Aug. 31, 1937. N. S. COLEMAN ET AL 2,091,255

THERMOELECTRIC MOTOR

Filed Aug. 13, 1934

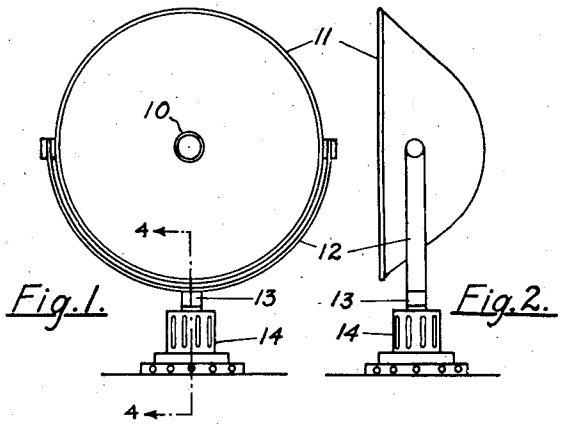


Fig. 1.

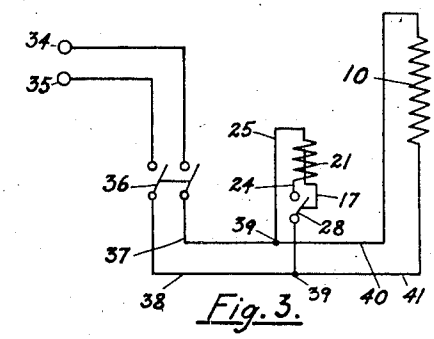


Fig. 2.

Fig. 3.

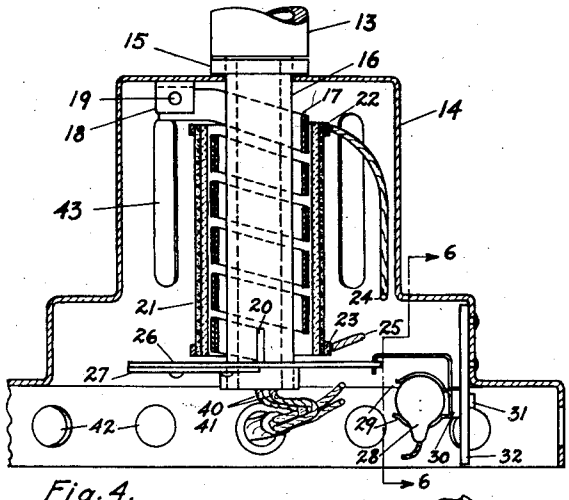


Fig. 4.

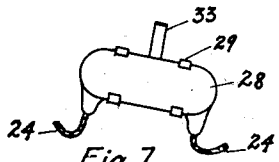


Fig. 7.

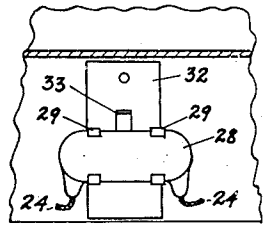


Fig. 6.

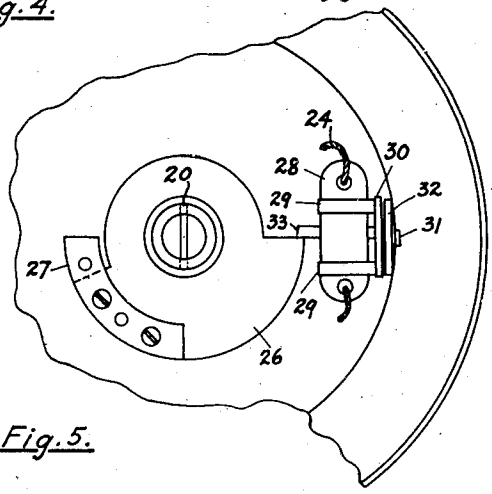


Fig. 5.

Nina S. Coleman

Magnus Björndal

INVENTORS

Patented Aug. 31, 1937

2,091,255

UNITED STATES PATENT OFFICE

2,091,255

THERMOELECTRIC MOTOR

Nina S. Coleman, Garden City, N. Y., and Magnus Björndal, Jersey City, N. J.

Application August 13, 1934, Serial No. 739,648

2 Claims. (Cl. 172—36)

Our invention relates to improvements in the common radiation-type electric heater. This heater derives its name from the fact that it depends on the well known physical phenomenon of the ability of heat rays to focus and being reflected by a parabolic mirror. However, due to this focusing effect the heat rays are only thrown in one direction inside a very limited field. A person located outside this field will thus not be able to enjoy the rays from the heater, and it is therefore difficult for several persons to enjoy the heat radiation at one time. The object of our invention is therefore to provide an oscillating heater which will better distribute its radiation. A further object is to provide an oscillating heater with a simple and mechanically strong oscillating device which can be manufactured at low cost. Other objects will be evident from the following specification and claims.

We attain these objects by means as illustrated in the accompanying drawing, in which:

Fig. 1 is a front view of an oscillating electric heater of a preferred construction.

Fig. 2 is a side view of the same heater.

Fig. 3 is a schematic wiring diagram of the electric connections of a heater embodying our invention.

Fig. 4 shows an enlarged sectional elevation along the line 4—4 in Fig. 1.

Fig. 5 is a partial plan view of the arrangement shown in Fig. 4 seen from below.

Fig. 6 is a sectional elevation along the line 6—6 in Fig. 4.

Fig. 7 shows the switch in Fig. 6 in open position.

Similar numerals refer to similar parts throughout the several views.

The heating element 10 and the parabolic mirror 11 as shown in Figures 1 and 2 are of the conventional type and need no further mention. The parabolic mirror is mounted in the fork 12 which has a tubular extension 13 down through the base 14. The latter is suitably formed as shown in Fig. 4, in section, and contains the oscillating device. The tubular extension 13 rests on a ball bearing, or washer, 15 and is continued by a tubular part of smaller cross-section 16 around which is located the bimetallic coil spring 17 one end of which is fastened to the base 14 through a projecting lug 18 by suitable screw or locking means 19. The lower end of the bimetallic coil spring 17 is fastened in a slot 20 in the tubular socket extension 16. A heating element 21 with terminals 22 and 23 is placed around the bimetallic coil spring 17 and suitably connected through wires 24 and 25 as shown in the wiring diagram in Fig. 3.

At the lower extremity of the tubular socket extension 16 there is fastened a disc with an adjustable section 27 as shown more clearly in Fig. 5. This disc 26 which has part of its circumference cut out to a smaller radius is rotatable with the tubular socket extension 16 and serves to operate the limit switch 28. This switch which may be of the mercury type as shown, or of any other suitable type, is mounted in clips 29. These clips 29 are rigidly mounted on a plate 30 which is rotatably mounted on pin 31 mounted in plate 32 which is again fastened to the base 14. An arm 33 extends from the base plate 30 of the mercury switch to the disc 26 whereby the mercury switch 28 may be opened and closed. The switch 28 is shown in Fig. 6 in its closed position while Fig. 7 shows the same in its open position.

In Fig. 3 the terminals 34 and 35 represent the connections to the source. Through a suitable switch 36 the leads 37 and 38 go to the junction 39 where the leads 24 and 25 are branched off to the heating element 21 through switch 28. The diagram only indicates symbolically the bimetallic spring 17 as indirectly operating switch 28. From the junction 39 wires 40 and 41 go to the main heating element 10, these wires 40 and 41 run through the tubular socket extension 16 as shown in Fig. 4.

The operation of our invention is as follows: The bimetallic spring 17 and the disc 26 are so adjusted that when there is no current on the switch 28 is always in a closed position. As soon as the current is turned on it will flow through the branch wires 24 and 25 to the heating element 21 which very quickly will get hot and at the same time raise the temperature of the bimetallic spring 17. This bimetallic spring 17 has the well known ability to bend when it is heated due to the greater expansion of one material than the other. Due to this effect the bimetallic coil spring 17 will try to make a turn, but as one end is fastened to the base 14 only the lower end of this spring is free to rotate. This lower end, however, is placed in slot 20 of the tubular socket extension and a revolving motion of the spring 17 will thus impart a similar motion to the socket 13 and the parabolic mirror 11 with the main heating element 10. When the disc 26 has rotated through an angle, depending on the setting of the adjustable portion 27, it will strike the arm 33 and open the switch 28. The heating element 21 will now be cooled by the air entering at the bottom of the base 14 through holes 42

and escaping through the slots 43, the bimetallic coil spring 17 will also cool off and the metals will contract and the lower end of said spring will return to its original position at which point the other limit of disc 26 will again strike the arm 33 of the switch 28 which will be closed and the heating cycle starts as above described. Through successive heating and cooling cycles the bimetallic spring thus imparts an oscillating motion to the parabolic mirror and the rays from the main heating element will be thrown out in space on a semicircle. The angle of rotation is determined by the adjustable limit disc 26. It is shown in Fig. 5 as being 180° but for most practical purposes a smaller angle may be selected by adjusting the part 27. The speed of rotation is dependent on the rate of heating and cooling. This speed may be changed by arranging a tapped heating element 21 so that the resistance may be varied by changing taps.

It will thus be seen that there has been provided a simple, inexpensive, dependable and yet uniquely adjustable thermo-motor driven oscillating electric heater, generally of a novel and valuable type, and well calculated to attain the various objects and advantages of the invention. While various particulars of description, as to materials, parts and shapings and connections and relations of parts have been hereinabove detailed, this has been done in aid of disclosing as clearly as possible an embodiment of the invention as now preferred; and it is to be understood that these can be varied, apparently widely, within the appended claims, which define the scope of protection contemplated.

We claim as new and desire to secure by Letters Patent of the United States:

1. A thermo-motor comprising a housing; a rotatable shaft extending into said housing; a bearing supporting said rotatable shaft in said housing; a bimetallic spring coaxially disposed on said rotatable shaft, the ends of said bimetallic spring being fastened to, respectively, said housing and said rotatable shaft; a heating element coaxially surrounding said bimetallic spring; a limit switch mounted on said housing, a cam mounted on said rotatable shaft in operable relation with said limit switch, whereby said limit switch will interrupt the current going through the heating element when said bimetallic spring by turning said rotatable shaft has brought the cam into engagement with said limit switch.

2. A thermo-motor comprising a housing; a rotatable shaft extending into said housing; a bearing supporting said rotatable shaft in said housing; a bimetallic spring coaxially disposed on said rotatable shaft, the ends of said bimetallic spring being fastened to, respectively, said housing and said rotatable shaft; a heating element coaxially surrounding said bimetallic spring; a limit switch mounted on said housing, a cam mounted on said rotatable shaft in operable relation with the limit switch, adjustable means on said cam for the regulation of the length of the angular rotation of said rotatable shaft.

NINA S. COLEMAN.
MAGNUS BJÖRNDAL.