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FIRE DETECTOR APPARATUS.

APPLICATION FILED SEPT. 25, 1912.

1,143,970. Patented June 22, 1915.

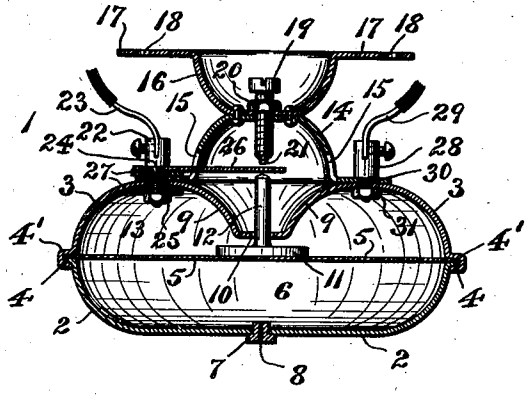


Fig. 1

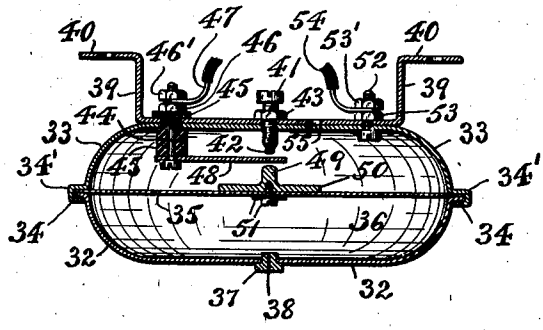


Fig. 2

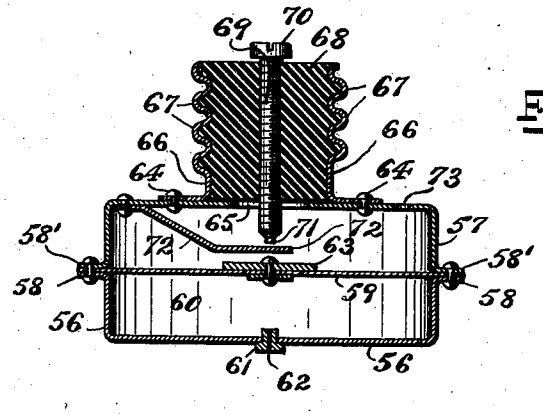


Fig. 3

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FIRE-DETECTOR APPARATUS.

1,143,970. Specification of Letters Patent. Patented June 22, 1915.

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To all whom it may concern:

Be it known that we, CHARLES H. KAYSER and WILLIAM H. HAMPTON, both citizens of the United States, residing at Orange, in the county of Essex and State of New Jersey, and at New York, county of New York and State of New York, respectively, have invented certain new and useful Improvements in Fire-Detector Apparatus; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The present invention relates, generally, to improvements in fire detector apparatus; and, the present invention has reference, more particularly to further improvements in electric fire-alarms and heat-indicating devices, such as are described in former Letters-Patent No. 1,016,268, dated February 6th, 1912.

The present invention, therefore, has for its purpose to provide a novel device or apparatus which automatically closes an electric circuit to sound an alarm, or operate other types of annunciators, when the device or apparatus is subjected to abnormal heat, but which maintains the said electric circuit interrupted or broken under a wide variation or fluctuation of normal temperature-conditions.

The present invention has for its principal object to provide in a device or apparatus of the kind above set forth, a compact and inexpensive construction in which is employed a diaphragm of maximum area, made of a suitable flexible material which is very sensitive to the sudden expansion of air in the air-chamber, said diaphragm, however, not forming of itself any part of the electric circuit in which the device is connected.

A further object of the invention is to provide in combination with said diaphragm, circuit-make and break devices of extreme simplicity, but which are easily regulated, so as to be properly controlled by the movement of the diaphragm.

With the various objects of the present invention in view, the said invention consists, primarily, in the novel heat or fire-detector device hereinafter set forth; and, the invention consists, furthermore, in the novel arrangements and combinations of the several devices and parts, all of which will be more fully described in the accompanying specification, and then finally embodied in the clause of the claim which is appended to and which forms an essential part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a longitudinal vertical section of the heat or fire-detector device made according to and embodying the principles of the present invention; and Figs. 2 and 3 are similar sectional representations of slightly modified forms of construction of the novel heat or fire-detector device, the same still embodying the principles of the present invention.

Referring now to the accompanying drawings, the reference-character 1 indicates a complete heat or fire-detector device made according to and embodying the principles of the present invention, the same comprising a shell-like body-portion composed of a lower body-section 2 and an upper body-section 3, the same being made preferably of sheet-metal. The said body-sections 2 and 3 are respectively provided with annular marginal flanges 4 and 4′, the flange 4′ of the said upper body-section 3 being bent or beaded around the periphery of the flange 4 of the lower body-section 2, thereby joining the two body-sections together. Clamped between the said flanges 4 and 4′ of the said lower and upper body-sections, so as to extend transversely between the latter, is a diaphragm-member 5, which may be made of any suitable resilient material or fabric which is air-proof, such for example as gold-beater's skin, parchment, rubber, oil-silk, or other similar material, and the same is constructed in such a manner that it closes over the lower body-section 2 and thereby provides beneath the said diaphragm, an air-chamber 6. The said diaphragm, being made of some light resilient material as above indicated, and presenting to the action of the expanding air, such a large receiving area, is readily sensitive to the sudden expansion of the air contained in said

chamber 6, caused by abnormal rises of temperature, and will quickly bulge or bend upward above said air-chamber and thereby operate suitable circuit-closing devices to be subsequently described.

The said lower body-section 2 is provided, in any convenient location, in its wall or shell with an air-vent means comprising a suitable block 7 which is provided with a perforation or vent 8 of very minute diameter. This air-vent means provides for the compensation of air-pressure within the air-chamber 6, during the course of normal fluctuations of temperature, which are generally slow or gradual in change, so that the slow expansion of the air in said air-chamber 6 will not operate or bulge out said diaphragm 5; but rather, the pressure of the air, due to such slow expension, will be relieved before operating said diaphragm by a portion of the air within said air-chamber venting itself through the said perforation or vent 8. When, however, the temperature rises quickly, or suddenly becomes abnormal, the expansion of the air within the said chamber 6 is too rapid to permit of the air to escape fast enough through the perforation or vent 8, and consequently the pressure of the rapidly expanding air bulges or presses upwardly the said diaphragm 5 and closes the make and break mechanism controlling the electric circuit in which the heat or fire-detector device is connected. The said upper body-section 3 is provided with a centrally depressed portion 9 which is formed with a centrally disposed hole or opening 10. Seated upon the upper side of said diaphragm 5 is the base-portion 11 of a lift-pin 12 which extends upwardly through and is guided by means of said hole or opening 10. Said hole or opening 10 further serves to permit the air contained in chamber 13 above said diaphragm 5 and formed by the upper body-section 3 to readily escape, when expanded, at all times, so as not to obstruct the upward movement of the diaphragm caused by the pressure in the air-chamber 6 beneath the same. Secured, in any suitable manner, upon the upper outer surface of said upper body-section 3, and so as to register above its centrally depressed portion 9, is a bridge or dome-piece 14, the same being provided in its walls with air-escape openings 15 and connected, in any suitable manner, with the upper end of said bridge or dome-piece 14 is a bracket or hanger-member 16, the flange 17 of which is provided with suitable holes or perforations 18 through which may be passed screws, or the like, for securing the fire-detector device to the wall or other place in which its functions are desired. Centrally disposed in a screw-threaded perforation in the wall of said bridge or dome-piece 14 is an adjustable contact-screw 19, the lower end of which projects within said bridge or dome-piece, and connected with said contact-screw 19 is a lock-nut 20 for the purpose of securely locking said contact-screw 19 in the desired adjusted position. The lower or contact end of said contact-screw 19 is preferably provided with a contact-piece 21, which may be made of platinum, or some similarly suitable material, said contact-screw 19 being in electrical contact with said dome-piece 14 and said upper body-section 3. Secured in connection with the wall of said upper body-section 3 is a binding-post 22 adapted to receive a wire 23 which forms a part of the electric alarm-circuit. Said binding-post is also provided with a screw-threaded shank 24 which passes through the body-section 3, so as to receive a nut 25 for securely holding said binding-post in place. Connected with said binding-post 22 is a spring contact-plate 26 which is electrically in contact with said binding-post 22, and extends forwardly so that its end registers beneath said contact-screw 19 and above said lift-pin 12, but which is normally out of contact with the said contact-screw 19. Said binding-post 22 and the contact-plate 26 are insulated from electrical contact with said dome-piece 14 and said body-section 3 by means of a sleeve and washers 27 of insulating material, such as fiber or hard rubber, which are interposed between the said parts, thus normally insulating said contact-plate 26 from said contact-screw 19.

Connected with said body-section 3 is another binding-post 28 also adapted to receive a wire 29 which forms a part of the electric alarm-circuit. Said binding post 28 is in electrical contact with the said body-section 3 and consequently is also in contact electrically with said contact-screw 19. Said binding-post 28 has a screw-threaded shank 30 which passes through the said body-section 3, so as to receive a nut 31 for securely holding the binding post in place.

When the device, constructed in a manner as hereinabove described, is subjected to excessive or a sudden rising of temperature, over and above the normal fluctuations of temperature of the place in which the device is located, the heat in striking the walls of the lower body-section 2, raises the temperature of the same and heats the air contained in the air-chamber 6, thus causing the air in said air-chamber to expand and press upwardly upon the diaphragm 5. The diaphragm will consequently bulge or bend upwardly, thereby lifting said lift-pin 12 and cause the same to bear or press upwardly upon the contact-plate 26, thus moving the latter into electrical contact with said contact-screw 19. As a result of such operation, the electrical current is bridged across the break between the respective wires 23 and 29, whereupon the alarm or annun-

ciator is operated at its station to indicate and locate the existence of fire or abnormal temperature-conditions.

Referring now to Fig. 2 of the accompanying drawings, there is illustrated thereby a slightly modified construction of fire-detector device, made according to and embodying the principles of the present invention. In this construction, the fire-detector device comprises a lower body-section 32 and an upper body-section 33, each section being preferably made of sheet-metal, and said sections being further provided with annular flanges 34 and 34′, respectively, the said annular flange 34′ being bent or beaded around the periphery of the flange 34, thereby joining the two body-sections securely together. Clamped between the said flanges 34 and 34′, so as to extend transversely between the said body-sections 32 and 33, is a diaphragm-member 35, the same being made of any resilient air-proof material or fabric, as above indicated, the said diaphragm 35 being disposed within the body-section 32, so as to provide beneath said diaphragm 35, an air-chamber 36. Connected in the wall of the body-section 32, so as to operatively communicate with said air-chamber 36, is an air-vent means provided for the purposes above indicated in describing the construction of Fig. 1, said air-vent means comprising a block 37 having a perforation or vent 38 of very minute diameter. Connected with said upper body-section 33, in any suitable manner, is a hanger or bracket-member 39, the same having perforated flanges or lugs 40, through which screws, or other fastening means, may be passed to suspend said device in the place wherein it is desired to use the same. Centrally disposed in a screw-threaded perforation in the wall of said upper body-section 33, provided for the purpose, is an adjustable contact-screw 41, the lower end of which is provided with a contact-piece 42 made of platinum or other suitable material, said contact-screw projecting inwardly within the interior of said upper body-section 33. A lock-nut 43 is provided, whereby said contact-screw may be locked in any desired adjusted position. Said contact-screw is also in electrical contact with said upper body-section 33.

Secured in connection with the wall of said body-section 33 is a binding-post 44, the same being insulated from electrical contact with said body-section, however, by means of an insulating sleeve and washer 45. Said binding-post is provided with nuts 46 and 46′, at its outer end, which serve both to secure the binding-post in place and also to connect therewith a wire 47 which forms a part of the alarm or annunciator-circuit in which the device is connected. The inner end of said binding post, 44, and the insulating sleeve 45 project within the interior of said body-section 33, and connected mechanically and electrically with the inner end of said binding post 44 is a contact-plate 48, which extends forwardly so as to register beneath said contact-screw 41, but normally is away from electrical contact therewith. Connected with said diaphragm 35 is a lift-pin 49, the base 50 of which is preferably secured to said diaphragm by means of a screw and washer 51, so that the position of said lift-pin is always normally maintained in registration beneath said contact plate 48, and so that when said diaphragm is bulged upwardly by the expansion of air within the air-chamber 36, it will carry said lift-pin into lifting engagement with the contact-plate 48, and consequently will lift or move the latter upwardly into electrical contact with the contact-screw 41. Connected with the wall of said body-section 33, and maintained in electric contact therewith, is another binding-post 52, the outer end of which is provided with nuts 53 and 53′ which serve both to secure said binding-post in place, and also to connect therewith a wire 54, which also forms a part of the electric alarm or annunciator-circuit with which the fire-detector device is used. The wall of said body-section 33 is further provided with a hole or opening 55 which serves to freely permit the escape of air from within the body-section 33 and from above the diaphragm 35, so as not to interfere with the operation of the latter when pressed upwardly by the expansion of the air in the chamber 36.

The operation of the device thus described, is substantially the same as that of the device shown in Fig. 1 of the drawings.

Referring now to Fig. 3 of the drawings, there is illustrated therein still another modification of the novel construction of fire-detector device embodying the principles of the present invention. In this form of construction, there is provided a lower body-section 56 and an upper body-section 57, each section having an annular flange 58 and 58′, respectively, whereby the said body-sections may be fastened together by means of rivets, or any other suitable fastening means. Clamped between the said flanges 58 and 58′, so as to extend transversely between the said body-sections 56 and 57, is a diaphragm-member 59, the same being made of any resilient air-proof material or fabric, as above indicated. The said diaphragm 59 is so disposed within the body-section 56, that beneath said diaphragm 59 an air-chamber 60 is provided.

Connected in the wall of said lower body-section 56, so as to operatively communicate with said air-chamber 60, is an air-vent means provided for the purposes above indicated in describing the construction of

Fig. 1, said air-vent means comprising a suitable block 61 having a perforation or vent 62 of very minute diameter. Connected with said diaphragm 59 and fastened thereto in any suitable manner is a lift-disk 63, and secured, by means of rivets 64 or any other suitable fastening means, to the upper body-section 57, and registering over the centrally disposed opening 65 of the latter, is a cylindrical metallic shell 66, formed to provide exterior screw-threads 67 for screwing the device into an ordinary socket-connection, such as the ordinary incandescent electric lamp-socket. The interior of said cylindrical shell 66 is filled with insulating material 68, and the latter is provided with a centrally disposed screw-threaded opening adapted to receive an adjustable contact-screw 69, the head 70 of which projects above the insulating material, so that, when the cylindrical shell 66 is screwed into the lamp-socket, the said head will be brought into electrical contact with the one pole or terminal of the lamp-socket. The lower end of said contact-screw projects through the opening 65, into the interior of said upper body-section 57, and is provided with a contact-piece 71, preferably made of platinum.

Connected both electrically and mechanically with said upper body-section 57, so as to be arranged within the interior of the same, is a spring-like contact-plate 72, the free end of which extends beneath the end of said contact-screw 69, but normally is away from electrical contact therewith, and above said lift-disk 63 of the diaphragm 59. Said contact-plate 72 is in electrical contact with the other pole or terminal of said lamp-socket which receives the screw-threaded cylindrical shell 66, and which electrically contacts with the said upper body-section 57. Thus said contact-screw 69 and said contact-plate 72 are normally separated and electrically insulated from each other. When, however, the air within the air-chamber 60 expands so as to bulge or bend upwardly the said diaphragm 59, said lift-disk 63 is carried into contact with said contact-plate 72 and exerts thereupon an upwardly moving pressure which carries said contact-plate into electrical contact with said contact-screw 69, and thereby closing the electrical alarm-circuit in which the device is connected by means of the ordinary lamp-socket which also serves to suspend the same. It will also be apparent that in using this form of fire-detector construction, the device may be suspended in any position, it being unnecessary that the diaphragm be maintained in a horizontal plane. The said upper body-section 57 is also provided in its wall with a hole or opening 73 which serves to freely permit the escape of the air from within the body-section 57 and from above the diaphragm 59, so as not to interfere with the operation of the latter when pressed upwardly by the expansion of the air in the air-chamber 60.

Having thus described our invention, we claim:—

In a device of the kind described, a hollow shell comprising an upper body-section and a lower body-section each having marginal flanges, a flexible diaphragm extending transversely between said body-sections and clamped between the marginal flanges thereof, a lift-means connected with said diaphragm, said lower body-section providing an air-chamber beneath said diaphragm, a compensating vent-means connected with said lower body-section provided with a vent of minute diameter communicating with said air-chamber, said upper body-section having an opening providing a quick relief for the air from within said upper body-section and above said diaphragm, and an electrical circuit make and break means connected with said upper body-section comprising an adjustable contact-screw and a spring-like contact-plate, the free end of which extends between said contact-screw and said lift-means, the same being electrically insulated from each other, and means for connecting in an electrical circuit said contact-screw and said spring-like contact-plate.

In testimony, that we claim the invention set forth above we have hereunto set our hands this 23rd day of September, 1912.

CHARLES H. KAYSER.
WILLIAM H. HAMPTON.

Witnesses:
GEORGE D. RICHARDS,
ADOLPH HANSEN.