

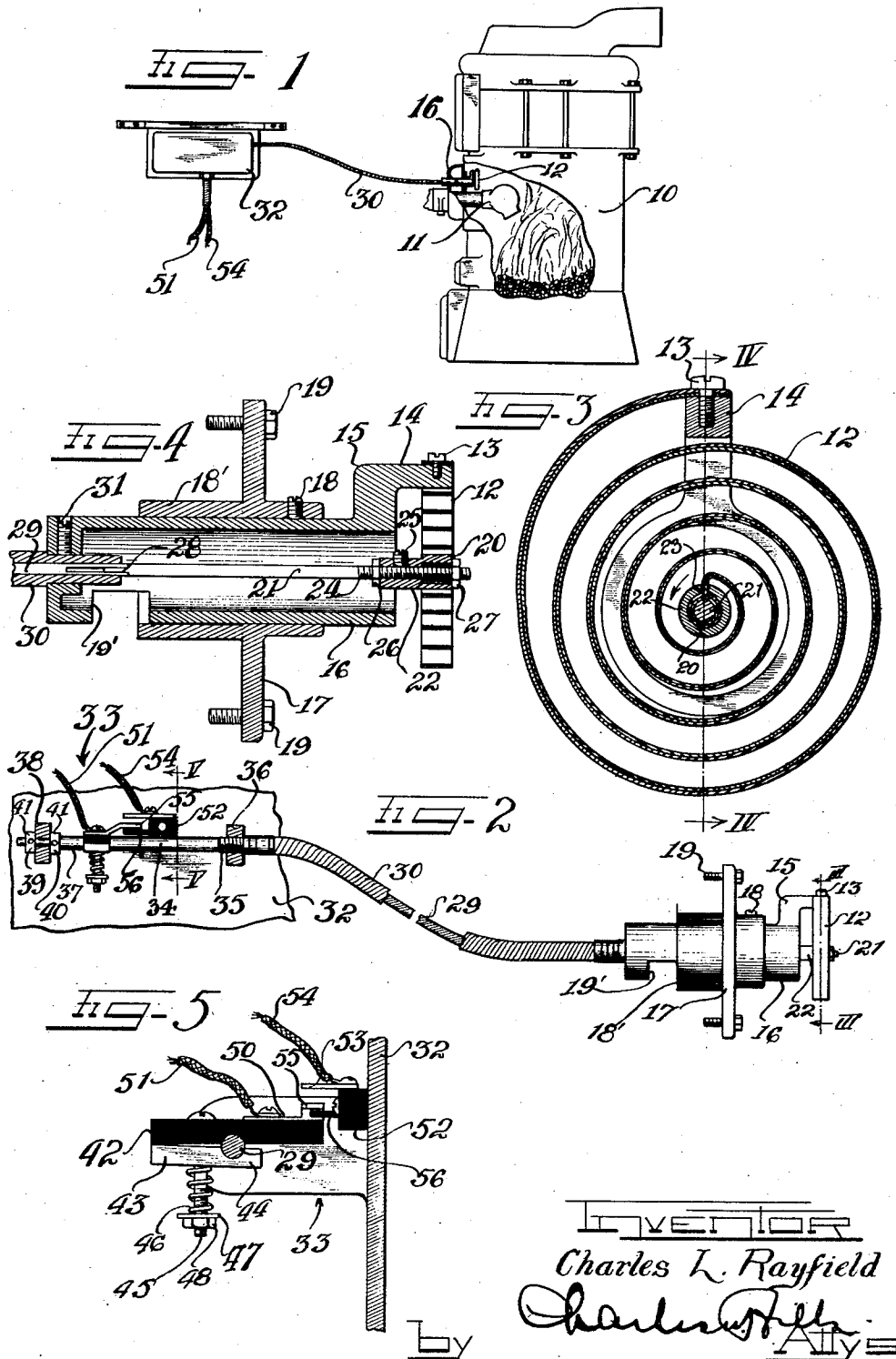
Dec. 23, 1930.

C. L. RAYFIELD

1,785,787

THERMOSTATICALLY OPERATED DEVICE

Filed Sept. 15, 1927



UNITED STATES PATENT OFFICE

CHARLES L. RAYFIELD, OF CHICAGO, ILLINOIS, ASSIGNOR TO RAYFIELD MANUFACTURING CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

THERMOSTATICALLY-OPERATED DEVICE

Application filed September 15, 1927. Serial No. 219,651.

The present invention relates to thermostatic operating mechanism, and more particularly to a thermostatically operated flexible shaft.

5 An object of the present invention is to provide a novel thermostatic construction for imparting a rotary movement to a flexible shaft or the like.

10 Another object of the present invention is to provide means for connecting a clockspring-like thermostat to a flexible shaft in such a manner that the thermostat upon being actuated will impart a rotary movement to the shaft.

15 Other objects and advantages of my invention will more fully appear from the following detailed description taken in connection with the accompanying drawing, which illustrates a single embodiment thereof and
20 in which:

Figure 1 is a fragmentary elevation illustrating an application of my invention wherein the thermostat is disposed in a furnace adjacent an oil burner;

25 Figure 2 is a fragmentary elevation, partly in section and drawn to an enlarged scale, of the thermostat and its connection to the flexible shaft, as well as the connection between the shaft and a movable switch element;

30 Figure 3 is an enlarged sectional view of the clockspring-shaped thermostat taken on substantially the line III—III of Figure 2 looking in the direction indicated by the arrows;

35 Figure 4 is a sectional view taken on the line IV—IV of Figure 3 and illustrating the mounting for the thermostat and the connection between the thermostat and an end of the flexible shaft, and

40 Figure 5 is an enlarged detail sectional view taken on substantially the line V—V of Figure 2 illustrating the connection between an end of the flexible shaft and a movable switch element.

45 In the drawing:

Like reference characters designate similar parts throughout the several views. The numeral 10 designates generally a furnace which may be of the oil burner type and into
50 which extends a burner nozzle 11. Posi-

tioned adjacent the burner nozzle 11 and disposed within the furnace is a thermostat 12 embodying the features of the present invention. This thermostat, as shown in Figure 3, comprises a strip of metal bent into a spiral shape resembling that of a clockspring. This strip is preferably made of any conventional type of thermostatic metal.

One end of the thermostat 12 is anchored by means of a bolt 13 to the lateral end 14 of an extension 15 secured to a tubular member or sleeve 16. Mounted upon the periphery of the sleeve 16 is a plate 17 which is adjustably secured to the sleeve 16 by means of a setscrew 18. This plate 17 may be secured to the wall of the furnace through the means of the bolts 19.

Formed integral with plate 17 is a hub portion 18' disposed over and concentric with sleeve 16. The free end of the hub portion is positioned adjacent a slot 19' in the sleeve 16. This slot permits of air circulating through the sleeve to cool coil 12. Now obviously by adjusting the position of the plate 17 axially on tube 16, it is possible to move the hub portion 18' relative to slot 19' and thus vary the size of the opening afforded by slot 19' to the circulating air. This in turn results in the amount of air circulating through the sleeve being varied and thus determines the degree to which the coil 12 will be cooled by the circulating air.

The other end of the thermostat 12 is bent into a circular shape 20 and is disposed about the periphery of a shaft 21. Disposed about the circular end 20 of the thermostatic strip is a split collar 22. The thermostatic strip extends through the slit or slot 23 of this split sleeve or collar 22. The collar 22 is disposed on the threaded end of the shaft 21 and is adjustably secured thereto by means of a setscrew 25. One end of the collar 22 abuts the nut 26 on the threaded end 24 of shaft 21 and the other end of the collar abuts nut 27 threaded on this same end of the shaft. These two nuts permit of the axial adjustment of the collar 22 on the shaft 21 so as to enable the thermostat 12 to be properly aligned with the lateral end 14 of the extension 15.

The shaft 21 extends through the bore of

the sleeve 16 and has its other end provided with a reduced portion 28 which is coupled to a flexible shaft 29 so that the two shafts 21 and 29 will rotate together. This flexible shaft 29 may be of any conventional construction and is preferably disposed inside of a flexible conduit 30, one end of which extends into the bore of the sleeve 16 and is fastened to the sleeve by means of a setscrew 31.

The other end of the flexible shaft 29 extends into a switch housing 32 in which is disposed a switch designated generally by the reference character 33. The end of the conduit associated with this end of the shaft has formed integral with it a tube 34 provided with a threaded portion 35 threaded into an extension 36 secured to the interior side of the casing wall. Also disposed about this end of the shaft 29 is a small piece of tubing 37 spaced from the end of the tube 34. The extreme end of the shaft 29, as shown in Figure 2, is rotatably mounted in an extension or bracket 38 secured to the interior side of the casing wall. This shaft is held in place in the bracket by means of a pair of collars 39 and 40 which may be secured to the shaft by setscrews 41.

The portion of the shaft 29 disposed between the ends of the adjacent spacing tubes 34 and 37 has connected to it an insulation block 42 and a clamping plate 43. Each of these two members is provided with an arcuate shaped groove 44 through which extends this portion of the shaft. The clamping plate 43 resiliently clamps the shaft 29 to the insulation block 42 through the means of a spring urged bolt 45. The bolt extends through the block 42 and the plate 43 and has surrounding it a compression spring 46 positioned between the plate 43 and a washer 47 held in place by means of a nut 48 threaded on the end of the bolt. This spring 46 functions to at all times urge the plate 43 toward the block 42. Secured to the block 42 is a switch contact 50 having connected to it an electrical conductor 51.

The wall of the casing 32 has secured to it a block of insulation 52 to which is fastened a switch contact 53 (Figure 5) cooperable with contact 50. The two contacts 50 and 53 comprise parts of the switch 33. Secured to this contact 53 is an electrical conductor 54. The contact 50 has a lateral extension 55 adapted upon rotation of the block 42 to strike the contact 53 and thus establish an electrical connection between the two conductors. Normally this extension 55 abuts the lateral insulation lug 56 secured to block 52.

Now it will be evident that when the thermostat 12 is exposed to a predetermined heat, it will expand and cause the shaft 21 to move in the direction indicated by the arrow in Figure 3. This rotation of the shaft results in the clamping plate 43 and the block 42 moving therewith until the lateral extension 55 of the

contact 50 strikes the switch contact 53. Thereafter the shaft rotates without turning these two members.

After an operation of the thermostat 12, it will, upon cooling and returning to its normal position, move the block 42 and the clamping plate 43 back to their normal positions, thus breaking the connection between the two conductors 51 and 54.

Some of the principal advantages of the clockspring-like thermostat 12 are that it is relatively compact; it is capable of a relatively great amount of movement upon each operation thereof, and it is adapted to efficiently impart a rotary movement to a shaft or the like. Then, too, it is simple to make and is economical to manufacture in large quantities.

Another advantage of my compact coil thermostat is that all the turns of it are subjected to substantially the same degree of heat due to the fact that they are disposed within each other and in substantially the same vertical plane. Moreover, the adjustable plate, as previously described, permits of the ready variation of the amount of air circulating through tube 16, thus enabling to a certain extent, a control of the atmospheric conditions surrounding the coil 12.

Now, of course, I desire it understood that although I have illustrated and described in detail the preferred form of my invention, the invention is not to be thus limited, but only in so far as defined by the scope and spirit of the appended claims.

I claim as my invention:

1. In a thermostatically operated device, the combination of a tubular member, a rotary member extending through said tubular member, a thermostat coil having its outer end secured to said tubular member and its inner end secured to said rotary member, a support for said tubular member comprising a sleeve in which said tubular member is axially shiftable, said tubular member having an air inlet for the entrance of air to circulate through said member and said thermostat coil, said sleeve adjusting the area of said air inlet when said tubular member is shifted in said sleeve.

2. In a thermostatically operated device, the combination of a tubular member, a thermostat coil secured at its outer end to the inner end of said tubular member, a shaft extending through said tubular member and journaled at its outer end in the outer end of said tubular member, the inner end of said shaft being secured to the inner end of said thermostat coil, said tubular member having an inlet for the flow of air there-through and through said thermostat coil, and a supporting sleeve receiving said tubular member and cooperable therewith to control the area of said air inlet.

3. In a thermostatically operated device, 130

the combination of a tubular member having an air inlet at its outer end and open at its inner end, a shaft journaled in the outer end of said tubular member and extending therethrough, a thermostat coil secured at its inner end to said shaft and secured at its outer end to said tubular member in the path of air flow through said tubular member, said tubular member and sleeve being relatively movable to control the flow of air through said tubular member.

4. In a thermostatically operated device, the combination of a tubular member which is free to the flow of air therethrough, a shaft journaled in the outer end of said tubular member and extending axially therethrough, a thermostat coil adjacent to the outlet end of said tubular member, said coil being secured at its outer end to said tubular member and at its inner end to said shaft, a sleeve receiving said tubular member, and an air inlet at the outer end of said tubular member, said tubular member and sleeve being relatively axially movable whereby to adjust the area of said air inlet and thereby the volume of air flow through said tubular member.

5. In a thermostatically operated device, the combination of a tubular member, a shaft journaled in the outer end of said tubular member, a thermostat coil adjacent the inner end of said member, the outer end of said coil being secured to said member, said coil at its inner end being secured to and supporting the inner end of said shaft, said tubular member being open to the flow of air therethrough and said coil being in the path of the air flowing from said member.

In testimony whereof I have hereunto subscribed my name at Chicago, Cook County, Illinois.

CHARLES L. RAYFIELD.