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W. KAGAN

2,585,656

THERMOSTATIC HEAT AND FIRE CONTROL

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FIG. 1.

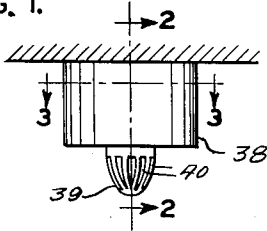


FIG. 2.

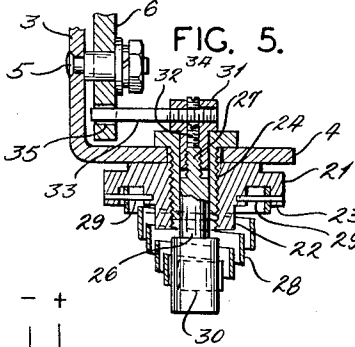
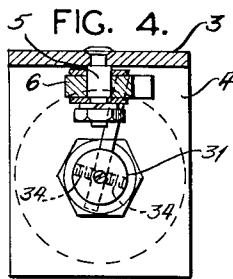
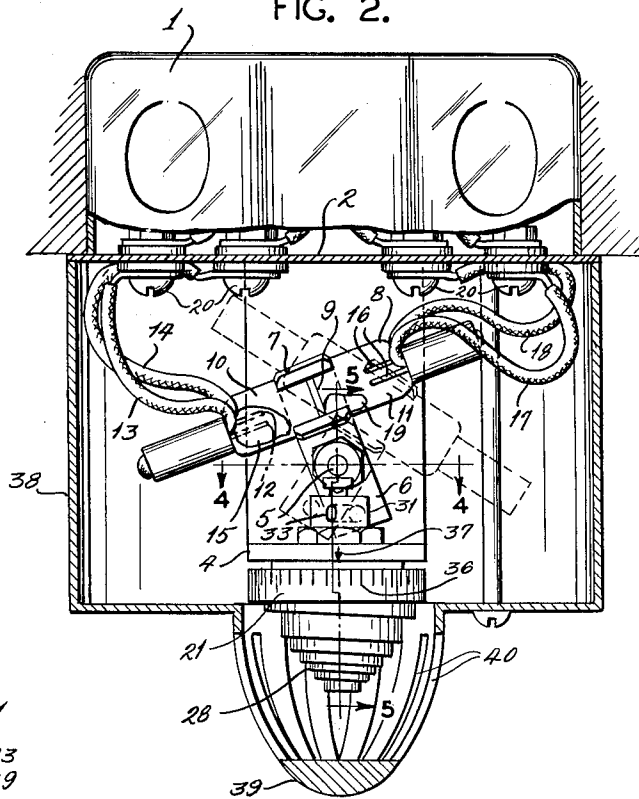


FIG. 3.

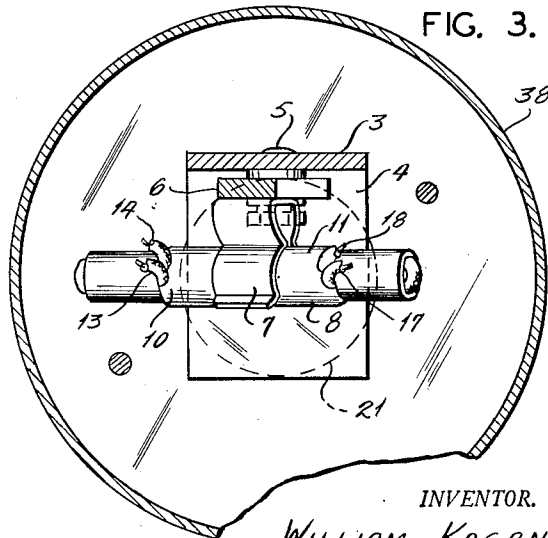
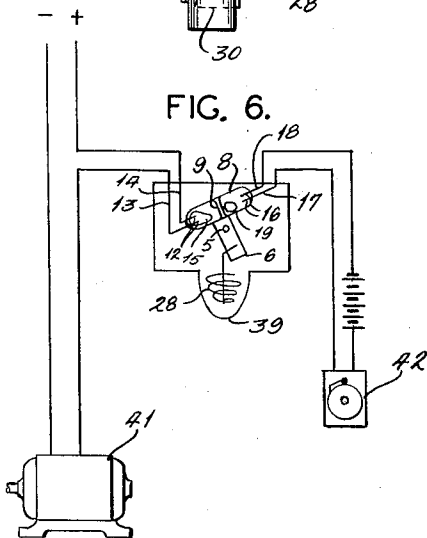


FIG. 6.



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UNITED STATES PATENT OFFICE

2,585,656

THERMOSTATIC HEAT AND FIRE CONTROL

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1 Claim. (Cl. 297—16)

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This invention relates to thermostatic heat and fire control devices, for furnaces and fire alarms, for use upon and in connection with a furnace of any kind, and this invention constitutes an improvement upon my co-pending application, Serial Number 138,327, as filed under date of January 13, 1950, now Patent No. 2,567,112, September 4, 1951.

The main object of this invention is to provide an automatic heat and fire control device for mounting at or upon a furnace of any usual type, such as a coal, oil or gas furnace, where the fuel as fed into the furnace is automatically regulated by electrically operated means for maintaining a constant and regular flow of heat, said heat and fire control device including thermostatically operated means for opening the electrical circuit at one side, for cutting off the flow of fuel into the furnace, and for simultaneously closing an electrical circuit at the other side, for sounding or operating an alarm of any usual kind, in the event of the generation of excess heat in the furnace.

Another object of the invention is to provide a thermostatically controlled and electrically and thermostatically operated device or unit for mounting at, and preferably immediately above, a furnace or other heat generating apparatus, for the purpose of automatically opening the electrical circuit of the unit in the event of the temperature of the surrounding area either rising to an excess degree, and for simultaneously operating or sounding a conventional type of alarm, for warning people in the vicinity.

With the stated objects in view, together with such other and additional objects and advantages as may be disclosed in the following specification and claim, attention is now directed to the accompanying drawing as exemplifying a preferred embodiment of the invention and preferred structural features thereof, and wherein:

Figure 1 is a side elevation of a control device embodying this invention, shown mounted on a ceiling,

Figure 2 is an enlarged section on line 2—2 of Fig. 1,

Figure 3 is a similar section on line 3—3 of Fig. 1,

Figure 4 is a horizontal section of the supporting bracket taken on line 4—4 of Fig. 2,

Figure 5 is a detail section on line 5—5 of Fig. 2, and

Figure 6 is a diagram showing the electric circuit connection of the device when installed for use.

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The device illustrated is designed for mounting on any suitable base such as on a standard outlet box for electric wiring. Such boxes are at present thoroughly standardized as to the mounting dimensions of fittings to be assembled with them and, while such dimensions may be changed from time to time, the current standard at any given time is well established and known throughout the wiring art. In the accompanying drawing 1 designates such a standard ceiling outlet box. A plate 2 is formed to provide a cover for the box 1 and is attached thereto by the standard fasteners, not shown, provided for such attachment. Said plate 2 provides a base for the control device in accordance with this invention.

Secured to the plate 2, as by welding or otherwise, is an angle bracket having a vertical leg 3 and a horizontal leg 4. Pivoted on a stud 5 secured to the vertical leg 3 is a switch-supporting bracket 6. This bracket is provided with a spring clip 7 adapted to grip and support a mercury switch whose tube is indicated at 8. This tube has a partition 9 in its middle dividing the interior thereof into two compartments 10 and 11. Within the compartment 10 and at the end of the tube 8 is a pair of contacts 12 to which flexible conductors 13 and 14 are connected. A mercury globule 15 in the compartment 10 bridges the contacts 12 when the tube is in the full-line position shown in Fig. 2. Similarly, in the other compartment 11 and at the other end of the tube is a pair of contacts 16 to which flexible conductors 17 and 18 are connected and a mercury globule 19 bridges these contacts when the tube is rocked to the dotted-line position in Fig. 2. Thus, when the tube is rocked on the pivot 5 the circuit of one pair of contacts is opened and the other is closed. The conductors 13, 14, 17 and 18 are connected, one to each of a set of terminals 20 mounted on, and extending through the plate 2, but insulated therefrom, in the usual manner, so that the circuit wires may be connected to these terminals within the outlet box 1.

Mounted on the other leg 4 of the supporting angle bracket is a thermostat adapted to control the position of the switch tube 8. A disc 21 having a central hub portion 22 is provided at its periphery with an annular flange 23. The hub 22 has a threaded bore adapted to receive a threaded stud 24 passed through a perforation in the leg 4 of the supporting bracket. The head 25 of this stud engages the upper face of said bracket to clamp the disc 21 thereto. The stud

24 has an axial bore in which is journaled a shaft 23 having a reduced, threaded portion 27.

A bi-metallic, thermostatic member 28 is wound into spiral form and has its outside convolution seated within the flange 23, as shown in Fig. 5, and secured to said flange as by one or more pins 23. Thus, the element 28 is fixed to the disc 21. The inner end 30 of the element 28 is seated in a slot, not shown, in the lower end of the shaft 25 in a well known manner, so that said shaft will be caused to rotate as the element 28 expands or contracts in response to changes of temperature. The upper end of this shaft has attached thereto a head 31 having a shank extending into the bore of the stud 24. This head has a threaded axial bore adapted to receive the threaded portion 27 of the shaft 26. A set screw 32, in said threaded bore, may be tightened against the end of the shaft 26 to lock said head and shaft in any angular relation to each other. The head 31 also has a transverse bore adapted to receive an operating arm 33. The latter may be secured in any adjusted position in said bore by one or more set screws 34 threaded in the head 31.

The arm 33 extends into a clearance hole 35 in the lower end of the pivoted bracket 6 as shown in Fig. 5. This provides a connection whereby the movement of the shaft 26 causes the bracket 6 to rock on its pivot to rock the switch 8. The movement of the switch in response to the action of the thermostatic element 28 may be adjusted as desired by means of two adjustments. The head 31 may be adjusted in rotation relatively to the shaft 26 by loosening the set screw 32 (having first removed the arm 33), rotating the head on the shaft, and again tightening the screw 32. The disc 21 may also be adjusted by first loosening the stud 24, turning the disc on the supporting bracket, and retightening the stud. A scale 36 may be provided on the disc 21 for cooperation with an index 37 on the support to aid in making this adjustment.

A cover for the device is provided as shown in Fig. 2. This may be a casting of metal such as aluminum or other suitable material and is formed with a cup-shaped portion 38 which incloses the switch and its operating mechanism, and has an extension 39 provided with lowers 40 to admit the atmosphere thereto. This extension houses the thermostatic element 28 but permits ample access of the surrounding air thereto to permit the element 28 to follow closely the variation in temperature of such air. It will be noted that since the thermostat is mounted on the outer part of the supporting bracket it is in a position to project into the extension 39 or as to be accessible for contact with the air from all sides.

In the use of this device it is mounted on an outlet box, such as shown at 1 which box may be part of a wiring system. It is preferably mounted directly over a furnace or furnace pipe or other source of heat which may become dangerously hot. As indicated in the diagram of Fig. 6, the conductors 13 and 14 may be connected in the power circuit of the furnace or other heat generating apparatus, the power appliances thereof being represented in the diagram by the motor 40, while the conductors 17 and 18 are connected to control

the circuit of an alarm 42 of any switch type. If now the temperature of the air surrounding the element 28 should rise to a dangerous value for which said element set, the expansion of said element will rotate the shaft 26 thereby causing the arm 33 to swing on said shaft as a pivot. The engagement of the arm 33 with the bracket 6 at the hole 35 will then swing the bracket 6 and the switch 8 to dotted-line position of Fig. 2. This causes the mercury globule 15 to flow away from the contacts 12 and thereby opens the circuit to the motor 40 to stop the operation of the furnace or other heat generator. At the same time the globule 19 flows to the right hand end, Fig. 2, of the tube 8, which end is now lowermost. This globule thus bridges the contacts 16 and thereby closes the circuit to the alarm 41 to give warning of the dangerous condition.

It will be seen that this invention provides a safety control device of novel construction which, when mounted over a heat generator of any kind has its thermo-sensitive element in such a position that the air in the vicinity of such generator may flow to it from all sides. Said element will, therefore, follow closely variations in the temperature of such air. When this temperature becomes too high the simple mechanism described is brought into action to stop the generator and sound an alarm to give warning of the dangerous condition.

I claim:

In a safety control device of the character described, a thermostat comprising, a supporting disc having a hub portion and an annular peripheral flange, said hub-portion having a threaded bore, a clamping stud threaded to fit said bore and having a head engageable with a support to secure said disc thereto, said stud having an axial bore, a shaft journaled in said bore of said stud and having a threaded portion, a spirally-arranged thermostatic element having its outer portion seated in said flange and secured thereto and its inner portion operatively engaging said shaft to rotate the latter in accordance with variations in temperature, a head having a shank journaled in said bore of said stud and an internal thread receiving the threaded portion of said shaft, and a locking screw in said internal thread engageable with said shaft to lock said head in any angular position relative to said shaft.

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