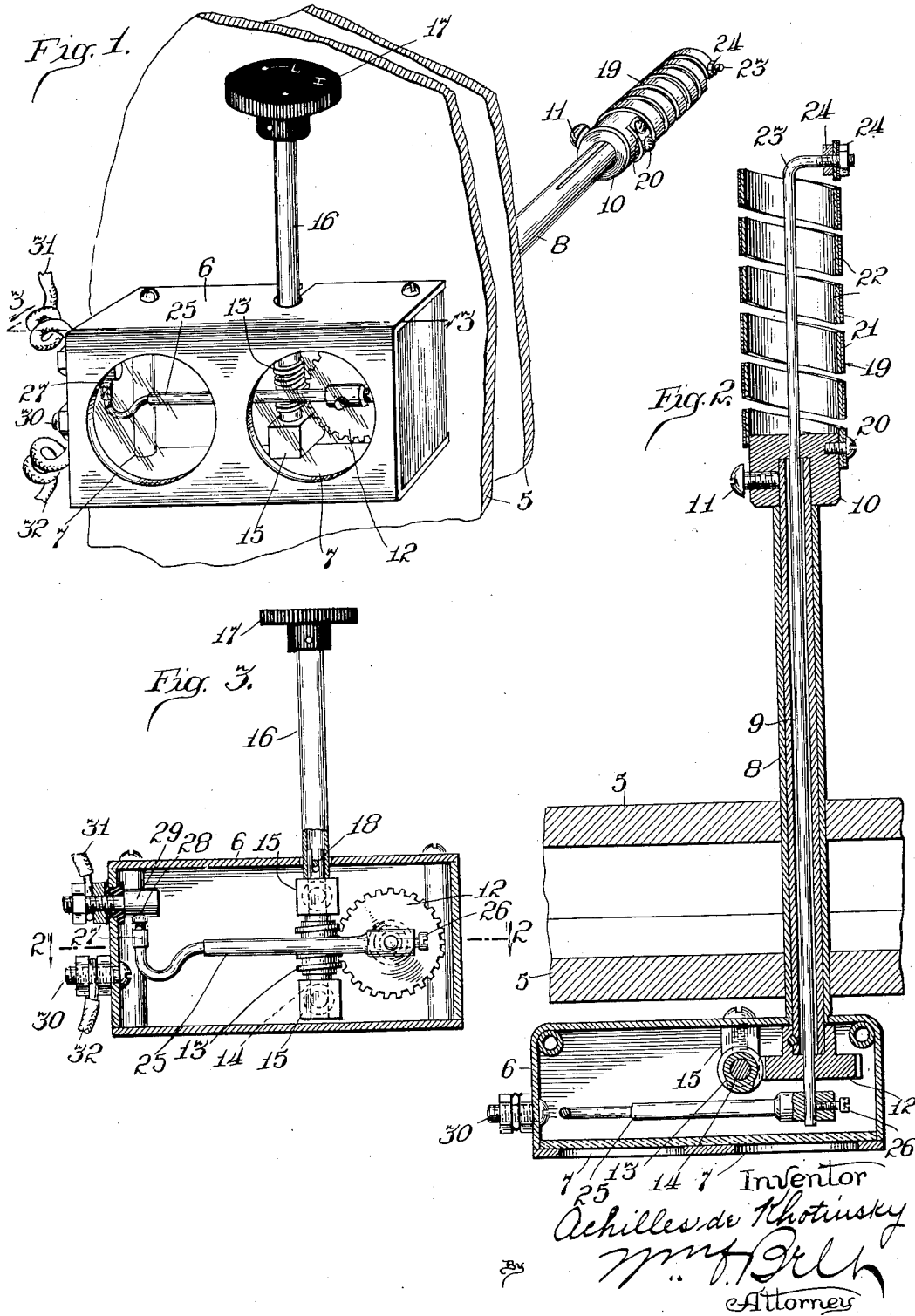


A. DE KHOTINSKY.
THERMOSENSITIVE CIRCUIT CONTROLLER.
APPLICATION FILED DEC. 6, 1917.

1,375,780.

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Inventor
Achilles de Khotinsky
Wm. H. Bell
Attorney

UNITED STATES PATENT OFFICE.

ACHILLES DE KHOTINSKY, OF CHICAGO, ILLINOIS, ASSIGNOR TO CENTRAL SCIENTIFIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

THERMOSENSITIVE CIRCUIT-CONTROLLER.

1,375,780.

Specification of Letters Patent.

Patented Apr. 26, 1921.

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To all whom it may concern:

Be it known that I, ACHILLES DE KHOTINSKY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Thermo-sensitive Circuit-Controllers, of which the following is a specification.

This invention relates to a thermo-sensitive circuit controller and has for its object the provision of a compact and active thermo-sensitive device for regulating the passage of current in an electric circuit, having means permitting manual adjustment to operate at predetermined temperatures.

A further object of my invention is the provision of a novel thermo-sensitive element for devices of the character described.

Further objects and advantages of my invention reside in the various combinations hereinafter described whereby numerous advantageous results are achieved as will be better understood by reference to the following specification when read in connection with the accompanying drawing illustrating the preferred embodiment thereof, in which—

Figure 1 is a view in perspective of the device attached to the wall of a chamber, the temperature of which is controlled by the device;

Fig. 2 is a longitudinal section through the device; and

Fig. 3 is a section on the line 3—3 of Fig. 1.

My invention is particularly designed for use in connection with electrically heated ovens, incubators and the like, although it may be applied wherever it is desirable to control an electric circuit thermally.

Referring to the drawing 5 indicates the double walls of a chamber. A suitable casing 6 is mounted on the outer wall and is preferably provided with glass windows 7 through which the inclosed mechanism is readily visible. Preferably the casing is of metal though other material may be used.

A tube 8 connected to the rear wall of the casing 6 extends through the walls 5 of the chamber and serves as a support for the mechanism. A tube 9 is disposed within the tube 8 and projects beyond the end thereof to support a collar 10 which is fastened thereto by a screw 11. The other end of the tube 9 projects within the casing 6 and

is provided with a worm gear 12 meshing with a worm 13 on a shaft 14 journaled in suitable bearings 15 within the casing 6 and projecting slightly beyond the casing. The end of the shaft 13 is slotted and is adapted to receive a tubular key 16 bearing a knurled wheel 17 at its outer end and having a pin 18 to engage the slot in the end of the shaft 14. Thus the shaft may be rotated by means of the knurled wheel 17 and the key may be removed after the device has been set to preclude tampering therewith. Preferably arrows and the letters L and H are delineated on the face of the knurled head 17 to indicate the direction of rotation in adjusting the device for lower or higher temperatures. A thermo-sensitive element consisting of helical coil 19 is fastened at one end by a screw 20 to the collar 10. The helical coil is made up of two metals secured together throughout the length of the coil and having different coefficients of expansion. Various metals may be employed, but I prefer to use an outer layer 21 of "Invar" and an inner layer 22 of brass. I am aware that metallic thermo-sensitive elements have heretofore been known and used, but so far as I am aware they have never been used in the form of a helical coil as herein described which upon expansion uncoils about a fixed axis, thus permitting the application of the element in carrying out the purpose of my invention.

A rod 23 is secured by nuts 24 to the free end of the element 19 and extends through the tube 9 and the worm gear 12 within the casing 6. Upon the end of the rod 23 an arm 25 is adjustably mounted by means of a screw 26. The arm 25 is provided with a contact 27 adapted to engage a fixed contact 28 on a binding post 29 secured to and insulated from the casing 6. A binding post 30 is secured to the casing 6, the latter forming when of metal, a part of the electric circuit. The conductors 31 and 32 leading to the controlled electric means (not shown) are connected respectively to the binding posts 29 and 30.

The operation of my invention will be readily understood by the following brief description thereof. When the tube 9 is rotated through the key 16, worm 13 and worm gear 12, the rod 23 will, through its connection with the element 19 be rotated about its axis to swing the arm 25 and carry the con-

tact 27 into engagement with the contact 28. Thus the circuit is closed. If the contacts 27 and 28 barely touch each other a slight rise in temperature within the chamber will cause the element 19 to uncoil sufficiently to rotate the rod 23 on its axis and swing the arm 25 to carry the contact 27 away from the contact 28 thus breaking the circuit. If it is desired to break the circuit at a still higher temperature the tube 9 is rotated sufficiently to tension the element 19 thus holding the contacts 27 and 28 in engagement under pressure. A greater rise in temperature will cause the element 19 to expand and uncoil sufficiently to release the tension and finally disengage the contact 27 from the fixed contact 28. Thus breaking of the circuit at any predetermined temperature may be assured. The action of the device is very rapid and a rise of 0.10 C. is sufficient to expand the element 19 and separate the contacts 27 and 28.

Obviously the device may be employed to close a circuit upon a rise in temperature either by modifying the relative positions of the fixed and movable contacts, or by placing the metal of relatively low expansibility on the inner surface of the helical coil.

From the foregoing it will be readily understood that I have provided a simple and effective means for accomplishing the desired result in a satisfactory and efficient manner and that various changes may be made in the form, arrangement and construction of the parts without departing from the spirit and scope of the invention or sacrificing any of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a device of the character described, a thermal circuit closer comprising a fixed contact, a movable contact adapted to open or close the circuit with the variation of the temperature, an arm carrying said movable contact, a bi-metallic helical coil, a rod secured at one end to said arm and extending through said coil and secured at its other end to the adjacent end of the coil, a collar ar-

ranged on said rod and secured to the other end of the coil, and means for adjusting said collar relative to said rod to regulate the tension on said coil.

2. In a device of the character described, a thermal circuit closer comprising a fixed contact, a movable contact, an arm carrying said movable contact, a bi-metallic helical coil, a rod secured at one end to said arm and extending through said coil and having its other end secured to the adjacent end of the coil, a sleeve surrounding said rod, a collar mounted on the rod and secured to said sleeve and to the other end of the coil, and means for adjusting the sleeve and collar relative to the rod to regulate the tension on said coil.

3. In a device of the character described, a thermo-circuit closer comprising a fixed contact, a movable contact adapted to open or close the circuit with the variation of the temperature, an arm carrying said movable contact, a rod connected at one end to said arm and having its other end bent laterally, a bi-metallic helical coil connected at one end to the laterally bent end of the rod, a collar secured to the other end of the coil, a sleeve secured at one end to the collar, a worm gear on the other end of the sleeve, a worm meshing with said gear, and means for operating the worm to adjust the sleeve and collar relative to the rod.

4. In a device of the character described, a thermal circuit closer comprising a fixed contact, a movable contact adapted to open or close the circuit with the variation of the temperature, an arm carrying said movable contact, a bi-metallic helical coil, a rod secured at one end to said arm and extending through said coil and secured at its other end to the adjacent end of the coil, a collar arranged on said rod and secured to the other end of the coil, and means for rotating said collar relative to said rod to adjust said coil.

A. DE KHOTINSKY.

Witnesses:

M. A. KIDDIE,

ERNEST H. MERCHANT.