Sept. 3, 1940. R. C. IDDINGS 2,213,765

FIRE EXTINGUISHER

Filed Feb. 9, 1938

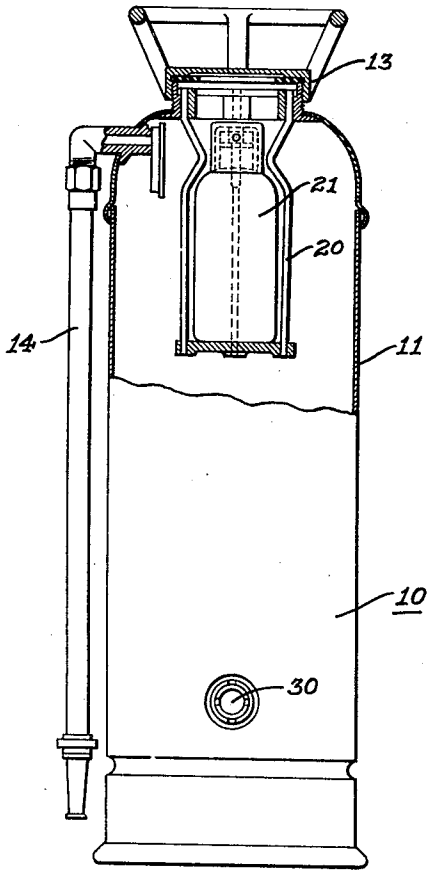


Fig. 1

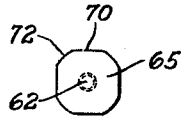


Fig. 4

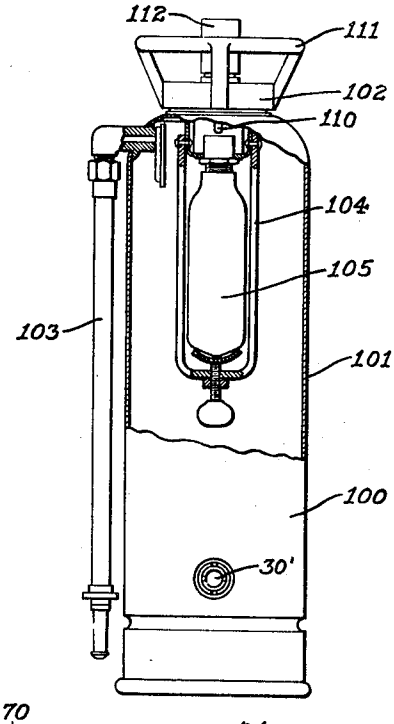


Fig. 5

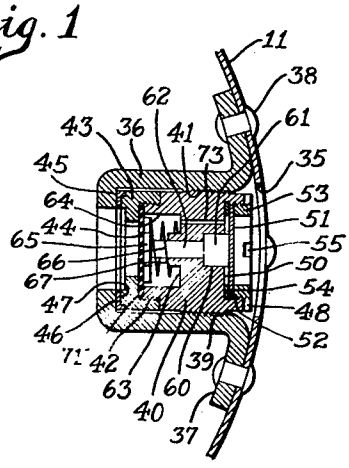


Fig. 3

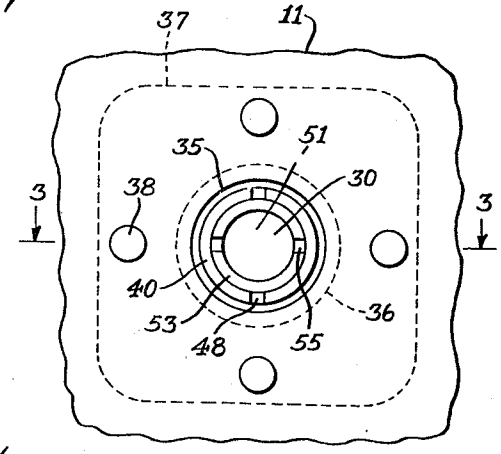


Fig. 2

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FIRE EXTINGUISHER

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12 Claims. (Cl. 169—30)

This invention relates to fire extinguishers and more particularly to hand apparatus in which pressure is generated or released within the extinguisher to force extinguishing fluid exteriorly thereof.

In accordance with the present invention the fire extinguisher is provided with a pressure actuated indicator which shows on the exterior of the extinguisher whether or not the charge has been used, which identifies the type of charge contained in the extinguisher and which assures that a proper charge is employed in the extinguisher. The indicator is adapted to be used in combination with any extinguisher whthin which a charge is received and released to create pressure within the extinguisher, but has particular utility in combination with an extinguisher of the chemical reaction type adapted to receive a charge having a relatively long life compared to charges heretofore provided for extinguishers of this type.

In a fire extinguisher of the chemical reaction type the charge comprises two chemical containing parts maintained separated in non-use which are adapted to react upon intermixture thereof to create pressure within the extinguisher and force a stream of extinguishing fluid exteriorly thereof. After the extinguisher has been once used it is necessary to refill it with a new charge before it can be again used. Such charges, however, are subject to deterioration while standing in the extinguisher by reason of dilution of the sulfuric acid portion of the charge with atmospheric changes, and by reason of greater or less decomposition taking place in the sodium bicarbonate in solution, precipitation of salts in the outlet opening, and the like. As a result it has been the custom of the Underwriters' Laboratories to recommend recharging of Soda-Acid type extinguishers annually. It is also the practice of fire inspectors for insurance companies and others to insist on this procedure.

It has been recently discovered that it is possible to provide a charge for fire extinguishers of the chemical reaction type which does not deteriorate sufficiently to lose its effectiveness for a much longer period, such as of the order of three or more years. Extinguishers heretofore provided for one year charges are not adapted to receive such a long life charge, however, inasmuch as the character and proportion of chemicals used is different in the two cases. A long life charge of this character may comprise, for example, sodium carbonate which is more stable than the bicarbonate and sulfuric acid the surface of which is suitably protected by an acid sealing material adapted to prevent ingress of moisture into the acid. In order to develop the same quantity of pressure expelling gas with such charge, however, approximately twice as much acid is required as for the conventional charges in which sodium bicarbonate and sulfuric acid is used.

In order to avoid confusion, it is desirable that a longer life charge be used in an extinguisher clearly distinguishable from the older type of extinguishers adapted to receive the shorter life charge so that an inspector or others can readily determine whether the extinguisher contains a charge which has been approved for a longer period of time, three or more years, for example; or for the shorter period of time. It is likewise desirable that an extinguisher intended for a long life charge be filled with such a charge and not with one having shorter life.

Accordingly it is a primary object of the invention to provide a fire extinguisher of the chemical reaction type which is adapted to receive a charge having a longer life than charges heretofore used in such apparatus, which is readily distinguishable from extinguishers adapted to receive shorter life charges, and which assures that only a long life charge is used in the extinguisher.

A further object of the invention is the provision of an indicator for a fire extinguisher which serves to identify the type of charge which the extinguisher is adapted to receive and which shows on the exterior of the extinguisher whether or not the charge has been used.

A further object is the provision of an indicator for a fire extinguisher in which a frangible element of the indicator is broken upon use of the extinguisher and can be replaced only by purchasing a proper charge for refilling the extinguisher.

A further object is to provide an indicator for a fire extinguisher which is operated by the pressure made effective within the extinguisher upon use thereof to indicate on the exterior of the extinguisher that the charge therein has been used.

A further object is the provision of a pressure operated indicator of this character which serves as a safety valve to relieve pressure within the extinguisher in the event that such pressure rises above a predetermined limit.

Other objects and advantages of the invention will be apparent from the following description, the appended claims, and the accompanying drawing, in which

Fig. 1 is an elevational view, partly broken

away, of a fire extinguisher constructed in accordance with the present invention;

Fig. 2 is an enlarged fragmentary view showing the indicator of Fig. 1 in elevation;

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2;

Fig. 4 is a detail view of a portion of the indicator mechanism; and

Fig. 5 is an elevational view, partly broken away, showing the indicator of the invention applied to a fire extinguisher of the pressure cartridge type.

Referring to the drawing and to Fig. 1 in particular, a fire extinguisher of the chemical reaction type is shown at 10 and comprises a generally cylindrical sheet metal container 11 provided with a removable cap 13 and a flexible discharge hose 14. The structure of the outer container is generally similar to that employed in the construction of extinguishers of this character heretofore provided.

A cage 20 is mounted in the upper part of the extinguisher and is adapted to receive an acid bottle or other container 21 for holding one of the chemicals of the charge. The container 21 has such capacity as to hold approximately double the amount of acid heretofore used in the conventional soda acid extinguisher, being suitably lengthened for this purpose, if necessary. The cage 20 is preferably of such size and proportions that a container such as 21 which is provided with charges of shorter life will not be properly received therein. The container 21 which is provided with the longer life charges is preferably of such dimensions that it will fit within the cage 20 but will not fit within extinguishers provided for the shorter life charges. In this manner it is assured that only a proper acid bottle and acid charge will be received within the extinguisher 10. The basic portion of the charge, comprising a solution of sodium carbonate, is supplied to the outer container in the usual or desired quantity.

For the purpose of indicating on the exterior of the extinguisher whether or not the charge has been used the extinguisher 10 is provided with an indicator 30 which, as shown in Fig. 1, is mounted on the extinguisher relatively close to the bottom. The indicator is of such structure that it serves to clearly identify the type of charge which the extinguisher is adapted to receive and provides further assurance that only such charge is used therein. Referring to Figs. 2 and 3 the cylindrical wall 11 of the extinguisher is shown as provided with a circular opening 35 within which the indicator 30 is received. The outer housing 36 of the indicator is preferably stamped from sheet brass or other suitable material and is provided with an outwardly turned flange 37 adapted to engage the wall 11 of the extinguisher and mount the indicator thereon. The flange 37 is generally rectangular as shown in Fig. 2 and is provided with a curved surface corresponding to the curvature of the casing 11, as shown in Fig. 3, to provide a pressure tight joint between the indicator and casing. The flange 37 is secured to the casing by suitable means such as rivets or the like 38. The inner wall of the outer housing 36 is provided with a screw threaded portion 39 within which the plunger housing 40 is adapted to be threadedly received.

The plunger housing 40 comprises a cylindrical member provided with screw threads 41 adapted to engage with the threads 39 on the outer housing and having an externally threaded portion 42 of reduced diameter adjacent the inner end. An internally threaded annular cap 43 is adapted to screw upon the threaded portion 42 and clamp a flexible diaphragm 44 of rubber or the like between the cap 43 and the end of the plunger housing 40. The outer housing 36 is provided with an inturned flange 45, and a pressure tight seal between the outer housing and plunger housing is provided by means of a gasket 46 of lead or other suitable material which is interposed between the flange 45 and cap 43 when the plunger housing 40 is screwed into the outer housing. An annular rib 47 provided on the inner face of the cap 43 and adapted to engage the gasket 46 insures a tight joint when the plunger housing 40 is screwed up tight within the outer housing 36. Slots 48 are provided in the outer end wall of the plunger housing 40 to assist in screwing the plunger housing into and out of the outer housing 36.

The end of the plunger housing 40 which is towards the exterior of the extinguisher is provided with a circular recessed portion 50 of substantial diameter within which an indicating disk 51 is adapted to be received. The recessed portion 50 is provided with threads 52 and a threaded collar 53 is adapted to screw therein and secure the disk 51 in place. A washer 54 of vellumoid or other suitable material is interposed between the disk 51 in place. A washer 54 of Vellumoid or 53 is provided with notches 55 adapted to assist in screwing up and unscrewing the collar.

The indicator disk 51, supplied as a part of the charge, comprises a thin circular disk of frangible material, preferably linen-backed Bakelite. The disk is preferably given a distinctive color and may be provided with suitable indicia. When a disk composed of linen-backed Bakelite is used the outer Bakelite portion of the disk may be given one distinctive color such as red and the inner linen backing an entirely different color such as green. Then when the disk is ruptured by the plunger mechanism hereinafter described the distinctive colored backing will be exposed through the cracks in the outer disk and clearly indicate the fact that the disk has been ruptured.

The plunger housing 40 is provided interiorly of the recessed portion 50 with a recessed portion 60 adapted to receive the enlarged head 61 of a plunger 62. The stem portion of the plunger 62 extends through a suitable opening 63 provided in the housing member and projects inwardly into a recess 64 provided in the housing member 40 adjacent the diaphragm 44. A washer 65 is attached to the end of the plunger adjacent the diaphragm by means of solder or the like and is adapted to slide within the recess 64 upon flexing of the diaphragm. The washer 65 is pressed against the diaphragm by means of a coil spring 66 which is maintained in position by means of an annular projection 67 provided on the housing member 40 adjacent the opening 63 for the stem of the plunger. The spring 66 thus serves to prevent rattling of the plunger during handling of the extinguisher thereby avoiding accidental rupture of the frangible disk.

The diaphragm 44 is adapted to be flexed outwardly against the force of the spring 66 by means of the pressure created within the fire extinguisher upon reaction. The diaphragm forces the plunger 62 outwardly against the frangible disk 51 with sufficient force to rupture the disk. As an example, with an extinguisher adapted to generate a pressure of 50 pounds per square inch in the normal use of the device the indicator

may be adjusted to rupture the disk at a pressure of 20 to 30 pounds per square inch.

It will be apparent from the foregoing description that so long as the extinguisher is not used the indicating disk will remain unbroken and thereby show on the exterior of the extinguisher that the charge has not been used. Upon use of the extinguisher the disk is ruptured and the ruptured disk gives a clear visible indication on the exterior of the extinguisher that the extinguisher has been discharged.

The indicator can only be reset to indicate a charged condition by removing the old ruptured disk and inserting a new unbroken one. Inasmuch as a replacement disk can only be obtained by purchasing a new charge for the extinguisher, it will be evident that the indicator cannot be reset or restored to indicate a charged condition unless a new charge for the extinguisher is actually purchased, thus assuring that the extinguisher will be actually recharged when the indicator is reset. The replacement disk which is furnished with a long life charge, such as the extinguisher 10 of Fig. 1 is adapted to receive, will have a distinctive size, shape, color or indicia which clearly distinguishes it from a replacement disk which would be furnished with a different type of charge for use in an indicator applied to an extinguisher adapted to receive a different charge. Thus the indicator applied to an extinguisher adapted to receive a long life charge may have a different size or shaped opening for receiving the disk than an indicator applied to an extinguisher adapted to receive a different type of charge so that the disks will not be interchangeable, or the extinguisher may be marked for a disk of a certain color, or the disk itself may carry suitable indicia identifying the type of extinguisher with which it is adapted to be used. In this manner the disk serves to positively identify the type of charge which is placed in the extinguisher, thereby assuring that the extinguisher will be charged with a proper charge and meeting the recommendations of the Underwriters' Laboratories for an approved extinguisher adapted to receive a long life charge. In a similar manner the disks furnished with other types of charges for use in indicators applied to extinguishers adapted to receive such charges may have a distinctive size, shape, color or indicia to identify one charge from another and assure that the charge is placed in an extinguisher adapted to receive it.

As a further feature of the invention the indicator is preferably so constructed as to serve as a safety valve for relieving pressure within the extinguisher in the event that such pressure should rise above a predetermined limit. For this purpose the diaphragm 44 is preferably made of rubber and the washer 65 which is attached to the stem of the plunger and slides in the recess 64, instead of being circular, has a plurality of segments cut off around the circumference thereof as illustrated at 70 in Fig. 4, which portions may be provided with sharpened cutting edges. With such a washer the rubber diaphragm will be forced outwardly against the washer by the pressure within the extinguisher and will be pinched in the openings 71 provided between the edge of the washer and the wall of the recess 64 by these cut away portions of the washer. The washer 65 is guided in the circular recess 64 by means of the circular portions 72 provided in the periphery of the washer. One or more small openings 73 are provided in the body portion of the plunger housing 40 and provide an opening between the interior and the exterior of the extinguisher to relieve the pressure within the extinguisher when the diaphragm has been thus pinched and the frangible disk 51 ruptured by the plunger 62. It has been found that the amount of pressure required to cut the rubber diaphragm can be controlled very closely and thus the safety valve can be set to operate at any desired predetermined pressure such, for example, as 200 pounds per square inch, this value being suitably chosen as to be below the rupturing pressure of the outer container. The washer shown in Fig. 4 is preferably made by stamping four segments from the periphery of a circular washer. Should it be desired to provide an indicator without a safety valve it is only necessary to leave the washer 65 round and without sharpened cutting edges.

In Fig. 5 of the drawing the indicator is shown as applied to a fire extinguisher of the pressure cartridge type in which the extinguishing fluid is forced exteriorly of the extinguisher by means of a fluid which is normally confined under pressure within an inner container and is released into the interior of the outer container when it is desired to use the extinguisher. A fire extinguisher of this character is shown and described in the United States Patent No. 1,976,056 issued to John W. Wright and assigned to the same assignee as this application, and is only generally shown in Fig. 5 of the drawing. Referring to this view the extinguisher 100 is illustrated as comprising an outer sheet metal container 101, removable cap 102, flexible hose 103, and a cage 104 for supporting an inner container 105 within which the fluid for creating a pressure within the outer container 101 is normally maintained under pressure. A plunger 110 extends through the cap 102 and is adapted to move axially to puncture the inner container 105 and release the compressed fluid contained therein. The cap 102 is provided with a ring-shaped handle 111 which serves as a convenient handle for carrying the extinguisher and the plunger 110 protrudes exteriorly of this ring-shaped handle within a movable cap 112. To operate the extinguisher the plunger 110 is depressed to puncture the top of the container 105 by inverting the extinguisher and bumping the protruding cap 112 upon the ground. This releases the compressed fluid normally contained within the inner container 105 into the interior of the container 101 and forces the charge of fire extinguishing fluid exteriorly of the extinguisher through the hose 103.

The indicator 30' is mounted in the shell 101 of the outer container near the bottom of the extinguisher. The pressure released within the outer container 101 when the inner container 105 is punctured by the plunger 110 forces the plunger of the indicator outwardly and ruptures the frangible disk of the indicator in the manner hereinabove described in connection with the extinguisher 10, thereby indicating at once from the exterior of the extinguisher whether or not it has been operated.

While the forms of apparatus herein described constitute a preferred embodiment of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. In a fire extinguisher of the character described in which a charge of fire extinguishing material is received within a container and is expelled by pressure within said container upon operation of the extinguisher, the combination of a frangible element mounted in said container and visible from the exterior thereof, and pressure responsive means carried by said container in a position to be directly subjected to the pressure therein for rupturing said frangible element upon discharge of said extinguisher.

2. In a fire extinguisher of the character described, a container for receiving a quantity of fire extinguisher material, a housing member carried by said container in pressure tight relation to the interior of the container, said housing member being provided with an opening extending from the interior to the exterior of said container, a diaphragm mounted adjacent the interior end of said opening, a plunger extending from said diaphragm towards the exterior end of said housing, and means located adjacent the exterior end of said housing and adapted to removably receive a frangible element in position visible from the exterior of the container and arranged to be broken by said plunger upon movement of said diaphragm in response to a predetermined pressure within said container.

3. In a fire extinguisher of the character described, a container adapted to hold a quantity of fire extinguishing material, a housing member in the wall of said container provided with an opening therethrough, a diaphragm mounted adjacent one end of said opening, a plunger extending from said diaphragm towards the other end of said opening, a frangible element, means located adjacent said other end of said opening for removably receiving said frangible element in position visible from the exterior of the container and arranged to be broken by said plunger upon movement of said diaphragm in response to a predetermined pressure within said container and effective thereon, and spring means positioned within said housing member and adapted to normally urge the plunger out of contact with the frangible element in the absence of expelling pressure within the container.

4. In a fire extinguisher of the character described, a container for receiving a quantity of fire extinguisher material, a housing member carried by said container in pressure tight relation to the interior of the container, said housing member being provided with an opening extending from the interior to the exterior thereof, a diaphragm mounted adjacent the interior end of said opening, a plunger extending from said diaphragm towards the exterior end of said housing, means located adjacent the exterior end of said housing and adapted to removably receive a frangible element in position visible from the exterior of the extinguisher and arranged to be broken by said plunger upon movement of said diaphragm in response to a predetermined pressure within said container, and a passageway provided in said housing member for relieving pressure within said container when said pressure therein exceeds a predetermined limit sufficient to effect rupture of said diaphragm on said plunger.

5. In a fire extinguisher of the character described, a fire extinguisher casing provided with an opening in a wall portion thereof, a housing member carried by said casing at said opening therein, means securing said housing member upon the inner wall of said casing and providing a pressure tight connection therebetween, said housing member having an opening therethrough in substantial alignment with the opening in said casing, a diaphragm mounted adjacent the interior end of said housing opening, an axially movable plunger extending from said diaphragm towards the exterior end of said housing, means located adjacent the exterior end of said housing and adapted to removably receive a frangible element in position visible from the exterior of the extinguisher and arranged externally of said plunger to be broken by said plunger upon movement of said diaphragm in response to a predetermined pressure within said casing, and resilient means continuously effective upon said plunger to tend to retain said plunger in a fixed non-rattling position.

6. In a fire extinguisher of the character described, a container adapted to hold a quantity of fire extinguishing material, said container being provided with an opening in a wall portion thereof, an internally threaded outer housing member carried by said container adjacent said opening, said outer housing member being provided with a flange shaped to closely fit the wall of said container to provide a pressure tight seal therebetween, means securing said outer housing member to said container, a plunger housing adapted to be screwed within said outer housing, means providing a pressure tight seal between said outer housing and said plunger housing, a recess in said plunger housing adjacent the exterior of the extinguisher, said recess being adapted to receive a frangible member visible from the exterior of the extinguisher, means for removably securing said frangible member in said recess, a flexible diaphragm mounted adjacent the interior end of said plunger housing and subjected to the pressure condition within the extinguisher, plunger means axially slidable in said plunger housing between said frangible member and said diaphragm and adapted to rupture the frangible member upon movement of the diaphragm in response to an operating pressure within the extinguisher, and spring means normally urging said plunger means out of contact with said frangible member.

7. In a fire extinguisher of the character described, a container adapted to hold a quantity of fire extinguishing material, said container being provided with an opening in a wall portion thereof, an internally threaded outer housing member carried by said container adjacent said opening, said outer housing member being provided with a flange shaped to closely fit the wall of said container to provide a pressure tight seal therebetween, means securing said outer housing member to said container, a plunger housing adapted to be screwed within said outer housing, means providing a pressure tight seal between said outer housing and said plunger housing, a recess in said plunger housing adjacent the exterior of the extinguisher, said recess being adapted to receive a frangible member visible from the exterior of the extinguisher, means for removably securing said frangible member in said recess, a diaphragm mounted adjacent the interior end of said plunger housing and subjected to the pressure condition within the extinguisher, plunger means axially slidable in said plunger housing between said frangible member and said diaphragm and adapted to rupture the frangible member upon movement of the diaphragm in re-

sponse to an operating pressure within the extinguisher, said plunger means being provided with a cutting edge on the end thereof adjacent said diaphragm adapted to rupture the diaphragm upon a predetermined pressure condition within said extinguisher, said plunger housing being provided with an opening adapted to relieve pressure within the extinguisher upon rupture of said diaphragm, and spring means normally urging said plunger means out of contact with said frangible member.

8. In a fire extinguisher of the character described adapted to receive a long life charge of the chemical reaction type, the combination of an outer container adapted to receive a quantity of sodium carbonate solution, an inner container adapted to receive a sufficient quantity of acid material to react with said sodium carbonate solution to create a fluid expelling pressure, means located in the wall of said outer container for removably supporting a frangible member in a position to be visible from the exterior of said extinguisher, a frangible member mounted in said supporting means, and pressure responsive means subjected to the pressure condition within said outer container for effecting rupture of said frangible member in response to development of an operating pressure within the extinguisher, to thereby indicate upon the face of the extinguisher whether operation thereof has taken place.

9. In a fire extinguisher of the character described, an outer container adapted to hold a quantity of fire extinguishing material, an inner container adapted to be received within said outer container and having therein a compressed fluid adapted when released to create a fluid-expelling pressure within the outer container, means extending exteriorly of said outer container for puncturing said inner container, means located in the wall of said outer container for removably supporting a frangible member in a position to be visible from the exterior of said extinguisher, a frangible member mounted in said supporting means, and pressure responsive means subjected to the pressure condition within said outer container for effecting rupture of said frangible member in response to development of an operating pressure within the extinguisher to thereby indicate upon the face of the extinguisher whether operation thereof has taken place.

10. In a fire extinguisher of the character described in which a charge of fire extinguishing material is received within a container and is expelled by pressure within the container upon operation of the extinguisher, the combination of an indicator for visually indicating discharge of said extinguisher exteriorly of said container, said indicator comprising a frangible member adapted to be ruptured upon operation of the extinguisher, pressure responsive means directly subjected to the pressure within said container and providing for rupturing said frangible member upon discharge of the extinguisher, and means for mounting said indicator in a side wall of said container with said frangible member extending closely adjacent said side wall to be readily visible from the exterior of the extinguisher and with substantially all portions of the indicator including said frangible member and said pressure responsive means received within the interior of said container in protected relationship with respect to the side wall of the container.

11. In a fire extinguisher of the character described in which a charge of fire extinguishing material is received within a container and is expelled by pressure within the container upon operation of the extinguisher, the combination of pressure responsive means carried by said container in a position to be directly subjected to pressure therein for visually indicating discharge of said extinguisher at the exterior of said container, and means forming a part of and operatively associated with said pressure responsive means for relieving pressure within said container when said pressure exceeds a predetermined limit.

12. In a fire extinguisher of the character described, an outer container adapted to receive a quantity of fire extinguishing material and having a filling opening, a removable closure for said filling opening, an inner container supported within said outer container and having a charge therein adapted when released to create an expelling pressure upon the contents of the outer container, means providing for releasing said charge, and means located within the confines of said outer container for indicating the condition of charge of the extinguisher including means communicating with the interior of the outer container and responsive to the pressure therein, an indicator member visible from the exterior of said outer container and having a normal position and an actuated set position, and means operable by said pressure responsive means upon initial development of a substantial pressure within the extinguisher incident to operation thereof for effecting actuation of said indicator member to said set position in which it is maintained independently of the subsequent pressure condition within the extinguisher to afford a continuing indication that the extinguisher has been discharged.

ROSCOE C. IDDINGS.

CERTIFICATE OF CORRECTION.

Patent No. 2,213,765. September 3, 1940.

ROSCOE C. IDDINGS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 14, for "whthin" read --within--; page 2, second column, line 29, for the words "in place. A washer 54 of Vellumoid or" read --and the plunger housing 40. The collar--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of October, A. D. 1940.

Henry Van Arsdale,

(Seal) Acting Commissioner of Patents.