March 16, 1937. S. E. ALLEN 2,074,157

FIRE EXTINGUISHING APPARATUS WITH WARNING SIGNAL

Filed Sept. 8, 1934

Fig. 1.

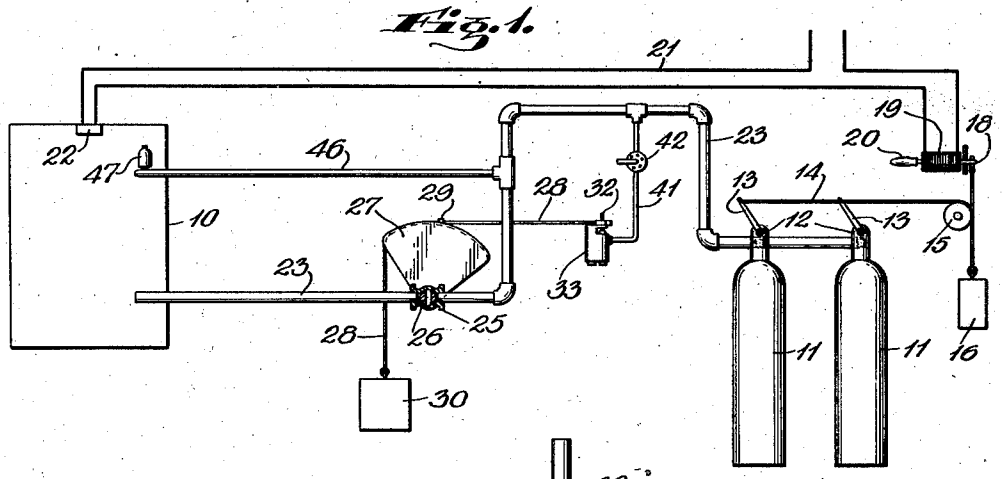


Fig. 2.

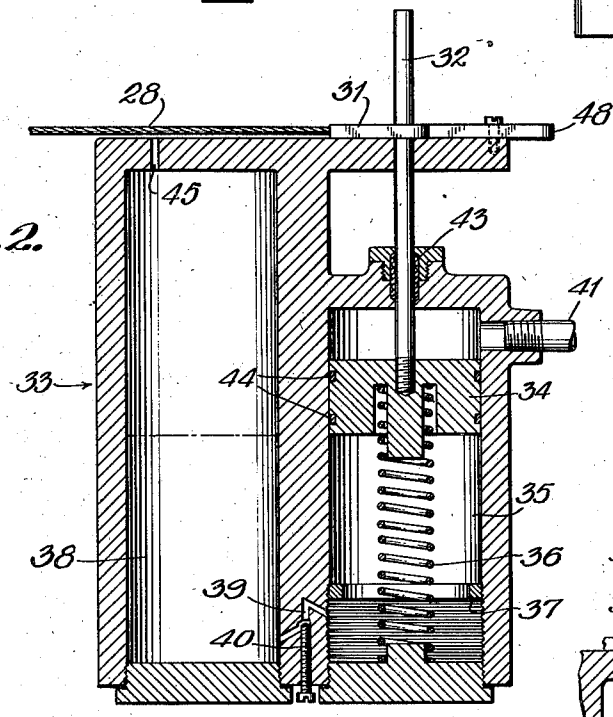


Fig. 4.

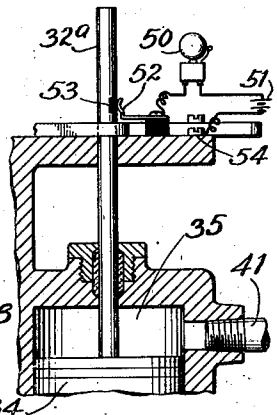
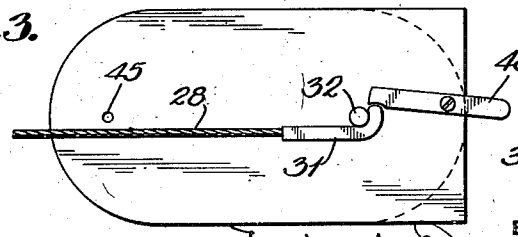


Fig. 3.



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FIRE EXTINGUISHING APPARATUS WITH WARNING SIGNAL

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15 Claims. (Cl. 169—11)

The present invention relates to fire extinguishing systems in which a fluid, such, for instance, as liquefied or gaseous carbon dioxide, is admitted into an enclosure to create a fire extinguishing atmosphere therein. Since the discharge of the fluid into the enclosure may be brought about by automatic means or may be effected accidentally it is desirable under certain circumstances to give a preliminary warning to occupants of the enclosure so that they may escape before the enclosure is flooded with the fluid.

An object of the present invention is to provide a signal automatically actuated preceding each discharge of extinguishing fluid into the container.

Another object is to provide means actuable by the fluid itself to delay the discharge thereof into the enclosure for a predetermined period during which period an alarm will be sounded in the enclosure.

A more specific object of the invention is to provide a branch line leading into the enclosure from the main discharge line which operates an audible signal so that as soon as fluid is released into the discharge line this signal will be sounded. In the meantime, the main body of fluid will be stopped by a control valve in the main line beyond said branch line, said control valve being opened after a predetermined interval by timing means actuated by pressure of the fluid.

Other objects and advantages of my invention will appear in the following description of a preferred embodiment and thereafter the novelty and scope of the invention will be pointed out in the claims.

In the accompanying drawing;

Figure 1 is a somewhat diagrammatic view in side elevation of a fire extinguishing system embodying my invention;

Fig. 2 is a view in vertical section of a timing device employed in said system;

Fig. 3 is a plan view of the timing device; and

Fig. 4 is a fragmental view in vertical section of a modified form of timing device.

An enclosure 10 is indicated in Figure 1 from which gas has limited egress. To protect this enclosure a supply of highly compressed fire extinguishing fluid is provided. In the drawing, this supply is indicated as consisting of a pair of cylinders 11 containing carbon dioxide liquefied under pressure.

Each cylinder is provided with a discharge head 12 which may be of a standard construction, with means for releasing the fluid from the cylinders either automatically or manually. In Fig. 1, this means is shown as consisting of a discharge lever 13 projecting from each discharge head 12, said levers being connected to a rope 14 which passes over a pulley 15 and has a weight 16 attached to its extremity. Normally the rope is relieved of the load of weight 16 by a line 17 attached to the weight at one end and hooked at its opposite end over a pin 18. This pin forms an extension of the core of a solenoid 19 so that when the solenoid is actuated it will withdraw the pin 18 permitting the weight to drop and thereby swinging the levers 13 to operate the discharge heads 12 and permit release of fluid from the cylinders 11. A handle 20 connected to the pin or core 18 may be manually operated to release the weight 16 whenever desired.

To effect automatic release of the weight when the temperature in the enclosure 10 rises to a dangerous point, I provide a thermostatic switch 22 in the enclosure 10 which normally interrupts the energizing circuit 21 of the solenoid 19 but which will complete this circuit when predetermined dangerous temperature conditions occur in the enclosure. Obviously, any kind of a thermostatic control may be employed to effect energization of the solenoid 19.

When the discharge heads 12 are operated fluid from the containers 11 will discharge into a conduit 23 leading therefrom to the enclosure 10. This conduit is normally closed by a valve 25 in the conduit at a suitable point and preferably near the enclosure 10. This valve is of the rotary plug type, comprising a plug 26 to which is fixed a sector 27. An actuating rope 28 passes about the sector and is attached to the periphery thereof at 29. One end of this rope is connected to a weight 30 while the opposite end is provided with a hook 31 which engages a stem 32 projecting from a timing device 33.

The interior of the timing device is shown in Fig. 2. The stem 32 is fixed at its lower end to a piston 34 which has a closed sliding fit in a cylinder 35. A spring 36 normally holds this piston in raised position. A ring 37 is threaded into the lower end of the cylinder and provides an adjustable stop to limit depression of the piston 34. The timing device also includes an oil reservoir 38 which is connected to the lower end of the cylinder 35 by a passage 39. A needle valve 40 is provided to close this passage to any degree desired.

A branch line 41 leads from the conduit 23 to the top of the cylinder 35 so that when the fluid is admitted into the conduit it will depress the piston 34. In the line 41 there is a pressure

regulator 42. A quantity of oil is maintained in the timing device and this resists depression of the piston 34 to an extent controlled by the adjustment of the needle valve 40, for, as the piston 34 is lowered it will displace oil from the cylinder 35, forcing the displaced oil through passage 39 and past the needle valve into the reservoir 38. A vent 43 is provided to release air that may be trapped in the reservoir. It will be understood that the piston 34 makes a very close fit with the cylinder 35, being provided with piston rings 44, and the stem 32 is provided with a stuffing box 43 so as to prevent escape of fluid under pressure introduced through the pipe 41.

A branch line 46 extends from the conduit 23 on the upstream side of the valve 25 into the enclosure 10. This branch line may either be of such reduced diameter as to feed a very small stream of fluid into the enclosure 10 or it may be provided with a small discharge orifice. Preferably a whistle 47 is provided at the discharge end of the line 46 to be sounded by the discharging fluid.

In operation when there is a fire in the enclosure 10 the fluid from containers 11 is either automatically or manually released into the conduit 23. The flow of the main body of this fluid will be initially checked by the normally closed valve 25 but part of the fluid will pass through the line 46 sounding the whistle 47. In some cases the whistle may be dispensed with because the noise of the discharging fluid will be sufficiently loud to serve as a warning that a discharge of larger volume is soon to follow. In the meantime, part of the fluid at a pressure controlled by the regulator 42, will enter the top of cylinder 35, forcing the piston 34 downward at a rate controlled by the needle valve 40. When the piston reaches the bottom of its stroke the stem 32 will be withdrawn from the hook 31, releasing the rope 28 and permitting the weight 30 to open the valve 25. In this way, after a predetermined interval during which the warning signal is sounded, the fluid will be permitted to discharge in large volume into the enclosure 10 so as to establish, quickly, a fire extinguishing atmosphere therein.

If for any reason the timing device should fail to operate satisfactorily the hook 31 may be manually released from the stem 32 by operating lever 48 to push the hook clear of the stem and permit the valve 25 to open under pull of weight 30.

If desired, the auxiliary line 46 and whistle 47 may be dispensed with and an electric signal may be substituted therefor as indicated in Fig. 4. An electric gong 50 may be located at any desired point. One terminal of the gong is connected to a terminal of a battery 51 and the other to a contact finger 52 which is mounted on but electrically insulated from the metallic casing of the timing device. This finger normally bears against a block 53 of electric insulation embedded in the metallic stem 32*a* of the piston 34. The other terminal of the battery is connected to a binding post 54 on the casing. In operation, when the piston is depressed by fluid entering the cylinder 35 through pipe 41 the finger 52 contacts with the metal stem 32*a* and through the metallic casing completes the circuit of the gong and sounds the alarm.

While I have described a preferred embodiment of my invention and a modification thereof, it will be understood that these are to be taken as illustrative and not limitative of my invention and that I reserve the right to make various changes in form, construction, and arrangement of parts without departing from the spirit and scope of my invention as pointed out in the following claims.

I claim:

1. A fire extinguishing apparatus for protecting an enclosure, which comprises a source of fire extinguishing fluid under pressure, a discharge conduit leading from said source to the enclosure, means for admitting said fluid from said source to said conduit, a valve normally closed and interrupting discharge of said fluid through said conduit, time delay means controlled by the pressure of said fluid for opening said valve, and means constructed and arranged to give a warning signal during operation of the time delay means.

2. A fire extinguishing apparatus of the character described comprising a discharge conduit, means for supplying the conduit with fire extinguishing fluid under pressure, a discharge valve normally closing the conduit, time delay means controlled by pressure of said fluid for opening the valve, signal means, and means controlled by the time delay means for actuating said signal means during operation of said time delay means.

3. A fire extinguishing apparatus for protecting an enclosure, which comprises a source of fire extinguishing fluid under pressure, a discharge conduit leading from said source to the enclosure, means for admitting said fluid from said source to said conduit, a valve normally closed and interrupting discharge of said fluid through said conduit, time delay means controlled by the pressure of said fluid for opening said valve at a predetermined interval after admission of fluid into the conduit, means for regulating the duration of said interval, and means constructed and arranged to give a warning signal during operation of the time delay means.

4. A fire extinguishing apparatus for protecting an enclosure, which comprises a source of fire extinguishing fluid under pressure, a discharge conduit leading from said source to the enclosure, means for admitting said fluid from said source to said conduit, a valve normally closed and interrupting discharge of said fluid through said conduit, time delay means controlled by the pressure of said fluid for opening said valve, and signal means operable by said fluid before said valve is opened.

5. A fire extinguishing apparatus for protecting an enclosure, which comprises a source of fire extinguishing fluid under pressure, a discharge conduit leading from said source to the enclosure, means for admitting said fluid from said source to said conduit, a valve normally closed and interrupting discharge of said fluid through said conduit, time delay means controlled by the pressure of said fluid for opening said valve at a predetermined interval after admission of fluid into the conduit, means for regulating the duration of said interval and a warning signal device constructed and arranged to be operated by said fluid before said valve is opened.

6. A fire extinguishing apparatus of the character described comprising a source of fire extinguishing fluid under pressure, a discharge conduit normally free of extinguishing fluid, means for releasing extinguishing fluid from said source into the conduit, a discharge valve normally closing the conduit, means tending to open the valve,

a timer normally restraining the opening means, said timer being actuable by said fluid to release the opening means so as to open the valve at a predetermined time interval after admission of said fluid into the conduit.

7. A fire extinguishing apparatus of the character described comprising a discharge conduit, means for admitting extinguishing fluid under pressure into the conduit, a discharge valve normally closing the conduit, means tending to open the valve, a timer normally restraining the opening means, said timer being actuable by said fluid to release the opening means so as to open the valve at a predetermined time interval after admission of said fluid into the conduit, and a signal device constructed and arranged to be operated by said fluid to give a warning signal before said valve is opened.

8. A fire extinguishing apparatus of the character described comprising a discharge conduit, means for admitting extinguishing fluid under pressure into the conduit, a discharge valve normally closing the conduit, means tending to open the valve, a timer normally restraining the opening means, said timer being actuable by said fluid to release the opening means so as to open the valve at a predetermined time interval after admission of said fluid into the conduit, and means controlled by said timing device for giving a warning signal before the valve is opened.

9. A fire extinguishing apparatus for protecting an enclosure, said apparatus comprising a conduit leading into the enclosure, means for supplying the conduit with extinguishing fluid under pressure, a branch line tapping the conduit and arranged to discharge a part of the fluid at a materially retarded rate into the enclosure, a normally closed discharge valve in the conduit beyond the branch line, and time delay means operated by pressure of the fluid for causing the valve to open at a predetermined time interval after the fluid has been supplied to the conduit.

10. A fire extinguishing apparatus for protecting an enclosure, said apparatus comprising a conduit leading into the enclosure, means for supplying the conduit with extinguishing fluid under pressure, a branch line tapping the conduit and arranged to discharge a part of the fluid at a materially retarded rate into the enclosure, a whistle at the discharge end of said branch line and actuable by said fluid, a normally closed discharge valve in the conduit beyond the branch line, and time delay means operated by pressure of the fluid for causing the valve to open at a predetermined time interval after the fluid has been supplied to the conduit.

11. A fire extinguishing apparatus for protecting an enclosure, said apparatus comprising a conduit leading into the enclosure, means for supplying the conduit with extinguishing fluid under pressure, a branch line tapping the conduit and arranged to discharge a part of the fluid at a materially retarded rate into the enclosure, a normally closed discharge valve in the conduit beyond the branch line, a gravity actuated means for opening said valve, a detent restraining operation of the gravity actuated means, and a dash-pot control operable by pressure of the fluid in the conduit for withdrawing the detent.

12. A fire extinguishing apparatus for protecting an enclosure, said apparatus comprising a conduit leading into the enclosure, means for supplying the conduit with extinguishing fluid under pressure, a branch line tapping the conduit and arranged to discharge a part of the fluid at a materially retarded rate into the enclosure, a normally closed discharge valve in the conduit beyond the branch line, a gravity actuated means for opening said valve, a detent restraining operation of the gravity actuated means, a dash-pot control operable by pressure of the fluid in the conduit for withdrawing the detent, and means for regulating the pressure supplied to the dash-pot.

13. A fire extinguishing apparatus for protecting an enclosure, said apparatus comprising a conduit leading into the enclosure, means for supplying the conduit with extinguishing fluid under pressure, a branch line tapping the conduit and arranged to discharge a part of the fluid at a materially retarded rate into the enclosure, a normally closed discharge valve in the conduit beyond the branch line, a gravity actuated means for opening said valve, a detent restraining operation of the gravity actuated means, a dash-pot control operable by pressure of the fluid in the conduit for withdrawing the detent, means for regulating the pressure supplied to the dash-pot, and means for regulating the operation of the dash-pot control.

14. A fire extinguishing apparatus for protecting an enclosure, said apparatus comprising a conduit opening into the enclosure, means for supplying the conduit with extinguishing fluid under pressure, a normally closed discharge valve in the conduit, gravity actuating means for opening said valve, a dash-pot control normally restraining operation of the valve but operable by pressure of fluid in the conduit to withdraw its restraint from the gravity means, an alarm bell, and electrical means for sounding the bell during operation of the dash-pot control.

15. A fire extinguishing apparatus for protecting an enclosure, a supply of fire extinguishing fluid, said apparatus comprising a discharge conduit leading from said supply into the enclosure, means controlled by temperature conditions in the enclosure for discharging the fluid from said supply into the conduit, a discharge valve normally closed and interrupting the discharge of said fluid through the conduit, time delay means controlled by pressure of said fluid for opening the valve at a predetermined time interval after release of the fluid into the conduit, and means controlled by said fluid for sounding a warning in the enclosure before said valve is opened.

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