Nov. 13, 1951 A. O. SAMUELS 2,574,890

FIRE EXTINGUISHER

Filed June 16, 1949

FIG. 1

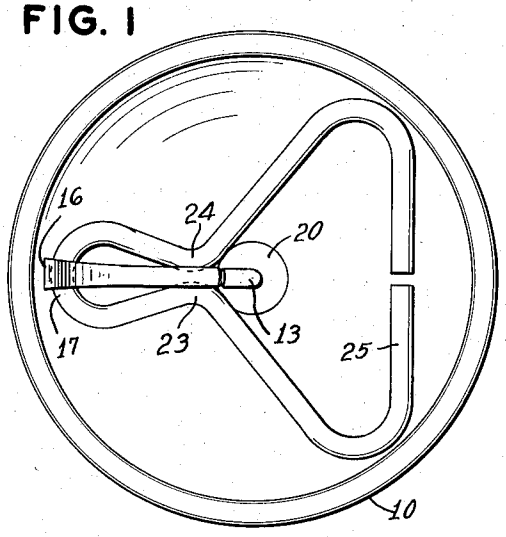


FIG. 3

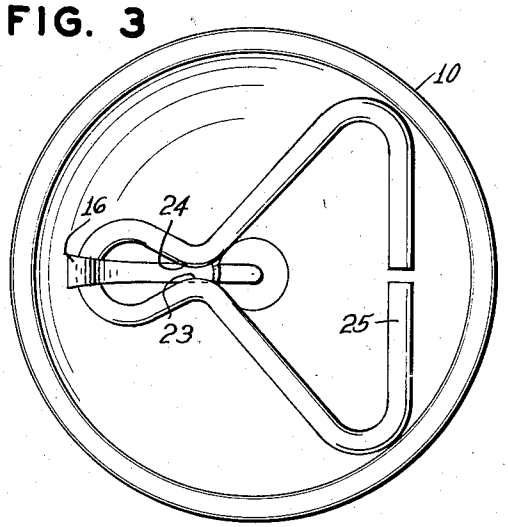


FIG. 2

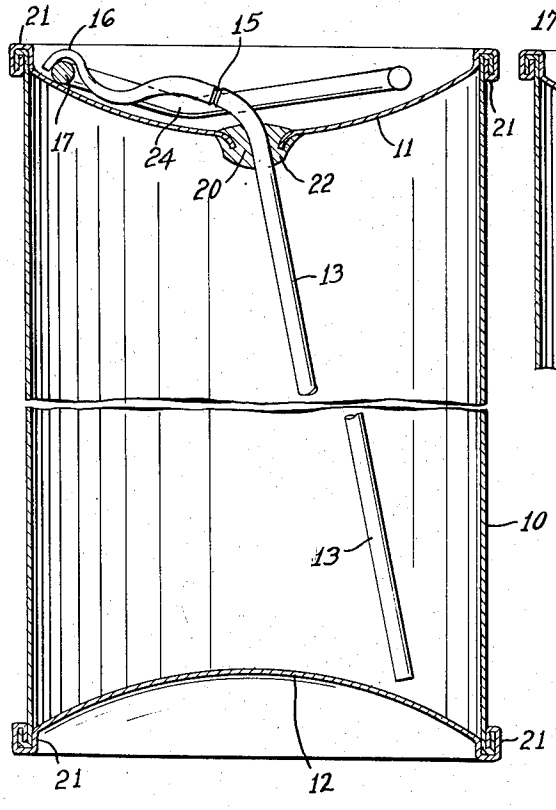
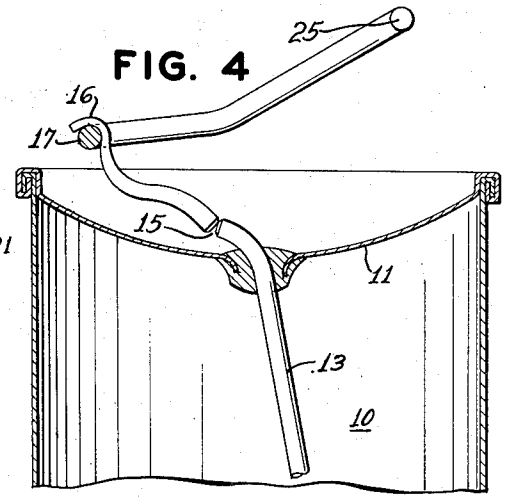


FIG. 4



INVENTOR.
Abe O. Samuels
BY
Pennie, Edmonds, Morton and Barrows
ATTORNEYS

Patented Nov. 13, 1951

2,574,890

UNITED STATES PATENT OFFICE

2,574,890

FIRE EXTINGUISHER

Abe Obner Samuels, Bridgeport, Conn., assignor, by mesne assignments, to Maryland Devices, Inc., Baltimore, Md., a corporation of Maryland

Application June 16, 1949, Serial No. 99,380

3 Claims. (Cl. 169—31)

1

This invention relates to an improved fire extinguisher and, more particularly, to a fire extinguisher wherein all external parts are disposed within the cavity of a dished closure end generally below the plane of the edge of the container. My invention also includes a method for assembling and filling the fire extinguisher.

A great variety of fire extinguishers have been proposed and, indeed, constructed which have as their purpose the extinguishment of incipient fires. These extinguishers, of course, operate on numerous principles. However, all generally provide for smothering the fire or flame, that is to say, cutting off or reducing the source of oxygen of the oxidation zone. One commonly used type comprises a cylinder containing a sodium bicarbonate solution in which is placed a separate small container of sulfuric acid. Upon inversion of the cylinder, the sulfuric acid and sodium bicarbonate are mixed, carbon dioxide generated under pressure, and water, containing carbon dioxide, is forced out of a nozzle and sprayed on the fire. In another conventional type substantially pure carbon dioxide is stored under pressure in a sealed container and projected when desired upon the fire. A third variety of extinguisher comprises a solution of highly volatile carbon tetrachloride in a piston-actuated cylinder. Or carbon tetrachloride may be pressurized in a sealed chamber and released upon opening of a valve.

However, practically all of the fire extinguishers in use today have at least one disadvantage and many have several. A large number are bulky and difficult to handle. This latter type is also usually expensive to manufacture and in many cases uneconomical to the consumer. For instance, the contents of the sodium bicarbonate-sulfuric acid extinguishers must be used all at once and thus provides a costly method of extinguishing fires. Fluid containers requiring actuation are inconvenient and sometimes difficult to use after long periods of inactivity. Thus it might be said that many fire extinguishers in general are characterized by either their inconvenience of operation, difficulty of handling, or high cost of production and use, the latter factors being of great importance to the ultimate user. And as to construction, it will be found that practically all of the fire extinguishers on the market today have protruding parts readily susceptible to untimely actuation. These protruding parts may result in the premature operation of the fire extinguisher which, of course, due to the inherent nature of the chemical contents of

2

the container, may result in considerable injury to persons or property.

I have invented an improved self-dispensing fire extinguisher characterized by at least one inwardly dished closure end in which is located a discharge tube having a sealed breakable tip adapted to be broken off along a weakened line therein by a lever or other similar means engaging therewith. These parts are disposed within the cavity of the dished closure end generally below the plane of the edge of the container so that no protruding parts extend substantially beyond either end of the extinguisher. Thus my fire extinguisher has no projected or elevated parts which might render it readily susceptible to accidental discharge. The vital parts are protected by their location within an inwardly projected dished closure end which, however, still renders the extinguisher adaptable to an immediate deliberate discharge as desired. In addition, the dished closure ends render the container better able to stand higher pressures. This fire extinguisher is most advantageously manufactured in the form of small cans, i. e., the conventional "tin" can of commerce, which may be easily placed near or by a location for which fire protection is desired. My extinguisher can be stored, for instance, in the glove compartment of an automobile, in a drawer in any room of a home, or any other similar place without danger of the extinguisher being accidentally discharged. In addition, this product is readily susceptible to economical manufacture due to its simplicity of construction, and it thus provides a low cost, easily stored fire extinguisher of high utility.

My invention also includes the method of assembling and filling the fire extinguisher. Essentially, a closure end is secured to the side wall and a perforation made therein. A discharge tube is then passed through the perforation and affixed to this plate by a tight seal. The can is then placed in a position so that the open end is substantially upward and is partially filled with a suitable fire extinguishing liquid. Volumetrically measured pieces of solidified carbon dioxide, namely, Dry Ice, are placed on a conveyor leading to the partially filled open can, at the end of which is located a gravimetric device which automatically determines whether the Dry Ice pieces are within the weight limits necessary to produce the desired pressure within the container. If the piece is of the desired weight, the Dry Ice is deposited in the partially filled container, the can immediately pressure sealed, and then placed into a warm bath. The warm bath melts the Dry Ice

within the fire extinguisher and at the same time tests the sealed can for defective seals. This method of assembling and filling my improved fire extinguisher thus is readily susceptible to a continuous process and affords considerable economy in manufacture.

In the accompanying drawings I have illustrated a preferred embodiment of my invention. This fire extinguisher has, most advantageously, as its receptacle the conventional "tin" can of commerce, for instance, a twelve-ounce "beer" can.

Figure 1 is a top view of a cylindrical fire extinguisher illustrating the placement and construction of the lever and the external part of discharge tube, in relation to the periphery of the container.

Figure 2 is a cross-sectional side view of the fire extinguisher illustrating particularly the placement within the dished closure end of the lever and discharge tube.

Figure 3 illustrates in a top view the position of the lever upon movement and rupture of the discharge tube.

Figure 4 illustrates in a cross-section side view the identical movement of the actuating lever as in Figure 3 and shows particularly the external part of the discharge tube.

Figures 1 and 2 illustrate in top and cross-sectional side views a preferred embodiment of my invention in the form of a cylindrical container of small size wherein both closure ends are inwardly dished. The cylinder **10** of the fire extinguisher is capped at its uppermost or top end by an inwardly dished closure end **11** and at its bottom extremity by inwardly dished closure end **12**. These ends are secured to the cylindrical section by hermetically sealed or pressure-tight connections **21** which may be accomplished in any conventional way. That part of the discharge tube **13** located within the receptacle or container extends to a point in close proximity with the lower dished plate **12**, although not touching it, and is open at this end. In this way a maximum amount of the fluid contained within the chamber may be easily removed under pressure. The discharge tube passes through the upper dished closure plate **11** by means of perforation **20** and is fastened therein by a pressure-tight seal **22**. In order to improve the utility of this fire extinguisher and to facilitate widespread distribution of same, I prefer to form the pressure seal **22** holding the discharge tube to the upper closure plate of a readily fusible metal, such as soft solder. Thus material of this nature will provide a pressure-tight seal, but the seal will melt or open readily under moderately high temperatures. As a result when the extinguisher is in the vicinity of an elevated thermal environment, the seal will give way and an explosion is averted. In this way my extinguisher will meet United States postal regulations as regards shipment of nonexplosive containers and thus facilitate distribution of them.

The discharge tube is weakened at point **15** so as to provide a kerf or line of weakness by any suitable means, such as a sharp concussion, and is extended to the approximate vicinity of the periphery of the can where it is curled over and sealed so as to be pressure tight. Placed under this curled or bent end **16** is the extremity of an actuating hand member constructed in the form of lever **17**. The lever is extended from the curled end **16** so that its center portion **24** underlies the discharge tube between the weakened

fold **15** and the sealed end **16** at **23**, thereby insuring that the lever will remain substantially in the cavity of the dished closure plate. The lever is then further extended to the opposite end of the periphery of the can to form a gripping handle **25** as illustrated in Figures 1 and 2. Depending upon construction of the lever and as in the embodiment illustrated in these drawings, it is most advantageously constructed of an elastic metal and slightly bent or curved downwardly in the horizontal plane so as to fit completely within the upper dished closure end and thus prevent an emergence or projection of any of its parts above the plane of the top of the can.

The fire extinguisher is operated as indicated in Figures 2 and 3. Most advantageously, the cylindrical container **10** is firmly held in the hand of the operator so that the sealed end **16** is directed towards the fire which is to be extinguished. Then the gripping portion of the lever **25**, namely, that portion at the opposite side of the periphery of the can, is grabbed firmly between several fingers of the hand of the operator and pulled upwardly with a hard, quick motion. The center portion of the lever will readily slip from beneath the discharge tube so that the lever remains secured only to the curved sealed end of the tube. A further pull or quick motion backwardly will discharge the container. The discharge tube **13** breaks off at the weakened fold **15**, permitting the emergence under pressure of a stream of fire-fighting fluid. The lever **11** and the end of the discharge tube containing the sealed coiled end **16** is, of course, now completely detached from the discharge tube proper and may be discarded as they are of no further use. The manner of breaking off or rupturing the discharge tube as described will have the further advantage of removing the tab away from the stream released through the nozzle so that backward splashing will be eliminated to a great extent. When the contents of the fire extinguisher have been used, the can may be thrown away.

This fire extinguisher may be readily assembled, sealed, pressurized, and finally sealed in the following manner: A closure end is fastened securely to the side wall and a perforation made therein. The discharge tube, closed at its external extremity, is inserted into the perforation and sealed securely in place, so that the internal extremity of the discharge tube will extend to a point substantially adjacent to the bottom plate of the extinguisher. The pressure-tight seal may be made in any conventional manner and is, most advantageously of a soft solder connection so as to comply with United States postal regulations as hereinbefore described. The container is then inverted so that the uncapped end is exposed to a filling mechanism. A suitable fire extinguishing liquid, carbon tetrachloride, for instance, is deposited in the can to a level near the top. The partially sealed container is then pressurized in this manner, a method readily susceptible to a continuous or conveyor system of operation. On a conveyor at the end of which is an automatic gravimetric weighing device are placed volumetrically measured pieces of solidified carbon dioxide, so-called Dry Ice. The individual pieces of Dry Ice pass along the conveyor until they reach a go-no go gravimetric weighing machine which determines whether the Dry Ice is within the weight limits necessary to produce the desired pressure within the sealed can. If the piece of Dry Ice is of a satisfactory weight, it is dropped into the container where-

upon the can is immediately capped by a closure end and then hermetically sealed. If, of course, the Dry Ice is under or overweight, the piece is rejected or thrown aside and a new portion of solidified carbon dioxide is placed into position for evaluation. Upon sealing, the finished container is then placed into a warm bath, most advantageously of heated water, which effects a phase changing of the carbon dioxide solid into its gaseous state. At the same time, the liquid bath provides an efficacious method of determining the effectiveness of all the pressure seals of the fire extinguisher. That is to say, an incomplete or defective seal is ascertainable simply upon discovery of gas bubbles that will emerge from the can at any point where there is an unsatisfactory seal. After a short time in the warm bath, the completed fire extinguisher is removed and is now ready for use. Thus this method of assembling, filling, and testing my improved fire extinguisher is substantially continuous, since conventional conveyor systems may be employed for movement of the cans and of the Dry Ice pieces, an automatic Dry Ice weighing machine employed for determination of Dry Ice weight, and similar other automatic machinery, such as filling machine employed to facilitate quantity and quality production.

I claim:

1. A single-use non-refillable fire extinguisher consisting of a dispensing container having a sealed discharge orifice, a fire extinguishing liquid hermetically sealed in said container, and a sufficient amount of gas under pressure within said container forcefully to expel substantially all of said liquid through said orifice when said orifice is unsealed, said container including, in combination, a cylindrical sheet-metal side wall, an inwardly dished sheet-metal bottom wall crimped to said side wall, an inwardly dished sheet-metal top wall crimped to said side wall, a discharge tube passing through said top wall and tightly sealed on its periphery thereto, the bottom end of said tube being open within said container adjacent said bottom wall, the top end of said tube being sealed outside said container, the portion

of said tube outside said container having a line of weakness in its wall between said top wall and said sealed tube end, and a handle member engaging said tube between said sealed tube end and said line of weakness, all of the outside portion of said tube and all said handle member being substantially within said dished top wall and below the plane of the top of said side wall.

2. A fire extinguisher according to claim 1 in which the handle member is constructed as a lever and the outside portion of the discharge tube is constructed so that the sealed end thereof is flattened and bent in the horizontal plane, said handle being so positioned within the dished top wall as to pass beneath said discharge tube at its sealed end, engaging in the bend thereof, and partially underlying said tube at a second and unflattened point substantially nearer the point of passage of said tube through said top wall, whereby said tube releasably holds said handle against said closure end.

3. A fire extinguished according to claim 1 in which the discharge tube passes through an opening in the top wall of substantially greater inside diameter than the outside diameter of said tube and safety plug of fusible metal seals the outside of said tube to the inside of said opening, the melting point of said plug being lower than the temperature at which the amount of gas within said container would exert a pressure in the space provided it within said container sufficient to rupture any portion of said container.

ABE OBNER SAMUELS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
685,304	Sigafoos	Oct. 29, 1901
908,201	Burke	Dec. 29, 1908
1,946,502	Rosin	Feb. 13, 1934
2,268,964	Soffell	Jan. 6, 1942
2,449,478	Herzog	Sept. 14, 1948