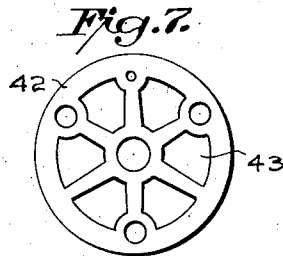
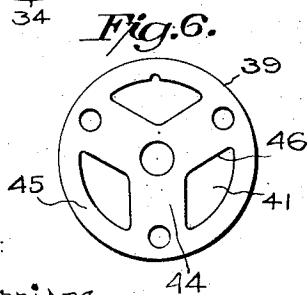
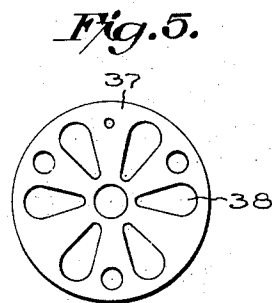
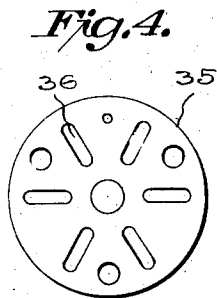
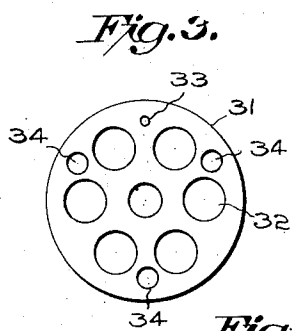
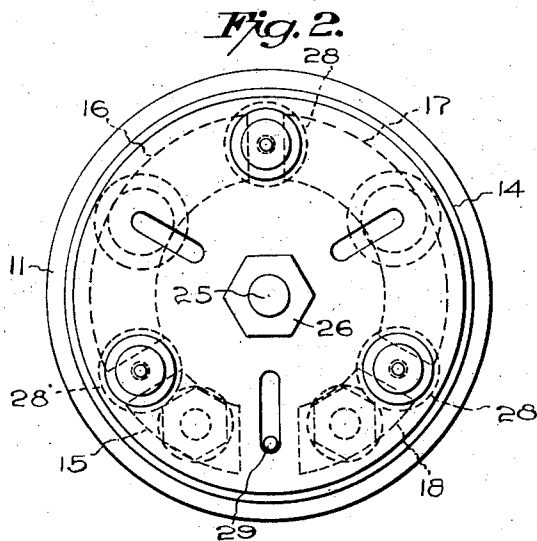
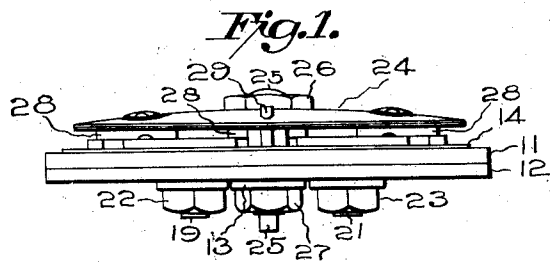


Dec. 27, 1927.

1,654,320

O. A. COLBY
THERMOSTATIC DISK
Filed July 17, 1926



WITNESSES:

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THERMOSTATIC DISK.

Application filed July 17, 1926. Serial No. 123,217.

My invention relates to temperature-control devices and particularly to snap-acting bimetallic disks.

An object of my invention is to provide a snap-acting bimetallic disk that shall embody means for reducing the strains set up in the disk by temperature changes.

In practicing my invention I provide a bimetallic disk having a plurality of openings therein which is initially deformed to cause it to operate with a snap action from one limiting position to another.

In the single sheet of drawing,

Fig. 1 is a view, in side elevation, of a thermostatic switch assembly comprising a device embodying my invention.

Fig. 2 is a top plan view thereof, and

Figs. 3 to 7 inclusive are top plan views of various modifications of a device embodying my invention.

Referring more particularly to Figs. 1 and 2 of the drawings, I have here illustrated two co-operating metal disks 11 and 12 which are held in proper operative positions relatively to each other by a tubular metal member 13 located in a central opening in each of the plates 11 and 12, the ends of which are suitably turned or spun over.

A disk 14 of electric-insulating material, such as mica, is located against the outer face of the plate or disk 11 and a plurality of contact and terminal members 15, 16, 17 and 18 are insulatedly mounted upon the outer surface of the sheet or disk 14. The terminal and contact members are of arcuate form and are positioned substantially as shown by the respective broken lines in Fig. 2 of the drawing.

The contact members 16 and 17 are held by rivet members extending through, and insulated from, the plates 11 and 12. The terminal members 15 and 18 are held by stud members 19 and 21, respectively, one end of each of which is secured to the plates 15 and 18, the other ends of which extend through the disks 11 and 12 and are provided with nuts 22 and 23, respectively, to permit of connecting thereto the usual control-circuit conductors (not shown).

A bimetallic disk 24 is operatively mounted on the base and is held in its proper operative position by a central stud 25 having a nut 26 at the upper end thereof, the disk 24 being loosely mounted on the stud 25. A nut 27 is provided on the other end of the

stud 25, whereby the position of the disk 24, relatively to the base of the device, may be adjusted.

A plurality of contact-bridging members 28 are loosely and insulatedly mounted on the disk 24 adjacent to the periphery thereof. The locations of the respective bridging members 28 are such that each member engages two spaced end portions of the fixed contact and terminal members hereinbefore described when the disk is in one of its limiting positions.

The bimetallic disk 24 is of the type disclosed and claimed in Patent No. 1,448,240 issued to J. A. Spencer and is provided with a deformed or non-developable portion therein so that it is actuated from one of its two opposed limiting positions to the other limiting position with a snap action. It is possible to cause the contact-bridging members 28 to engage the fixed contact and terminal members with a predetermined pressure to thereby permit of an electric current flowing through the device without heating of the contact, terminal and bridging members. When the temperature of the device has reached a predetermined temperature the periphery of the disk 24 is caused to move away from the base, whereby the contact-bridging members are disengaged from the fixed contact members, and a circuit therethrough is interrupted. In order to prevent any turning movement of the loosely mounted disk 24 on its support, a pin 29 is provided in the base member which extends through an opening in the disk, the result being that the contact-bridging members are maintained in proper operative alinement with the ends of the fixed contact members and in substantially the positions shown in Fig. 2 of the drawings.

A mathematical analysis of the strains set-up in a disk of this kind tends to show that these strains are relatively high and may, in time, cause trouble because of the fatigue of the metals employed in the bimetallic disk. I have found that the provision of a plurality of openings in the disk tends to reduce the strains in the disk without apparently having any effect upon the snap-acting characteristic of the bimetallic disk made in accordance with the teachings of the above specified Spencer patent.

Fig. 3 illustrates a bimetallic disk 31 hav-

ing a plurality of circular openings 32 therein which are symmetrically spaced peripherally of the disk. The opening 33 is the one provided for the pin 29, and the openings 34 are the ones provided for receiving the mounting means of the contact-bridging members 28.

Fig. 4 illustrates a bimetallic disk 35 having a plurality of symmetrically spaced radially extending slots 36 therein, the other parts of the device being as herein before described in connection with Figure 3.

Fig. 5 illustrates a bimetallic disk 37 having a plurality of elongated openings 38 therein, the outer portions thereof being wider than the inner portions thereof.

Fig. 6 illustrates a bimetallic disk 39 having a plurality of symmetrically spaced triangular openings 41 therein.

Fig. 7 illustrates a bimetallic disk 42 having a greater number of openings 43 therein than are provided in the disk 39, the openings 43 being of substantially triangular shape. The disks 37, 39 and 42 conform in all other respects, to the description given above in regard to disk 31.

In general, all the disks illustrated in Figs. 3 to 7, inclusive, may be described as embodying an inner or central portion and an outer peripheral portion connected by a plurality of radially extending arms. Referring more particularly to Fig. 6, the disk 39 may be considered as comprising an inner portion 44 and an outer peripheral portion 45 that are connected by three radially extending arms 46 which are integral with the inner and outer peripheral portions.

While I have not made a mathematical analysis of the changes introduced by the plurality of openings, I believe that the general result of providing such openings is to effect a material decrease in the strains set-up in a disk of this kind, particularly during the time that it is moving from one position to another. My opinion is that the openings reduce particularly the tangentially extending strains in the disk of the material, so

that this strain is well within the limits permitted by the material employed in its construction. Actual devices have shown that disks of this kind possess a high degree of snap action and such tests as have been made indicate that they will operate properly and for long periods of time under the conditions to which they are normally subjected.

Various modifications may be made in the device embodying my invention without departing from the spirit and scope thereof, and I desire that only such limitations shall be placed thereon as are imposed by the prior art.

I claim as my invention:

1. In a thermostatic disk having two opposed limiting positions and being actuated from one to the other of said positions with a snap action, said disk having spaced-apart apertures therein for reducing the strains therein when deflecting from one position to the other.

2. A bimetallic disk having a non-developable portion therein, said disk being reciprocally self-actuable from one position to another with a snap motion and means for reducing the strains in the disk during the time that the disk is in motion, said means comprising a plurality of spaced-apart apertures located in the disk between the periphery and the center of said disk.

3. A thermally-actuable element comprising a bimetallic disk embodying a central portion, an outer peripheral portion and a plurality of spaced radially extending arms integral with the central and peripheral portions.

4. A bimetallic disk having an initial deformation therein whereby it has two opposed limiting positions only and is moved from one position to the other with a snap action, and a plurality of peripherally aligned openings in the disk for reducing the strains in the disk when moving from one position to the other.

In testimony whereof, I have hereunto subscribed my name this 1 day of July, 1926.

ORA A. COLBY.