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VALVE FOR FIRE EXTINGUISHING SYSTEM

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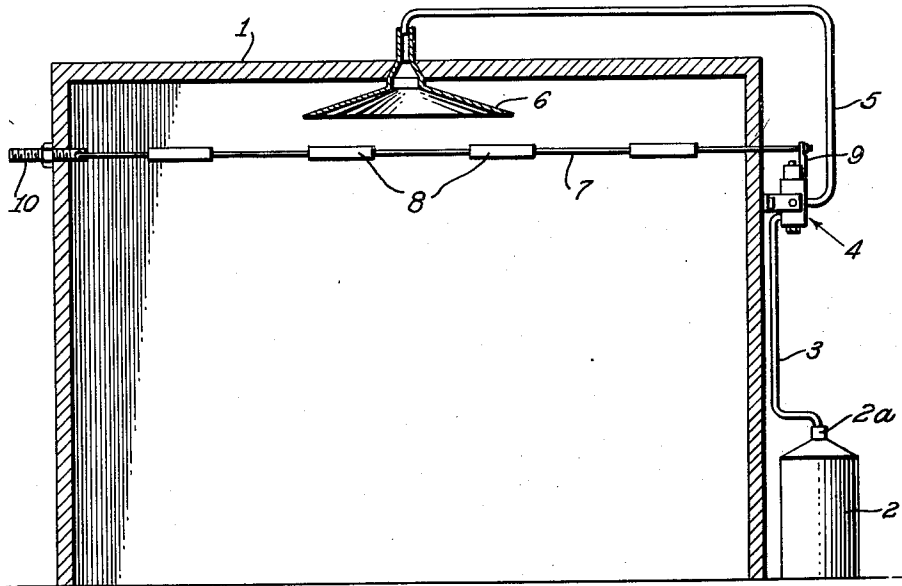


Fig. 1

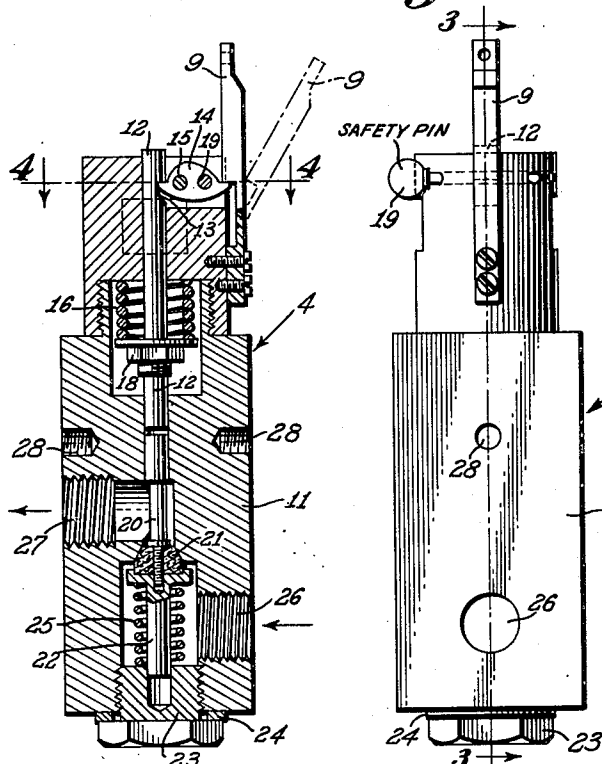


Fig. 3

Fig. 2

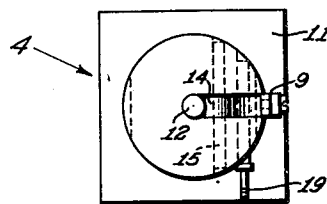


Fig. 5

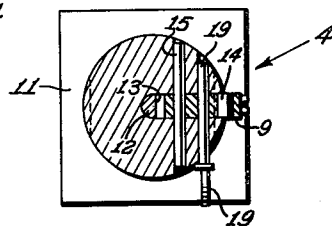


Fig. 4

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VALVE FOR FIRE-EXTINGUISHING SYSTEM

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4 Claims. (Cl. 169-19)

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This invention relates to a fire extinguishing system, more particularly to apparatus including a quick acting valve for automatically turning on the flow of fire extinguishing fluid, such as carbon dioxide gas, upon the occurrence of a fire.

While the apparatus embodying the present invention is of general application, it has particular usefulness in extinguishing fires such as occur in tobacco curing barns. In the curing of tobacco, the fire hazard is quite considerable, there being about 2,000 barns burned a year in only one state. An outstanding disadvantage of many conventional types of fire extinguishing systems is that they are not always reliable and positive in operation, particularly the automatic control valves thereof, and oftentimes they will either fail to operate or will operate only after the fire has done considerable damage before the fire extinguishing fluid is turned on.

An object of this invention is to provide, in a fire extinguishing system, a control valve and latching means therefor which is reliable and quick acting in operation, and effective for initiating a flow of fire extinguishing fluid at a predetermined temperature indicative of a fire condition.

Other objects and advantages of our invention will become apparent from a study of the following specification, taken with the accompanying drawing wherein:

Fig. 1 is an elevational view somewhat schematic and partly in cross-section showing a fire extinguishing system embodying the present invention and applied to a barn or building;

Fig. 2 is an enlarged elevational view of the automatic fluid control valve shown in Fig. 1;

Fig. 3 is a longitudinal cross-sectional view of the control valve shown in Fig. 2 taken along line 3-3 of Fig. 2;

Fig. 4 is a cross-sectional view taken along line 4-4 of Fig. 3, and

Fig. 5 is a top plan view of the valve shown in Figs. 2 and 3.

Referring more particularly to the figures, numeral 1 denotes a building, such as, for example, a tobacco barn, the contents of which are to be protected against fire. Exteriorly of the building, preferably, there is provided a storage tank 2 filled with carbon dioxide or other fire extin-

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guishing fluid under pressure. The top of tank 2 is connected by valve 2a to a pipe or conduit 3, which, in turn, is connected to an automatic control valve denoted generally by numeral 4. When the gas of tank 2 flows through the valve, it will be conducted by pipe 5 to a disbursing funnel 6 or other device to spread the carbon dioxide below the ceiling of the building or barn so as to form a blanket of carbon dioxide gas over the flames to smother and extinguish the fire. For most effective results, building 1 should be substantially air-tight to prevent entry of oxygen due to drafts and other causes, and to retain the carbon dioxide gas. With such air-tight building, such gas will effectively extinguish the fire by smothering and lowering the kindling temperature.

In order to control the automatic valve 4, there is strung by a wire 7 a plurality of low melting point fuse links, such as 8, of any suitable metal. For example, the fuse links may be made of an alloy consisting of 50% bismuth, 30% lead and 20% tin which has a melting point of approximately 197.6° F. Such alloy, however, is merely exemplary, it being obvious that other alloys having other melting points are likewise suitable. One end of wire 7 is connected to a leaf spring latch 9 and the other end is fastened by means of a turnbuckle 10 to the opposite side wall of the building, thereby placing wire 7 under tension. As will appear more clearly from Fig. 3, the leaf spring latch 9 is normally biased outwardly to the position shown in dash-and-dot lines so that upon melting of any of the fuse links 8, the latch 9 will move from the full line to the dash-and-dot line position to allow opening of the valve, as will appear more clearly hereinafter.

The valve 4 comprises a valve body 11 having a bore extending centrally and longitudinally therethrough through which is slidably fitted a plunger 12 whose outer end portion is provided with a notch 13. A cam 14 is pivotally mounted on body 11 by pin 15. A valve release spring 16 surrounds plunger 12 and has one end seated against a top wall of the bore and the other end resting against a holding nut 18 held in any longitudinal adjustable position by screw threaded engagement with the plunger. Plunger 12 may be forced upwardly to compress spring 16 by any suitable means, such as by clamping

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in a vise, thereby allowing the cam 14 to become seated in notch 13. The cam 14 is maintained in the horizontal seated position shown in Fig. 3 by means of the tension of wire 7 which holds latch spring 9 inwardly against the valve body in the latched position. A safety pin 19 is provided for locking the cam in the latching position, as shown, whenever desired, such as during assembly when stringing wire 7.

At the bottom portion of the valve is provided a valve stem 20 having a threaded shank encircled by a valve disk or washer 21 of any suitable material for forming an air-tight fit with the valve seat of conical or other desired corresponding shape. An extension 22 of the stem has a flanged upper end portion also screwed onto stem 20 for tightly holding washer 21 in place and a lower end portion slidably fitted within a cylindrical bore formed in a cap screw 23. Washer 24 of copper or other suitable material is interposed between the cap screw and valve body for forming an air-tight joint. A helical valve seating spring 25 surrounds stem 22 and has one end resting on the inner face of the cap screw 23 and the other resting against the flanged end portion of stem 22 to provide yieldable pressure for maintaining the valve in its closed position. Screw threaded openings 26 and 27 are provided to serve as inlet and outlet openings, respectively, and to which the ends of pipes, such as 3 and 5, may be screwed. Threaded openings 28 are provided for mounting the valve on a wall such as the outer wall of building 1.

It should be especially noted that the valve release 16 is considerably stronger than the valve seating spring 25. For instance, the valve release spring 16 may provide 295 lbs. pressure, whereas the valve seating spring 25 may provide only about 10 lbs. pressure. Valve seating spring 25 maintains the valve in the closed position until air under pressure from tank 2 has been turned on, after which the air itself will maintain valve washer 21 in the closed position and will seal the valve tightly so that there is no leaking there-through.

In operation, let it be assumed that the valve is in the closed position as illustrated in Figs. 1 and 3, and that a fire should occur within the building. After a predetermined temperature has been reached sufficient to melt one or more of the fuse links 8, the tension of wire 7 will be relieved, allowing leaf spring 9 to spring outwardly to the dash-and-dot line position shown, thereby unlatching cam 14, thereby allowing spring 16 to force plunger 12 downwardly with a substantial force. After a short downward travel, the lower end of the plunger will abut against the top end of stem 20 causing the latter to be pushed downwardly, thereby unseating disc 21 and opening the valve against the action of the weaker spring 25. Therefore, carbon dioxide or other fluid under pressure from tank 2 will flow through the valve in the direction shown by the arrows, thence through pipe 5 and funnel 6 so as to spread underneath the ceiling and form a blanket to extinguish the fire.

Of course, after the fire has been extinguished, and the melted fuse links replaced, wire 7 is strung again so as to hold leaf spring 9 in the vertical or latching position to maintain the valve in a closed position in readiness for another possible fire.

Thus it will be seen that we have provided an efficient fire extinguishing system having an

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automatic valve for controlling the flow of carbon dioxide or other fire extinguishing fluid, which valve is immediately responsive to fires, fast-opening, therefore, highly reliable in operation, and which involves a self-sealing feature accomplished by an additional spring and particularly by the carbon dioxide pressure from the tank which maintains the valve in closed condition and leak-proof at all times when no fire exists.

While we have illustrated and described a certain specific embodiment of our invention, it will be understood that this is by way of illustration only, and that various changes and modifications may be made within the contemplation of my invention and within the scope of the following claims.

We claim:

1. A fluid control valve for a fire extinguishing system adapted to be controlled by having a fusible link means, the valve latching leaf spring to be yieldably biased to the latched position by the fusible link means, said valve including a stem-like plunger having a notch therein, a valve release spring mounted on said plunger, a pivotally mounted double cam having one face seated in a notch formed in said latching leaf spring and the other face seated in said stem-like plunger notch so as to maintain said valve release spring under compression, whereby upon fusing of said link means by a fire said latching leaf spring will spring away from the cam-seating position, unlatching and allowing said cam to turn and said valve release spring to cause opening of said valve to admit flow of fire extinguishing fluid there-through.

2. An automatic valve for a fire extinguishing system adapted to be actuated on the occurrence of a predetermined temperature to admit fire extinguishing fluid therethrough, said valve comprising a plunger, a valve release spring mounted thereon, latch means including a resilient latching element and an interlocking cam between said element and said plunger normally held by said latching element for latching said plunger in a position so as to compress said spring, a valve stem having a valve thereon and a valve seating spring for normally maintaining said valve in closed position, said stem being operable by said plunger under the action of said valve release spring when said cam is released by biasing said latching element out of contact therewith to overcome the bias of said valve seating spring and open said valve and cause flow of said fluid from a source of fire extinguishing fluid under pressure.

3. An automatic control valve for a fire extinguishing system comprising a body having secured thereto a latching leaf spring, a double latching cam pivotally mounted on said body and having one face latched by said leaf spring, a plunger slidably mounted in said valve body including a notch for latching by the other face of said double latching cam, a valve release spring contained within a bore in said body and latched under compression by said cam and leaf spring, and a valve stem coaxially mounted with respect to said plunger with one end in closely spaced relationship with the inner end of said plunger so as to be longitudinally movable thereby upon deflection of said leaf spring from latching position to unlatch said double cam and release said release spring thereby moving said stem in a direction so as to open said valve.

4. Apparatus recited in the preceding claim wherein a valve seating spring is provided on said stem, a cap screw threaded onto an end of said body for maintaining said last named spring under relatively small compression for holding said valve in the closed position, and an inlet conduit connected to the side of the valve containing the valve seating spring to couple a fluid under pressure therethrough so that the fluid under pressure will assist the last named spring in maintaining the valve in closed air-tight condition at all times while the valve is latched in normally closed position.

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