Nov. 13, 1928. 1,691,041

A. C. BADGER

FIRE EXTINGUISHER

Filed Aug. 20, 1925

Fig. 1.

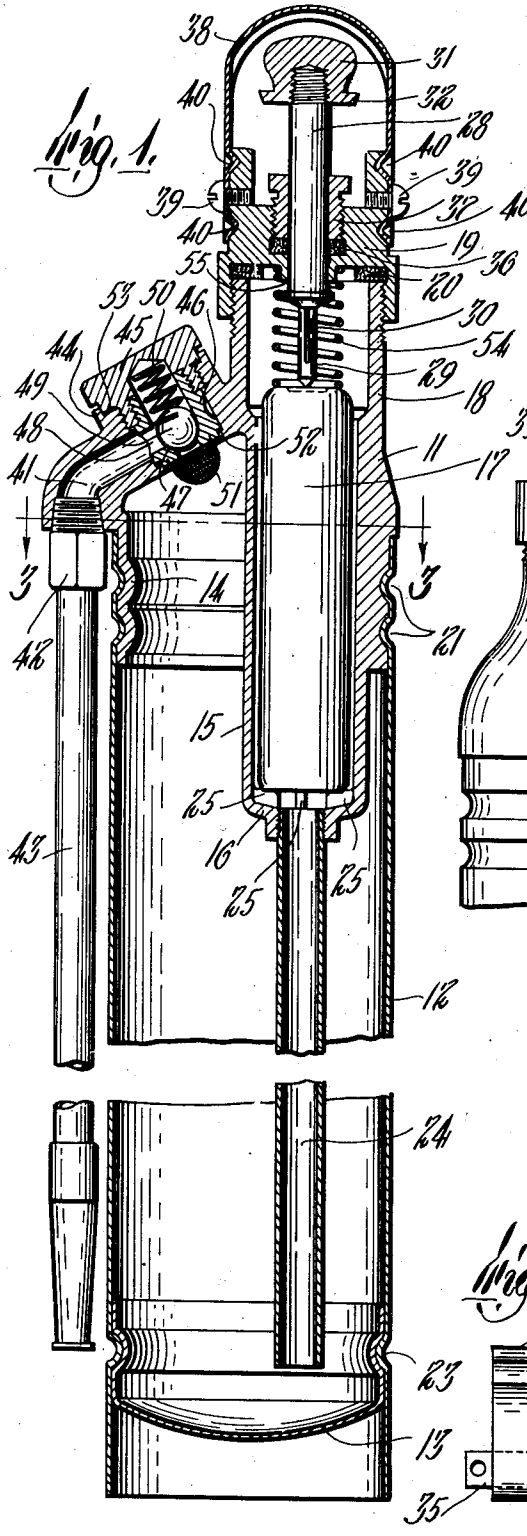


Fig. 2.

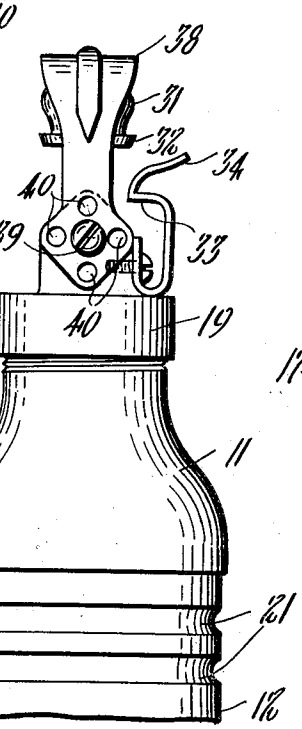


Fig. 4.

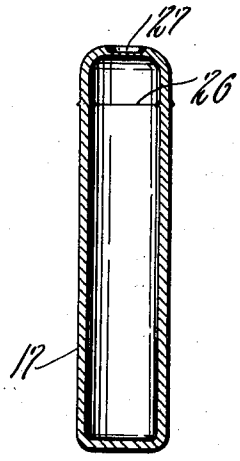


Fig. 3.

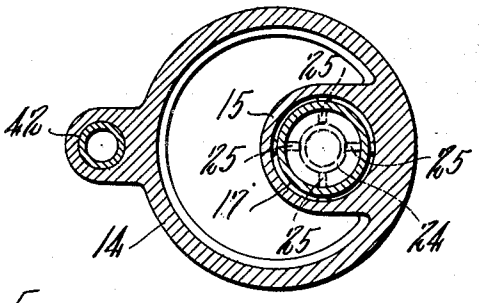


Fig. 5.

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UNITED STATES PATENT OFFICE.

ARTHUR C. BADGER, OF NEWTON, MASSACHUSETTS.

FIRE EXTINGUISHER.

Application filed August 20, 1925. Serial No. 51,318.

The present invention relates to fire extinguishers of the type which contain a charge of liquid adapted to extinguish fires, together with means for causing a gas to be liberated and applied upon the liquid charge at the moment of use. Its main object is to furnish a fire extinguisher in which the source of gas pressure for expelling the charge is a confined body of liquefied or highly compressed gas in an inner cartridge or shell of such construction that escape of the confined gas is made impossible, together with means for conducting the gas when liberated from the cartridge, and when the extinguisher as a whole is inverted, to the upper surface of the liquid charge without mingling with the liquid; and to furnish a compact and efficient portable extinguisher having certain novel and improved characteristics, as will appear from the following specification.

The embodiment of the present invention shown herein contains subject matter originally disclosed in my pending application for fire extinguishers, filed October 31, 1924, Serial No. 747,010, together with additions and improvements, in which, and equivalents thereof, the present invention resides.

In the drawings furnished herewith;

Figure 1 is a longitudinal central section of the complete fire extinguisher;

Figure 2 is a side elevation of the upper part of the extinguisher as seen from the righthand side of Figure 1;

Figure 3 is a cross section of the extinguisher on line 3—3 of Figure 1;

Figure 4 is a longitudinal section of the compressed gas cartridge which I prefer to use with this extinguisher;

Figure 5 is an elevation showing, in detail, a latch provided to hold the cartridge-piercing plunger in a certain position.

Like reference characters designate the same parts wherever they occur in all the figures.

The shell of the extinguisher consists of a head 11, which for the purposes of this description may be called the upper head, because it is shown in the drawing as uppermost, a tubular section 12 and a second head 13, which may be called the lower head or bottom. The head 11 is preferably made as a casting of any suitable metal, that is a metal which can be cast and is not readily subject to corrosion. I prefer to use copper, brass, or bronze, but may use other metal if desired. This head is preferably circular in end view and is formed with a cylindrical skirt portion 14 and an integral inner cylindrical partition 15 having a bottom flange 16 and so arranged as to delimit an inner compartment chamber or pocket in which the gas cartridge 17 is placed. In the specific illustration here given, which is that of a small extinguisher capable of being grasped around the body with one hand, the partition 15 is eccentric to the head and substantially tangent to one side thereof, but this is a detail which although here claimed as a novel and valuable feature, may be departed from without departure from other aspects of the invention.

The walls of the inner compartment are extended to form a neck 18, the interior of which is at least as large as any other part of the compartment; and the neck is externally threaded to take a cap 19, such cap having a lip which embraces the neck and being formed to confine and press a packing washer 20 against the end of the neck.

The part 12 of the casing is a tube, which may be a seamless drawn tube or one made of rolled sheet metal. Such tube embraces the skirt part 14 of the head 11 and is indented at 21, 21 into encircling grooves formed in outer surface of said skirt portion, whereby these members are securely united together. They may be soldered or brazed, or otherwise hermetically joined together, in addition. The bottom head 13 is preferably made as a cup-shape member drawn from sheet metal which is inserted into the lower end of the tube and secured thereto by an inwardly rolled encircling bead or groove 23. Both the tubular part and the bottom head may be made of any metal or other material suitable for fire extinguisher construction.

The cartridge 17, which is preferably cylindrical in form, is enough smaller in diameter than the above described chamber to permit of easy insertion thereinto and also to permit the gas, when released, to flow between its outer surfaces and the walls of the chamber. There is a hole in the bottom 16 of this chamber in which is inserted, preferably by being screwed in, one end of a tube 24. Shoulders or seating ledges 25 are provided on the upper side of the bottom 16 to support the cartridge with open spaces through which gas may freely flow to the tube 24.

The cartridge is a tube or bottle of any desired form with integral walls completely enclosing the charge of gas. It is constructed, filled, and closed essentially in the manner described in my application Serial No. 747,010 aforesaid, and in my previous application Serial No. 692,468 filed February 13, 1924, entitled Method of and apparatus for creating abnormal pressures in and sealing hollow bodies. That is it consists essentially of a body part and an end wall or head which are united autogenously by electric welding into an integral unit structure after the body has been filled with compressed or liquefied gas, and while the filling charge is under pressure. The line 26 in Figure 4 represents the welded union between the body and head, but this union may be located at other points than that indicated, and the cartridge as a whole may be made of other forms. The material which I have used in making such cartridges and prefer, is steel.

The charge contained in the cartridge may be carbon dioxide, air, or any other gas, either liquefied and under pressure, or compressed but not liquefied. Whenever in the present specification I speak of the contents of such a cartridge as being gas, I intend to include liquefied gases as well as those in the gaseous state. Thus in this specification the term "gas" so used means substances which are gases at ordinary temperatures and atmospheric pressure regardless of whether or not they are in the liquid state when confined under pressure in the cartridge.

A portion of one head of the cartridge is made with less thickness than the walls elsewhere, as shown at 27 in Figure 4, in order that it may be readily punctured by a piercing tool, but the area of this portion is made so small that, in spite of its reduced thickness, it has sufficient strength to withstand the pressure of the confined gas and not be ruptured thereby.

In the cap 19 is a passage through which extends a plunger 28 having an inner end portion 29 of reduced diameter, pointed at its extremity. Such reduced portion, except for its terminal point, is cylindrical and of an area in cross section somewhat smaller than the area of reduced thickness in the cartridge head, and of a length great enough to pass through such head. In one side of this reduced portion is a narrow and shallow groove 30 of proper length and properly positioned to lie partly within and partly outside of the cartridge, and thus form a restricted channel for conducting gas out of the cartridge when the piercing tool thus penetrates such head. On the outer end of the plunger 28 is secured a knob 31 having a latching abutment formed preferably as a surrounding flange or lip 32. Such plunger or piercing tool is a means for opening the cartridge; that is, for releasing the agent which causes pressure to be exerted on the extinguishing charge. On the side of the cap is secured a spring latch 33 adapted to hook over the lip 32 and having an inclined guide portion 34 by which it is pushed aside by the lip in passing. Preferably the latch and its guide are made from a single piece of spring sheet metal, bent substantially as shown in Figure 2, and having also two outstanding lugs 35, shown in Fig. 5, for attachment to the cap.

Leakage of the gas or liquid past the plunger is prevented by packing 36 and a gland 37 mounted in the cap, shown in Figure 1. A guard member, preferably made as a bail 38, is connected to the cap by pivot screws 39, and normally extends over the knob 31 to prevent the same from being struck and pushed inward accidentally, but is movable aside from that position to an inoperative position, to permit of the plunger being intentionally moved inward. This bail is preferably made of a sheet metal strip bent into U-shape, having a stiffening rib in its bent portion, and with indented offsets 40 adjacent to the pivots adapted to enter sockets in the adjacent part of the cap. Such offsets hold the bail in either its guarding position or in its inoperative position with some firmness, but yield to permit its displacement from one position to another by application of sufficient force.

There is formed in a part of the head 11 an enclosed outlet passage 41 having an external orifice which is threaded to receive a coupling 42 by which an eduction hose 42 is made fast. A transverse passage crossing the passage 41 opens into the interior of the head and its outer end is surrounded by a lip 44. A valve device is detachably secured in said transverse passage. Such valve device, in the form here shown, comprises a cap or plug 45 adapted to screw into the lip 44, and in which is screwed one end of a valve casing 46 having a longitudinal passage terminating in an inner or end orifice or port surrounded by a valve seat 47, and having both a lateral orifice or port 48 adapted to register with the passage 41 and an external groove in the same zone with port 48 to make a flow connection with the passage in case the port should not register with it when plug 45 is screwed in tightly. A ball valve 49 is contained in the casing 46 and is pressed against the seat 47 by a spring 50 reacting against the cap 45. A strainer 51 is secured to the inner end of the valve casing across the inner orifice thereof. Packings 52 and 53, placed substantially as shown in Fig. 1, prevent leakage around the parts of the valve device to either the outlet passage 41 or the outside of

the casing. This valve device may be readily applied and removed as a whole, and its parts may be disassembled upon unscrewing the casing member 46 from the cap 45. Other means than screw threads may of course be used to connect the parts of the device together and to secure the device in the head. This spring-loaded valve prevents accidental slopping or leaking of the liquid charge out of the casing, but yields and allows expulsion of the charge under the pressure of the gas applied when the extinguisher is to be used.

The extinguisher is charged, ready to be used, by filling the casing or shell with suitable liquid. Such liquid may be water, or a non-freezing solution of salt in water, or any other liquid which is not inflammable and may be volatile, such as carbon tetrachloride. In order thus to charge the extinguisher the valve device is removed and the liquid may either be poured into the opening left thereby, or through the neck 18, the cap 19 being removed and the opening for the valve device then serving as a vent for escape of air. A gas cartridge 17 is placed in the chamber enclosed by the partition 15. This may be done either before or after filling the main body of the extinguisher with liquid. The cap and valve are then put in place and made tight.

It will be understood that the gas cartridge used will be of such length, in proportion to the length of the chamber which receives it and to the length and possible movement of the piercing projection 29, that its upper head will lie so near the piercing projection that the latter may penetrate such head to the required depth, when pushed inward, but will not be forced through the head by the screwing down of the cap; and the weakened area 27 is located in the part of said upper head which then comes in line with the piercing projection. Preferably a spring 54 is inserted between the gas cartridge and the cap to prevent the cartridge being thrown against the piercing point and accidentally punctured by rough handling or knocking about of the extinguisher. This spring is preferably a helix, the internal diameter of which is larger than the plunger 29, and is centered by surrounding at its upper end a tubular guiding extension 55 on the inner end of the cap through which the plunger passes. The bail is placed in the guarding position, and it is stiff enough and firmly enough held in this position to prevent accidental striking of the plunger and penetration of the cartridge head by knocking about of the extinguisher.

When the extinguisher is to be used the bail is first turned aside, and the extinguisher body is grasped and moved so as to strike or press the knob 31 against some hard object or surface with enough force to move the plunger inward and drive the piercing point through the adjacent head of the cartridge. In being so moved the lip 32 slides over the cam portion 34 of the latch, and retracts the latch, passing the toe, or locking angle of the latch, which then snaps back over the lip and holds the piercing point in the cartridge, where the groove 30 provides a channel for escape of the gas. Such channel may be made of any depth and width desired to permit release of the charge of gas at any desired rate of speed. The escaping gas passes through the clearance space between the cartridge and the surrounding walls, and through the tube 24. It is thus conducted through the liquid without mingling therewith, and its pressure is applied directly on the surface of the liquid. The valve 49 prevents escape of the liquid until such pressure is applied, and then it yields and permits flow of the liquid in a forcible stream.

While I have shown and described the embodiment of this invention which seems preferable at the present time, it should be understood that various changes in the details of construction may be made without departure from the spirit of the invention or the protection which I claim.

What I claim and desire to secure by Letters Patent is:

1. A fire extinguisher comprising a casing adapted to hold a fire extinguishing charge and having an inner compartment near one end, opening through such end, and adapted to hold a cartridge, a closure for the open end of said compartment, a plunger movably mounted in said closure and arranged to engage and open said cartridge, and a guard member embracing and crossing the outer end of said plunger, pivoted to the closure at opposite sides of the plunger, and adapted to be turned about its pivots to expose the plunger for application of force to move it inward.

2. In a fire extinguisher having a cartridge-opening plunger, a guard pivotally mounted on said extinguisher at opposite sides of said plunger to extend across the outer end thereof, said guard being movable aside from the above named position.

3. In a fire extinguisher having a cartridge-opening plunger projecting externally of the extinguisher for operation by external engagement, a guard comprising essentially, a bail pivoted to the extinguisher and adapted to occupy a position in which it so embraces and crosses the outer end of said plunger as to prevent accidental operation thereof, and another position in which it lies at one side of the plunger.

4. In a fire extinguisher having a cartridge-opening plunger, a bail pivoted to the extinguisher and adapted to occupy a posi-

tion in which it embraces and crosses the outer end of said plunger, and another position in which it lies at one side of the plunger, said bail having flat end portions pivoted at opposite sides of the plunger and formed with offset projections adapted to occupy cavities in the adjacent surfaces of the extinguisher body.

5. A fire extinguisher comprising an outer shell or casing adapted to hold a liquid charge, said shell having at one end a head formed with an integral inner partition, which partition encloses a chamber adapted to receive a cartridge and being open at one end, said head having a discharge outlet from the space outside of said partition at a point adjacent to the junction of the partition with the head, a cartridge containing in compressed condition a substance which is a gas at ordinary temperature, said cartridge having impervious and integrally continuous walls throughout its whole extent and being formed to leave a space for flow of gas between itself and the walls of said chamber, a tube extending from the bottom of said chamber toward the opposite end of the shell mounted detachably on the open end of said chamber, and a cartridge puncturing plunger mounted in the cap and movable through the same.

6. A fire extinguisher comprising an outer shell or casing adapted to hold a liquid charge, said shell having at one end a head provided with a discharge outlet at the same end, and formed with an integral inner partition, which partition encloses a chamber adapted to receive a cartridge and being open at one end, a cartridge containing in compressed condition a substance which is a gas at ordinary temperature, said cartridge having impervious and integrally continuous walls throughout its whole extent and being formed to leave a space for flow of gas between itself and the walls of said chamber, a tube extending from the bottom of said chamber toward the opposite end of the shell mounted detachably on the open end of said chamber, and a cartridge puncturing plunger mounted in the cap and movable through the same, said plunger having a puncturing extremity of reduced diameter adapted to pass through the adjacent wall of the cartridge and formed with a channel in one side.

7. A fire extinguisher comprising a shell adapted to be grasped in a person's hand, said shell having at one end a head provided with an eccentric cartridge chamber close to one side of the shell and an entrance opening in line with the cartridge chamber, the head having also a discharge outlet opening from the space outside of the cartridge chamber at the same end, a tube running from the bottom of the cartridge chamber toward the opposite end of the shell and opening adjacent to said opposite end, a structurally separate cartridge occupying said chamber loosely enough to permit free passage of its contents between its outer surfaces and the enveloping walls of said chamber, a cap detachably mounted on the said entrance, and a plunger mounted in said cap with provision for endwise movement and having an inner puncturing end adapted to puncture the adjacent end wall of said cartridge to release the contents thereof.

8. A fire extinguisher comprising a shell having a head at one end provided with a partition forming an interior cartridge receiving chamber, and having an open ended inlet in line with said chamber and a hole outside of said chamber, the head being also formed with a lateral discharge passage opening into one side of said hole, a cartridge detachably and loosely occupying said chamber, a detachable cap for said inlet, a cartridge puncturing plunger movably mounted in said cap, and a second cap detachably mounted upon the head across said hole and having a valve chamber occupying the hole and containing a port in communication with said discharge passage, a valve seat between said port and the interior of the shell, and a spring loaded valve cooperating with said seat and adapted to be displaced therefrom by pressure developed within the shell.

9. A fire extinguisher comprising a shell having an interior cartridge receiving chamber and an inlet to said chamber in line therewith and constructed to permit entrance thereinto of a cartridge containing a compressed charge of gas, a cap detachably and tightly closing said entrance, means for puncturing the cartridge in said chamber to release the compressed gaseous charge thereof, said shell having a filling hole at one end and an enclosed outlet passage opening from the side of said hole, a detachable cap for said hole, a valve chamber carried by said cap filling the hole when the cap is in place and having ports opening respectively into the interior of the extinguisher and into said discharge passage, a valve in said casing between said ports, and a spring arranged to seat said valve over the port which opens into the extinguisher.

In testimony whereof I have affixed my signature.

ARTHUR C. BADGER.