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FIRE EXTINGUISHING APPARATUS

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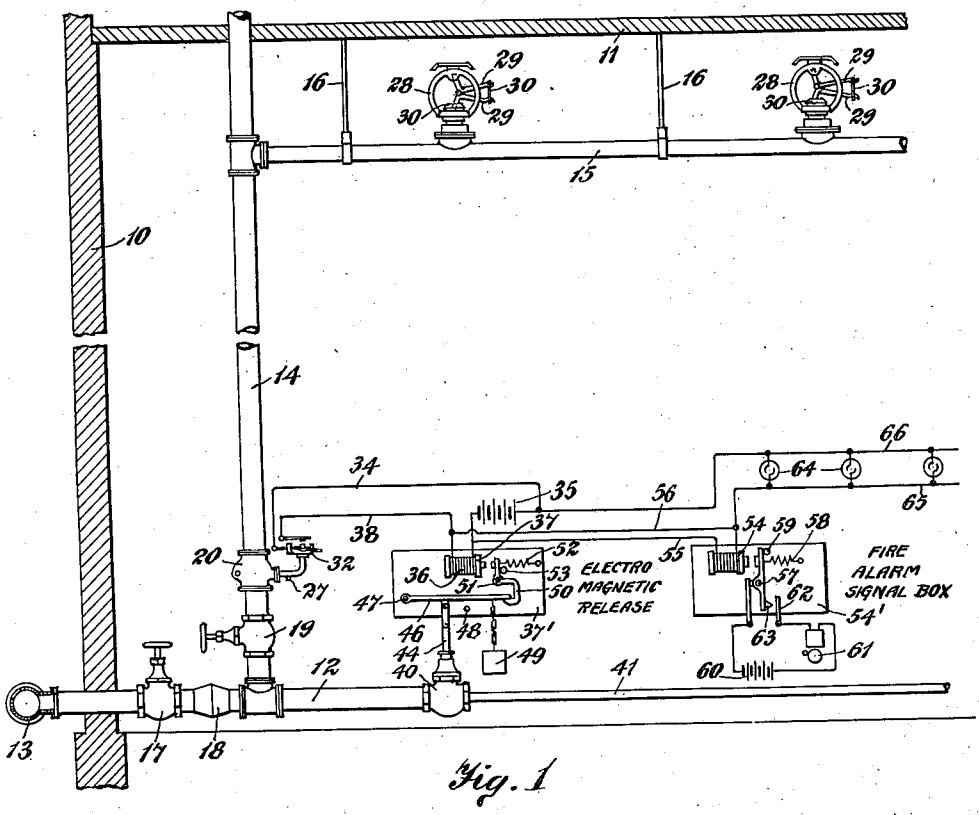


Fig. 1

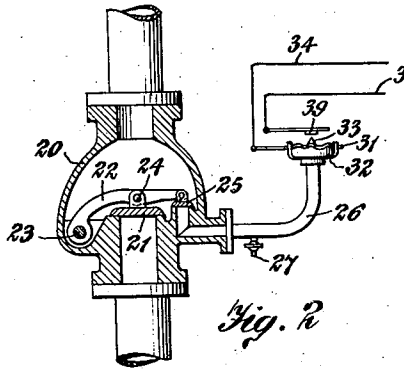


Fig. 2

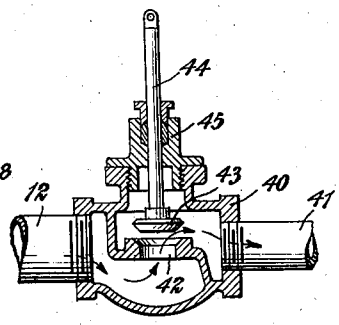


Fig. 3

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FIRE EXTINGUISHING APPARATUS

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This invention relates to a fire extinguishing system susceptible to the action of heat, such as that occasioned by a fire, to thereby cause the apparatus of the system to function resulting in the discharge of water or other fire extinguishing medium to the fire in question.

The primary object of the invention is the production of a fire extinguishing apparatus which shall be simple in construction and which may be installed with ease, facility and at small cost.

The invention is peculiarly adapted in its application to dwelling houses or small plants wherein the installation of a fire extinguishing system heretofore has not been feasible because of the expense attendant upon such installation.

A further object of the invention is the production of a system which may be utilized and installed in conjunction with the usual and conventional water supply system for a dwelling house or plant or other enclosure while at the same time eliminating a large portion of the expense which has heretofore been necessary in connection with such installation.

At present it is difficult to secure the approval of the board of fire underwriters of a fire extinguishing system which is directly connected to a branch water main or pipe leading into the house or plant from a street water main and which normally supplies water to the domestic service supply pipe leading to the faucets and lavatory and other outlets in the house or plant for the reason that should fire occur and the domestic service supply pipe at that time is in use, the water pressure in many cases would be insufficient to supply the necessary volume of water to the fire extinguishing system and in consequence the fire extinguishing system would fail to properly function. It is now necessary, if a fire extinguishing system is to be installed, where water is depended upon for fire extinguishing purposes, to make a separate connection between the water street main and the system which is expensive and entails the employment of otherwise useless and unnecessary apparatus and also makes it necessary to tear up the street, lay in a separate pipe connecting the fire extinguishing apparatus and street main and using separate pipe connections with separate control valve meters and other parts of a fire extinguishing apparatus to permit it to properly perform its fire extinguishing or controlling function.

According to the invention the lead-in pipe from the street main which is conventionally connected to the domestic supply pipe is also employed for the fire extinguishing system and the apparatus and the arrangement is such that upon the occurrence of fire in the building, a quick operating cut-off valve is automatically closed thus severing the connection between the lead-in pipe and domestic service supply pipe and permitting the full supply of water to flow to the extinguishing system per se and thus eliminate the objections above referred to.

A further object of the invention is the production of an apparatus of the above character which shall be supplied with a quick operating valve of a conventional type preferably interposed between and connected to the main supply pipe and the domestic service supply pipe and adapted to automatically close at the moment the fire extinguishing system is brought into action.

A further object of the invention is the production of a system of the above character which preferably shall be provided with the usual sprinkler heads or other extinguishing fluid outlets, which system shall function to close the aforesaid quick operating valve when said extinguishing system is brought into action by operation of the one or more of the sprinkler heads or otherwise.

A further object of the invention is the production of a system of the above character which shall be provided with a plurality of thermostats or other heat actuated devices of any desired construction and preferably adapted to be actuated upon a rise in temperature due to a fire, the functioning of said thermostats acting to automatically close the aforesaid quick operating valve and permit the supply of fluid, such as water, to flow only to the extinguishing system while disconnecting the said supply from the domestic service supply pipe.

A further object of the invention is the production of a system of the above character which shall not only operate to close the afore-mentioned quick operating valve when one or more sprinkler heads operate or when one or more thermostats are actuated but which shall also simultaneously cause a signal to be given, such as a bell, to report the presence of fire in the building.

In the accompanying drawing illustrating a practical embodiment of the invention:

Fig. 1 is a side elevation and partially diagrammatic view of the invention.

Fig. 2 is an enlarged section taken through the main control valve.

Fig. 3 is an enlarged section taken through the

quick operating valve for disconnecting the supply of fluid from the main supply pipe to the domestic service supply pipe.

Referring in detail to the several figures of the drawing:

10 and 11 indicate the side wall and ceiling of a room respectively while 12 indicates the main water supply pipe usually located in the ground and connected to the water main 13 beneath the street. The supply pipe 12 has a riser 14 connected thereto, as is usual in fire extinguishing systems, and laterally or horizontally extending distributing or branch pipes 15 are connected to the riser 14 being supported by pipe hangers 16 of any suitable construction connected to the ceiling of the room. The main supply pipe 12 is provided with a suitable form of control valve 17 for shutting off the supply of water from the street main 14, when so desired, and a water meter 18 of any suitable type may also be provided in said pipe 12 and is preferably interposed between the control valve 17 and the connection between the water main 12 and the riser 14. The riser 14 is also provided with a fire extinguishing system control valve 19 and automatic main control valve for controlling the supply of water to the riser 14 when the system functions, the valve chamber of which is generally indicated at 20.

The main automatic valve 20 is provided with a valve 21 normally cutting off the supply of water or other fire extinguishing medium from the main supply pipe 12 to the riser 14. The fire extinguishing system shown is preferably one known as the "wet-pipe" system and the riser 14 and distributing or branch pipes 15 are normally filled with water. The valve 21 is held on its seat by any desired means as for instance by a weighted clapper 22, pivoted as at 23 to the valve casing and pivotally connected as at 24 to the valve 21. The clapper 22 also carries a valve 25 normally closing a pipe 26 leading to the valve chamber 20. The pipe 26 may be provided with any conventional form of bleed drip 27 whereby any residual water in pipe 26 is drained therefrom when the extinguishing system is not operating.

The distributing pipes are preferably provided with a plurality of automatic fusible sprinkler heads 28 (illustrated in somewhat enlarged form) having pivoted levers or arms 29 normally holding a valve cap 30 on its seat in closed position to prevent the passage of water from the distributing or branch pipes 15 to and from said sprinkler heads. The ends of levers 29 are held in normal position by means of a fusible link 30 so when the link 30 fuses or melts due to a fire and, as is well known in the art, the cap 30 will automatically be removed from its seat by the pressure of water from the riser 14 and distributing pipe 15 whereby the water will flow to and be discharged from the sprinkler head to perform its fire extinguishing function.

The pipe 26 terminates in a diaphragm casing 31 sealed by a flexible diaphragm 32 carrying a contact 33. A lead-wire 34 connects with a battery 35 or other source of power which in turn is connected with the coil 36 of an electro-magnet 37 forming a part of an electro-magnetic release indicated generally at 37'. The other end of said coil is in electrical connection by lead-wire 38 with contact button 39 which is adapted to be engaged by contact 33 when the diaphragm 32 is flexed upwardly by fluid pressure flowing through pipe 26 and to thereby close the circuit and thus energize the electro-magnet 37.

The casing of a quick-acting valve is indicated at 40 and it connects the main water supply pipe 12 and a domestic service supply pipe 41 which leads to the faucets and other water outlets in the building. It is supplied with a valve opening and seat 42 and a valve head 43 adapted to engage and cooperate with said seat for either preventing or permitting the flow of water from the main water supply pipe to the domestic service supply pipe. A valve stem 44 is connected to the valve head 43 and slidably engages within a stuffing box 45.

The valve stem 44 is pivotally connected to a rod or bar 46 pivoted at one end and as at 47 to permit it of partial movement in a clockwise direction, the extent of movement being limited by engagement of head 43 with the seat 42, a stop 48 being provided to limit the downward movement of rod or bar 46 should occasion arise. The free end of rod or bar 46 carries a suspended weight 49 constantly urging the downward movement of the rod or bar 46 on its pivot to thereby cause the valve head 43 to engage its seat 42 and thus check, upon release of weight 49, the flow of water from the main supply pipe 12 to the domestic service supply pipe 41.

The free end of the rod or bar 46 is held in inoperative or raised position by the hooked end of detent 50 which is pivoted at 51 and which is held in latching position shown by means of spring 52, the pivotal movement of the detent being limited by a stop 53. Should fire occur, one or more of the automatic sprinkler heads will function and water or other fluid will be delivered from one or more of the sprinkler heads to the fire. This release of fluid pressure in the distributing pipe or pipes 15 raises the valve 21 from its seat by water pressure applied therebeneath from the main supply pipe 12 whereby the clapper 22 will also swing upwardly on its pivot 23 to unseat the valve 25 and permit water to flow into pipe 26 and exert pressure against diaphragm 32 to close the electrical circuit as previously explained and thereby energize electro-magnet 37.

Energization of electro-magnet 37 causes the detent 50 to swing on its pivot 51 against the action of spring 52 whereby the detent will be moved in a counterclockwise direction. This releases the hooked end of detent 50 from its engagement with the bar or rod 46 which swings downwardly on its pivot 47 by the action of the weight 49 permitting the valve head 43 to engage its seat 42 and disconnect the flow of fluid from main supply pipe 12 to domestic supply pipe 41 All of the fluid is then utilized by the fire extinguishing system as is obvious.

We further provide for the giving of a signal, such as the ringing of a bell upon the energization of the electro-magnet 37. A second electro-magnet 54 is provided and forms a part of a fire-alarm signal box which is indicated generally at 54'. One end of the coil of said electro-magnet is connected by lead-wire 55 to the connection between the battery 35 and the electro-magnet 37 while the other end is connected by lead-wire 56 to the lead-wire 38. Thus when electro-magnet 37 is energized, electro-magnet 54 also becomes energized and attracts the upper end of pivoted bar 57 into engagement therewith against the action of a spring 58, the clockwise movement of bar 57 on its pivot being limited by stop 59 when the electro-magnet 54 is de-

energized. The pivoted bar 57 is in circuit with a battery, said battery being connected to a bell or other signal 61 which in turn is in electrical connection with a bar 62 adapted to be engaged by contact 63 on pivoted bar 57 to close the local circuit and sound the bell 61 when electro-magnet 54 is energized. If so desired and as is manifest, the signal or bell could be relayed to a central fire or other station.

We further provide one or more heat-actuated thermostats 64 operating on any well-known principle and which are connected by the lead-wires 65 and 66 to the lead-wires 56 and 34 respectively and which thermostats, when subjected to heat of a sufficient degree, will close the electrical circuits hereinbefore described to close the quick-acting valve and give the signal irrespective of the actuation of the sprinkler heads.

Obviously the invention may be applied to a fire detecting or alarm system per se which is actuated by fluid pressure upon the occasion of a fire, and in some cases we prefer to have the device actuated only by operation of the thermostats 64 and irrespective of whether or not the sprinkler heads have fused at that time.

The invention claimed is:

1. In a fire extinguishing system, a main supply pipe for supplying water to the system, a domestic supply pipe connected therewith, a domestic service control valve in said domestic supply pipe, a fusible sprinkler head connected to said main supply pipe, a normally closed valve controlling the supply of water from the main supply pipe to the sprinkler head and adapted to open upon the fusing of the sprinkler head for the flow of water thereto and discharge of the water therefrom, and a distendable diaphragm controlled means responsive to the flow of water upon the fusing of said sprinkler head and the opening of the second-named valve for automatically closing said domestic service control valve.

2. In a fire extinguishing system, a main supply pipe for supplying water to the system, a supplemental domestic service supply pipe, a service control valve in said supplemental supply pipe, a fusible sprinkler head connected to said main supply pipe, a distendable diaphragm operated means for closing the domestic service control valve, and a normally closed valve for controlling the flow of water from the main supply pipe to the sprinkler head and distendable diaphragm and adapted to be opened to allow flow of water thereto upon the fusing of the sprinkler head, said diaphragm being actuated by the pressure of the water when the second-named valve is opened for automatically closing said service control valve.

3. In a fire extinguishing system, a main supply pipe connected to a source of water supply, a domestic supply pipe, a quick acting valve in said domestic supply pipe, a riser connected to said main supply pipe, a sprinkler head connected to said riser, a valve normally closing the passage between said main supply pipe and said riser, a flexible diaphragm, means connected to said diaphragm and said valve and normally closed against the passage of water from said main supply pipe and means connecting said diaphragm and said quick acting valve to close the same upon the opening of said passage closing valve and the consequent pressure of water against said diaphragm.

4. In a fire extinguishing system, a main supply pipe connected to a source of water supply, a domestic supply pipe, a quick acting valve in said domestic supply pipe, a sprinkler head connected to said main supply pipe, a valve in said main supply pipe for regulating the discharge of water from said main supply pipe to and through said sprinkler head, pressure responsive means communicating with said regulating valve and adapted to be actuated by water pressure when said regulating valve is open and means connected to said quick acting valve and said pressure responsive means for closing said quick acting valve upon actuation of said pressure responsive means.

5. In a fire extinguishing system, a main supply pipe connected to a source of water supply, a domestic supply pipe, a quick acting valve in said domestic supply pipe, a sprinkler head connected to said main supply pipe, a valve in said main supply pipe for regulating the discharge of water from said main supply pipe to said sprinkler head, means communicating with said regulating valve and adapted to be actuated upon the opening of said regulating valve, an electro-magnet in circuit with said communicating means and adapted to be energized upon actuation of said communicating means, a detent actuated upon the energization of said electro-magnet and means normally engaging said detent and said quick acting valve for closing said quick acting valve upon actuation of said detent.

6. In a fire extinguishing system, a main supply pipe connected to a source of water supply, a domestic service supply pipe, a service control valve in said domestic service supply pipe, a fusible sprinkler head connected to said main supply pipe, a distendable diaphragm connected to said main supply pipe and actuable under pressure of water flowing therefrom, means normally preventing flow of water from the main supply pipe to the sprinkler head and diaphragm and adapted to be actuated upon the fusing of said sprinkler head to permit flow of water from said main supply pipe to the sprinkler head and diaphragm, and an electro-magnetically controlled release adapted to be actuated by the diaphragm for automatically closing the service control valve.

7. In a fire extinguishing system, a main supply pipe connected to a source of water supply, a domestic service supply pipe, a service control valve in said domestic supply pipe, a detent for normally holding said valve in open position, a sprinkler head connected to said main supply pipe, an electro-magnetic release connected to said detent for releasing the same to close said valve, means for normally preventing flow of water from the main supply pipe to the sprinkler head and permitting flow of water from said pipe to the sprinkler head upon the fusing of the head, and means responsive to the flow of water in said main supply pipe to said sprinkler head and in circuit with said electro-magnetic release for energizing the same to close the service control.

8. In a fire extinguishing system, a main supply pipe connected to a source of water supply, a domestic supply pipe, a valve in said domestic supply pipe, a fusible sprinkler head connected to said main supply pipe, a valve closing device connected to said valve for closing the same, a normally closed main valve interposed between the main supply pipe and sprinkler head and adapted to open upon the fusing of said sprinkler head for supply of water from said main supply pipe to said sprinkler head, and means operative

upon the opening of said main valve for actuating said valve closing device.

9. In a fire extinguishing system, a main supply pipe connected to a source of water supply, a domestic supply pipe, a valve in said domestic supply pipe, a fusible sprinkler head connected to said main supply pipe, a valve closing device connected to said valve for closing the same, a normally closed valve in the main supply pipe adapted to open upon the fusing of said sprinkler head for supply of water from the main supply pipe to said sprinkler head, and means including a member responsive to flow of water to the sprinkler head when the main valve opens for actuating said valve closing device.

10. In a fire extinguishing system, a main supply pipe connected to a source of water supply, a supplemental supply pipe, a quick-acting valve in said supplemental supply pipe, a riser connected to said main supply pipe and to the fire extinguishing system, a main valve in said main supply pipe for regulating the discharge of water to said riser and the fire extinguishing system, and means adapted for actuation to close said quick-acting valve when said regulating valve is opened.

11. In a fire extinguishing system, a main water supply pipe, a riser connected therewith, a domestic service pipe, a control valve in said domestic service pipe, a fusible sprinkler head connected with the riser, a valve closing device for closing said control valve, a regulating valve for permitting flow of water from the main supply pipe to the riser upon the fusing of the sprinkler head, means responsive to water flow in the riser upon the opening of said regulating valve for actuating the valve closing device to closed position, and heat responsive means independent of the sprinkler head and operative at a fixed predetermined temperature for actuating the valve closing device independent of the water flow responsive means.

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