July 10, 1956 H. G. KINCAID 2,753,944

FIRE EXTINGUISHING SYSTEM

Filed June 12, 1953 3 Sheets-Sheet 1

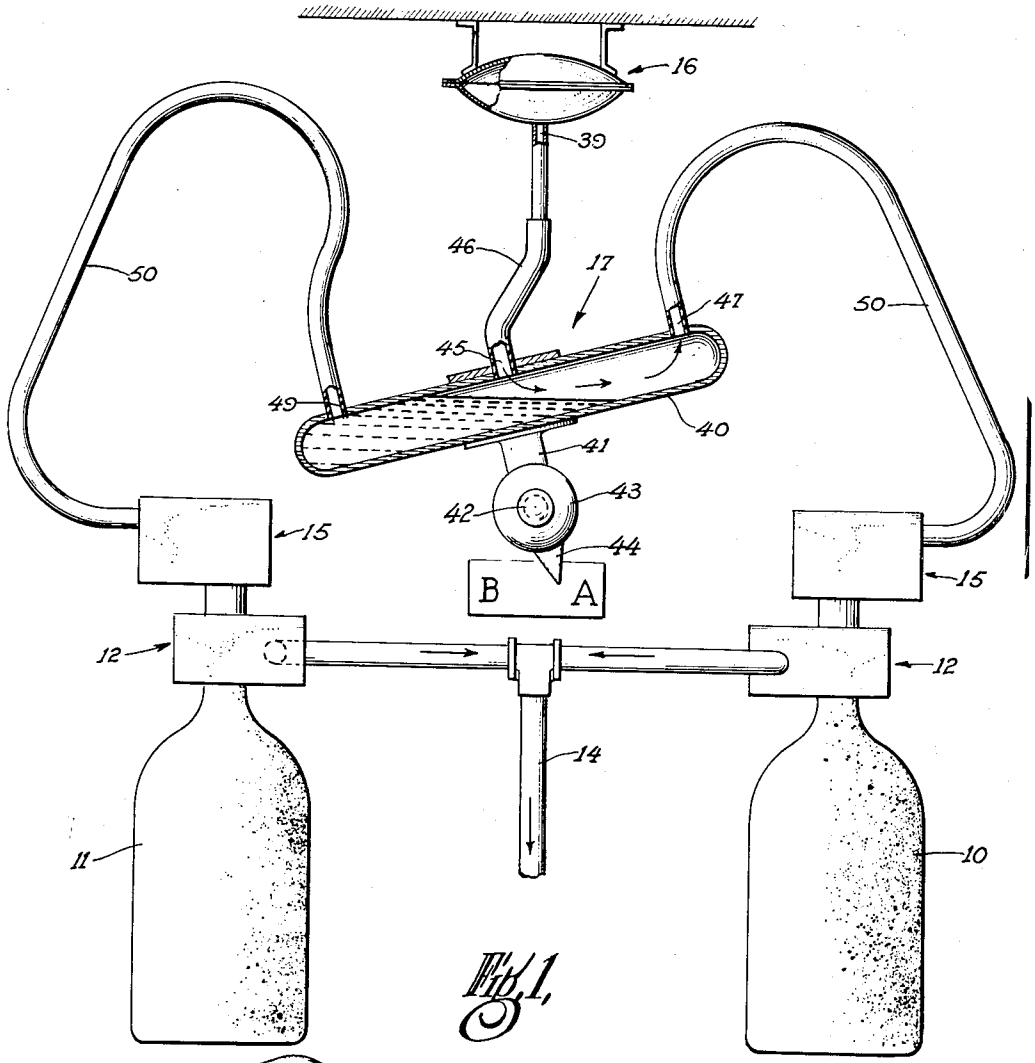


Fig. 1.

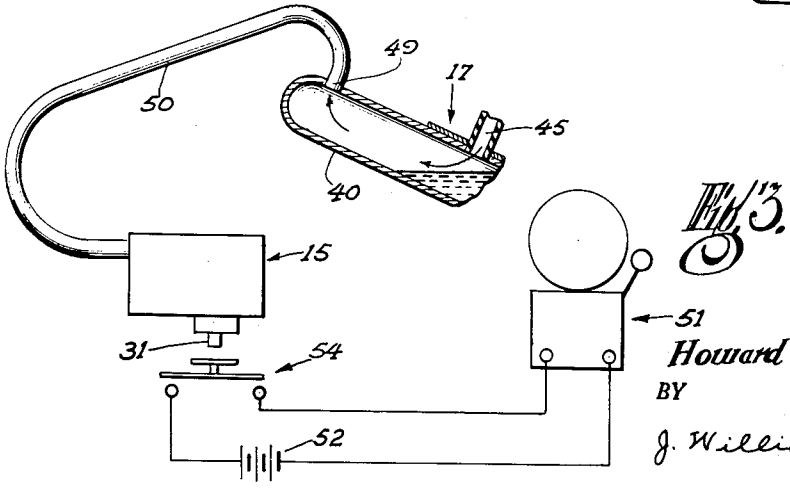


Fig. 3.

INVENTOR.
Howard Gordon Kincaid
BY
J. William Carson
ATTORNEY

July 10, 1956 H. G. KINCAID 2,753,944

FIRE EXTINGUISHING SYSTEM

Filed June 12, 1953 3 Sheets-Sheet 2

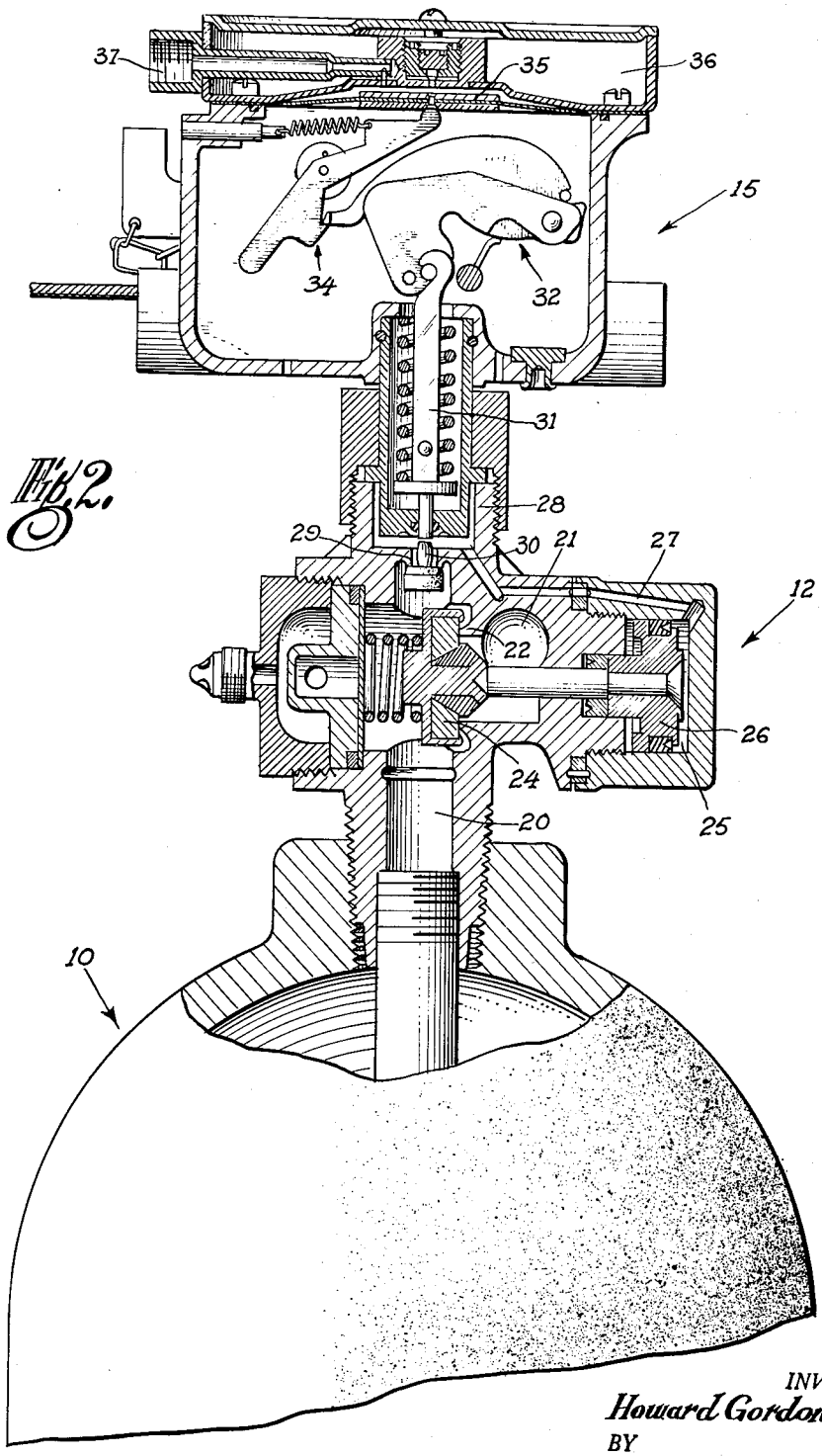


Fig. 2.

INVENTOR.
Howard Gordon Kincaid
BY
J. William Carson
ATTORNEY

July 10, 1956 H. G. KINCAID 2,753,944

FIRE EXTINGUISHING SYSTEM

Filed June 12, 1953 3 Sheets-Sheet 3

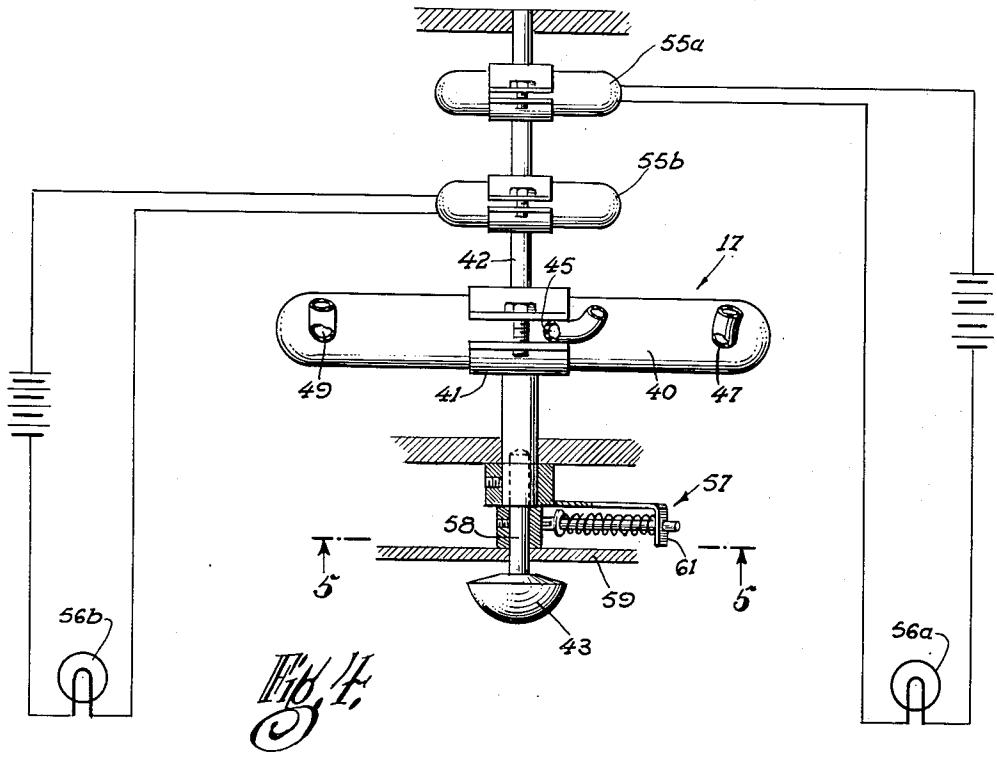


Fig. 4.

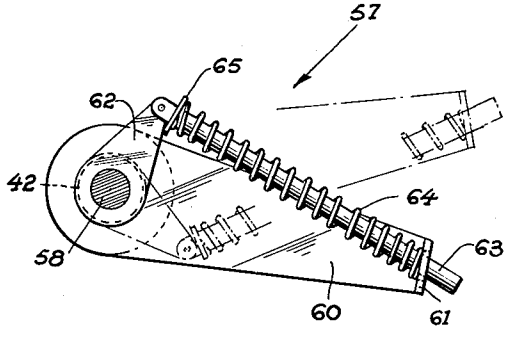


Fig. 5.

INVENTOR.
Howard Gordon Kincaid
BY
J. William Carson
ATTORNEY

United States Patent Office 2,753,944 Patented July 10, 1956

2,753,944

FIRE EXTINGUISHING SYSTEM

Howard G. Kincaid, Boonton, N. J., assignor to Specialties Development Corporation, Belleville, N. J., a corporation of New Jersey

Application June 12, 1953, Serial No. 361,170

10 Claims. (Cl. 169—11)

The present invention relates to fire extinguishing systems, and, more particularly, to improvements in such systems which are fluid pressure actuated upon the expansion of gas in a chamber by the heat of a fire to produce a pressure.

Accordingly, an object of the present invention is to provide such a system wherein a source of fire extinguishing medium can be released selectively, automatically and under manual supervision upon the detection of heat.

Another object is to provide such a system wherein the pressure produced by the expansion of the gas due to heat can be utilized selectively for effecting automatic release of the medium and for effecting operation of an alarm or for effecting automatic release of another source of fire extinguishing medium.

Another object is to provide such a system wherein a main source and a reserve source of fire extinguishing medium can be released selectively by the pressure of the gas.

A further object is to provide such systems which are simple and economical in construction and which are practical and fool-proof in operation.

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.

In accordance with the present invention, the foregoing objects are accomplished by providing a fire extinguishing system comprising, in combination, a container for storing a source of fluid medium under pressure having an outlet, valve means for controlling the outlet to release the medium from the container, a control head having means operable in response to fluid under pressure including a member for effecting operation of the valve means to release the medium including a chamber provided with an inlet, a second control head having means operable in response to fluid under pressure including a member for effecting operation of an auxiliary device, such as the switch of an alarm system or the valve means for controlling the release of a second source of fluid medium under pressure, and including a chamber provided with an inlet, a gas chamber wherein gas is adapted to be expanded by heat to produce a pressure having an outlet, and means for selectively connecting the gas chamber outlet in fluid flow communication with one of the control head chamber inlets and isolating the gas chamber outlet from the other control head chamber inlet.

In the drawings:

Fig. 1 is a schematic view, partly in elevation and partly in section, illustrating a fire extinguishing system in accordance with the present invention.

Fig. 2 is a longitudinal section view of a valve and control head adapted to be utilized in connection with the present invention.

Fig. 3 is a fragmentary schematic view of a modified system embodying the invention.

Fig. 4 is a schematic plan view of the selector means and indicating means associated therewith.

Fig. 5 is an enlarged sectional view taken along the line 5—5 on Fig. 4.

Referring to the drawings in detail and more particularly to Fig. 1 thereof, a fire extinguishing system is shown which generally comprises a container **10** having an outlet, a second container **11** having an outlet, a valve **12** for controlling each of the container outlets, a discharge pipe **14** connected to the outlets of the valves and extending to the space (not shown) to be protected against fire, a pressure operable control head **15** for effecting opening of the valves each having an inlet, a chamber **16** having an outlet and located in the space to be protected and in which gas is adapted to be expanded by heat to produce pressure, and means **17** for selectively connecting the gas chamber outlet in fluid flow communication with either of the control head inlets as described hereinafter.

The containers **10** and **11** schematically represent main and reserve sources, respectively, of fire extinguishing medium, which sources actually may comprise one or more containers arranged in a system for effecting the discharge of fire extinguishing medium therefrom in most any desired manner. For example, such systems are illustrated in United States Letters Patents 2,352,627, 2,492,165 and 2,534,262.

The valve **12** (of either container) and the control head **15** associated therewith are illustrated in detail in Fig. 2.

The valve **12** comprises a body having an inlet **20** in communication with the interior of the container, an outlet **21** in communication with the pipe **14** and a main valve seat **22** between the inlet and outlet; a main valve member **24** for the seat **22**; a cylinder **25**; a piston **26** in the cylinder for unseating the main valve member; a passageway means **27** communicating with the inlet **20** and the cylinder **25** including a bushing **28** and a pilot valve seat **29**; and a pilot valve member **30** for the seat **29** adapted to control the admission of fluid medium under pressure from the container to the cylinder **25**.

The control head **15** is secured to the bushing **28** of the valve **12** to establish a passageway extending from the pilot valve seat **29** to the cylinder **25**. Preferably, the control head comprises a spring operated plunger **31** for effecting unseating of the pilot valve member; a latch and lever system **32** for retaining the plunger in spring loaded position; trigger means **34** for operating the latch and lever system to release the plunger; and means for manually and/or pneumatically actuating the trigger means.

The trigger may be actuated pneumatically by a diaphragm **35** forming a closure for a chamber **36** having an inlet **37** adapted to receive fluid medium under pressure from the selector means **17** as about to be described. A control head of the general type utilized herein is disclosed and more completely described in United States Letters Patent 2,466,750.

The chamber **16** may be any well known type of heat absorbing or pressure producing element adapted to create a pneumatic impulse transmitted through its outlet **39** on a sudden increase in temperature adjacent the same due to the heat of a fire.

The selector means **17**, in accordance with the present invention, comprises an elongate tube **40** closed at its ends and partially filled with a liquid such as mercury which will not absorb gas and is impervious to gas; a bracket **41** supporting the tube **40** at the middle thereof; means for pivotally mounting the bracket at **42**; a handle **43** for rocking the bracket about its pivot whereby the tube can be moved from one predetermined inclined position to another; and means for indicating the position

of the tube including a pointer 44 on the handle and indicia (A and B) associated with the pointer.

The tube 40 has an inlet 45 connected in fluid flow communication with the outlet 39 of the chamber 16 by a flexible hose 46, and has outlets 47 and 49 adjacent its ends, respectively, each connected in fluid flow communication with the inlet 37 of one of the control head chambers 36 by a flexible hose 50.

In operation, with the selector means 17 tilted to the left or position A shown in Fig. 1, communication between the inlet 45 and the outlet 47 is established through the tube 40 because the liquid therein is at the other end thereof and serves to seal the outlet 49, whereby a pressure impulse created in the chamber 16 is adapted to be transmitted to the control head 15 associated with the valve 12 of the container 10 to effect release of the fluid therein, but the impulse will not effect release of the fluid in the container 11. The system may be conditioned for releasing the fluid in the container 11 by tilting the selector means 17 to the right or position B.

While not shown herein, it will be understood that the inlet 45 and the outlets 47 and 49 have means associated therewith which permit air to flow when desired but prevent the passage of the liquid into the hoses 46 and 50 from the tube 40. Also, the chamber 16 or the control head chambers 36 may include means for bleeding off air upon a slow rise in pressure, as is customary, so that the system will be actuated only in response to a sudden rate of rise in temperature and corresponding pressure in the chambers.

In Fig. 3, a portion of a modified system embodying the present invention is illustrated. This system includes a main source of fire extinguishing medium such as shown in Fig. 1, but instead of the reserve or auxiliary source, includes an alarm circuit comprising alarm means 51, a source of electrical energy 52 for operating the alarm means, and a switch 54 adapted to be actuated by the plunger 31 of a control head 15 to close the circuit.

This system is particularly adaptable for installations where it is desired to operate the same automatically during the night or other times when no one is in attendance thereof, and, at other times, to merely sound an alarm to enable an attendant to decide whether or not the system must be operated to extinguish the fire. Depending upon the proper requirement, the attendant extinguishes the fire by other means or manually actuates the control head 15 associated with the container 10.

In Fig. 4, more detailed selector means and an indicating arrangement are illustrated, wherein mercury switches 55A and 55B are mounted on the shaft 42 and connected in circuits, respectively, in a manner to cause lamps 56A and 56B to be illuminated and indicate that the tube 40 of the selector means 17 is either in its A or B position.

Another feature of this arrangement is that provision is made for preventing the tube from assuming some position intermediate its A and B positions, whereby the inlet 45 cannot be in communication with both of the outlets 47 and 49 at the same time. This is accomplished by a toggle mechanism 57 connecting the shaft 42 to the handwheel 43 adapted to snap the tube 40 fully into its A or B position upon turning of the handwheel.

The toggle mechanism 57, as shown in Fig. 5, comprises a shaft 58 extending through a bearing 59 and into a bore at the end of the shaft 42, and having the handwheel secured to the free end thereof; an arm 60 secured to the shaft 42 having an ear 61 at its free end formed with an aperture; an arm 62 secured to the shaft 58; a link 63 having one end pivotally connected to the free end of the arm 62 and having its other end slidably disposed in the aperture of the ear 61; and a spring 64 coiled about the link 63 and held under compression between the ear 61 and a stop 65 adjacent the pivoted end of the link.

In operation, as the shaft 58 is turned clockwise, the arm 62 moves the link 63 to effect compression of the spring 64 until the arms 60 and 62 are in alignment. When the arm 62 is moved past this position, the spring 64 exerts a force on the arm 60 to turn the same in a counterclockwise direction to the position shown in broken lines, thereby causing the shaft 42 to be rotated to place the tube 40 fully in one of its desired positions.

From the foregoing description, it will be seen that the present invention provides a simple and practical fire extinguishing system adapted for selective operation to fulfill desired requirements under various operating conditions without being subjected to faulty operation.

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 fire extinguishing system, the combination of a container for storing a source of fluid medium under pressure having an outlet, valve means for controlling said outlet to release the medium from said container, a control head having means operable in response to fluid under pressure including a member for effecting operation of said valve means to release the medium and including a chamber provided with an inlet, a second control head having means operable in response to fluid under pressure including a member for effecting operation of an auxiliary device and including a chamber provided with an inlet, a gas chamber wherein gas is adapted to be expanded by heat to produce pressure having an outlet, and means for selectively connecting said gas chamber outlet in fluid flow communication with one of said control head chamber inlets and isolating said gas chamber outlet from said other control head chamber inlet.

2. In a fire extinguishing system, the combination of a container for storing a main source of fluid medium under pressure having an outlet, valve means for controlling said outlet to release the medium from said container, a control head having means operable in response to fluid under pressure including a member for effecting operation of said valve means to release the medium and including a chamber provided with an inlet, a container for storing a reserve source of fluid medium under pressure having an outlet, valve means for controlling the outlet of said last mentioned container to release the medium therefrom, a control head having means operable in response to fluid under pressure including a member for effecting operation of said reserve source valve means to release the medium and including a chamber provided with an inlet, a gas chamber wherein gas is adapted to be expanded by heat to produce pressure having an outlet, and means for selectively connecting said gas chamber outlet in fluid flow communication with one of said control head chamber inlets and isolating said gas chamber outlet from said other control head chamber inlet.

3. In a fire extinguishing system, the combination of a container for storing a source of fluid medium under pressure having an outlet, valve means for controlling said outlet to release the medium from said container, a control head having means operable in response to fluid under pressure including a member for effecting operation of said valve means to release the medium and including a chamber provided with an inlet, an alarm circuit including a switch, a second control head having means operable in response to fluid under pressure including a member for effecting operation of said switch to close said alarm circuit and including a chamber provided with an inlet, a gas chamber wherein gas is adapted to be expanded by heat to produce pressure having an outlet, and means for selectively connecting said gas chamber outlet in fluid flow communication with one of said control head camber inlets and isolating said gas chamber outlet from said other control head chamber inlet.

4. In a fire extinguishing system, the combination of a container for storing a source of fluid medium under pres-

sure having an oulet, valve means for controlling said outlet to release the medium from said container, a control head having means operable in response to fluid under pressure including a member for effecting operation of said valve means to release the medium and including a chamber provided with an inlet, an alarm circuit including a switch, a second control head having means operable in response to fluid under pressure including a member for effecting operation of said switch to close said alarm circuit and including a chamber provided with an inlet, a gas chamber wherein gas is adapted to be expanded by heat to produce pressure having an outlet, and means for selectively connecting said gas chamber outlet in fluid flow communication with one of said control head chamber inlets and isolating said gas chamber outlet from said other control head chamber inlet, said first control head including means for manually effecting operation thereof.

5. In a fire extinguishing system, the combination of a container for storing a source of fluid medium under pressure having an outlet, valve means for controlling said outlet to release the medium from said container, a control head having means operable in response to fluid under pressure including a member for effecting operation of said valve means to release the medium and including a chamber provided with an inlet, a second control head having means operable in response to fluid under pressure including a member for effecting operation of an auxiliary device and including a chamber provided with an inlet, a gas chamber wherein gas is adapted to be expanded by heat to produce pressure having an outlet, means for selectively connecting said gas chamber outlet in fluid flow communication with one of said control head chamber inlets and isolating said gas chamber outlet from said other control head chamber inlet, and means operatively associated with said last mentioned means for indicating which of said control head chamber inlets is connected in fluid flow communication with said gas chamber outlet.

6. In a fire extinguishing system, the combination of a container for storing a source of fluid medium under pressure having an outlet, valve means for controlling said outlet to release the medium from said container, a control head having means operable in response to fluid under pressure including a member for effecting operation of said valve means to release the medium and including a chamber provided with an inlet, a second control head having means operable in response to fluid under pressure including a member for effecting operation of an auxiliary device and including a chamber provided with an inlet, a gas chamber wherein gas is adapted to be expanded by heat to produce pressure having an outlet, and an elongate tube pivotally mounted intermediate the ends thereof and partially filled with a liquid impervious to gas, said tube having an inlet at the middle thereof connected in fluid flow communication with said gas chamber outlet and having an outlet adjacent each end thereof respectively connected in fluid flow communication with one of said control head chamber inlets thereby providing means for selectively connecting said gas chamber outlet in fluid flow communication with one of said control head chamber inlets and isolating said gas chamber outlet from said other control head chamber inlet.

7. In a fire extinguishing system, the combination of a container for storing a source of fluid medium under pressure having an outlet, valve means for controlling said outlet to release the medium from said container, a control head having means operable in response to fluid under pressure including a member for effecting operation of said valve means to release the medium and including a chamber provided with an inlet, a second control head having means operable in response to fluid under pressure including a member for effecting operation of an auxiliary device and including a chamber provided with an inlet, a gas chamber wherein gas is adapted to be expanded by heat to produce pressure having an outlet, an elongate tube pivotally mounted intermediate the ends

thereof and partially filled with a liquid impervious to gas, said tube having an inlet at the middle thereof connected in fluid flow communication with said gas chamber outlet and having an outlet adjacent each end thereof respectively connected in fluid flow communication with one of said control head chamber inlets thereby providing means for selectively connecting said gas chamber outlet in fluid flow communication with one of said control head chamber inlets and isolating said gas chamber outlet from said other control head chamber inlet, and means for rocking said tube from one tilted position to another.

8. In a fire extinguishing system, the combination of a container for storing a source of fluid medium under pressure having an outlet, valve means for controlling said outlet to release the medium from said container, a control head having means operable in response to fluid under pressure including a member for effecting operation of said valve means to release the medium and including a chamber provided with an inlet, a second control head having means operable in response to fluid under pressure including a member for effecting operation of an auxiliary device and including a chamber provided with an inlet, a gas chamber wherein gas is adapted to be expanded by heat to produce pressure having an outlet, an elongate tube pivotally mounted intermediate the ends thereof and partially filled with a liquid impervious to gas, said tube having an inlet at the middle thereof connected in fluid flow communication with said gas chamber outlet and having an outlet adjacent each end thereof respectively connected in fluid flow communication with one of said control head chamber inlets thereby providing means for selectively connecting said gas chamber outlet in fluid flow communication with one of said control head chamber inlets and isolating said gas chamber outlet from said other control head chamber inlet, and means for rocking said tube from one tilted position to another, said last mentioned means including means operatively associated therewith for indicating which of said control head chamber inlets is connected in fluid flow communication with said gas chamber outlet.

9. In a fire extinguishing system, the combination of a container for storing a source of fluid medium under pressure having an outlet, valve means for controlling said outlet to release the medium from said container, a control head having means operable in response to fluid under pressure including a member for effecting operation of said valve means to release the medium and including a chamber provided with an inlet, a second control head having means operable in response to fluid under pressure including a member for effecting operation of an auxiliary device and including a chamber provided with an inlet, a gas chamber wherein gas is adapted to be expanded by heat to produce pressure having an outlet, pivotally mounted means for selectively connecting said gas chamber outlet in fluid flow communication with one of said control head chamber inlets and isolating said gas chamber outlet from said other control head chamber inlet, and means for operating said last mentioned means to place the same in one of its selected positions including a spring actuated toggle mechanism for preventing said last mentioned means from assuming an intermediate position.

10. In a fire extinguishing system, the combination of a container for storing a source of fluid medium under pressure having an outlet, valve means for controlling said outlet to release the medium from said container, a control head having means operable in response to fluid under pressure including a member for effecting operation of said valve means to release the medium and including a chamber provided with an inlet, a second control head having means operable in response to fluid under pressure including a member for effecting operation of an auxiliary device and including a chamber provided

with an inlet, a gas chamber wherein gas is adapted to be expanded by heat to produce pressure having an outlet, a shaft, an elongate tube mounted intermediate the ends thereof on said shaft and partially filled with a liquid impervious to gas, said tube having an inlet at the middle thereof connected in fluid flow communication with said gas chamber outlet and having an outlet adjacent each end thereof respectively connected in fluid flow communication with one of said control head chamber inlets thereby providing means for selectively connecting said gas chamber outlet in fluid flow communication with one of said control head chamber inlets and isolating said gas chamber outlet from said other control head chamber

inlet, and means for turning said shaft to place said tube in one of its selected positions including manually operable means and a spring actuated toggle mechanism connecting said manually operable means and said shaft for preventing said tube from assuming an intermediate position.

References Cited in the file of this patent

UNITED STATES PATENTS

484,516	Cutmore	Oct. 18, 1892
1,738,656	Lowe	Dec. 10, 1929
1,942,823	Lowe et al.	Jan. 9, 1934
2,011,368	Mapes	Aug. 13, 1935