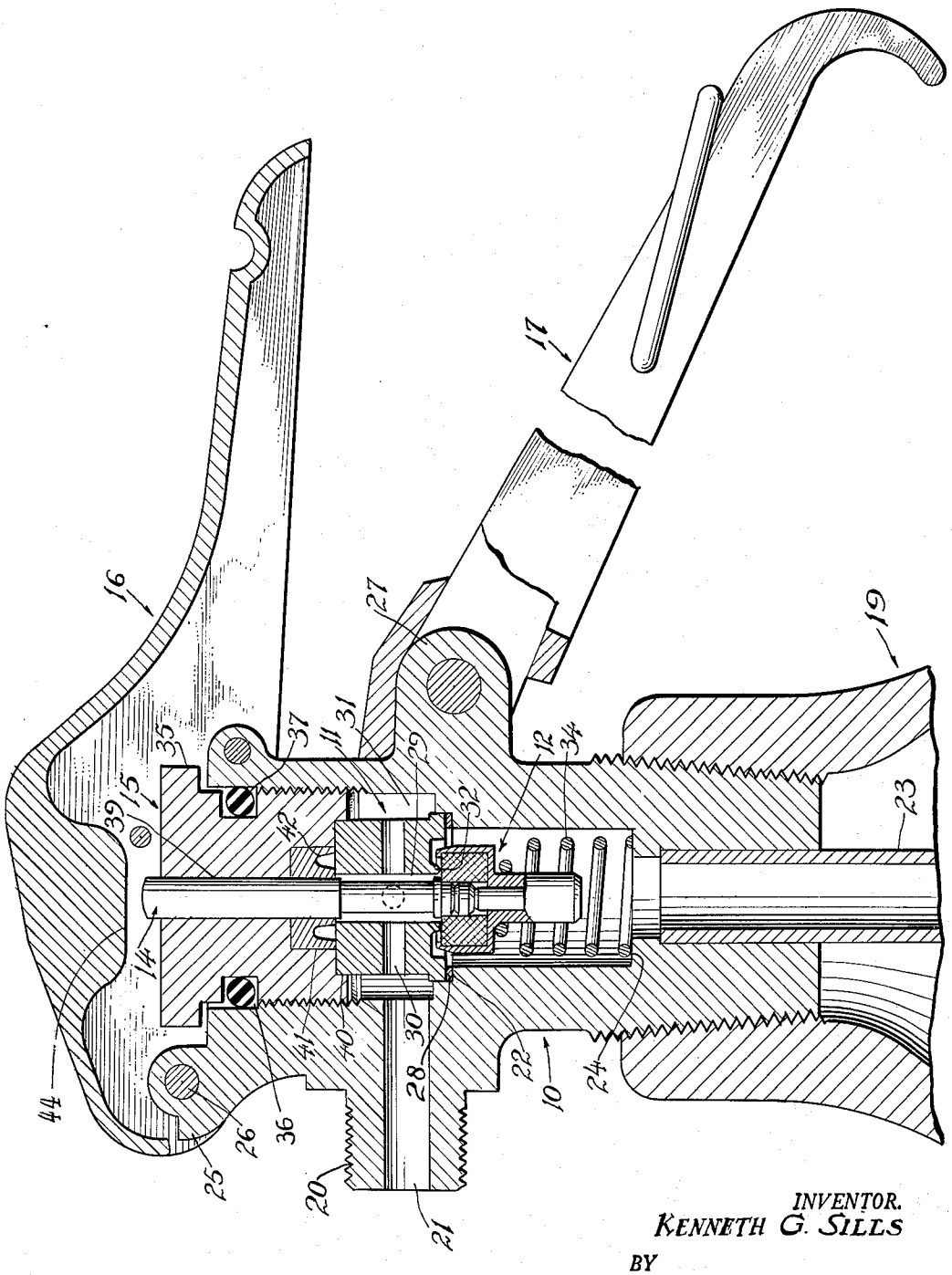
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DISCHARGE HEAD

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DISCHARGE HEAD

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The present invention relates to improved discharge heads for controlling the flow of fluid under pressure, and, more particularly, to such heads which are adapted for use in connection with fire extinguishers of the carbon dioxide type.

Accordingly, an object of the present invention is to provide such a discharge head which is extremely simple and economical in construction.

Another object is to provide such a discharge head which is constructed of a minimum number of parts which are readily assembled and secured in their assembled position.

A further object is to provide such a discharge head having a high rate of discharge but not subject to freeze-ups in the event liquid carbon dioxide is discharged therethrough at sub-zero temperatures.

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:

The single figure is an enlarged side view of a discharge head in accordance with the invention shown partly in longitudinal section and partly in elevation as applied to the receptacle of a fire extinguisher of which only the upper end is shown.

Referring to the drawing in detail, there is shown a discharge head which generally comprises a casing or body 10, a valve seat member 11, a valve member 12, a valve stem 14, a valve seat member retaining plug 15, a valve stem operating lever 16, and carrying handle 17.

The lower end of the body is screw-threadedly secured within the neck of a receptacle 19 for storing fire extinguishing fluid under pressure such as liquid carbon dioxide. The body has a vertical bore extending therethrough, the lower end of which communicates with the receptacle to provide an inlet for the bore, and has a laterally extending nipple 20 adapted for securement of a hose or discharge directing device (not shown) and formed with an outlet passageway 21 communicating with the vertical bore.

The vertical bore is interiorly threaded at its upper end and is stepped to provide an upwardly facing annular shoulder 22 between the passageway 21 and the inlet end of the bore but closely adjacent to the passageway, and to provide an upwardly facing annular shoulder 24 about halfway between the lower end of the bore and the shoulder 22, the purpose of these shoulders being described hereinafter. A syphon tube 23 extends from the lower end of the vertical valve body bore to the bottom of the receptacle 19 in the customary manner.

The body 10 further has a boss 25 at its upper end located above the nipple 20 which boss has a pin 26 extending therethrough for pivotally mounting one end of the lever 16 so that the latter extends diametrically across the upper end of the body in a position to operate the valve stem 14. The body also has a boss 27 diametrically opposite, but slightly below the nipple 20, for pivotally mounting the inner end of the carrying handle 17 so that this handle can be positioned against the receptacle 19 and can be swung upwardly beneath and in vertical alignment with the lever 16 to provide for squeeze-grip operation of the lever while supporting the extinguisher by means of the handle.

The valve seat member 11 is a generally cylindrical member which has its lower peripheral surface seated on the shoulder 22 to centrally align the seat member within the vertical throughbore of the body 10 and to determine its position within the bore depthwise. An annular gasket or washer 28 is disposed between the seat member 11 and the shoulder 22 to form a seal between the inlet end of the casing bore and the outlet passageway 21. This seat member has an aperture or bore 29 extending vertically therethrough; and has a plurality of spaced radial apertures 30, herein indicated as four in number, providing communication between the aperture 29 and an annular space 31 between the outer wall of the seat member and the wall portion of the vertical bore of the casing or valve body, whereby communication is established between the lower or inlet end of the aperture 29 and the outlet passageway 21.

The aperture 29 has an effective cross-sectional area designed to provide for discharge of the contents of the receptacle at a high rate of flow. The combined cross-sectional area of the apertures 30 is about equal to the area of the aperture 29 less the cross-sectional area of the stem; the radial cross-sectional area of the annular space 31 is about equal to the combined area of the apertures 30; and the cross-sectional area of the passageway 21 is about equal to the area of the space 31. In this manner, the path from the inner ends of the apertures 30 to the outlet passageway 21 does not have any zone at which there is an increase in cross-sectional area where the expansion of carbon dioxide and the formation of carbon dioxide snow may take place. Consequently, in the valve construction of the present invention, there is no danger of freeze-ups which either clog the path of discharge of the liquid carbon dioxide or partially restrict this path to materially decrease the discharge rate. This desirable feature is attained in a practical and economical manner, to wit, by proportioning the vertical valve body bore diameter, the seat member diameter, and the number of radial bores or apertures and the diameter thereof. Also, since the areas of the zones though which flow takes place are about equal, the flow of fluid carbon dioxide is not restricted and a high discharge rate can be attained. These areas are determined by substantially regular geometrical shapes, and thus can be accurately calculated and maintained within predetermined tolerances.

The lower surface of the seat member preferably has an annular rib 32 adjacently surrounding the lower end of the bore 29 against which the valve member 12 is urged by a spring 34 having its lower end seated on the shoulder 24.

The plug 15 is exteriorly threaded for cooperation with the threaded upper portion of the valve body bore, and has a nut portion 35 for facilitating securement and removal thereof. An annular recess 36 is provided below the nut portion in which a packing 37 is disposed for forming a seal between the valve body and the plug, and a central vertical bore 39 is provided in the plug through which the valve stem 14 extends. The lower surface of

the plug is formed with a central circular recess **40** for receiving the upper end of the seat member **11** to centrally align the same and a second concentric circular recess **41** is formed within the recess **40** for receiving a packing **42** adapted to form a seal between the valve stem and the plug bore **39**. When the plug is applied, it serves to align and secure the seat member in its proper position.

In operation, when the lever **16** is depressed, the cam boss **44** on the underside thereof engages the upper end of the valve stem **14** and moves the same downwardly to effect unseating of the valve member, whereby discharge of the medium in the receptacle is effected.

From the foregoing description, it will be seen that the present invention provides a simple, practical and economical discharge head particularly adapted for controlling the discharge of expandable fluids such as carbon dioxide by reason of the contour and proportionate dimensions of the internal fluid passageways which are effective to prevent freezing of the fluid therein. This advantage, together with the ease of assembly of parts, is accomplished in an expeditious and predeterminable manner. The seat member and retaining plug arrangement facilitate manufacture of the discharge head without impairing the operating effectiveness thereof.

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.

I claim:

1. In a discharge head for controlling the flow of fluid medium under pressure, a casing having a vertical bore extending therethrough, the lower end of which provides an inlet, said bore including upper, lower and intermediate counter-bore sections terminating at their lower ends in upper, lower and intermediate upwardly facing shoulders respectively, said casing having a laterally extending passageway communicating with said upper bore section to provide an outlet; a generally cylindrical member seated on said intermediate shoulder and disposed in the lower portion of said upper bore section with its outer peripheral wall spaced from said upper bore section to provide a continuous annular passageway therebetween, said member having a central vertical through bore formed with a valve seat at its lower end and having a plurality of radial apertures providing communication between its said central bore and said annular passageway; a valve member in said lower bore section; a spring having its lower end seated on said lower shoulder and having its upper end in engagement with said valve member to urge the same against said valve seat; a plug threadedly secured in the upper portion of said upper bore section and having its lower end in engagement with said cylindrical member to retain the same on said intermediate shoulder and having a vertical through bore in registry with said central bore of said cylindrical member; means for moving said valve member off its seat including a valve stem extending through said bores of said plug and said cylindrical member; and annular means forming a seal between said stem and the lower end of said plug bore and forming a seal between the lower end of said plug and the upper end of said cylindrical member to prevent the escape of medium under pressure from the upper end of said cylindrical member bore; said discharge head being characterized in that the combined area of said radial apertures is about equal to the cross-sectional area of said vertical aperture less the cross-sectional area of said valve stem; the radial cross-sectional area of said annular space is about equal to the combined area of said radial apertures, and the cross-sectional area of said laterally extending outlet passageway is about equal to the radial cross-sectional area of said annular space, whereby the path through which the fluid medium flows from the port of said valve seat to said outlet passageway is free from zones of increasing cross-sectional area wherein sufficient expansion of the fluid medium can take place to effect solidification thereof.

2. A discharge head according to claim 1, wherein a sealing washer is disposed between said intermediate shoulder and the lower end of said cylindrical member to prevent fluid flow communication between said lower bore section and said annular passageway.

3. A discharge head according to claim 1, wherein said plug member has an annular recess at its lower face concentric with its bore for the reception of said annular sealing means and has a second recess at its lower face concentric with and larger than said first mentioned recess for receiving the upper end of said cylindrical member, whereby said cylindrical member is maintained in vertical alignment and compression of said sealing member is effected upon final securement of said plug.

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