Dec. 12, 1933. J. L. COFFIELD 1,939,336

FIRE EXTINGUISHER

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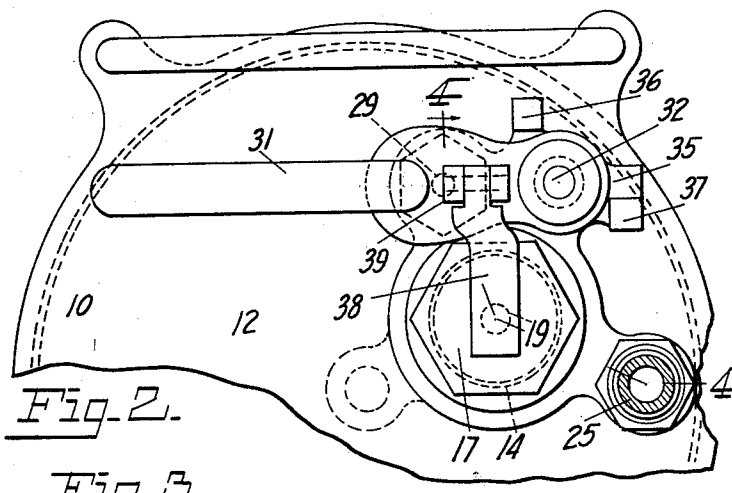


Fig. 2.

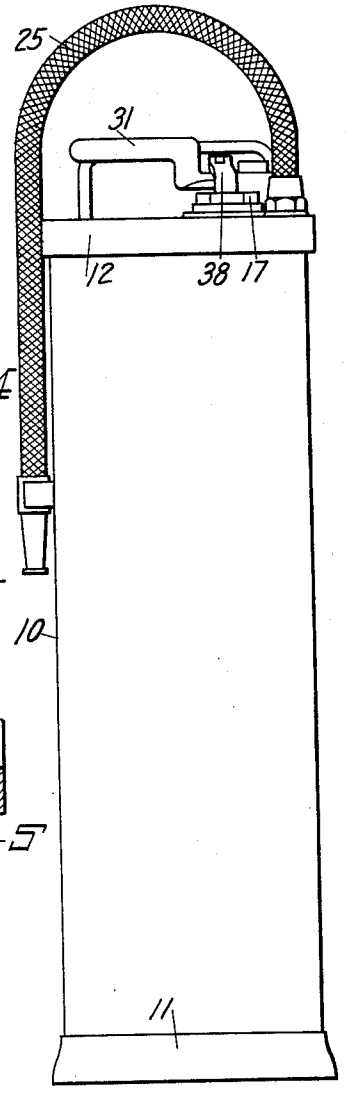
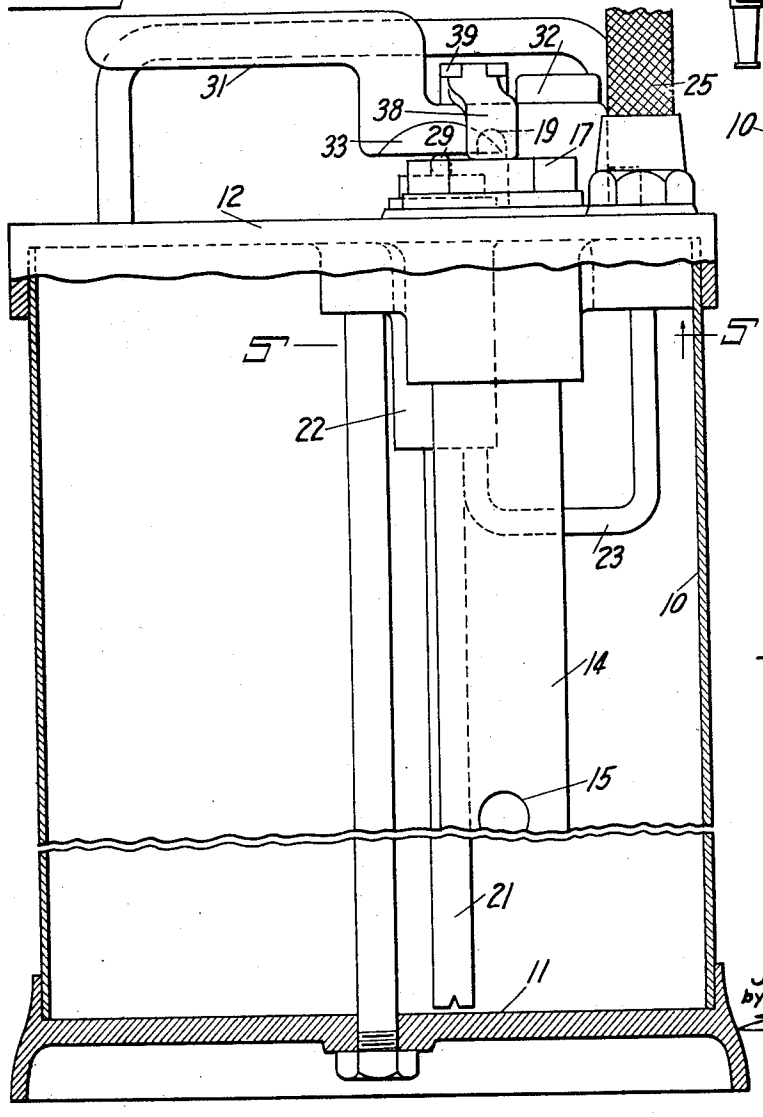


Fig. 1.

Fig. 3.



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Fig. 4.

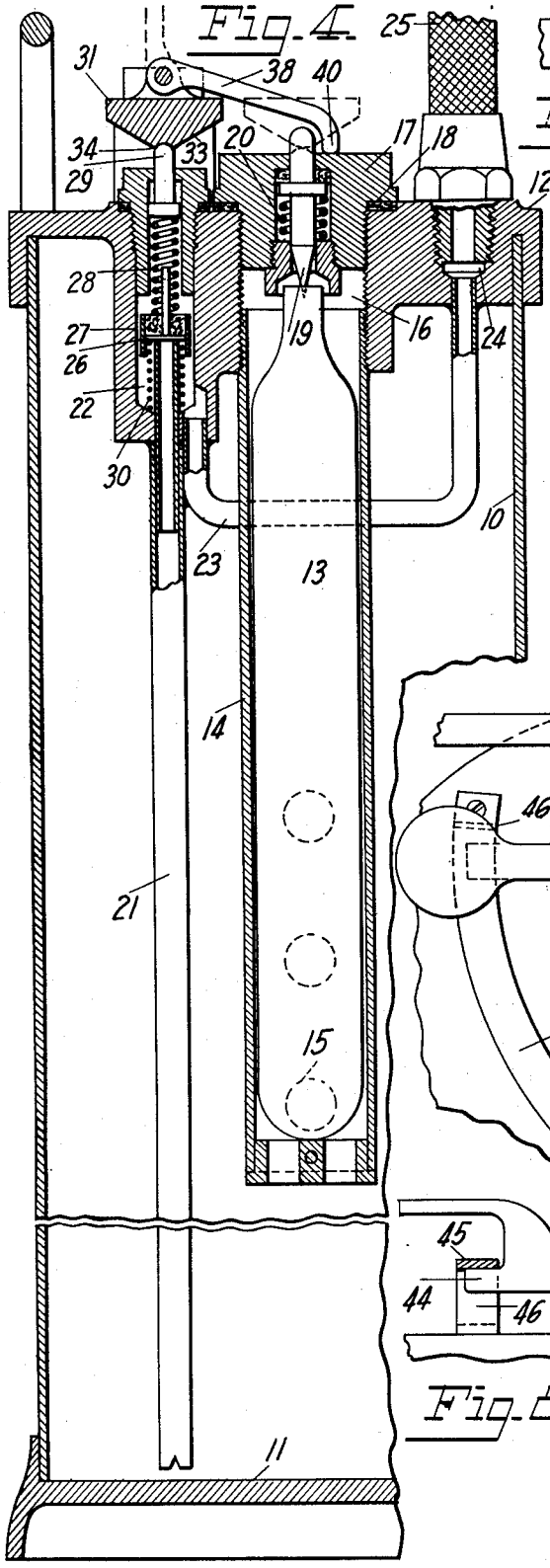


Fig. 6.

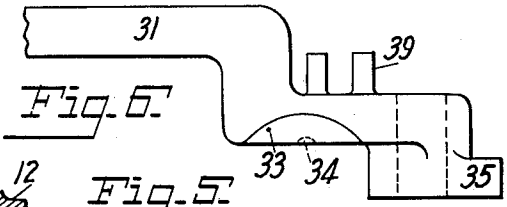
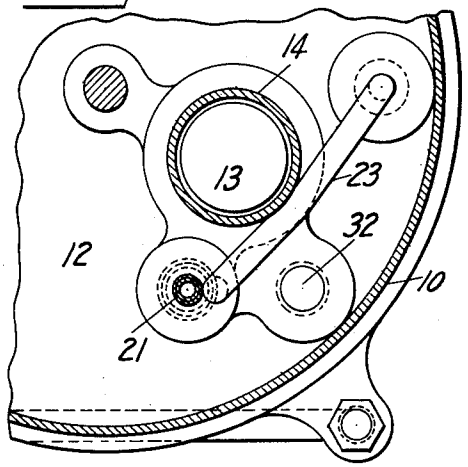


Fig. 5.



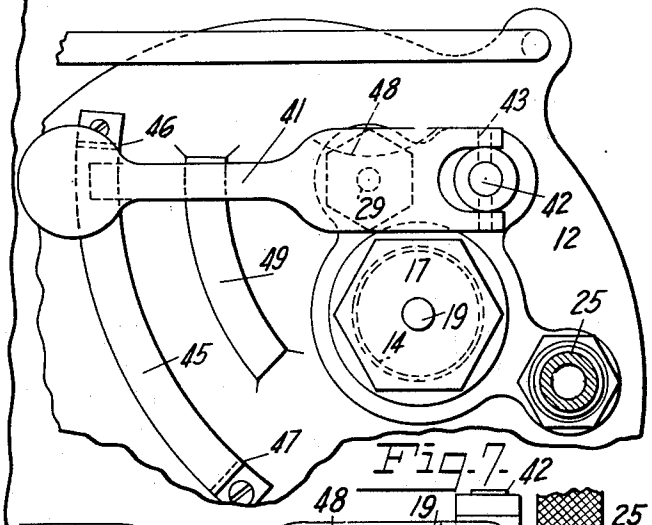


Fig. 7.

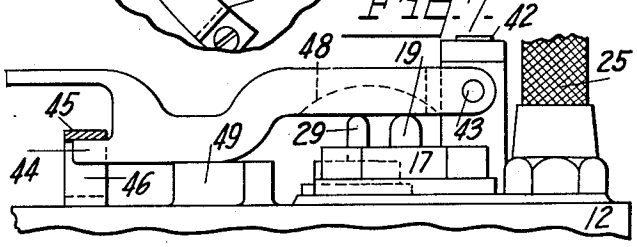


Fig. 8.

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UNITED STATES PATENT OFFICE

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FIRE EXTINGUISHER

James L. Coffield, Dayton, Ohio

Application November 10, 1930
Serial No. 494,564

18 Claims. (Cl. 169—31)

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 released from a cartridge supported within a liquid container.

One object of the invention is to provide an efficient, easily operated device for opening the cartridge to release the gas therefrom.

A further object of the invention is to provide a fire extinguisher of this type with a device for opening the gas cartridge which will also serve to hold the outlet valve closed under normal conditions and will release this valve when the device is actuated to open the cartridge.

Other objects of the invention will appear as the device is described in detail.

In the accompanying drawings Fig. 1 is a side elevation of a fire extinguisher embodying my invention; Fig. 2 is a top plan view of a portion of the extinguisher; Fig. 3 is a vertical sectional view taken through the container and showing the actuating device in elevation; Fig. 4 is a vertical sectional view taken through the container on the line 4—4 of Fig. 2; Fig. 5 is a section taken on the line 5—5 of Fig. 3 looking in the direction of the arrow; Fig. 6 is a detail view of the actuating device, partly broken away; Fig. 7 is a top plan view of a portion of an extinguisher showing a modified lever arrangement; and Fig. 8 is a side elevation of the lever of Fig. 7.

In these drawings I have illustrated one embodiment of my invention, together with a slight modification thereof, and have shown the same applied to a fire extinguisher of the large portable type, which usually have a capacity of from one to three gallons, but it will be understood that this particular embodiment has been chosen for the purposes of illustration only and that the device may take various forms and may be applied to fire extinguishers of various kinds without departing from the spirit of the invention.

The fire extinguisher here shown comprises a container 10 for the fire extinguishing liquid, which is preferably cylindrical in form and is closed at its lower end by a head 11 and at its upper end by a head 12. Means are provided for supporting within the container a cartridge 13 of compressed gas, the term "gas" being here used to include any gaseous fluid which may be utilized for this purpose. Preferably the support is tubular in form, as shown at 14, and is provided near its lower end with openings 15 through which the gas may escape into the container when the cartridge is opened. This tubular support is arranged in line with an opening 16 in the upper end wall or cylinder head 12 and is preferably screwed into that opening. This opening serves both to permit the insertion and removal of the gas cartridge and as a filling opening through which the fire extinguishing liquid may be introduced into the container. It is normally closed by a plug 17 screw threaded into the opening and provided with a gasket 18 to form a gas tight joint. Mounted in the upper end of the container, and preferably in the plug 17, is a device for opening the cartridge to permit the escape of the gas therefrom, this device being operable from the exterior of the container. As here shown, the opening device is in the form of a plunger 19, slidably mounted in an opening in the plug 17, having its lower end pointed to pierce the upper end of the cartridge and having its upper end projecting normally above the top of the plug 17. A spring 20 acts on the plunger 19 to hold the same normally in its elevated position.

A tube 21 leads from the lower portion of the container into a valve chamber 22 arranged near the top of the container and preferably formed in a part of the cylinder head or closure 12. This valve chamber is connected by a discharge conduit 23 with an outlet opening 24 with which is connected a flexible hose 25. The flow of the liquid through the outlet 24 is controlled by a valve interposed between the tube 21 and the conduit 23. As here shown, a disk valve 26 is slidably mounted in a guide 27 within the valve chamber and is held normally in contact with the upper end of the tube 21 by a spring 28, the upper end of which bears against the inner end of a plunger 29 slidably mounted in the cylinder head or closure 12 and projecting above that closure. The spring 28 is of such a character that when the plunger 29 is depressed, as shown in Fig. 4, the spring will be compressed to such an extent that it will hold the valve firmly on its seat and thus prevent any escape or evaporation of liquid from the container. When the plunger is released it will be elevated by the spring and the compression of the spring relieved so that the valve may be unseated by the pressure of the liquid in the tube 21. If desired, a spring 30 may be arranged beneath the valve to assist in unseating the same but ordinarily this will not be necessary as the gas pressure will be ample for this purpose.

Mounted on the container, in the present instance on the cylinder head or closure 12, is an actuating device adapted to be moved transversely to the cartridge opening device or plunger 19 into and out of operative relation to

that plunger and also serving to so control the action of the valve controlling plunger 29 as to cause the valve to be opened at the proper time. In the arrangement here illustrated the valve is opened by a spring or by pressure within the container and the actuating device is so controlled that when in its normal position it will hold the valve closed and when moved from its normal position will release the valve controlling plunger and thus cause the valve to be opened. In the form shown in Figs. 1 to 6 the actuating device comprises a lever 31 pivotally mounted on the cylinder head or closure 12 near one edge thereof and adjacent to the two plungers 19 and 29, as shown at 32, the movement of the lever being about a vertical axis, that is, an axis substantially parallel with the plunger 19. The lower longitudinal corners of the lever are cut away, as shown at 33, to provide the same with inclined or cam surfaces adapted to engage and actuate the respective plungers when movement is imparted to the lever. The lever is arranged to engage the valve controlling plunger 29 and hold the valve closed when the lever is in its normal position, and in the present arrangement the adjacent edges of the inclined surfaces of the lever are spaced apart to provide a flat or slightly recessed space 34 adapted to engage the outer end of the valve controlling plunger 29 and retain that plunger in its depressed position. The lever is pivoted near what is usually the rear side of the extinguisher when the latter is in use and normally extends from its axis directly above the valve actuating plunger 29, which is thus held in its depressed position when the extinguisher is not in use. When the extinguisher is to be used the lever is moved about its axis to bring the adjacent cam surface 33 into engagement with the outer end of the cartridge opening plunger 19, thus forcing that plunger directly inwardly and causing it to pierce the end of the cartridge. This movement, of course, carries the lever out of line with the valve controlling plunger and releases the valve so that, as soon as the cartridge is opened, the gas can force the liquid through the outlet 24. The cam surface 33 is inclined at such an angle that it will force the plunger 19 through the end of the cartridge when a relatively light pressure is exerted on the lever 31, thus rendering the device very easy to operate. Preferably the movement of the lever is positively limited in both directions and, in the present construction, a lug 35 extends rearwardly from the lever between two fixed stops 36 and 37. When the lug is in contact with the stop 37 the lever will be in operative engagement with the valve controlling plunger and when the lug is moved into contact with the stop 36 the lever will be carried slightly beyond the cartridge opening plunger 19, thus permitting that plunger to be raised by its spring to avoid any obstruction to the escape of gas from the cartridge.

To prevent the accidental operation of the cartridge opening plunger 19, I have mounted on the lever 31 a guard 38 which is so arranged that when the lever is in its normal position this guard will extend across the end of the plunger 19 so as to prevent anything from coming in contact therewith. In order to permit the guard to be moved out of the way when it is desired to remove the plug 17 it is pivoted between two lugs 39 on the lever and its free end is turned downwardly, as shown at 40, so that it will contact with a fixed part of the container, preferably the plug 17, and will thus hold the guard out of engagement with the plunger.

In Figs. 7 and 8, I have illustrated a slightly different arrangement of the operating lever. As there shown, this lever is movable about a vertical axis into and out of operative relation to the cartridge opening plunger and the valve controlling plunger and is movable about a horizontal axis to actuate the cartridge opening plunger. In the form illustrated the lever 41 is mounted for movement about a vertical axis 42, arranged substantially in the same position shown in Fig. 2, and is also movable about a horizontal axis 43. At its outer or free end the lever has a lip 44 which extends beneath a guide bar 45, the end portions of which are turned downwardly and secured to the top of the container and form stops, as shown at 46 and 47. When the lever is in contact with the stop 46 it will be in line with the valve controlling plunger and will be held against upward movement, by the contact of the lip 44 with the horizontal portion of the guide bar, and will therefore hold the valve controlling plunger 29 in its depressed position. The underside of the lever is beveled at one side, as shown in dotted lines at 48, to cause the plunger 29 to be depressed as the lever is moved into line therewith. To facilitate the operation of the device and prevent the lever from being depressed before it is brought into operative relation with the cartridge opening plunger 19 it is supported normally on an upwardly extending rib 49 which terminates just short of the position occupied by the lever when it is in contact with the stop 47 and is in operative relation to the plunger 19. When the lever is in contact with the stop 47 it will be free from the supporting rib 49 and may be depressed to actuate the plunger.

While I have shown and described two embodiments of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, a support for a gas cartridge mounted within said container, a plunger slidably mounted in the end wall of said container, having a pointed inner end arranged to pierce a gas cartridge on said support and having its outer end extending normally above said end wall, and an actuating member pivotally mounted on said end wall for movement about a vertical axis and having a cam shaped lower surface to engage the end of said plunger and force the latter inwardly.

2. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, means for supporting a gas cartridge within said container, a device movably mounted on said container for opening said gas cartridge and having a part projecting beyond said container, a lever pivotally mounted on said container for movement about a vertical axis from one side of said cartridge opening device to the other side thereof and having a part to engage the projecting part of said cartridge opening device and impart operative movement thereto, and a guard carried by said lever and arranged to extend across said part of said cartridge opening device when said lever is in its normal inoperative position with relation thereto.

3. In a fire extinguisher, a container for fire

extinguishing liquid having an outlet, means for supporting a gas cartridge within said container, a device movably mounted on said container for opening said gas cartridge and having a part projecting beyond said container, a lever mounted on said container for movement transversely to the projecting part of said cartridge opening device into operative relation thereto, and a guard pivotally mounted on said lever, arranged to extend across the end of said cartridge opening device when said lever is in its normally inoperative position with relation thereto, and having its free end turned downwardly to engage a part of said container.

4. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, a valve to control the flow of liquid through said outlet, a device to control the position of said valve, means for supporting a gas cartridge within said container, a device for opening a cartridge on said supporting means, and a lever adapted to normally act on said valve controlling device to hold the valve closed and movable out of engagement with said valve controlling device and into operative relation with said cartridge opening device.

5. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, a valve to control the flow of liquid through said outlet, a valve controlling device having a part extending beyond the end of said container, means for supporting a gas cartridge within said container, a device for opening a cartridge on said supporting means and having a part extending beyond the end of said container, and an actuating device movably mounted on said container and so arranged that when in one position it will operatively engage said valve controlling device and when moved to another position it will engage and actuate said cartridge opening device.

6. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, a valve to control the flow of liquid through said outlet, a valve controlling device having a part extending beyond the end of said container, means for supporting a gas cartridge within said container, a device for opening a cartridge on said supporting means and having a part extending beyond the end of said container, and an actuating device pivotally mounted on the end of said container for movement about a vertical axis and arranged to act on said valve controlling device and hold said valve in its closed position when said actuating device is in one position and to release said valve controlling device and operatively engage said cartridge opening device when said actuating device is moved to another position.

7. In a fire extinguisher, a container for fire extinguishing liquid, an outlet conduit for said liquid, a valve to control the flow of liquid through said outlet conduit, a plunger mounted in the end wall of said container, connected with said valve to hold the latter in its closed position and extending above said end wall, a support for a gas cartridge mounted within said container, a second plunger mounted in said end wall, having a pointed end arranged to pierce a gas cartridge on said support and having its outer end extending normally above said end wall, and a lever mounted on said end wall for movement about a vertical axis, having a part to normally engage the first mentioned plunger to hold said valve in its closed position and having a cam shaped part to engage said second plunger and force the same inwardly, said parts of said lever being so arranged that the movement of said lever to actuate said second plunger will release said first mentioned plunger and permit said valve to open.

8. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, a valve to control the flow of liquid through said outlet, a device to control the position of said valve, means for supporting a gas cartridge within said container, a device for opening a cartridge on said supporting means, and a lever mounted on said container for movement about a vertical axis into operative relation to either said valve controlling device or said cartridge opening device, and movable about a horizontal axis to impart operative movement to said cartridge opening device, and means acting on said lever to hold the same against upward movement about its horizontal axis when it is in operative relation to said valve controlling device.

9. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, a valve to control the flow of liquid through said outlet, a device to control the position of said valve, means for supporting a gas cartridge on said container and establishing communication between the same and said container when said cartridge is opened, a device movably mounted on said container for opening said cartridge, and an actuating device supported by said container and movable transversely to said cartridge opening device into operative relation to said valve controlling device and said cartridge opening device and having means acting on said valve controlling device to cause said valve to open when said actuating device is moved in one direction and to be closed when said actuating device is moved in the other direction and acting on said cartridge opening device to cause said cartridge to be opened.

10. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, means for supporting a gas cartridge within said container, said container having an opening through which a cartridge may be placed on or removed from said supporting means, a closure for said opening, a cartridge opening device mounted on said closure, and an actuating device pivotally mounted on said container for movement transversely to said closure into and out of operattive relation to said cartridge opening device.

11. In a fire extinguisher, a container for fire extinguishing liquid having a head at one end thereof and provided with an outlet, means for supporting a gas cartridge on said container, means comprising a plunger to open said cartridge and establish communication between the same and said container, said plunger being slidably mounted in and projecting beyond said head, and an actuating device mounted on said head for movement transversely to said plunger and having manually operated means for positively moving the same into operative engagement with said plunger to cause said cartridge to be opened.

12. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, means for supporting a gas cartridge on said container and establishing communication between the same and said container when said cartridge is open, means for puncturing said cartridge, means carried by said container for actuating said puncturing means and comprising a part mounted for movement transversely to said puncturing means from one side thereof to the other side thereof and adapted to engage and actuate said puncturing means and to then move beyond the same, and a part to retract said puncturing means

when the first mentioned part moves beyond the same.

13. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, means for supporting a gas cartridge on said container and establishing communication between said cartridge and said container when the cartridge is opened, a device movably mounted on said container for opening said gas cartridge, and an actuating device pivotally mounted on said container on a vertical axis spaced laterally from said cartridge opening device and having a cam surface arranged to move transversely to said cartridge opening device into operative engagement therewith.

14. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, a valve to control the flow of liquid through said outlet, a device to control the position of said valve, means for supporting a gas cartridge on said container and establishing communication between the same and said container when said cartridge is opened, a device for opening said cartridge having a part arranged exteriorly of said container and operable separately from said valve controlling device, and an actuating device pivotally supported on said container for movement transversely to said part of said cartridge opening device and into operative engagement therewith and having a part acting on said valve controlling device to allow said valve to be opened when transverse movement is imparted to said actuating device in one direction and to cause said valve to be closed when said actuating device is moved in the other direction.

15. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, a valve to control the flow of liquid through said outlet, a device to control the position of said valve, means for supporting a gas cartridge on said container and establishing communication between the same and said container when said cartridge is opened, a device movably mounted on said container for opening said cartridge and spaced laterally from said valve controlling device, and an actuating device mounted on said container to control the operation of said valve controlling device and said cartridge opening device and movable transversely to said cartridge opening device into operative relation to said valve controlling device and said cartridge opening device.

16. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, a valve to control the flow of liquid through said outlet, means for supporting a gas cartridge on said container and establishing communication between the same and said container when said cartridge is opened, a device for puncturing said cartridge, and an actuating device movably mounted on said container to impart operative movement to said puncturing device, and means controlled by the position of said actuating device to open said valve when said actuating device is moved in one direction and to close said valve when said actuating device is moved in the other direction, and to withdraw said puncturing device after said cartridge has been punctured and before said actuating device has been moved in a direction to close said valve.

17. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, a valve to control the flow of liquid through said outlet, a device to control the position of said valve, means for supporting a gas cartridge on said container and establishing communication between the same and said container when said cartridge is opened, a device for puncturing said cartridge, means for withdrawing said puncturing device from the opening formed thereby in the cartridge, and an actuating device movably mounted on said container and having means to control the operation of said valve controlling device and said puncturing device, said controlling means being so arranged that when said actuating device is moved in one direction said valve will be opened, said cartridge punctured and said puncturing device withdrawn, and when said actuating device is moved in the other direction said valve will be closed.

18. In a fire extinguisher, a container for fire extinguishing liquid having an outlet, a valve to control the flow of liquid through said outlet, a valve controlling plunger projecting beyond said container, means for supporting a gas cartridge in said container, means comprising a plunger for puncturing said cartridge and having a part projecting beyond said container, and actuating mechanism comprising a member pivotally mounted on said container for movement transversely to said plungers and means controlled by the position of said member and acting on said plungers to open said valve, to puncture said cartridge and to retract said puncturing plunger when said member is moved in one direction and to close said valve when the member is moved in the other direction.

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