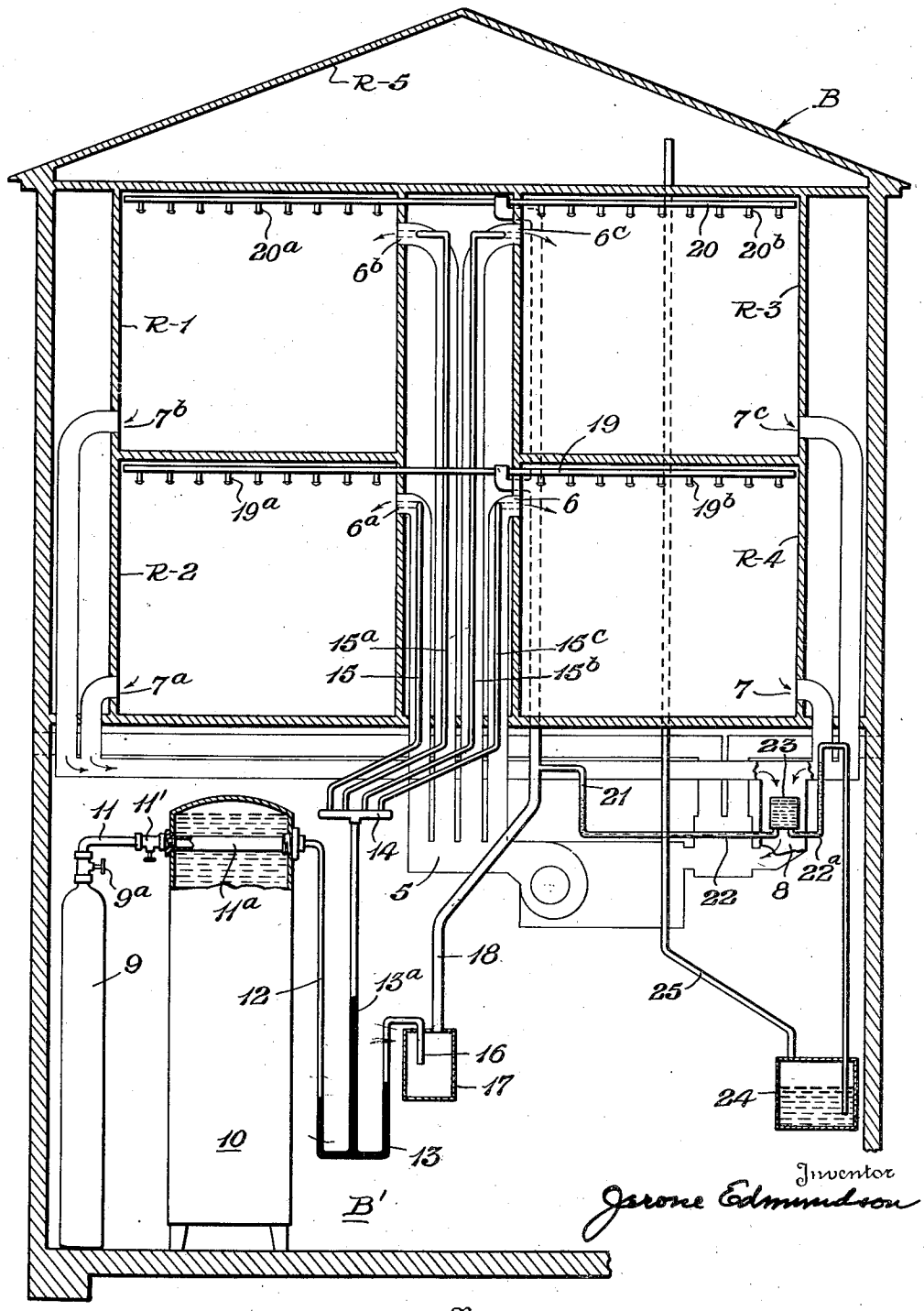
July 9, 1940. J. EDMUNDSON 2,207,662

FIRE EXTINGUISHING SYSTEM

Filed July 22, 1937



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Patented July 9, 1940 2,207,662

UNITED STATES PATENT OFFICE

2,207,662

FIRE EXTINGUISHING SYSTEM

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Application July 22, 1937, Serial No. 155,132

11 Claims. (Cl. 169—11)

This invention relates to fire extinguishing systems, and has particular reference to systems which operate, automatically through the release of a gaseous extinguishing medium, such as carbon dioxide (CO_2) and the like.

A fire extinguishing system, in order to be practical and efficient, should be sure in operation, should be capable of both a localized and general application of the extinguishing medium and at the same time should be susceptible of release at a predetermined temperature selected in view of the conditions attending the particular installation. The present invention has been devised primarily with the foregoing features in mind, and accordingly it is so constructed as to be thrown in operation irrespective of the nature of the fire, be it localized or general throughout the building, and at the same time means are provided whereby when a certain predetermined temperature has been reached in the building, the system will operate automatically to disperse an initial supply of extinguishing medium, and then should the fire spread or become general, the entire system will be applied in the extinguishing operation. Means are also provided to insure against clogging of the system, or to prevent shutting off the main source of supply from the outlets for the fire extinguishing medium, such means being such as to involve no equipment other than is found in the ordinary dwelling or industrial plant.

The objects and advantages generally of the system will become clearly apparent in view of the following description taken in conjunction with the drawing, the latter showing more or less diagrammatically a conventional dwelling and a fire extinguishing system constructed in accordance with the features of the present invention operatively associated with the dwelling.

Referring to the drawing in detail, a building or dwelling is generally indicated at B and is provided with a plurality of rooms at R—1, R—2, R—3, R—4 and R—5 and a basement B'. The building is shown as being provided with an air conditioning system having a main air pressure duct 5 which is on the pressure side of the system and feeds into various rooms through inlet ducts 6, 6*a*, 6*b*, and 6*c*, the air being exhausted from the rooms through exhaust ducts 7, 7*a*, 7*b* and 7*c* and returning to the suction side of the system through main return duct 8.

A supply tank for a fire extinguishing medium, preferably carbon dioxide under pressure, is indicated at 9 and adjacent thereto is a conventional hot water tank 10, the outlet pipe 11 from the tank 9 leading through the tank 10 by means of a connection or conduit 11*a* and thence through pipe line 12 to a liquid seal generally indicated at 13 and arranged in the form of a U-shaped pipe having a branch 13*a* projecting upwardly from the intermediate point thereof, the branch 13*a* exhausting or opening into a header 14 having connected thereto a plurality of pipe lines 15, 15*a*, 15*b* and 15*c* which terminate or exhaust outwardly into the rooms of the dwelling through the ducts 6, 6*a*, 6*b* and 6*c*. Tank 9 is provided with a cut off valve 9*a*, and pipe line 11 is provided with an adjustable pressure reducing or expansion valve 11'.

The liquid seal piping 13 is provided with an outlet connection 16 which leads into a container 17, and from this container a conduit 18 extends upwardly and connects with headers 19 and 20 having a series of fusible plugs 19*a*, 19*b* and 20*a* and 20*b* projecting therethrough, the plugs, as will be noted, being shown located in the top area of the various rooms of the drawing.

Branching off from conduit 18 is a pipe line 21 having therein a trap portion 22 and 22*a* and a liquid seal container, or what may be termed a plug 23. Pipe line 22*a* leads from the plug or container 23 downwardly to a receptacle or container 24 so that liquid displaced from the seal or plug 23 will flow into the receptacle 24. From the receptacle 24 a pipe line or conduit 25 leads upwardly and exhausts or opens into the top room R—5, which as shown is the attic of the dwelling.

The system operates as follows:

Carbon dioxide or a like gaseous fire extinguishing medium may be stored in the tank 9, such tanks being obtainable in loaded form on the market in a manner well understood by those versed in the art; or it may be substituted by suitable apparatus for generating and maintaining a constant supply of CO_2 under pressure, depending entirely upon the character of the installation, especially as regards size. Assuming the valve 9*a* is open, carbon dioxide under pressure passes through reducing valve 11', at which point the pressure and temperature of the gas is reduced due to expansion of the fluid, the expanded gas passing through the pipe connection 11*a* and into pipe line 12. Since the tank 10 contains the hot water supply for the dwelling, the CO_2 in the connection 11*a* will be prevented from freezing. This is an important feature since it insures against clogging of the supply line and at the same time entails no additional expense in the installation and upkeep of the system. The liquid seal 13 may be provided with a suitable fluid such as mercury or the like which may be relatively heavy as compared with the CO_2 or fire extinguishing medium.

Let us assume, for example, that a fire breaks out in room R—1, thereby melting the fusible plugs 20*a* and releasing the pressure in conduit 18 and header 20. When this happens, the mercury or other liquid in the seal 13 will become displaced and flow into the container or trap 17,

thereby releasing the fire extinguishing medium in the line 12, which obviously is of lower pressure than that stored in the tank 9, and clearing this line CO_2 will then flow up through conduit and outwardly through the fusible plugs 20a, or such of the latter as have been released. The mercury or like sealing fluid will also clear line 13a so that CO_2 gas will also flow into header 14 and thence outwardly into the various rooms through pipe lines 15, 15a, 15b and 15c. Thus not only will the extinguishing medium be applied through plugs 20a, but it will also be applied through pipe 14a and outlet 6b, and if the air conditioning system is operating dispersion of the gas will be facilitated. Should only one or more of the plugs be fused, the supply through line 15a will make up for the deficiency.

The liquid seal or plug 23 provides a safety means which is in effect a selective arrangement whereby CO_2 gas may be discharged into the interior of the building when the temperature therein rises above a certain predetermined point. This point may vary in certain dwellings or buildings. For example, suppose the maximum releasing temperature is 125° F., then a liquid having a boiling point in that range may be utilized, such as dichlorethylene or the like. When this temperature is reached, the liquid in the seal or plug 23 boils and passes out through outlet extremity of pipe line 22a into container 24, the latter being provided with a suitable liquid or medium to prevent escape or volatilization of the liquid from plug 23. After the lines 22 and 22a are clear, pressure is released in pipe line 21, conduit 18 and container 17, whereupon the mercury in the seal 13 flows into container 17 and CO_2 flows through the lines 12 and 13, into container 17, from the latter through conduit 18 into pipe line 21, thence through line 22, plug 23, line 22a, into container 24 and thence upwardly through pipe line or conduit 25 into the top area of the dwelling or other point to which the conduit 25 may extend. As will be obvious, this may take place prior to release of the main system, or release of the fusible plugs 19a or 20a. For certain types of buildings, for example, such as warehouses or the like, the liquid seal or plug 23 may be arranged to operate at a temperature lower in cold weather than in warm weather. It is preferred to place the plug or seal 23 in the return duct of the air conditioning system since this is the most sensitive point of the entire system and will indicate a rising temperature regardless of in what portion or area of the room or building the fire may take place.

It will thus be seen that the system may be arranged so that the seal 23 is first released to flood the entire building with CO_2 gas or other fire extinguishing medium, and then should the fire continue, the entire system will be thrown into operation through the medium of the overhead plugs 19a and 20a and the header outlets 15 to 15b inclusive.

While not shown, it will be obvious that liquid seals similar to that at 23 could be installed in conjunction with the pipe lines 15, 15a, 15b and 15c and so located as to be influenced by the temperature of the respective rooms and thus avoid release of gas in any room other than that in which the fire may occur.

The seal or plug 23 may be used alone or constitute the only control if desired, in which event the conduit 25 leading to the top of the dwelling would exhaust into each individual room, for example, through a series of connections such as those leading from the header 14. This feature renders the system particularly adaptable for air-conditioned buildings.

It will also be obvious that other changes in the general arrangement and design of the system may be adopted within the scope of the invention as defined by the appended claims, the drawing simply illustrating diagrammatically the general principles of the invention.

I claim:

1. The combination with a building having an interior compartment or space therein, a fire extinguishing system comprising a supply of fire extinguishing medium such as carbon dioxide or the like, a conduit communicating said supply with said space or compartment, a liquid seal displaceable through pressure of the said medium operatively associated with said conduit, and means normally closing the outlet end of said conduit and located to be influenced by the temperature of the air in said compartment for opening said outlet.

2. In combination with a building having a compartment or space therein, a fire extinguishing system including a supply of fire extinguishing medium such as carbon dioxide or the like, a conduit communicating said supply with said compartment, fusible plugs controlling the outlet of said conduit, and a liquid seal operatively associated with said conduit to normally maintain said supply in said tank and adapted to be displaced through pressure of said gas when the outlet of said conduit is opened due to fusion of said plugs.

3. In combination with a building having a compartment or space therein, fire extinguishing apparatus comprising a supply of carbon dioxide or the like under pressure, a conduit communicating said supply with said compartment, one or more fusible plugs normally closing the outlet of said conduit, another conduit communicating said supply with said compartment, a liquid seal operatively associated with said conduits to normally prevent escape of said supply from said tank a receptacle between and in communication with said seal and said conduits, said receptacle arranged to receive the displaced liquid of said liquid seal upon displacement through excessive temperature reaction on said plugs.

4. In combination with a building having a compartment or space therein, fire extinguishing apparatus comprising a source of supply of carbon dioxide or the like, a conduit communicating said source of supply with said compartment, one or more fusible plugs controlling the outlet of said conduit, a liquid seal operatively associated with said conduit and normally blocking flow of gas therethrough, a receptacle between and in communication with said seal and said conduit, said receptacle arranged to receive the displaced liquid of said seal, and an additional conduit provided with sealing means arranged to be influenced by the temperature of said compartment prior to fusion of said plug, said plug comprising a container filled with fluid whose boiling point approximates a dangerous temperature rise, said latter conduit communicating said source of supply with said compartment beyond said liquid seal.

5. In combination with a building having a compartment or space therein and inlet and exhaust ducts for admitting air into and withdrawing air from said compartment, fire extinguishing apparatus comprising a source of supply of carbon dioxide or the like under pressure,

a conduit communicating said supply with said compartment, one or more fusible plugs located in the top area of said compartment and controlling the outlet of said conduit, a liquid seal operatively associated with said conduit and normally restraining the carbon dioxide gas to said supply and upon displacement permitting the gas to flow through said conduit, and a separate conduit communicating said source of supply through said seal with said compartment, said latter conduit communicating with the compartment through said air inlet ducts.

6. In combination with a building having a compartment or space therein, fire extinguishing apparatus including a source of supply of carbon dioxide or like fire extinguishing medium under pressure, a conduit communicating said source of supply with said compartment, a liquid seal operatively associated with said conduit and normally blocking flow of carbon dioxide therethrough, and a temperature release plug in the form of a container having therein a fluid whose boiling point approximates a dangerous temperature rise in said compartment and arranged to be influenced by the temperature of said compartment, said plug being operatively connected into and closing said conduit beyond said liquid seal and upon boiling and displacement of the fluid therein, opening said conduit and permitting pressure of the carbon dioxide to displace the said liquid seal.

7. In combination with a building having a compartment or space therein and an air return duct through which air is withdrawn from said space, fire extinguishing apparatus including a tank or the like containing a supply of carbon dioxide or like fire extinguishing medium under pressure, a conduit communicating said source of supply with said compartment, a liquid seal operatively connected into said conduit and normally blocking flow of carbon dioxide therethrough, and a temperature release plug in the form of a container having therein a fluid whose boiling point approximates a dangerous temperature rise in said compartment, said plug being located in said air return duct and connected into said conduit beyond said liquid seal to normally close the outlet of the conduit.

8. In combination with a building having a compartment or space therein and an air inlet and an air return duct for supplying air to and withdrawing air from said compartment, a fire extinguishing system including a tank or analogous supply of carbon dioxide or the like fire extinguishing medium under pressure, a liquid seal adapted to maintain the carbon dioxide against release from said tank, a conduit communicating said tank beyond said seal with said compartment and having one or more fusible plugs in the outlet thereof, another conduit communicating said source of supply with said compartment beyond said seal and communicating with said compartment through said inlet duct, and an additional conduit communicating said supply with the interior of the building, said latter conduit being controlled by a plug in the form of a container having therein a liquefied gas whose boiling point approximates a dangerous temperature rise in said compartment, said plug being located in said air return duct.

9. In combination with a building having a compartment therein, fire extinguishing apparatus comprising a tank or analogous source of supply of carbon dioxide or the like fire extinguishing medium under pressure, a conduit leading from said tank, an expansion valve in said conduit, a liquid seal operatively associated with said conduit and normally blocking flow of gas therethrough, a receptacle or trap for receiving the liquid from said seal, a conduit connecting at its inlet end with said receptacle and at its outlet end being provided with a plurality of fusible plugs which upon fusion open and permit the carbon dioxide to exert pressure on the liquid of the seal and cause it to flow into said receptacle and permit carbon dioxide gas under pressure to pass through said conduit and outwardly into said compartment through said plugs.

10. In combination with a building having a compartment therein and an air inlet duct for admitting air to said compartment, fire extinguishing apparatus comprising a tank or analogous source of supply of carbon dioxide or the like fire extinguishing medium under pressure, a conduit leading from said tank, an expansion valve in said conduit, a liquid seal operatively associated with said conduit and normally blocking flow of gas therethrough, a receptacle or trap for receiving the liquid from said seal, a conduit connecting at its inlet end with said receptacle and at its outlet end being provided a plurality of fusible plugs which upon fusion open and permit the carbon dioxide to exert pressure on the liquid of the seal and cause it to flow into said receptacle and permit carbon dioxide gas under pressure to pass through said conduit and outwardly into said compartment through said plugs, said liquid seal having an additional conduit branching therefrom opening into said compartment through said air inlet duct whereby an additional supply of carbon dioxide gas is provided for said compartment upon release of said seal.

11. In combination with a building having a compartment or space therein and air inlet and return ducts for admitting conditioned air into and withdrawing air from said compartment, fire extinguishing apparatus comprising a tank or analogous source of supply of carbon dioxide under pressure, a conduit leading from said tank and having an expansion valve therein for expanding and reducing the temperature of said gas, a liquid seal in said conduit normally maintaining the carbon dioxide gas against escape from said tank, a receptacle or trap for the liquid in said seal, a conduit leading from said receptacle and provided at its outlet end with one or more fusible plugs located in the top area of said compartment, the conduit in which said liquid seal is located being provided with a branch which communicates with said compartment through said inlet duct, whereby upon fusion of said plugs the liquid seal is displaced and flows into said container and clears said conduit so that carbon dioxide gas is exhausted into said compartment through said plugs and also through said air inlet duct and an additional conduit connected into the system beyond said liquid seal and having therein a plug in the form of a container loaded with a liquid having a predetermined boiling point, said latter plug being located to be influenced by the air flowing into and through said air return duct and discharge means from said plug to release the liquid at said boiling point.

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