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ELECTRIC MOTOR FOR FURNACE REGULATORS

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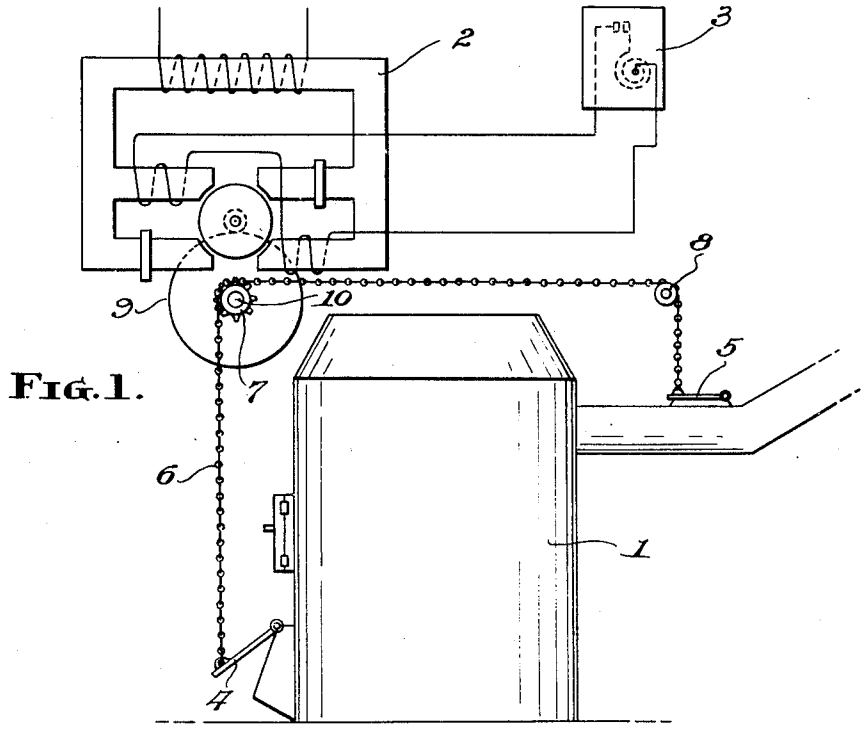


FIG. 1.

FIG. 2.

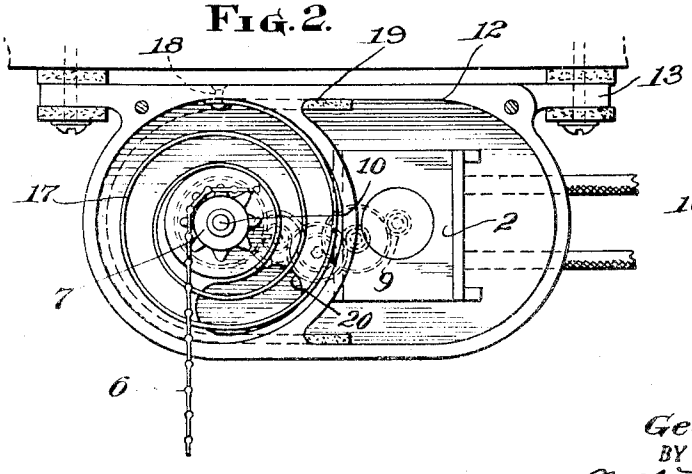
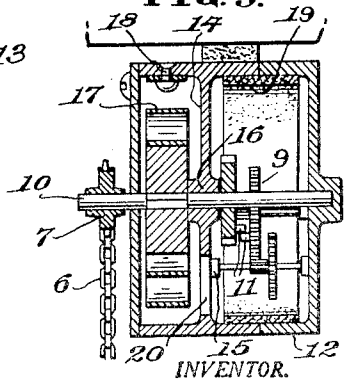


FIG. 3.



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ELECTRIC MOTOR FOR FURNACE REGULATORS

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2 Claims. (Cl. 172—36)

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The present invention relates to electric motors, and more specifically to electric motors of the type employed in controlling the flow of air through solid fuel burning furnaces, said motor, in turn, being controlled by the action of a thermostatic switch.

In the past, numerous control systems of this general character have been used in conjunction with furnaces, wherein the draft door of a furnace is opened by the energization of an electric motor acting in response to a room thermostat. In such systems, a spring is generally employed to return the draft door to a closed position when the motor is deenergized through the opening of the thermostatic switch. Numerous objections to devices of this character have arisen through the failure of the spring, and the consequent damage arising from such failure. It will be manifest that springs of this type must completely recycle the associated motor through its complete rotation as well as actually exerting a closing force upon the draft door or a connecting train mechanism. The disadvantages of such systems are apparent, when realizing the atmospheric conditions in which they must function. The usually damp atmosphere normally present in a basement tends to corrode a spring of this nature with the result of failure due to breakage or sufficient weakening of the spring of a degree so as to impair its resiliency. It will be understood that if the spring fails in any respect to close the draft door of a furnace, once it is opened by the motor, serious damage may result from overheating.

To overcome this difficulty, the present invention contemplates the use of a reversible motor, which under ordinary operating conditions serves to both open and close the draft door of a furnace, and in addition to such motor, a spring is employed to close the draft door in the event of an operational failure within the motor.

The electric motor embodied in the present invention is of the reversible shaded-pole type which is set forth in Patent No. 2,134,685, issued jointly to the applicant under date of November 1, 1938, and this invention is an improvement thereon.

In the furnace control system set forth in the above mentioned patent, it will be seen that the opening and closing of the draft door of an associated furnace is controlled entirely by the reversible electric motor, which in turn is controlled by the action of a room thermostat. It will be manifest, that in the event of a power failure, such as would result from a blown fuse

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or broken wire, the motor would fail to function properly, and if such failure resulted while the draft door was open, serious damage might result from the overheating of the furnace.

It is therefore an object of this invention to provide in a furnace control system, a reversible motor embodying a spring adapted to normally cooperate with the motor during its draft-closing cycle, and adapted, under emergency conditions arising from a power failure within the motor, to recycle the motor through its full rotation and consequently accomplish the draft-closing action thereof.

It is another object of the present invention to provide improved means for supplying sufficient lubrication to the electric motor and to its associated spring, whereby each are protected against corrosion caused by the usually damp atmosphere of a basement in which such a system is normally contained.

These and many additional objects and advantages of the present invention will become more apparent with reference to the following description and accompanying drawing, wherein:

Fig. 1 is a diagrammatic plan view, partially in elevation, disclosing the operational relation of the various parts of a furnace control system embodying the present improved electric motor;

Fig. 2 is an enlarged front elevational view, partially in vertical section, of the motor disclosing the emergency spring;

Fig. 3 is a vertical sectional view taken along the line 3—3 of Fig. 2.

Referring now to Fig. 1 of the drawings, which depicts, in diagrammatic form, a system wherein the flow of air through a furnace 1 is controlled ultimately by a reversible electric motor 2 acting in response to a thermostatic switch 3. The furnace 1 is provided with a draft door 4 and a damper door 5, both of which are hingedly mounted. A lightweight flexible chain 6, of the type normally associated with manual control systems, is linked at its respective ends to each of these doors. The intermediate portion of the chain is passed over a sprocket 7 which is driven at relatively slow speeds by the reversible motor 2. It will be understood that it is necessary to position guide rollers 8 at intermediate points so as to direct the chain to its three functional points in a manner to insure smooth operation.

The electric motor 2, as heretofore generally described, and set forth in detail in Patent No. 2,134,685, is a reversible shaded-pole type induction motor, and in the present embodiment drives a series of speed-reducing gears 9, which

gears in turn drive a shaft 10 which carries the sprocket 7 at its outer end. Two of the gears 9 in the speed-reducing train are provided with relatively engageable studs 11 which serve as limit stops for the rotation of the motor and, consequently, the rotation of the sprocket 7.

As noted in Figs. 2 and 3, the motor and gears are housed within a casing 12 which is provided with the supporting flanges 13 which are adapted to be attached to the ceiling or studding of a basement. The casing is divided substantially in half by a longitudinally extending web 14 which web is formed with suitable end bushings 15 for the reception of the ends of the various gear shafts accompanying the reduction train. The web is further provided with a bearing 16 through which the sprocket shaft 10 extends. The inner compartment of the casing receives the motor 2 and the accompanying gear train, while the outer casing serves as a housing for a helical spring 17. This spring is secured at one of its ends, as at 18 to the inner wall of the casing, and at its opposite inner end to the shaft 10. Referring to Fig. 2, it will be seen that the spring is positioned so as to contract with the clockwise motion of the sprocket gear, which motion serves to open the draft door 4 of the furnace.

It will be understood that the studs 11 are positioned upon their respective gears so as to engage with one another upon a predetermined cycle of rotation, both in a counterclockwise and clockwise direction. The chain 6 is positioned upon the sprocket 7 so as to have the draft door in a completely closed position, with the damper door 5 in an open position, when the studs 11 are engaged in their counterclockwise limits. The opening cycle of the motor is such that the relative travel of the chain upon the sprocket 7 is sufficient to open the draft door to its fullest extent, and at the same time completely closing the damper door 5. Under ordinary conditions, the operation of these doors both in closing and opening is controlled by the forward and reverse motion of the shaded-pole motor 2. However, it will be noted that, should a power failure result within the motor, the helical spring 17 will recycle the motor through its complete counterclockwise motion, and consequently will close the draft door 4.

Referring again to Fig. 3 of the drawing, for the purpose of maintaining lubrication within the gear train and within the helical spring 17, an arcuate lubricant-receiving pad 19 is positioned substantially around the inner walls of the casing of the inner compartment and surrounding the gear train. The center web 14 of the casing is provided with an opening 20 which serves to communicate the two compartments. As the electric motor serves to generate a certain amount of heat at all times, due to its stalled condition, the lubricant within the pad 19 will be partially vaporized and will pass from the inner compartment to the forward spring compartment whereupon the vapor will substantially condense upon the helical spring to afford sufficient lubrication thereto.

It will be manifest that the spring, in the present construction, serves only as an emergency means for the closing of the draft door, in the event of power failure within the motor, such as may be caused by a blown fuse or broken wire. In normal operation, both the opening and closing cycle is accomplished by the electric motor independently of the spring.

In view of the foregoing, it will be noted that the present invention contemplates a highly improved electrical governor for actuating furnace controls, and in addition, is provided with emergency spring means which precludes the normal hazards accompanying such systems. Also, the lubricant pad serves as an efficient means whereby the motor mechanism and spring will at all times receive the necessary lubrication to maintain the same in operating condition, and prevent the various parts from rusting or otherwise corroding and consequently becoming inoperative due to breakage or loss of resiliency. The present invention is further characterized by its simplicity of construction, its operational efficiency, and its economy in manufacture.

I claim:

1. In a furnace control system of the character described, a housing formed with a pair of separate but communicating compartments, a reversible and stallable electric motor carried in one of the compartments of said housing, a rotatable shaft driven by said motor and extending through both of the compartments of said housing, a helical spring positioned in the other compartment of said housing and attached at one of its ends to said housing and at its opposite end to said driven shaft, whereby to resiliently urge rotation of said shaft in one direction only, and a lubricant-absorptive pad arranged within the first-named compartment of said housing in close proximity to said motor for supplying a lubricant in a substantially vaporized state to the separate compartments of said housing when subjected to heat generated upon energization of said motor.

2. In an electrical governor for furnace controls, a housing formed with a pair of separate but communicating compartments, an electric motor and driven gear train arranged in one of the compartments of said housing, a rotatable shaft driven by said gear train and extending through both of the compartments of said housing, a spring mounted within the opposite compartment of said housing and cooperating with said shaft to urge rotation thereof in one direction, and a lubricant-absorptive member positioned within the first-named compartment of said housing in close proximity to said motor for supplying a vaporized lubricant to both of the compartments of said housing when subjected to heat generated upon energization of said motor.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,969,733	Drake	Aug. 14, 1934
2,334,447	Shaw	Nov. 16, 1943