

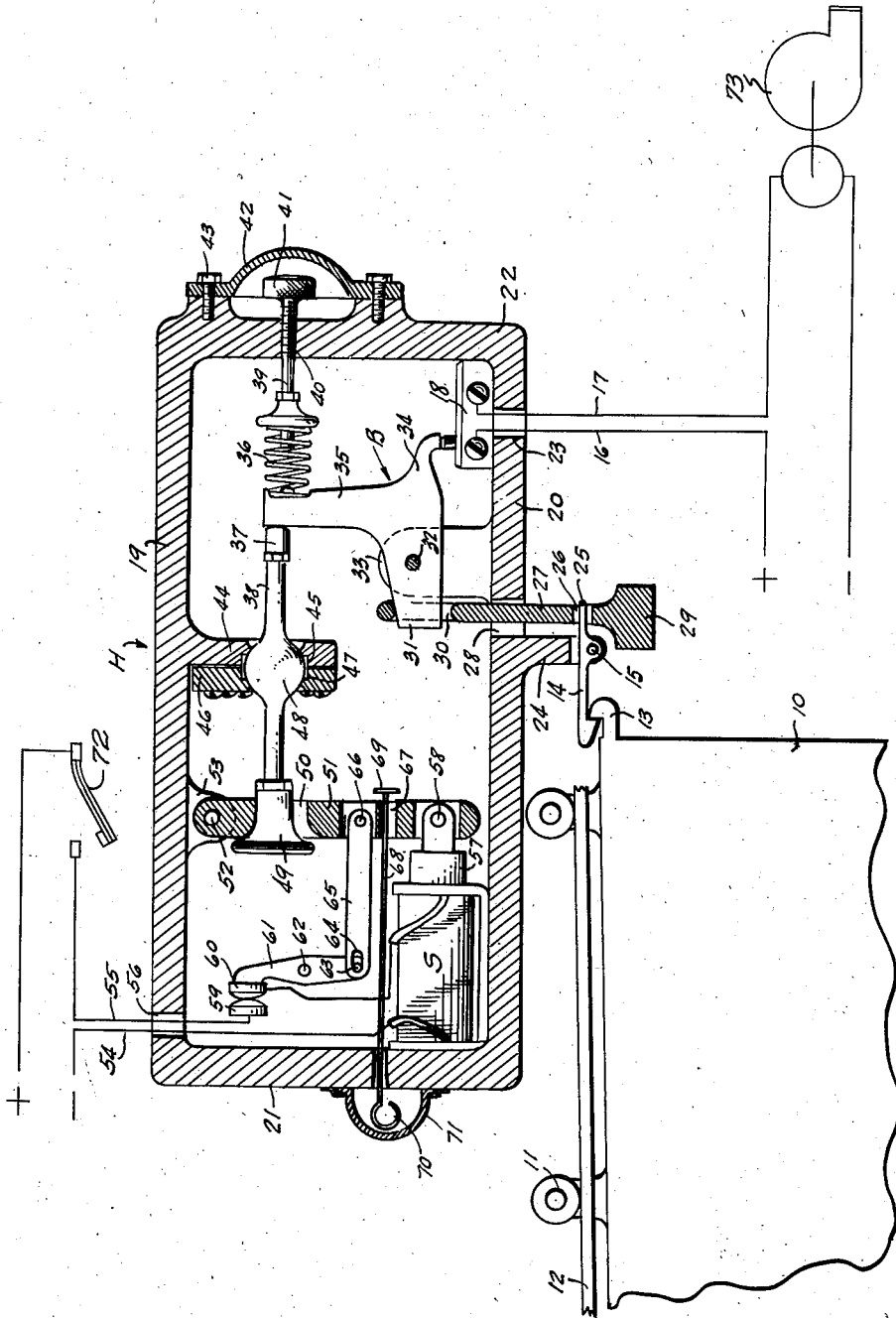
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FIRE PROTECTIVE SYSTEM

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## FIRE PROTECTIVE SYSTEM

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3 Claims. (Cl. 169—2)

This invention relates to fire protective systems, and is concerned primarily with the automatic control of a protective device, such as a fire door, and the automatic control of other instrumentalities which are combustion factors, such as blower fans and the like.

At the present time, it is common practice for factories, warehouses, stores, and similar places, to have installed therein an automatic sprinkler system for protection against fire. While there are several types of sprinkler systems, one which is now meeting with wide spread usage is the so-called "dry pipe" system. Such a dry pipe system is illustrated and described in the co-pending application of Leroy M. Lewis, Serial Number 458,741, filed September 17, 1942, and entitled "Valve for fire preventive system." In such a system, heat responsive units, such as rate of rise or fixed temperature thermostats, are appropriately distributed over the area to be protected. These thermostats are connected into an electrical circuit, which also includes a solenoid actuated control mechanism for a deluge valve.

Ordinarily, the building in which this system is installed also includes fire doors for localizing and preventing the spread of any fire which may be started. Many of these buildings also embody circulatory air installations, such as blowers and fans, which, if allowed to remain in operation after the start of a fire, would constitute factors tending to increase the combustion.

With the existing conditions, substantially as above outlined, this invention has in view, as its foremost objective, the provision of a mechanism for automatically controlling any fire doors which might be present in the particular building being protected, and also for controlling the operation of other combustion factors, such as the blowers.

More in detail, the invention has as an objective the provision of an automatic control mechanism of the character aforesaid, which is particularly adapted to be connected in with the electrical circuit that includes the thermostats. Such electrical circuit will ordinarily be present where a dry pipe sprinkler system of the type above noted is installed.

It is evident that when such automatic control mechanism is included in the electrical circuit, upon functioning of any of the thermostats, the circuit will be affected to cause operation of the control mechanism to close the fire doors, shut off the blowers and fans, while, at the same time, the deluge valve of the dry pipe system will be opened to admit water for fire extinguishing purposes.

Various other more detailed objects and ad-

vantages, such as arise in connection with carrying out the above noted ideas in a practical embodiment, will in part become apparent and in part be hereinafter stated, as the description of the invention proceeds.

The invention, therefore, comprises automatic control mechanism which is adapted to be connected in the electrical circuit of the thermostats of an automatic sprinkler system, and which control mechanism is designed for controlling fire doors and the operation of other combustion factors.

For a full and more complete understanding of the invention, reference may be had to the following description and accompanying drawing wherein:

The figure is a side view, partly in section, and partly in elevation, of automatic control mechanism designed in accordance with the precepts of the invention.

Referring now to the drawing, wherein like reference characters denote corresponding parts, a fire door is represented at 10 and is shown as being suspended from rollers 11, which engage an inclined track designated 12. Fire doors of this type are well known, and their construction may be briefly described by noting that they may be made of any appropriate metal together with heat insulating material, such as asbestos, if so desired. These doors 10 are ordinarily held in an open position and are adapted to move into a closed position under gravity action when released. Thus the door 10 is shown as including a detent 13, which may take the form of the hook illustrated and which engages a pivoted dog 14. The pivotal mounting of the dog is represented at 15, and it is evident that so long as the dog 14 remains in engagement with the detent 13, the door 10 will remain open. However, when this engagement is broken the door 10 will be released and move down the inclined track 12 to a closed position.

The electrical circuit for blowers and fans or other elements of a circulatory air installation is represented by the lines 16 and 17. A blower fan is indicated at 18 and is operated by an electrical motor included in the circuits 16 and 17. This circuit is ordinarily maintained closed by the switch indicated at 19, and when so closed, the blowers and fans are kept in operation. It is evident that if the switch 19 is affected to break the circuit, operation of the blowers and fans will be discontinued.

A housing for the automatic control mechanism of the invention is referred to in its entirety by

the reference character H, and is shown as including a top wall 19, bottom wall 20, and end walls 21 and 22. The switch 18 is mounted within the housing on the bottom wall 20 as illustrated, and an opening 23 in the bottom wall 20 accommodates the lines 16 and 17 of the blower circuit. A lug depends from the bottom wall 20 and is designated 24. This lug is shown as carrying the pivotal mounting 15 of the dog 14. The latter includes the end extension 25 that is received in an opening 26, formed in a link 27, which passes through an opening 28 in the bottom wall 20. The lower end of the link 27 is suitably weighted, as indicated at 29, for a purpose that will later become apparent, and this link is suspended from its upper end which is formed with a recess 30, which receives the free end of an arm 31 of a bell crank designated generally B. The bell crank B is pivotally mounted on a pin 32 that is carried by an ear 33 that upstands from the bottom wall 20. This bell crank B also includes an arm 34, which normally engages the switch 18 to maintain the circuit of the lines 16 and 17 closed. Another arm 35 of the bell crank B extends upwardly and is engaged on one side by a spring 36 and on the other side by the nose 37 of a control lever 38. The spring 36 yieldably urges the arm 35 against the nose 37, and the tension of the spring may be adjusted by a threaded stem 39 that is screwed through a threaded opening 40 in the end wall 22. The outer end of the stem 40 carries an operating member in the form of a knurled nut 41, that is ordinarily kept from the access of unauthorized and mischievous persons by a cover 42 that is bolted to the end wall 22 by the screw bolts shown at 43.

It is evident that when it becomes desirable to adjust the tension of the spring 36, the cover 42 may be removed and the nut 41 operated to give the required adjustment.

Depending from the top wall 19 is a panel member 44, one face of which is formed with a recess 45. Carried by the member 44 is a plate element 46 formed with a complemental recess 47. The ball 48 is formed as an integral part of the lever 38 and this ball 48 is received in the recesses 45 and 47, being confined by the panel 44 and plate 46. At the end remote from the nose 37, the lever 38 carries a flared end piece 49 that is received in a correspondingly shaped recess 50, formed in a swinging arm 51. The latter is pivotally mounted on a pin 52 that is carried by a lug 53 that depends from the underface of the top wall 19.

A solenoid is referred to in its entirety by the reference character S, and is shown as being carried by the bottom wall 20. The solenoid S includes the usual windings that are connected to lines 54 and 55, that are accommodated by an opening 56 in the top wall 19. The solenoid S also includes a plunger 57 that is connected to the lower free end of the arm 51 as indicated at 58.

Contact elements 59 and 60 are shown as included in the line 55 and constitute a switch. The contact element 60 is carried at one end of a lever 61 that is pivotally mounted at 62 within the housing. The other end of the lever 61 carries a pin 63, that is received in a slot 64 formed in a link 65, that is connected to the arm 51 as shown at 66.

The arm 51 is also formed with an opening 67, through which freely passes a pull rod 68, one end of which is formed with an abutment 69 that is adapted to operatively engage the arm 51. The

pull rod 68 passes through an opening in the end wall 21 and exteriorly thereof, is formed with a handle, such as the hook 70. This handle 70 is enclosed by a frangible cover 71, which may be made of glass and which is carried by the end wall 21.

While the operation of the above described control mechanism is believed to be obvious, it may be briefly described by noting that the lines 54 and 55 are connected in the circuit of thermostats 72 that are suitably distributed throughout the area to be protected.

When any of these thermostats is affected by the starting of a fire, it closes the circuit and current is delivered to the windings of the solenoid S. The plunger 57 is retracted and the arm 51 swung to the left (speaking with reference to the showing of the drawing). This movement of the arm is carried out without affecting the pull rod 68 because of the opening 67 being sufficiently large to accommodate this movement. As the arm 51 is swung, it engages the flared end 49, and due to the camming action, that end of the lever 38 is depressed. This causes the nose 37 to rise and become free of the arm 35 of the bell crank B. When the bell crank B is so released, the end of the arm 31, together with the link 27, is depressed, at the same time the arm 34 is raised to affect the switch 18 and break the circuit of the lines 16 and 17. Thus the operation of the blowers and fans is discontinued. Downward movement of the link 27 depresses the end extension 25 of the dog 14, this raising the opposite end of the dog. The dog is thereby freed from engagement with the detent 13, and the fire door 10 is released to move into the closed position.

As the arm 51 is swung to the left the link 65 is urged in the same direction, and when the pin 63 reaches the end of the slot 64, the lever 61 is actuated to spread the contacts 59 and 60. Thus delivery of the current to the solenoid S is discontinued.

The operation above described is initiated by the thermostats. The same operation may be manually accomplished by one breaking the frangible cover 71 and exerting a pull on the handle 70 of the pull rod 68.

While a preferred specific embodiment of the invention is hereinbefore set forth, it is to be clearly understood that the invention is not to be limited to the exact constructions illustrated and described, because various modifications of these details may be provided in putting the invention into practice, within the purview of the appended claims.

What is claimed is:

1. In an automatic control device of the character described, a housing, a bell crank pivotally mounted in said housing and including a pair of oppositely extending arms, a fire door, latch means carried by said housing, means on said door for engagement with said latch means, connections between said latch means and one of said arms; a blower fan, a switch carried by said housing and connected to the motor of said blower fan, a connection between said switch and the other of said arms, means for maintaining said bell crank in position closing said switch and maintaining said latch means in effective engagement with the means on said door, said maintaining means including a control lever, and a solenoid operatively connected to said control lever.

2. In an automatic control device of the character described, a housing, a bell crank pivotally

mounted in said housing and including a pair of oppositely extending arms, a fire door, latch means carried by said housing, means on said door for engagement with said latch means, connections between said latch means and one of said arms, a blower fan, a switch carried by said housing and connected to the motor of said blower fan, a connection between said switch and the other of said arms, means for yieldably maintaining said bell crank in a position in which said latch means engages the means on said door and in which said switch is maintained closed, said maintaining means comprising an adjustable tension spring and a control lever, said spring and control lever engaging said bell crank on opposite sides, a cam for depressing one end of said control lever to move the other end out of engagement with said bell crank, and a solenoid operatively connected to said cam.

3. In an automatic control device of the character described, a housing, a bell crank pivotally mounted within said housing and including a pair of oppositely extending arms disposed substantially horizontally and an upstanding arm, a blower fan, a switch carried by said housing and

connected with the motor of said blower fan, an operating connection between said switch and one of said horizontally disposed arms, a weighted link suspended from the other of said horizontally disposed arms, a dog pivotally mounted on said housing and having an end extension in operative engagement with said link, a fire door, the hook end of said dog engaging a detent on said fire door, a spring engaging one side of said upstanding arm, means accessible from the exterior of said housing for adjusting the tension of said spring, a controlling lever pivotally mounted within said housing and having a nose engaging the other side of said upstanding arm, the end of said control lever remote from said nose having a cam surface, a swinging arm pivotally suspended within said housing and having a cam surface co-acting with a cam surface on said control lever, a solenoid including windings in the electrical circuit of a fire protective system, said solenoid also including a plunger operatively connected to said swinging arm and a switch for cutting off delivery of current to said windings upon operation of said solenoid.

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