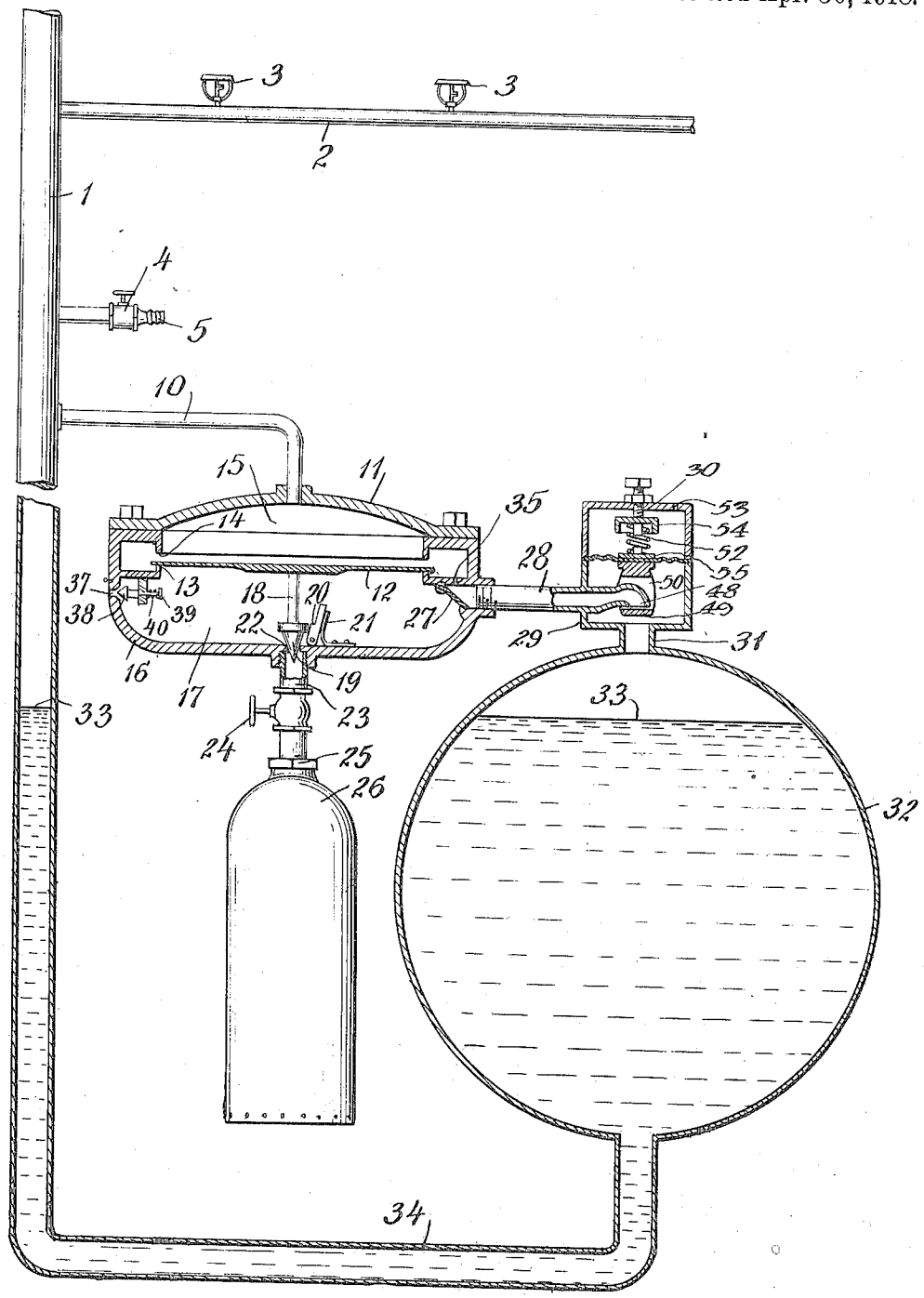
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AUTOMATIC FIRE EXTINGUISHING APPARATUS.

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WITNESSES

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AUTOMATIC FIRE-EXTINGUISHING APPARATUS.

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To all whom it may concern:

Be it known that I, JOHN R. HAMILTON, a citizen of the United States, residing at Yonkers, Westchester county, State of New York, have made a certain new and useful Invention Relating to Automatic Fire-Extinguishing Apparatus, of which the following is a specification, taken in connection with the accompanying drawing, which forms part of the same.

This invention relates especially to fire extinguishing apparatus in which a suitable distributing system comprising distributing devices such as sprinkler heads, hose connections, etc., are arranged so as to be supplied with extinguishing liquid under pressure from a pressure liquid supply tank under emergency conditions. On the opening of one or more of the distributing devices in the system, the pressure therein is reduced sufficiently to actuate a pressure control valve device and thus admit high pressure air or the like to said pressure liquid supply tank to force the extinguishing liquid normally contained therein into the distributing system at the desired working pressure.

The accompanying drawing shows in sectional elevation an illustrative embodiment of this invention.

The distributing system which may be of the dry pipe type may comprise a suitable riser or supply pipe 1 to which distributing pipe, such as 2, may be connected so as to supply distributing devices, such as the automatic sprinkler heads 3, which may thus be arranged at various points around the building. Suitable hose connections, such as 5, may also be arranged at desired points so as to operate the connected hose lines when the valves, such as 4, are opened. This distributing system may be connected in any suitable way with the pressure liquid supply tank from which the extinguishing liquid is supplied under emergency conditions, that is in the event of fire. The supply tank 32 may, for example, have a suitable pipe or connector 34 connected to one or more of the supply pipes of the distributing system in any suitable way so as to supply the water or other extinguishing liquid thereto when under emergency conditions. There is developed in this tank the working pressure of air, etc., which may be 50 to 100 pounds or so per square inch. Under these conditions the pressure acts on the upper surface 33 of the extinguishing liquid forcibly driving it throughout the distributing system so that it is discharged from the operating distributing devices therein.

The working pressure may be conveniently caused in this supply tank under emergency conditions by connecting therewith a high pressure tank containing air or other suitable gaseous or aeroform medium which is hereinafter referred to as air, at high pressure, such as 500 to 1000 pounds or so per square inch where a reducing valve is used, although with lower pressures of 100 pounds or so no such reducing valve is required. Any suitable pressure operated control valve device may be interposed between this high pressure tank and the liquid supply tank and also if desired a separate reducing valve which may be located anywhere between these two tanks so as to provide simple and effective means for thus causing the working pressure in the supply tank under emergency conditions. A reducing valve such as 29, may be provided with the regulating devices 30 and connected to the tank by the pipe or connection 31 this valve comprising if desired the valve seat 48 communicating with the control valve or device 16. The regulating valve 49 coöperating with this valve seat may be mounted on a yoke or spider 50 connected to a metallic or other flexible diaphragm 51 mounted in the casing 29 of this pressure regulating valve. The upper side of this diaphragm may be acted on by a spiral spring or the like 52 engaging a seat or alining member 55 on the upper side of the diaphragm and having its upper end within a recess or socket 54 connected to the regulating device or screw 30 by which the degree of pressure exerted by this spring on the diaphragm may be adjusted and then the parts held in this adjusted position as by the coöperating lock nut indicated. It is thus apparent that this well known form of regulating valve is held closed by the pressure within the supply tank and beneath the diaphragm so long as this pressure equals the predetermined working pressure therefor; and when this pressure decreases for any reason beyond the predetermined amount above the atmospheric pressure act-

ing on the upper side of the diaphragm through the vent 53, then the spring 52 forces the valve 49 downward away from its seat so as to admit additional air or other pressure fluid in sufficient amount to raise the tank pressure and automatically close this regulating valve which thus automatically maintains the air pressure in this supply tank at substantially the predetermined working pressure therefor. A connection 28 may be used to unite this relucing valve to the pressure operated control valve device which may comprise the casing 16 and cover 11 which may be removable. The high pressure tank or air bottle 26 may be connected to the control device in any suitable way as by the connecting pipe 23 having the shut-off valve 24 therein and screwed or otherwise secured to the flange 25 on the air bottle. A suitable control valve of any construction such as the conical valve 19 may be used to control the admission of this high pressure air to the liquid supply tank and this valve may be connected as by the stem 18 with a movable control member of any suitable form and construction, such as the diaphragm or plate 12, preferably having more or less resiliency in parts so as to fit more accurately on the seat 13 in the casing. Normally this control member is forced down on the seat 13 by the normal pressure in the distributing system which may be exerted on this member by connecting the control chamber 15 with the distributing system in any suitable way as through the pressure connection or pipe 10.

So long as this normal air pressure in the distributing system, which may be 10 to 20 pounds per square inch more or less, is maintained on this large area control member the connected control valve 19 is held down with sufficient force to hold it closed even against the high pressure of air in the connected air tank. If under emergency conditions of the distributing system one or more of the sprinkler heads opens the air pressure in the system is at once relieved and the pressure on the control member is correspondingly reduced and the control valve quickly opens and forces the control member upward as against the opposing upper seat 14 against which it may be tightly held in emergency position in connection, if desired, with a suitable latch 20 to engage and lie under a flange on the valve stem when pressed against the same by a light spring 21. The high pressure air from the air tank is thus allowed to pass through the connections into the reducing valve where it may be reduced to the proper working pressure and admitted in ample quantities at that pressure to the pressure liquid supply tank so as to force extinguishing liquid therefrom at the working pressure of 50 to 100 pounds or so to the square inch.

It is desirable to have a suitable check valve such as 27 between the liquid supply tank and the valve chamber 17 to prevent pressure being built up therein by leakage and so forth and for this reason it is also desirable to have a suitable vent hole, such as 37, in this valve chamber to normally allow any air to escape therefrom into the atmosphere, a suitable automatic vent valve being preferably provided to close this hole under emergency conditions. The vent valve 38 may be used for this purpose and may be slidingly mounted by its stem 39 passing through an adjacent lug or support so as to be normally held in open position by a light spring such as 40. When, however, the high pressure from the air tank enters this chamber it has sufficient force to quickly close this valve and prevent any further loss of pressure in this way. It is sometimes desirable in order to take care of heat expansion and so forth to provide some means for equalizing the pressure of air in the distributing system and the top of the liquid supply tank and for this purpose a suitable pin-hole or small area equalizing aperture 35 may be provided at any suitable point, preferably in the valve seat partition so as to communicate with the space between the two valve seats 13, 14. This slight equalizing aperture is sufficient to gradually allow the equalizing flow of air while being entirely insufficient to equalize the rapid changes of pressure which occur under emergency conditions and when the control member has finally moved into its emergency position against the valve seat 14 this equalizing aperture is thus rendered ineffective.

This invention has been described in connection with a number of illustrative embodiments, forms, elements, materials, parts and arrangements, to the details of which disclosure the invention is not of course to be limited, since what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims:

1. In automatic fire extinguishing apparatus, a dry pipe distributing system comprising automatic sprinkler heads and hose connection distributing devices, a pressure liquid supply tank connected to said distributing system and charged with extinguishing liquid, a high pressure air tank, a pressure operated control valve device between said liquid supply tank and said air tank and comprising opposed seats, a resilient control member movably mounted between said seats, a control valve operatively connected to said control member and located in a valve chamber in said control device to control the admission of air from said air tank to said valve chamber, a pressure connection between said distributing system and said control device to allow the pressure in said distributing system to act on said control

member and normally hold it against its seat and to hold said control valve closed, a check valve between said valve chamber and said liquid supply tank, a small area equalizing aperture being provided in said control device communicating with the space between said opposed seats, and with the connection to said pressure supply tank to allow the gradual equalizing of the pressure in the air spaces of said distributing system and pressure supply tank, there being a vent hole in said valve chamber, an automatically closing vent valve operating therewith and an automatic reducing valve between said air tank and said liquid supply tank.

2. In automatic fire extinguishing apparatus, a dry pipe distributing system comprising distributing devices, a pressure liquid supply tank connected to said distributing system and charged with extinguishing liquid, a high pressure air tank, a pressure operated control valve device between said liquid supply tank and said air tank and comprising opposed seats, a resilient control member movably mounted between said seats, a control valve operatively connected to said control member and located in a valve chamber in said control device to control the admission of air from said air tank to said valve chamber, a pressure connection between said distributing system and said control device to allow the pressure in said distributing system to act on said control member and normally hold it against its seat and to hold said control valve closed, a small area equalizing aperture being provided in said control device between said opposed seats to allow the gradual equalizing of the pressure in the air spaces of said distributing system and pressure supply tank, and an automatic reducing valve between said air tank and said liquid supply tank.

3. In automatic fire extinguishing apparatus, a dry pipe distributing system comprising distributing devices, a pressure liquid supply tank connected to said distributing system and charged with extinguishing liquid, a high pressure air tank, a pressure operated control valve device between said liquid supply tank and said air tank and comprising opposed seats, a control member movably mounted between said seats, a control valve operatively connected to said control member and located in a valve chamber in said control device to control the admission of air from said air tank to said valve chamber, a pressure connection between said distributing system and said control device to allow the pressure in said distributing system to act on said control member and normally hold it against its seat, and to hold said control valve closed, and an automatic reducing valve between said air tank and said liquid supply tank.

4. In automatic fire extinguishing apparatus, a dry pipe distributing system comprising distributing devices, a pressure liquid supply tank connected to said distributing system and charged with extinguishing liquid, a pressure air tank, a pressure operated control valve device between said liquid supply tank and said air tank and comprising opposed seats, a control member movably mounted between said seats, a control valve operatively connected to said control member and located in a valve chamber in said control device to control the admission of air from said air tank to said valve chamber and a pressure connection between said distributing system and said control device to allow the pressure in said distributing system to act on said control member and normally hold it against its seat and to hold said control valve closed.

5. In automatic fire extinguishing apparatus, a dry pipe distributing system comprising distributing devices, a pressure liquid supply tank connected to said distributing system and charged with extinguishing liquid, an air pressure tank, a pressure operated control device between said liquid supply tank and said air tank and comprising opposed seats, a resilient control member movably mounted between said seats, to cause the admission of air from said air tank to said valve chamber, a small area equalizing aperture being provided in said control device communicating with the space between said opposed seats and with the connection to said pressure supply tank to allow the gradual equalizing of the pressure in the air spaces of said distributing system and pressure supply tank, a check valve between said control device and said liquid supply tank and a pressure connection between the air space of said distributing system and said control device to allow the pressure in said distributing system to act on said control member.

6. In automatic fire extinguishing apparatus, a dry pipe distributing system comprising distributing devices, a pressure liquid supply tank connected to said distributing system and charged with extinguishing liquid, an air pressure tank, a pressure operated control device between said liquid supply tank and said air tank and comprising opposed seats, a control member movably mounted between said seats, to cause the admission of air from said air tank to said valve chamber, a small area equalizing aperture being provided in said control device communicating with the space between said opposed seats and with the connection to said pressure supply tank to allow the gradual equalizing of the pressure in the air spaces of said distributing system and pressure supply tank, and a pressure connection between the air space of said dis-

tributing system and said control device to allow the pressure in said distributing system to act on said control member.

7. In automatic fire extinguishing apparatus, a dry pipe distributing system comprising automatic sprinkler heads and hose connection distributing devices, a pressure liquid supply tank connected to said distributing system and charged with extinguishing liquid, a high pressure air tank, a pressure operated control valve device between said liquid supply tank and said air tank and comprising a control valve located in a valve chamber in said control device to control the admission of air from said air tank to said liquid supply tank, a pressure connection between said control device and the air space of said distributing system to allow the pressure in said distributing system to normally hold said control valve closed and under emergency conditions in said system to open said control valve and admit air at working pressure to said liquid supply tank, a small area equalizing aperture being provided in said control device normally open between said distributing system and pressure supply tank and automatically closed under emergency conditions, a reducing valve between said air tank and said liquid supply tank and a check valve between said valve chamber and said liquid supply tank.

8. In automatic fire extinguishing apparatus, a dry pipe distributing system comprising automatic distributing devices, a pressure liquid supply tank connected to said distributing system and charged with extinguishing liquid, a high pressure tank, a pressure operated control valve device between said liquid supply tank and said air tank and comprising a control valve located in a valve chamber in said control device to control the admission of air from said air tank to said liquid supply tank, a pressure connection between said control device and said distributing system to allow the pressure in said distributing system normally to hold said control valve closed and under emergency conditions in said system to open said control valve and admit air at working pressure to said liquid supply tank, a small area equalizing aperture being provided in said control device normally open between said distributing system and pressure supply tank and automatically closed under emergency conditions and a check valve between said valve chamber and said liquid supply tank.

9. In automatic fire extinguishing apparatus, a dry pipe distributing system comprising automatic distributing devices, a pressure liquid supply tank connected to said distributing system and charged with extinguishing liquid, a high pressure air tank, a pressure operated control valve device between said liquid supply tank and said air tank and comprising a control valve to control the admission of air from said air tank to said liquid supply tank, a pressure connection between said control device and said distributing system to allow the pressure in said distributing system to normally hold said control valve closed and under emergency conditions in said system to open said control valve and admit air to said liquid supply tank, and a small area equalizing aperture being provided in said control device normally open between said distributing system and pressure supply tank.

10. In automatic fire extinguishing apparatus, a dry pipe distributing system comprising distributing devices, a pressure liquid supply tank having a liquid discharge pipe connecting its lower portion to said distributing system and charged with extinguishing liquid, a high pressure air tank, a pressure operated control valve device between said liquid supply tank and said air tank and comprising a control valve to control the admission of air from said air tank to said liquid supply tank and a pressure connection between said control device and said distributing system to allow the pressure in said distributing system under emergency conditions in said system to open said control valve and admit air to said liquid supply tank.

11. In automatic fire extinguishing apparatus, a dry pipe distributing system comprising automatic sprinkler heads and hose connection distributing devices, a pressure liquid supply tank connected to said distributing system and charged with extinguishing liquid, an air pressure tank, a pressure operated control valve device between said liquid supply tank and said air tank and comprising a valve seat and a coöperating movable resilient control member, a control valve operatively connected to said control member to control the admission of air from said air tank to said valve chamber, and a pressure connection between said control device and the air space of said distributing system to allow the pressure in said distributing system to act on said control member and normally hold said control valve closed and under emergency conditions in said system to open said control valve and admit air at working pressure to said liquid supply tank.

12. In automatic fire extinguishing apparatus, a dry pipe distributing system comprising distributing devices, a pressure liquid supply tank connected to said distributing system and charged with extinguishing liquid, an air pressure tank, a pressure operated control device between said liquid supply tank and said air tank and comprising opposed seats, a control member

movably mounted between said seats, to cause the admission of air from said air tank to said valve chamber, a small area equalizing aperture being provided to allow the gradual equalizing of the pressure in the air spaces of said distributing system and pressure supply tank, and a check valve between said control device and the air space of said liquid tank.

13. In automatic fire extinguishing apparatus, a distributing system, a pressure liquid supply tank, a pressure air tank, a pressure control device between said liquid supply tank and said air tank, a control valve operatively connected to said control device to permit the admission of air from said air tank to said control device, a pressure balancing connection between said distributing system and said control device, a check valve in said control device, an equalizing aperture in said control device to allow the gradual equalization of the normal pressure in the distributing system and in the pressure supply tank, automatic venting means in said control device, and an automatic reducing valve between said air tank and said liquid supply tank.

14. In automatic fire extinguishing apparatus, a distributing system, a liquid supply tank, a pressure air tank, a pressure control device between said liquid supply tank and said air tank, a control valve operatively connected to said control device to permit the admission of air from said air tank to said liquid supply tank, an automatic reducing valve between said air tank and said supply tank, a pressure balancing connection between said distributing system and said supply tank, a check valve in said control device, and automatically closing venting means in said control device.

15. In automatic fire extinguishing apparatus, a distributing system, a liquid supply tank, a pressure air tank, a pressure control device between said liquid supply tank and said air tank, a control valve operatively connected to said control device to permit the admission of air from said air tank to said liquid supply tank, an automatic reducing valve between said air tank and said supply tank, a check valve in said control device, and automatically closing venting means in said control device.

16. In automatic fire extinguishing apparatus, a distributing system, a pressure liquid supply tank, a high pressure air tank, a pressure operated control device between said liquid supply tank and said air tank, a control valve operatively connected to said control device to control the admission of air from said air tank to said control device, a pressure connection between said distributing system and said control device, a check valve in said control device, an equalizing aperture in said control device to allow the gradual equalization of the normal pressure in the distributing system and in the pressure supply tank, means of closing said equalizing aperture, automatic venting means in said control device, and an automatic reducing valve between said air tank and said liquid supply tank.

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