Aug. 21, 1951 G. SIPKIN 2,564,733

DISCHARGE HEAD AND GRIP FOR PORTABLE FIRE EXTINGUISHER

Filed June 22, 1949

FIG. 1.

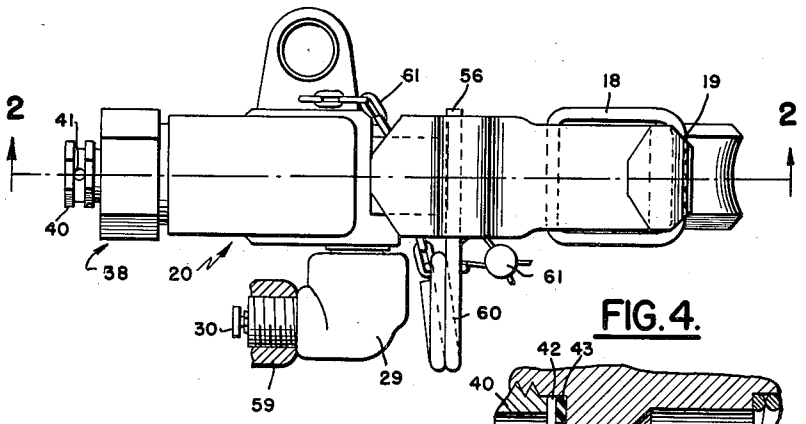


FIG. 4.

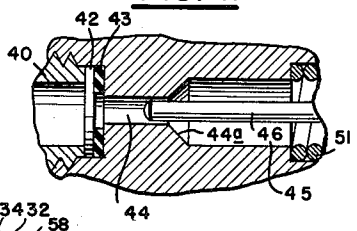


FIG. 2.

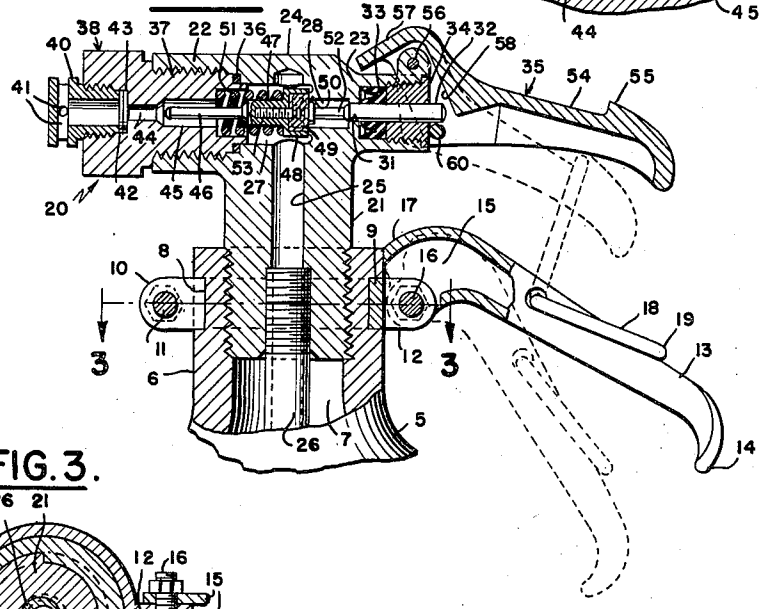
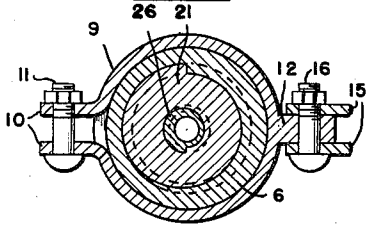


FIG. 3.



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DISCHARGE HEAD AND GRIP FOR PORTABLE FIRE EXTINGUISHER

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10 Claims. (Cl. 169—31)

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This invention relates to portable fire extinguishers with special application to the discharge head thereof and to means for facilitating portability of the extinguisher tank. The invention has special utility in connection with fire extinguishers utilizing carbon dioxide as the extinguishing agent.

Carbon dioxide has been found to be an effective material for fire suppression, acting in gaseous form to blanket and smother the flame. Certain risks, however, are attendant upon its use in portable equipment principally arising from the fact that the carbon dioxide in liquid form has a boiling point of −108° F. and a pressure at ordinary room temperature of between 800 and 900 pounds per square inch. Since the most effective use of the apparatus is obtained by playing the discharge as close to the fire as possible, and since moreover, the vapor pressure of the contained liquid varies directly as the temperature, it is apparent that the danger of explosive rupture of the container is present and that this danger is most imminent at the time of application of the extinguisher.

In currently used apparatus the danger of tank rupture is provided for by use of a frangible disk which yields at the danger pressure point. Heretofore, however, this blow-disk has been so placed that should fracture occur during use of the extinguisher, the carbon-dioxide sprays on the hands of the operator with acute disabling effect. The present invention therefore, contemplates structure wherein the blow port directs spray away from the operator, and moreover, at the moment of outlet control valve actuation by the operator, a choke is made effective to remove the pressure on the blow-disk or reduce or substantially eliminate the gas flow at the blow port if rupture occurs, thus preventing disabling of the extinguisher due to rapid uncontrolled escape of liquid. The invention also provides accessory tank support means enabling transport and support of the tank whether or not the discharge head is in place by one or both hands while at the same time cooperating to produce actuation of the outlet valve when the discharge head is in use.

The objects of the invention therefore are to provide fire extinguisher apparatus with means for protecting the operator from extinguisher spray; to provide apparatus for eliminating blow out during use or retarding liquid leakage at the blow port in case of blow out at the time the extinguisher is put into use; to provide tank support means for facilitating easy handling of

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the equipment before and during use; and also to provide a simple method of visual inspection of the blow-disk when the discharge head is partly disassembled. Other objects and features of the invention will appear on consideration of the following description of a preferred embodiment of the invention as illustrated in the accompanying sheet of drawing in which:

Fig. 1 is a plan view of the discharge head of the extinguisher;

Fig. 2 is a sectional view taken on lines 2—2 of Fig. 1 showing the valve mechanism;

Fig. 3 is a detail section on lines 3—3 of Fig. 2 showing the attachment device of the tank support handle; and

Fig. 4 is an enlarged detail section of the blow port choke valve in operated condition.

Referring now to the drawings, in which like numerals throughout the several figures designate like parts, and particularly to Fig. 2, the extinguisher tank 5 is constructed of pressure resistant material such as sheet steel with a constricted neck 6 at one end provided with an opening 7 internally threaded at its outer end. An annular groove 8 is cut in the outer face of tank neck 6 and in this groove strap clamp 9 having out turned adjoining ends 10, is adjustably held by bolt 11, as indicated. The midsection of the clamp is provided with a support tab 12 to which the support handle 13 is pivotally attached. This handle is preferably fashioned of sheet metal with the outer end 14 inturned toward the tank 5 to facilitate grasping of the handle, and the other end formed with side plates 15 which are apertured to receive the pivot pin 16 rotatable in an opening formed in tab 12. The top end 17 of the handle is extended beyond the pivot to form a stop for the handle when lifted into abutment with neck 6 whereby a firm carrying means for the tank is provided. A bail 18 having a transverse section 19 is pivotally attached to the side of the handle for holding the tank discharge port in open position as will hereinafter be more fully described. If desired, the annular groove 8 may be omitted from the neck 6 and the strap clamp 9 may be frictionally clamped to the neck.

The discharge head 20 of the apparatus is roughly T-shaped with an upright supporting section 21, left and right top sections 22 and 23 and a central head 24 at the junction of these various sections. The upright section 21 is provided with outer threads at the lower end thereof for attachment to the threaded area of the tank neck opening 7. A bore 25 is formed axially in

this upright section, terminating at the lower end in a threaded connection to the syphon tube **26**, this tube extending to a point adjacent the tank base, and the bore terminating at the upper end in a central cavity or chamber **27**. This chamber **27** is extended laterally into and through the T-sections **22** and **23**, to the left section **22** to supply the blow-port and to the right section **23** to supply the discharge valve. In forming the discharge valve duct the chamber **27** is constructed to make an outlet chamber **28** to which the discharge pipe unit **29** (Fig. 1) with the diffusing button **30** and horn **59** is attached, all as well known in the art.

A further constriction in the T-section **23** to the right of chamber **28** forms an opening **31** for the valve stem **32** which is slidably mounted therein; and the opening **31** is expanded into a larger cavity to receive the stem gasket **33** and the gasket nut **34**. The stem end is rounded and projects outwardly from the gasket nut to cooperate with the operating lever **35** as will be described more fully hereinafter.

The central chamber **27** is enlarged approximately midway to the end of T-section **22** to receive main plug washer **36**, and the threaded end **37** of main plug **38**. This plug is axially apertured to form a duct extending completely through the plug to the central chamber **27**. The outer section is internally threaded to receive blow out plug **40** which, in turn, is also axially apertured from its inner end to a point adjacent the outer end where radial outlet ducts **41** are formed. A copper blow-disk or element **42**, supported by washer **43**, extends completely over the inner end of blow-plug **40** and is closely held between the plug and the offset shoulder formed by the smaller intermediate duct section **44** with the outer duct section. This blow-disk is made of thin copper capable of withstanding pressures up to 3000 pounds per square inch and is gold coated to prevent corrosion by the gases and spray.

Inner intermediate duct-section **45** is separated from the blow port duct section **44** by a conical section **44***a* and forms a cavity, larger in diameter than section **44**, between section **44** and central cavity **27** for enclosing the blow out choke valve or pin **46**. This pin is a straight cylindrical rod mounted at one end on a central extension **47** from the back plate of valve **48**. The pin has a rounded outer end which is adapted on axial outer movement to penetrate the duct sections **44***a* and **44**, this penetration being facilitated by the conical shape of section **44***a*. The diameter of pin **46** is only slightly less than the inner diameter of duct **44** as shown in Fig. 4 so that fluids may move from the inner cavity **27** past the pin when inserted in the duct **44**, should the disc **42** rupture, but at a rate effectively reduced over that when the pin is withdrawn. Furthermore, as the end of the pin **46** penetrates further and further into the conical section **44***a*, the pin increasingly restricts the fluid passage between duct sections **44** and **45** so that a variable choke effect is produced to gradually reduce the fluid pressure tending to rupture disc **42** as will appear hereinafter.

The valve **48** consists of a cup shaped element having a back base attached to the choke pin **46** and a cup space for reception of the seal element **49**. This element is adapted to engage the valve seat **50** formed at the junction of the central cavity **27** and adjoining intermediate cavity **28**. A coil spring **51** enclosing valve extension **47** and extending between the valve back plate and the shoulder between cavities **27** and **45** normally holds the valve **48** in closed position. The valve **48** is connected to the valve stem **32** by means of a short stem extension **52** of reduced diameter which terminates in a holding groove and shoulder for the valve seal and a threaded end **53** for engagement with a threaded axial opening in the valve extension **47**. It thus appears that the valve stem **32**, the stem extension **52**, the valve **48**, the valve extension **47** and the choke pin **46** form together a rigid unit. It appears also that when the spring **51** holds the valve **48** seated, the choke pin is free of duct **44**, as shown in Fig. 2, but when the valve moves to the left due to compression of stem **32**, the choke pin **46** enters further into conical section **44***a* and eventually into section **44** to restrict free movement of liquid to the blow duct in case of blow out as shown in Fig. 4.

Means for actuating the valve stem **32** against tension of spring **51** is provided in the valve lever **35**. This lever includes an axially extended handle **54** having cross bail stop **55** at one end, lateral juxtaposed side openings to receive the pivot pin **56** at the other end, a pivot end extension **57** forming a lever limit stop for up movement, and a valve stem contact head **58** adjacent the pivot end of the lever. Downward movement of the lever causes engagement of contact head **58** with the outer end of valve stem **32**, thereby opening the valve and moving the choke pin **46** into the duct sections **44***a* and **44** in an amount proportional to the opening of valve **48**. In order to prevent accidental closure of the lever the side walls of the lever are apertured in such manner that when a pin **60** is inserted in these apertures, the pin and lever are stopped against the valve plug **34**. One end of the pin **60** is coiled and a chain **61** fixed to the head prevents accidental removal and loss of the pin. In addition, to prevent loss in transit a detachable wire-lead seal **61** is employed to hold the pin in place.

The operation of the discharge head as a complete unit may now be described, it being assumed that the tank or container **5** has been fully charged with liquid carbon dioxide. The operator grasps handle **13** and moves the tank to such proximity to the fire that the tank discharge may be applied at the base or edge of the flame, the lock pin **60** being preferably removed on the approach thereto. The lever **35** is then depressed opening the valve and permitting the liquid chemical to diffuse through the outlet horn **59**. On suffocation of the fire, the lever is permitted to raise and the coil spring **51** thereupon closes the valve, and this operation may be repeated until the supply of liquid is exhausted.

Should the pressure inside the tank become excessive due to the close proximity of the fire and before the operator has had an opportunity to apply the extinguisher, the blow disk may yield. In this case, since the outlet ducts **41** of the blow plug are in a vertical plane, or lie transversely to the handle **13** and lever **35**, there is no direct application of the highly freezing liquid to the hand of the operator who holds the apparatus. Moreover, by rupture of the blow disk the apparatus is not wholly disabled, since by operating the lever the outlet duct **44** to the blow port is choked and a substantial flow of extinguisher is maintained in the main valve port. It is likewise apparent that when valve **48** is open and is relieving the pressure inside the container **5**, the blow port **44** is either substantially or partially blocked thereby reducing the likelihood of rupture of the disk **42**

at this time, the amount of blocking being in proportion to the opening of the valve. Thus, the general efficiency of the extinguisher is maintained irrespective of blow disk fracture, and independently of whether fracture occurs directly before or after main valve actuation, and that likelihood of the latter occurring is greatly reduced. If the operator desires to leave the extinguisher with the valve open, he hooks the bail 18 over the stop 55 on the valve handle.

Certain advantages of the described apparatus may be here pointed out. The choke pin 46 serves not only to control escape of extinguisher fluid as described above but also serves as a removal pin for the valve structure since, on unscrewing of main plug 38, the pin may be seized and the entire valve unit removed. Further it is noted that to inspect the blow disk 42, it is unnecessary to unscrew the blow-out plug 45 after the main plug 38 has been removed as visual inspection of the disk 42 may be made through the duct 44 whereby the condition of the gold coating on the disk may be determined.

Also the arrangement of the handle is important in that it is susceptible to circumferential adjustment. Where a single hand operation is desired, the handle 13 may be set directly beneath the lever 35 as shown in Fig. 1 in which position the tank may be transported and the lever actuated by a single hand. Where two hand use is desirable, the groove clamp 9 is adjusted to obtain an angular diversion between handle and lever, in which position the tank may be transported by the left hand, for example, and the right hand used to remove the lock pin 60 and manipulate the lever. The bolt 11 may be left loose so that the handle 13 may be readily moved to the position desired.

While a groove on the tank neck is described, obviously the clamp may be secured on the ungrooved outer neck surface. Note is made also of the fact that handle attachment to the tank neck insures easy transportation means when the discharge head is removed; and that support means secured directly to the steel tank is more assured and possesses greater strength than support means attached to the brass extinguisher head 20 screwed into the tank neck. Carbon dioxide has been referred to as the extinguisher chemical but it is apparent that other chemicals operating on the pressure principle may be safely controlled by the described apparatus.

Modifications other than as mentioned may of course be made by those skilled in the art and it is understood therefore that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

The invention described herein may be manufactured and used by or for the government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. A discharge head for a fire extinguisher tank provided with a fluid outlet comprising a terminal head having a chamber therein, a blow port connected by a duct to said chamber, a frangible disk normally closing said blow port, an outlet port in communication with said chamber, a valve in said chamber for normally closing said outlet port, and means attached to said valve and associated with said duct for obstructing fluid flow therethrough when the valve is open.

2. A discharge head for a fire extinguisher tank provided with a fluid outlet comprising a terminal plug connected to said outlet having a valve chamber therein, a connecting duct between the chamber and tank outlet, a blow port connected to said chamber, a blow disk normally closing said blow port, an outlet port connected to said chamber, a main valve normally closing the passageway between the chamber and outlet port, a spring normally seating said valve in closed position, a choke valve fixed to said main valve adapted to enter said blow port to retard movement of fluid therethrough on blow disk rupture and main valve opening, and a lever for moving said main and choke valves to open said main valve and to close said choke valve.

3. The discharge head as described in claim 2 with the outlet ducts of the blow port extending approximately transversely to said lever.

4. The discharge head as described in claim 1 in which said blow port is obstructed by said means proportionately to the amount the valve is opened.

5. The discharge head as described in claim 2 in which movement of fluid through said blow port is controlled by said choke valve in proportion to the movement of said main valve.

6. A discharge head for a fire extinguisher tank provided with a fluid outlet, comprising a terminal head having a chamber therein, a blow port connected to said chamber, a yieldable blow element normally closing said blow port, an outlet port connecting to said chamber, a valve for normally closing said outlet port, and means including valve stems associated with said valve for substantially closing said blow port and opening said valve.

7. A portable fire extinguisher comprising a tank for containing extinguisher fluid, a discharge head having a chamber therein, a duct connecting said tank and chamber, a blow port connected to said chamber, a blow element normally closing said blow port, an outlet port connected to said chamber, a valve for normally closing said outlet port, means for operating said valve, means connected to said valve for obstructing said blow port upon opening movement of said valve, means for supporting said tank with one hand, means for manipulating said valve and blow port obstruction means with the other hand, and means attached to said handle and valve operating means for selectively holding the valve in open position.

8. A discharge head for a fire extinguisher tank provided with a constricted outlet port, comprising a terminal plug removably attached to said port having a central valve chamber with four aligned openings including a bore connecting the chamber and tank port, a duct connecting the chamber and discharge head port, a bore forming a bearing for a valve stem, and an opening for receiving a side plug, a side plug removably attached in said terminal plug opening, and having a two diameter duct therein communicating with said chamber, and a recess in the head thereof communicating with said duct, a blow disk, a blow plug removably insertible in said recess for retaining said blow disk in obstructive position for fluid flow from said chamber, said blow plug having a main duct aligned with said openings and transverse radial ducts communicating with said side plug duct on rupture of said blow disk, a valve seat formed in said chamber surrounding the inlet from the chamber to the discharge head port, a valve normally resting on said seat to close said outlet head port, a valve plug attached to said terminal plug and having

a bore therein in alignment with said valve bearing bore, a ring gasket between the valve and terminal plugs, a valve stem attached to said valve and slidably positioned in said valve stem bearing and valve plug bore with the free stem and extending outwardly beyond said valve plug, a choke pin attached to said valve and extending into the nearer and larger of said side plug ducts, a spring in said chamber normally holding said valve in closed position, and a lever for engaging and moving said valve pin end inwardly, whereby the valve is opened and the choke pin is forced into the farther and smaller of said side plug ducts.

9. A portable fire extinguisher comprising a tank adapted to hold extinguisher fluid under pressure, said tank comprising a tank outlet for said fluid having a restricted neck portion, said neck portion having an outer annular groove and an internal screw thread, said fire extinguisher further comprising a discharge head having a threaded stem portion removably screwed into said neck portion, said discharge head comprising a valve chamber and a main discharge outlet therefrom, a duct connecting said valve chamber with said tank outlet, a valve normally closing said discharge outlet and a lever mounted on said head for operating said valve, a clamp positioned in said annular groove, a handle attached to said clamp for lifting said tank with or without said discharge head, said lever being vertically spaced from said clamp a distance enabling an operator to grasp said lever and handle in one hand, and means for adjusting said clamp rotatively around said tank neck to position the handle attached to the tank in axial alignment with the valve lever attached to the head whereby they can be squeezed together by the hand of the operator for operating the lever to open said valve against the pressure inside said tank.

10. A portable fire extinguisher as defined in claim 9 but further characterized by a bail attached to said handle of a size substantially equal to said distance, and means on said lever for reception of said bail for holding said lever in the valve open position.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,067,829	Denne	Jan. 12, 1937
2,375,615	Boal	May 8, 1945
2,495,688	Blakeslee	Jan. 31, 1950