Jan. 22, 1946. J. H. STROOP 2,393,346

INDICATOR

Filed Dec. 31, 1942

Fig. 1

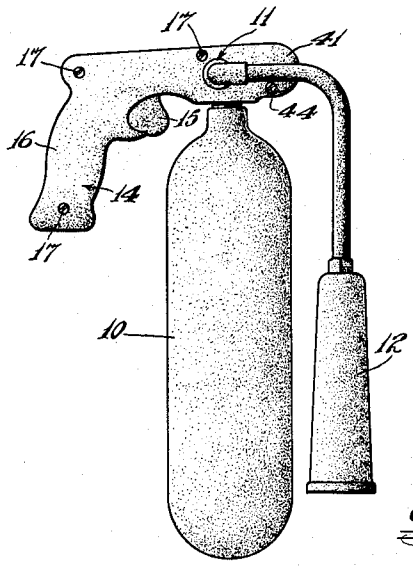


Fig. 2

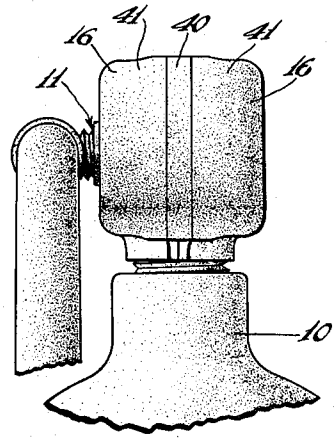


Fig. 3

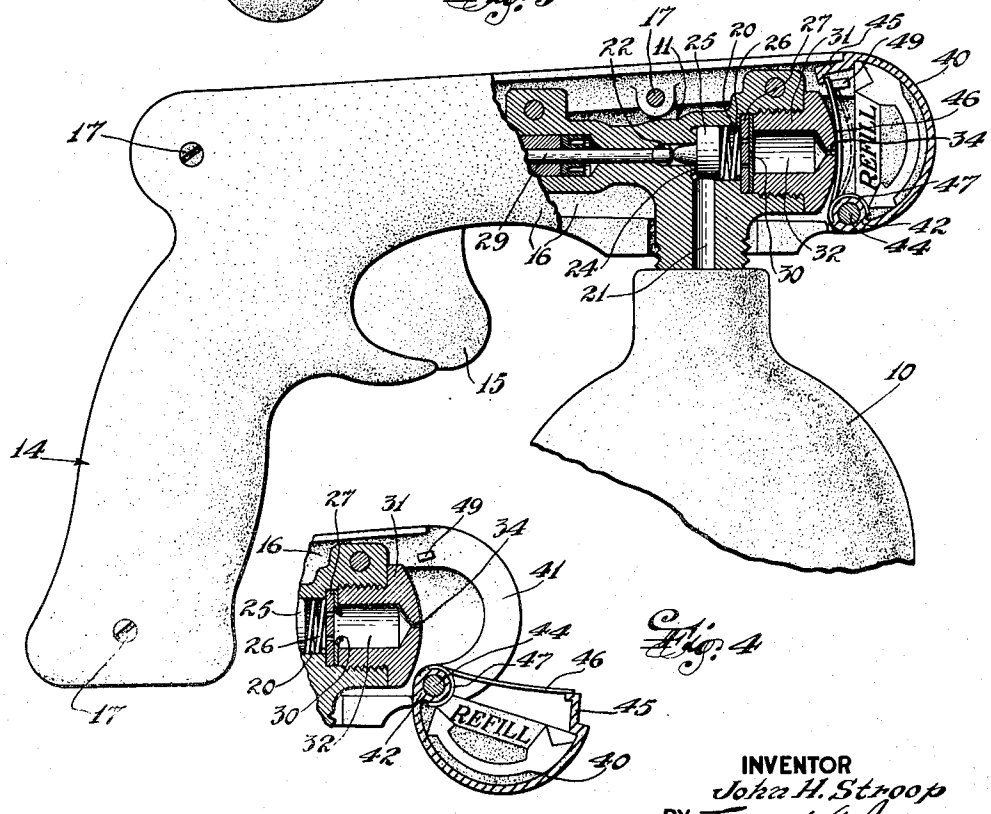


Fig. 4

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2,393,346

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21 Claims. (Cl. 116—114)

The present invention relates to indicators, and more particularly to indicators for indicating the discharge of fluid media under pressure.

Containers, such as metal cylinders, for storing fluid media under relatively high pressure, are provided with safety discharge means comprising one or more discs which rupture to release the media when the pressure thereof exceeds the safe working pressure of the containers. For example, the fluid media stored in the containers may be liquefied carbon dioxide, methyl bromide, compressed air, oxygen, nitrogen or other gases which are adapted to be used for one or more purposes such as fire extinguishing, stratosphere breathing, resuscitation, pressure operation of emergency devices, or inflation of flotation equipment.

Heretofore one of the difficulties has been that the safety discharge means would release the fluid medium without leaving any visible indication that the containers had been emptied and should be refilled. Since the fluid medium, in most instances, is used in emergencies as indicated herein, serious consequences may result in the event the containers are emptly when the emergency arises.

The present invention aims to overcome the foregoing difficulties by providing an indicator which gives a clear visible, as well as legible, indication that the containers have been discharged and emptied by way of the safety discharge means.

An object of the present invention is to provide an indicator for indicating the discharge of fluid media from containers by way of their safety discharge means.

Another object is to provide an improved indicator responsive to the release of a fluid media under pressure.

Another object is to provide an indicator which is constructed of a minimum number of parts, is compact in arrangement, and can be readily associated with the safety discharge means.

Another object is to provide a discharge head for containers having safety discharge means and an indicator for the safety means which are compactly arranged in the head.

Another object is to provide an indicator for a discharge head which does not materially increase the weight or the cost of the head.

Another object is to provide an indicator which is positive and reliable in operation.

A further object is to provide a fire extinguisher provided with an indicator adapted to accomplish the foregoing objects and advantages.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawing, forming a part of the specification, wherein:

Figure 1 is an elevational view of a portable fire extinguisher having a discharge control head provided with an indicator in accordance with the present invention.

Figure 2 is an enlarged end elevational view of the discharge control head, illustrating the location of the indicator.

Figure 3 is an enlarged side elevational view of the discharge control head, partly in section, illustrating the indicator in detail in its concealed or non-operated position.

Figure 4 is an enlarged fragmentary sectional view of the discharge control head, illustrating the indicator in its operated or indicating position.

Referring to the drawing, and more particularly to Figure 1, there is shown a portable fire extinguisher, such as illustrated in United States Reissue Patent No. 22,045. The fire extinguisher comprises a container or cylinder 10 adapted to contain liquefied carbon dioxide, a discharge control head 11 at the upper end of the container, a discharge shield or horn 12 operatively connected to the head for forming carbon dioxide snow and directing the same to a fire, and a handgrip 14 secured about the discharge head having a trigger 15 mounted thereon for controlling the operation of discharge means within the head.

As shown in Figures 2 and 3, the handgrip 14 comprises a pair of complementary longitudinally split casing members 16 having a manually engageable pistol grip at one end (Figures 1 and 3) and providing a housing for enclosing the discharge head 11. The casing members 16 are suitably attached to the control head and are secured to each other by suitable screws, bolts or studs 17, whereby the discharge head is secured therein.

The discharge head 11 is illustrated in detail in Figure 3, and comprises a valve body secured to the outlet of the container 10, a valve chamber 20 in the body, an inlet passage 21 leading from the container to the valve chamber, and an outlet passage 22 leading from the valve chamber 20 to

the discharge horn 12. The outlet passage 22 is provided with an annular valve seat 24 at the chamber end thereof for receiving a valve member 25 adapted to be seated thereon by the pressure of the carbon dioxide in the container and, in addition, if desired, by a spring 26. One end of the spring engages the valve member 25, and its other end engages a perforated disc member 27, the purposes of which will be described hereinafter.

The valve member 25 is adapted to be unseated to permit the flow of carbon dioxide past the valve seat 24 and through the outlet passage 22 to the discharge horn 12 by means of a rod or pin 29 slidably mounted in the valve body. The rod 29 is adapted to be moved inwardly to unseat the valve member by the trigger 15 which may be suitably connected thereto.

As shown in Figure 3, the disc member 27 forms a wall of the valve chamber 20 in which pressure exists while carbon dioxide is in the container. The perforations in the disc member 27 are sealed by a safety disc 30 which, together with the disc member, is held in place by a safety discharge plug 31 secured to the valve body. The plug has a chamber 32 therein provided with a discharge aperture 34 of dimensions adapted to throttle the flow of the released carbon dioxide to prevent recoiling of the extinguisher. The safety disc 30 is adapted to rupture when the pressure in the valve chamber 20 exceeds the safe working pressure of the container, whereby the contents of the container are discharged through the perforations of the disc member 27 and to the atmosphere by way of the aperture 34 in the plug 31.

In accordance with the invention, a normally concealed indicator is provided for giving a visible indication when the contents of the container have been discharged by way of the safety disc. This indicator, preferably, is located at the end of the casing members 16 adjacent the safety discharge plug 31, as shown in Figures 2, 3 and 4.

The indicator illustrated herein comprises an arcuate member 40 having an outer surface conforming to and providing a portion of the end walls 41 of the casing members 16, so that the member 40 is substantially concealed and is not noticeable when in its normal or non-operated position. Preferably, the indicator member 40 is seated in a recess or opening provided between the end walls 41 (Figure 2). The indicator member 40, as shown in Figures 3 and 4, may be provided with suitable legend or indicia which is normally concealed in the housing provided by the casing members (Figures 1, 2 and 3), and which is exposed upon discharge through the safety disc (Figure 4). Such indicia or legend may comprise an arrow conspicuously colored, and the word "Refill" to which the arrow points, thereby directing attention to the fact that the container has been emptied by discharge through the safety outlet, and that refilling thereof is necessary.

The lower end of the indicator member has an apertured boss 42 pivotally mounted on a pin 44 suitably supported by the casing members, and the upper end of the indicator member has formed thereon a latching projection 45 adapted to extend into the housing provided by the casing members.

The indicating member 40 is adapted to be normally latched or retained in its non-operated position, as shown in Figure 3, by a latching member such as a spring member 46 formed of a substantially flat strip of resilient material and adapted to be flexed. If desired, the spring member may be mounted on the indicator member for pivotal movement therewith, by providing an arcuate formation 47 at one end adapted to be snapped over and retained on the boss 42 at the lower end of the indicator member. The other end of the spring member is free and is adapted to be engaged by the latching projection 45. The spring member 46 is adapted to be retained in latching position and against outward movement by a projection or stop 49 formed on one of the casing members 16 adjacent but out of the path of the latching projection 45. This projection 49 also serves to hold the spring member over the aperture 34 of the safety discharge plug, so that the spring member will be in the path of and is adapted to be flexed by the carbon dioxide discharge through the aperture.

In operation, the indicator is assembled, so that in its normal or non-operated position (Figure 3), the free end of the spring member 46 is engaged by the stop 49 at one side thereof and is engaged by the latching projection 45 at the other side thereof. When so assembled the indicator member 40 is seated in the recess between the end walls 41 of the casing members and appears to be part of the end walls. As shown in Figures 1 and 2, the indicia or legend on the indicator member 40 is concealed and the member 40 itself is hardly noticeable.

In the event the pressure in the container exceeds the safe working pressure of the container, the safety disc 30 is ruptured and the carbon dioxide in the container flows through the perforations of the disc member 27, enters the safety plug chamber 32, and discharges to the atmosphere through the aperture 34. When the carbon dioxide passes through the aperture 34, it is directed against the spring member 46 and the pressure thereof flexes or bows the spring member 46, as shown in dotted lines in Figure 3, whereby the free end of the spring member is moved downwardly and is moved away from between the projection 45 and the stop 49 to unlatch the indicator member 40. Upon being unlatched, the pressure of the discharged carbon dioxide rotates the indicator member 40 downwardly and outwardly about its pivot to its indicating position shown in Figure 4. The legend or indicia thereon is then readily visible to indicate that safety discharge of the container has taken place.

During movement of the indicator member 40 to its indicating position, the spring member 46 mounted thereon is carried along so that it is moved away from the aperture 34 to permit unobstructed discharge of the carbon dioxide through the recess between the casing members 16.

Preferably, the projection 45, the spring member 46, and the stop 49 are arranged as illustrated herein, so that the indicator member 40 cannot be relatched without taking the casing members apart. This prevents unauthorized persons from relatching the indicator member after safety discharge has taken place, and necessitates that the container be taken to a refilling station where authorized persons can reset and relatch the indicating member after the container has been refilled.

It will be seen that the present invention provides an indicator for containers of fluid media under pressure which is operated by the dis-

charge of the media through the safety discharge means. The indicator gives a clear visible and legible indication in every instance when a container has been so discharged and that the container is empty and should be refilled. This eliminates the possibility of containers being discharged without knowledge thereof, and then found empty when their contents are urgently needed to combat an emergency. The indicator is simple in construction, and can be economically manufactured and assembled. The parts of the indicator are rugged in construction and can readily withstand any rough usage to which they may be subjected.

While the present invention has been described in connection with a portable fire extinguisher by way of example, it will be understood that the indicator may be used in connection with all type of containers for storing fluid media under pressure or systems for discharging such media to effect desired emergency operations. For example, the indicator could be provided in a safety outlet fitting connected in the pipes of a fire extinguishing system, or the like. It will also be understood that the indicator need not be mounted adjacent the safety discharge means, but could be located on a control board or the like and operatively associated with the safety discharge means by suitable tubing for directing the discharged media to the indicator.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

It is also to be understood that the following claims are intended to cover all the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. An indicator of the class described, comprising a casing, indicating means including an indicating member and a latch pivotally mounted on and normally concealed in said casing, and means cooperating with said latch for retaining said member and latch in concealed position, said latch being responsive to fluid pressure to release said indicating member for pivotal movement to indicating position outside said casing.

2. An indicator of the class described, comprising a casing, indicating means including an indicating member and a flexible latch pivotally mounted on and normally concealed in said casing, and means cooperating with said latch for retaining said indicating means in concealed position, said latch being responsive to fluid pressure for flexing action to release said indicating means for pivotal movement to indicating position outside said casing.

3. An indicator of the class described, comprising a casing, an indicating member pivotally mounted adjacent one end thereof on said casing and being normally concealed in said casing, said member having a latching projection adjacent its other end, and a latching member engaging said latching projection to retain said indicating member in its concealed position, said latching member being constructed to be flexed by a fluid pressure medium acting thereon to thereby release said latching projection, whereby said indicating member is rotated about its pivot and is moved out of said casing into an indicating position.

4. An indicator of the class described, comprising a casing, an indicating member pivotally mounted adjacent the lower end thereof on said casing and being normally concealed in said casing, said member having a latching projection adjacent its upper end, a latching member having a surface adapted to be acted on by fluid pressure medium, said latching member having its lower end mounted on said casing and having its upper end engaging said latching projection to retain said indicating member in its concealed position, and a projection adjacent the upper end of said latching member for preventing displacement thereof, said latching member being constructed to be flexed by a fluid pressure medium acting on said surface to thereby release said latching projection, whereby said indicating member is rotated about its pivot and is moved out of said casing into an indicating position.

5. An indicator of the class described, comprising a casing, an indicating member pivotally mounted on and normally concealed in said casing, means for retaining said member in its concealed position adapted to be rendered ineffective for retaining said member by a fluid pressure medium acting on said means, and means for directing a fluid pressure medium towards said indicating member retaining means.

6. An indicator of the class described, comprising a casing, an indicating member pivotally mounted on and normally concealed in said casing, latching means for retaining said member in its concealed position adapted to be rendered ineffective for retaining said member by a fluid pressure medium acting on said means, whereby said member is rotated about its pivot and is moved out of said casing into an indicating position, and means for directing a fluid pressure medium towards said latching means.

7. An indicator of the class described, comprising a casing, an indicating member pivotally mounted adjacent one end thereof on said casing and being normally concealed in said casing, said member having a latching projection adjacent its other end, a latching member engaging said latching projection to retain said indicating member in its concealed position, said latching member being constructed to be flexed by a fluid pressure medium acting thereon to thereby release said latching projection, whereby said indicating member is rotated about its pivot and is moved out of said casing into an indicating position, and means for directing a fluid pressure medium towards said latching member to cause flexing thereof and release of said latching projection.

8. An indicator of the class described, comprising a casing, an indicating member pivotally mounted adjacent the lower end thereof on said casing and being normally concealed in said casing, said member having a latching projection adjacent its upper end, a latching member having a surface adapted to be acted on by fluid pressure medium, said latching member having its lower end mounted on said casing and having its upper end engaging said latching projection to retain said indicating member in its concealed position, a projection adjacent the upper end of said latching member for preventing displacement thereof, said latching member being constructed to be flexed by a fluid pressure medium acting on said surface to thereby release said latching projection, whereby said indicating member is rotated about its pivot and is moved out of said casing

into an indicating position, and means for directing a fluid pressure medium towards said surface between the upper and lower ends of said latching member to cause flexing thereof and release of said latching projection.

9. In a device for controlling the discharge of a fluid pressure medium, the combination of a source of fluid pressure medium, safety discharge means having an outlet for releasing the medium in the event the pressure of the medium becomes excessive, and indicating means pivotally mounted adjacent said outlet adapted to be operated by the medium released through said outlet.

10. In a device for controlling the discharge of a fluid pressure medium, the combination of a source of fluid pressure medium, safety discharge means having an outlet for releasing the medium in the event the pressure of the medium becomes excessive, an indicating member mounted on and normally concealed in the device, and latching means adjacent said outlet for retaining said member in its concealed position and adapted to be rendered ineffective for retaining said member by the medium released from said outlet, whereby said member is adapted to be moved into an indicating position.

11. In a device for controlling the discharge of a fluid pressure medium, the combination of a source of fluid pressure medium, safety discharge means having an outlet for releasing the medium in the event the pressure of the medium becomes excessive, an indicating member pivotally mounted on and normally concealed in the device, and latching means adjacent said outlet for retaining said member in its concealed position and adapted to be rendered ineffective for retaining said member by the medium released from said outlet, whereby said member is rotated about its pivot and is moved out of the device into an indicating position.

12. In a fire extinguisher, the combination of a container of fluid fire extinguishing medium under pressure; and a device for controlling the discharge of the medium from said container including safety discharge means having an outlet for releasing the medium in the event the pressure of the medium becomes excessive, and indicating means adjacent said outlet adapted to be operated by the medium released through said outlet.

13. In a fire extinguisher, the combination of a container of fluid fire extinguishing medium under pressure; and a device for controlling the discharge of the medium from said container including safety discharge means having an outlet for releasing the medium in the event the pressure of the medium becomes excessive, an indicating member mounted on and normally concealed in the device, and means adjacent said outlet for retaining said member in its concealed position and adapted to be rendered ineffective for retaining said member by the medium released from said outlet.

14. In a fire extinguisher, the combination of a container of fluid fire extinguishing medium under pressure; and a device for controlling the discharge of the medium from said container including safety discharge means having an outlet for releasing the medium in the event the pressure of the medium becomes excessive, an indicating member pivotally mounted on and normally concealed in the device, and latching means adjacent said outlet for retaining said member in its concealed position and adapted to be rendered ineffective for retaining said member by the medium released from said outlet, whereby said member is rotated about its pivot and is moved out of said device into an indicating position.

15. An indicator of the class described, comprising a casing, an indicating member pivotally mounted on and normally concealed in said casing, and latching means for retaining said member in its concealed position and adapted to be rendered ineffective for retaining said member by a fluid pressure medium acting on said means, said member being formed with a surface adapted to be acted on by the fluid pressure medium, whereby said member is rotated about its pivot and is moved out of said casing into an indicating position.

16. An indicator of the class described, comprising a casing, an indicating member pivotally mounted adjacent one end thereof on said casing and being normally concealed in said casing, said member having a latching projection adjacent its other end, and a latching member engaging said latching projection to retain said indicating member in its concealed position, said latching member being constructed to be flexed by a fluid pressure medium acting thereon to thereby release said latching projection, said indicating member being formed with a surface adapted to be acted on by the fluid pressure medium, whereby said indicating member is rotated about its pivot and is moved out of said casing into an indicating position.

17. An indicator of the class described, comprising a casing, an indicating member pivotally mounted adjacent the lower end thereof on said casing and being normally concealed in said casing, said member having a latching projection adjacent its upper end, a latching member having a surface adapted to be acted on by fluid pressure medium, said latching member having its lower end mounted on said casing and having its upper end engaging said latching projection to retain said indicating member in its concealed position, and a projection adjacent the upper end of said latching member for preventing displacement thereof, said latching member being constructed to be flexed by a fluid pressure medium acting on said surface to thereby release said latching projection, said indicating member being formed with a surface adapted to be acted on by the fluid pressure medium, whereby said indicating member is rotated about its pivot and is moved out of said casing into an indicating position.

18. An indicator of the class described, comprising a casing, an indicating member pivotally mounted on and normally concealed in said casing, and latching means for retaining said member in its concealed position and adapted to be rendered ineffective for retaining said member by a fluid pressure medium acting on said means, said latching means including means constructed to prevent return of said indicating means to its concealed position without resetting of said latching means.

19. In a device for controlling the discharge of a fluid pressure medium, the combination of a source of fluid pressure medium, safety discharge means having an outlet for releasing the medium in the event the pressure of the medium becomes excessive, an indicating member mounted on and normally concealed in the device, and latching means adjacent said outlet for retaining said member in its concealed position and adapted to be rendered ineffective for retaining said mem-

ber by the medium released from said outlet, whereby said member is adapted to be moved into an indicating position, said latching means including means constructed to prevent return of said indicating means to its concealed position without resetting of said latching means.

20. The combination of a pair of relatively pivoted member with one of said members constituting gravity operated fluid pressure indicating means normally concealed by said other member, and latching means for maintaining said indicating means so concealed, said latching means being directly affected by the fluid the pressure of which is to be indicated for effecting release of said indicating means for fluid pressure and gravity operation out of concealment.

21. The combination of a pair of separably connected casing members having spaced oppositely disposed walls, indicating means pivotally connected between said walls and normally concealed therebetween, keeper means carried by one of said walls and extending therebetween, and latching means carried by said indicating means and engaging said keeper means for retaining said indicating means so concealed and being operable out of engagement with said keeper means for releasing said indicating means to permit actuation of said indicating means out of concealment, said casing members being separable to permit said latching means to be positioned for engagement with said keeper means for retaining said indicating means when said casing members are reconnected.

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