

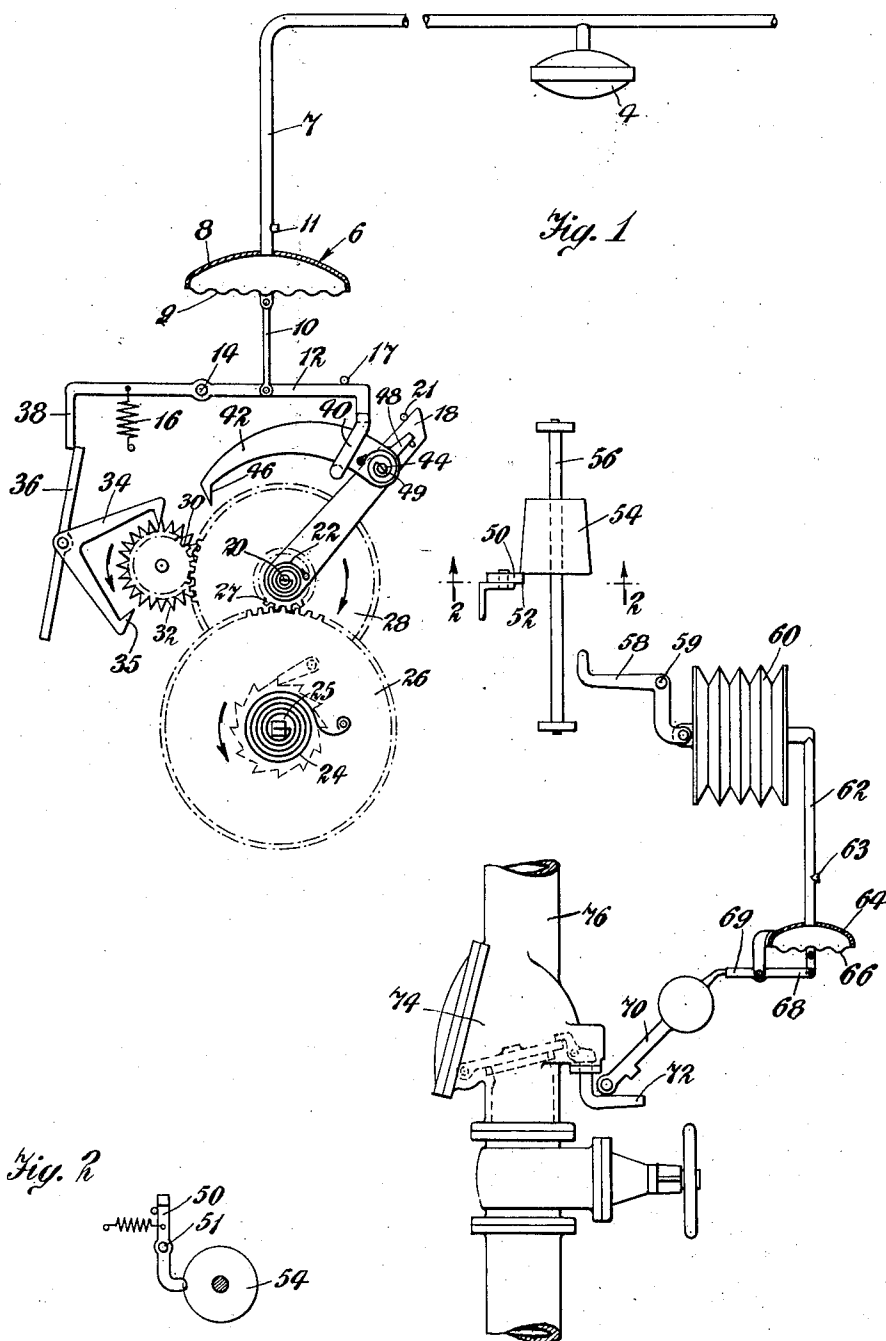
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RETARD DEVICE FOR DELAYING THE ACTION OF RATE OF RISE PNEUMATIC SYSTEMS

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RETARD DEVICE FOR DELAYING THE
ACTION OF RATE OF RISE PNEUMATIC
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This invention relates to fire extinguishing and control apparatus wherein thermally responsive devices placed in a fire zone are operatively connected with a release for producing the operation of the fire control or restraining apparatus.

It is a primary object of the present invention to provide in such a system a retarding unit which will require the existence of an increased temperature for a predetermined period of time in order to produce the operation of the final release which is designed to control or check the fire.

It is a further object to provide, in such a system, mechanism which can be operated in response to a predetermined rate of rise of temperature and which can be operated repeatedly through temporary or non-significant increases in temperature in the fire zone without actually freeing the release for releasing the flow of water or other fire fighting equipment.

The above and other objects will appear more fully from the following description when considered in connection with the drawing in which:

Fig. 1 is an elevational view, parts being in section and parts diagrammatically illustrated, showing one adaptation of my invention.

Fig. 2 is a fragmentary view, taken on the line 2-2 of Fig. 1, showing the construction of one of the elements employed in the system.

Fire controlling and restraining apparatus when installed in buildings subjected only to normal atmospheric temperature and pressure changes may be operated satisfactorily by causing the temperature responsive device to act directly upon the release or other controlled device so that on a predetermined rate of increase of temperature or on the attainment of a certain fixed temperature the controlled device will be actuated and the flow of water produced or the fire door closed or the foam producing device start in operation or other fire checking equipment rendered operative or other controlled device brought into action. It has been found, however, that in many instances the heat responsive devices in the fire zone are subjected to abnormal temperature or pressure changes, which only momentarily affect the heat responsive element and which are not indicative of an actual fire condition sufficient to justify the application of the fire fighting equipment. Under such conditions the usual controls can not be satisfactorily adjusted so as to be sufficiently sensitive to place in operation the equipment as soon as a sufficient heat condition arises to justify the same and which will at the same time not be so sensitive as to be operated by the local and temporary changes which are

not of sufficient significance to justify or necessitate the operation of the equipment. It is under such conditions that the present invention is particularly applicable.

Referring to the details of the drawing, the present embodiment of the invention includes a heat responsive pressure producing element 4 placed in a fire zone and connected to the pressure responsive member 6 by means of tubing 7. The member 6 includes a rigid housing 8 and a flexible diaphragm 9 connected at its outer edge to the housing 8 and connected at its central or movable portion, by means of a link 10, to the control lever 12. The tubing 7 is shown as supplied with the usual vent or restricted leak 11 for equalizing the pressures in the heat responsive element 4, tubing 7 and bellows device 6, etc., which are due to normal atmospheric pressure or temperature changes. The lever 12 pivotally mounted as indicated at 14 is normally retained in its initial or inoperative position shown in Fig. 1 by means of the spring 16 or equivalent device and wherein the lever rests against the stop 17.

The release actuating devices controlled by the lever 12, include a movable element 18 loosely mounted on a shaft 20 and normally maintained in its position of rest against the stop 21 by means of the spring device 22, tensioned to rotate the lever 18 in a counter-clockwise direction and of sufficient strength to maintain the lever normally in the position shown in the drawing.

The lever 18 is movable in a clockwise direction through an arc of substantially 45° from its initial position, a position of rest, as shown in Fig. 1, by means of the power devices disclosed. These devices comprise a clockwork with a driving spring 24 connected to the winding shaft 25 and to the driven gear wheel 26 rotatably supported on the shaft 25. The gear 26 meshes with the small gear wheel 27 rigid with the larger geared wheel 28. The teeth on the wheel 28 mesh with the gear 30 carried by the rotary element 32 of an escapement employing an oscillating yoke 34 and fan 36. The yoke 34 has teeth 35 engageable alternately with the escapement teeth on opposite sides of the rotary element 32 of the escapement, the escapement serving to restrict the movement of the rotary element and limiting the same to a predetermined rate of rotation.

The lever arm 12 controls the operation of the clockwork and also serves to connect the clockwork up to the lever 18 so as to cause the latter to be moved therewith, under proper conditions. To this end the lever 12 is formed with

a projecting end 38 engageable with the fan 36, when the lever 12 is in its normal position, to prevent the operation of the clockwork. The opposite end of the lever 12 is formed with a yoke 40 adapted to sustain or lower the pawl 42 pivotally mounted at 44 on the lever 18. The yoke will permit the pawl to slide through it during movements of the lever 18. The pawl 42 is formed with a toothed end 46 engageable with the teeth of the gear wheel 28 to be moved thereby in a clockwise direction when the pawl 42 is lowered into engagement with the gear wheel. The pawl may also include a rigid stop arm 48 engageable with a stop lug formed on the lever 18 when the lever is in inoperative position as shown, a spring 49 or a suitable counter-weight serving to counter-balance the weight of the pawl 42.

The movable element or lever 18 when moved to its operative position engages and operates by its beveled or inclined end, a release lever 50 pivotally mounted as at 51 and having an extension 52 normally positioned beneath the weighted release element 54, the element 50 being spring tensioned to its operative position as shown.

The weighted element 54 and the elements associated therewith are herein termed the release in that the freeing of the weight 54 produces any desirable operation utilized for the control or restraining of fires. As shown, the weight 54 is supported upon a bar 56 and when released drops down into engagement with the bell crank lever 58 pivotally mounted as at 59 and having one end connected to the bellows device 60 for producing a pneumatic impulse in the tubing 62. The tubing 62, preferably formed with the usual restricted vent 63, terminates in a bellows device formed of a housing 64 and a flexible diaphragm 66. The movable portion of the diaphragm is connected by means of a suitable link to a secondary release lever 68 formed with a projecting end 69 normally engaged with and restraining the weighted release lever 70 in the position shown. The lever 70, when permitted to fall, by movement of the lever 68, strikes the lever 72 and in the particular adaptation shown herein unlatches the valve 74 and admits the flow of water to the distributing pipes 76.

The operation of the apparatus will be readily understood from the above description. Upon the occurrence of an increase of temperature in the fire zone, a pneumatic impulse is developed and is carried to the bellows device 6. This impulse moves the lever 12 so that the pawl 42 engages the teeth of the gear 28 and the end 38 of the lever 12 moves away from the fan 36. The clockwork mechanism then begins to operate and gradually moves the lever 18 in a clockwise direction toward the release lever 50. If the heat change affecting the thermally responsive controlling element of the apparatus is not of a mere temporary or transitory nature and is of sufficient duration, the lever 50 of the controlled device is ultimately released and the released weight 54 produces an impulse in the bellows 60 which causes a device such as the main valve 74 to be operated. If the heat change, although it is sufficient to normally operate on the thermally responsive controlling element of the apparatus, to finally render the same active, is merely of a temporary or transitory nature not requiring the action of the controlled device and therefore terminates before the arm 18 has moved sufficiently to become effective in bringing about the operation of the controlled device, the decrease in pressure in the bellows device 6 permits the arm 12

to assume its original inoperative position thus stopping the operation of the clockwork mechanism and raising the pawl 42 from engagement with the gear wheel 28 whereby the operating lever 18 moves under the influence of its spring to its initial inoperative position as shown in Fig. 1. This operation may be repeated indefinitely under temporary temperature changes in the fire zone without operating the release 50, yet whenever the abnormal temperature is of sufficient duration the operation of the release is uniformly effected.

While I have shown the present invention as applied to the supplying of fire extinguishing fluid through the release of the restraining valve for the same, it will be understood that the invention is not to be so limited but that instead the invention is applicable to the release of other types of fire extinguishing, control or restraining apparatus or to the control of other devices to be brought into operation by thermal changes in the zone of fire protection upon the occurrence of fire. My invention is especially useful in the installations where advances or changes of heat affecting the thermostat are discontinuous or occur momentarily due to local heat conditions as for instance in drying, enameling and japanning ovens or other finishing processes. Under such conditions temporary high rates of temperature advance not requiring the operation of the controlled device may not be sufficiently compensated for by the compensating portion of the thermostat and hence the controlled device would come into action under conditions not requiring its operation. My present invention permits the thermostat or thermal element of the device or apparatus to ride over or bridge such local or transitory fluctuations of temperature still leaving the apparatus sensitive and operative in the intended manner for fire.

Having now described my invention, I claim:

1. In a fire extinguishing apparatus, a release, a mechanism for actuating said release, said mechanism being provided with means for delaying its operation for a predetermined time before it will effect the actuation of said release and means for setting said mechanism in operation.

2. In a fire extinguishing apparatus, a release, a mechanism for actuating said release, said mechanism being provided with means for delaying its operation for a predetermined time before it will effect the actuation of said release and temperature responsive means for setting said mechanism in operation.

3. In a fire extinguishing apparatus, a release, a mechanism for actuating said release, said mechanism requiring a predetermined time interval to effect the actuation of said release and temperature responsive means for setting said mechanism in operation and for halting the operation of said mechanism.

4. In a fire extinguishing apparatus, a release, a mechanism for actuating said release, said mechanism requiring a predetermined time interval to effect the actuation of said release and temperature responsive means for setting said mechanism in operation and for halting the operation of said mechanism and means for returning said mechanism to its initial inoperative condition.

5. In a fire extinguishing apparatus, a release, a mechanism for actuating said release, said mechanism requiring a predetermined time interval to effect the actuation of said release and temperature responsive means for setting said

mechanism in operation and for halting the operation of said mechanism and means for returning said mechanism to its initial inoperative condition, said last named means being connected for operation in conjunction with the operation of the means for halting said mechanism.

6. In a fire extinguishing apparatus, a release, a mechanism for actuating said release, said mechanism requiring a predetermined time interval to effect the actuation of said release, said mechanism including one element having a normal or initial inoperative position from which it is moved through a definite stroke to its final operative position and temperature responsive means for setting said mechanism in operation.

7. In a fire extinguishing apparatus, a release, a mechanism for actuating said release, said mechanism requiring a predetermined time interval to effect the actuation of said release, said mechanism including one element having a normal or initial inoperative position from which it is moved through a definite stroke to its final operative position and temperature responsive means responsive to temperature changes in a fire zone for causing said element to be moved from said initial position toward its final operative position or back to its initial position.

8. In a fire extinguishing apparatus, a release, a mechanism for actuating said release, said mechanism requiring a predetermined time interval to effect the actuation of said release, said mechanism including one element having a normal or initial inoperative position from which it is moved through a definite stroke to its final operative position and temperature responsive means responsive to temperature changes in a fire zone for causing said element to be moved from said initial position toward its final operative position or back to its initial position, said mechanism being operable repeatedly from or back to its initial position, in response to temperature changes in said fire zone.

9. In a fire extinguishing apparatus, a release, a mechanism for actuating said release, said mechanism requiring a predetermined time interval to effect the actuation of said release, said mechanism including one element having a normal or initial inoperative position from which it is moved through a definite stroke to its final operative position and temperature responsive means actuated by stored mechanical power and responsive to temperature changes in a fire zone for causing said element to be moved from said initial position toward its final operative position or back to its initial position.

10. In a fire control apparatus, a release, a movable element for actuating said release, means for moving said element temperature responsive means controlling the action of said moving means and a damping device for preventing the unrestricted movement of said element.

11. In a fire control apparatus, a release, a movable element for actuating said release, means for moving said element and a mechanical escapement for preventing the unrestricted movement of said element.

12. In a fire control apparatus, a release, a movable element for actuating said release,

means for moving said element, a mechanical escapement for preventing the unrestricted movement of said element and thermally responsive means for controlling the movements of said element.

13. In a fire control apparatus, a release, a movable element for actuating said release, a power actuated driving mechanism, means for coincidentally attaching said element to said mechanism to be actuated thereby and for causing said mechanism to operate and means for retarding the action of the devices in moving to position to operate the release.

14. In a fire control apparatus, a release, a movable element for actuating said release, a power actuated driving mechanism normally under tension for moving said element to releasing position, means for independently tensioning said element for movement to its initial or inoperative position, means for attaching said element to said mechanism to be operated thereby, means for retarding for a predetermined time the action of said mechanism in operating said element and means for releasing said mechanism for operation.

15. In a fire control apparatus, a release, means to operate said release temperature responsive means controlling said operating means and a damping device connected to said operating means for delaying the action of the same in effecting the release.

16. In a fire extinguishing system, means for releasing a fire extinguishing fluid, thermal devices for controlling said releasing means, said thermal devices operating on a predetermined rate of rise of temperature to produce an increase in pneumatic pressure for initiating the operation of said releasing means, and means operating on a decrease in said pneumatic pressure for halting the operation of said releasing means.

17. In a fire extinguishing apparatus, a fluid supply mechanism, means for operating said fluid supply mechanism and comprising a temperature responsive pressure producing element in a fire zone, a pressure responsive device connected therewith and means responsive to the continuous actuation of said pressure responsive device for a predetermined time for operating said fluid supply mechanism.

18. In a fire control apparatus, a release, means responsive to the occurrence of a predetermined temperature condition in a fire zone for actuating said release, said means including a mechanism for delaying the actuation of said release after the occurrence of said predetermined temperature condition and for a predetermined interval of time.

19. In a fire extinguishing apparatus, the combination with releasing means for the "fire extinguishing fluid of a thermal device controlling the same and operating on a prolonged change of temperature of definite duration and means for rendering said thermal device ineffective to bring the releasing means into operation when the change of temperature acting on said thermal device is of a comparatively temporary or transitory nature.

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