastening means may be provided, as by soldering the lugs to the shoulders. The dry substance or powder is carried by
 100 the supporting bar 20 and is so arranged with relation to the container that, when the latter is shattered, the liquid is thoroughly intermingled with the powder. In the present
 105 arrangement we have accomplished this by placing the vial or container 6 in a flexible container 23 which preferably consists of a paper bag, and surrounding the vial with the powder, as shown at 24. By plac-
 110 ing the vial centrally of the bag the powder can be equally distributed about the same. The upper end of the bag is then closed in
 115 any suitable manner, as by drawing it snugly about the container 6 by means of a cord, 25. This arrangement not only supports the powder in a position whereby all parts
 120 of it will be subject to the action of the liquid when the container is broken, but it acts as a packing between the container and the supporting structure to protect the con-
 125 tainer from injury when the extinguisher is being handled or shipped. A spreader, such as a disk of cardboard 31 may be placed in the bottom of the bag, before its contents are placed therein, to give the same a diam-
 130 eter approximately equal to the width of the transverse portion of the supporting structure. Further, a disk of cardboard 32 may be placed between the bag and the supporting structure to hold the same
 135 against movement relatively thereof, and

where the supporting structure is in the form of a bar as here shown, the edges of the disk are notched to receive the side portions of the bar, and the bag may be secured to the disk or washer of cardboard by applying glue to the disk before it is placed in position. By the use of one or more of these washers the container may be properly positioned with relation to the other parts to compensate for any variations in the sizes of the different containers, or to elevate the container to the proper point with relation to the breaking device.

Under normal conditions the pressure applied to the container, as above described will completely shatter the same, but should there be insufficient liquid within the container, or should it for any other reason fail to break under the pressure, it is desirable that other means should be provided for breaking the same. This we have accomplished by forming the disk 10 of Fig. 1, and 15 of Fig. 3, of a width greater than the adjacent portions of the respective containers. Thus if the stopper is forced into the container for its full length without breaking the same, the laterally projecting portions of the disk will come in contact with the edge of the container and crush it. In this manner the breaking of the vial, or container, is rendered absolutely certain.

In order that it may be determined from outward appearance whether or not the extinguisher is charged and ready for service, we have provided means for locking the plunger against returning to its normal position after it has been operated, thus holding the knob, or button 9 close to the cylinder head and indicating that the device has been operated. This may be accomplished in various ways, but in the present instance, we have secured to the cylinder head above the disk 10 two depending resilient fingers, 23, which when unrestrained will diverge downwardly as shown by the dotted lines on Fig. 1, but they may be moved inwardly and caused to enter openings in the disk 10 and stopper 7 when the latter are in their normal positions. When the plunger has been moved inwardly far enough to break the container the disk will be moved far enough to release the resilient fingers which will spring out of alinement with the openings in the disk, but will lie in the path of the edge portions thereof, thus effectively preventing the upward movement of the plunger. Inasmuch as these fingers are inaccessible from the exterior of the casing it is obvious that the plunger cannot be returned to its normal position without removing the cylinder head. The fingers 20 also serve to lock the disk and the stopper against rotation, thus preventing the displacement or breaking of the vial in the handling of the extinguisher.

It is also desirable that an air space should be provided within that portion of the casing containing the fire extinguishing fluid, to permit the expansion of this fluid. This we have accomplished by so constructing the casing that it cannot be completely filled with liquid. In the present construction the discharge opening for the casing is formed centrally of the lower cylinder head 3 and is surrounded by an inwardly extending boss 27. This opening is provided with a discharge nozzle 28 and to fill the casing this nozzle is removed and the liquid poured into the casing through the discharge opening. Inasmuch as the boss 27 extends inwardly for some little distance it will be apparent that a pocket of air will form about the boss and between the liquid in the casing and the cylinder head 3 and when the discharge opening has been closed, the air thus retained within the casing will move to the top of the liquid, whatever the position of the casing.

The discharge nozzle 28 may be of any suitable construction, but in order that the device may be set in operation by a single movement on the part of the operator, by breaking the container 6, we have in the present instance used a straight valveless nozzle, and have provided means for closing the discharge opening which will be released by the pressure of the gas. This means preferably takes the form of the disk of paper, or light cardboard, 40 extending across the inner end of the opening, which may be treated with paraffin, or otherwise, to render it impervious to the action of the fluid. To facilitate the placing of the disk in position, we have threaded the discharge opening throughout its length, and have mounted therein a threaded plug 29 having an opening of the same size as the opening of the nozzle 28. The paper closure is applied to the inner end of this plug to close the opening therein, and the plug is then screwed into the discharge opening, after which the nozzle is placed into position.

The operation of the device will be readily understood from the foregoing description, and it will be apparent that we have provided a very simple, inexpensive device in which the gas generating substances will be normally isolated one from the other but may be thoroughly intermingled by a single movement on the part of the operator, that of striking the knob of the plunger either with the hand or against some fixed object.

While we have shown and described certain embodiments of the invention, we wish it understood that we do not desire to be limited to the details of construction, as various modifications will occur to a person skilled in the art.

Having fully described our invention what

we claim as new and desire to secure by Letters Patent is:

1. In a fire extinguisher, a casing, a supporting structure secured to said casing near one end thereof, and having a portion extending lengthwise of said casing and arranged out of contact therewith, and a piston mounted in said casing and having one end thereof recessed to receive said portion of said supporting structure.

2. In a fire extinguisher, a casing, a closure for one end thereof, a supporting structure secured to said closure and having a part extending into said casing and spaced from the walls thereof, and a piston mounted in said casing and having one end thereof recessed to permit said piston to extend about the inwardly extending portion of said supporting structure.

3. In a fire extinguisher, a casing, a closure secured to the said casing and having inwardly extending flanges on the opposite sides thereof, a supporting structure comprising a U-shaped bar having lateral projections at the ends thereof, to engage the flanges on said closure.

4. In a fire extinguisher, a casing, a supporting structure mounted within said casing, a frangible container carried by said supporting structure, and adapted to contain a liquid, a stopper to close the end of said container, and means operable from the exterior of said casing to force said stopper into said container and exert sufficient pressure on the liquid therein to break the container.

5. In a fire extinguisher, a casing, a supporting structure mounted in said casing, a frangible container carried by said structure, a stopper to close the end of said container and a plunger slidably mounted in the end of said casing and connected with said stopper to force the same inwardly.

6. In a fire extinguisher, a casing, a supporting structure mounted in said casing, a frangible container carried by said structure, a stopper to close the end of said container, a plunger slidably mounted in the end of said casing and arranged to act on said stopper to force the same inwardly, a part connected with said plunger and projecting beyond the edges of said stopper into alignment with the wall of said container.

7. In a fire extinguisher a casing, a supporting structure mounted in said casing, a frangible container carried by said structure and adapted to contain a liquid a stopper to close one end of said container, a plate arranged to engage said stopper and force the same inwardly, and a plunger slidably mounted in an end wall of said casing and connected with said plate whereby the inward movement of said plunger will cause sufficient pressure to be exerted on the liquid to break said container.

8. In a fire extinguisher, a casing, a supporting structure mounted in said casing, a frangible container carried by said structure and adapted to contain a liquid, a stopper to close one end of said container, a plate arranged in engagement with said stopper, and a plunger slidably mounted in the end wall of said casing and connected with said plate, the said plate having lateral portions extending beyond the edges of said stopper.

9. In a fire extinguisher, a casing, a supporting structure mounted in said casing, a container carried by said structure and adapted to contain a liquid, means other than said structure for supporting a dry substance about the exterior of said container, and means operable from the exterior of said casing for breaking said container.

10. In a fire extinguisher, a casing, a bag to contain a dry substance, a container for a liquid arranged in said bag and surrounded by said dry substance, means to support said bag and said container within said casing and means to release the liquid from said container and permit it to permeate said dry substance, said bag being of such a character as to prevent the escape of said dry substance but to permit the escape of gas after said liquid has been released.

11. In a fire extinguisher, a casing, a supporting structure mounted in said casing, a container carried by said structure and adapted to contain a liquid, means for supporting a dry substance adjacent to said container, and means for applying pressure to the liquid within said container to cause the latter to burst.

12. In a fire extinguisher, a casing, a supporting structure mounted within said casing, a bag carried by said supporting structure, a frangible container arranged within said bag, adapted to contain a liquid, and surrounded by a dry substance, and means operable from exterior of said casing for breaking said container.

13. In a fire extinguisher, a casing, a supporting structure mounted within said casing, a bag carried by said supporting structure, a frangible container arranged within said bag, adapted to contain a liquid, and supported adjacent to a dry substance, and a plunger slidably mounted in the end wall of said casing and having means for breaking said container, and means for preventing said plunger from returning to its normal position after said container has been broken.

14. In a fire extinguisher, a casing, a supporting structure mounted in said casing, a frangible container carried by said structure and adapted to contain a liquid, a plunger mounted in the wall of said casing, and having means comprising a plate to cause said

container to be broken, said plate having an opening therein and a resilient finger secured to the end wall of said casing and adapted to enter said opening in said plate when said plunger is in its normal position, and to move out of alinement with said opening when said plunger has been actuated to break said container.

15. In a fire extinguisher, a casing having a discharge opening threaded throughout its length, a screw threaded plug seated

in said discharge opening near the inner end thereof and having an aperture therein, a closure of flexible material for said aperture, and a nozzle screw threaded into the outer portion of said discharge opening.

In testimony whereof, we affix our signatures hereto.

WILLIAM F. LAUTERBACH
ULRICH J. RAPPEL
MELROSE G. KOPF.