

0 T. E. ANDREWS
ADJUSTABLE TEMPERATURE RESPONSIVE CONTROL
FOR ELECTRICAL DEVICES
Filed July 28, 1958

Fig. 1.

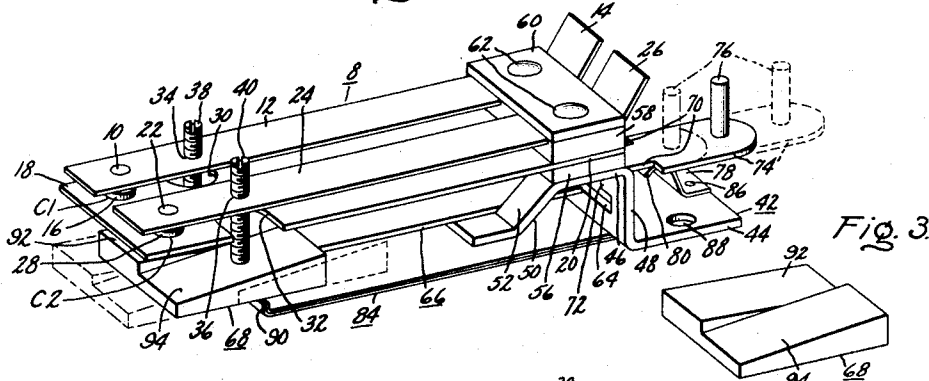


Fig. 3

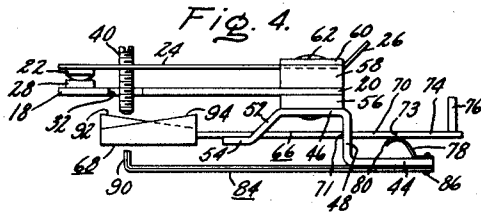


Fig. 4

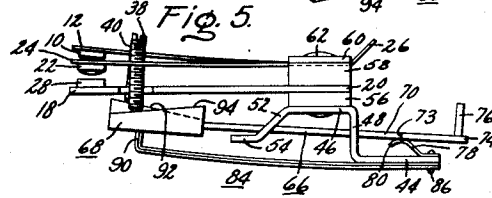


Fig. 5.

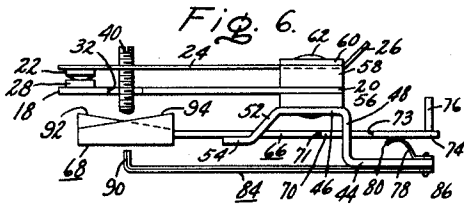


Fig. 6

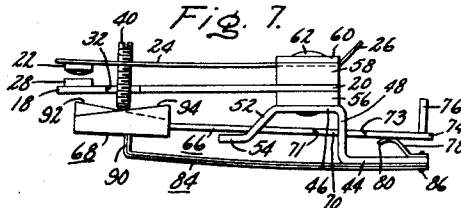


Fig. 7.

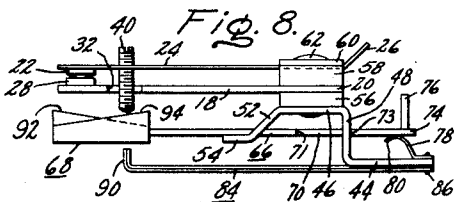


Fig. 8

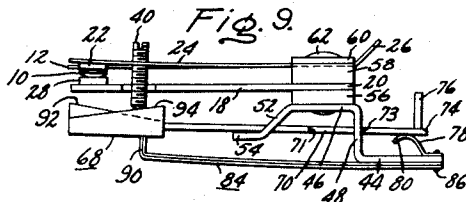


Fig. 9.

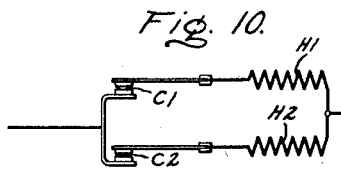


Fig. 10.

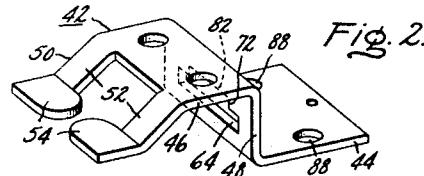


Fig. 2.

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2,930,874

ADJUSTABLE TEMPERATURE RESPONSIVE CONTROL FOR ELECTRICAL DEVICES

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Application July 28, 1958, Serial No. 751,302

6 Claims. (Cl. 200—138)

The present invention relates to an adjustable temperature responsive control for electrical heating devices, such as many of the common household electrical appliances, and particularly to such devices having two or more heating units, the circuits for which are to be individually controlled. An example of one particularly desirable application of the invention is in an automatic, electric coffee maker which includes a plurality of heating units that are individually controlled. For a more detailed understanding of one type of coffee maker into which the present invention may be incorporated, reference may be had to Patent No. 2,763,767 Lohrman et al., assigned to the assignee of the instant application.

An object of the invention is to provide an improved, adjustable, temperature responsive control for electrical heating devices having a plurality of heating circuits, which is a simple, compact, unitary structure that is adapted to be readily incorporated into or be associated with a device which it controls, which is accurate and reliable in operation and which is capable of being manufactured at low cost.

It is another object of the invention to provide a control of the type set forth in the preceding paragraph wherein maximum life and accuracy are enhanced because of the following attributes: (1) the control operates with uniform pressure between its electrical contacts regardless of the setting to which it is adjusted, and (2) the control operates with uniform contact disengagement load on the bimetallic member, which comprises an element of the control, regardless of the setting to which it is adjusted.

According to one form of the invention, the improved control comprises: a plurality of sets of circuit controlling, electrical contacts and associated, supporting, electrical blades therefor, a contact disengaging, bimetallic member that is arranged to deflect in response to temperature changes of a heat source and to cause disengagement of the pairs of contacts, and a movable cam member, having a plurality of cam surfaces of predetermined configuration to produce desired operational characteristics that correspond in number to the number of pairs of contacts, that is generally positioned between the bimetallic member and the pairs of contacts and their associated supporting blades. All of the foregoing elements of the control are so related that deflection of the bimetallic member toward the cam member, which results from an increase in the temperature of a heat source, causes the cam member to move toward the sets of contacts and to cause individual disengagement of them depending upon the precise dispositional relationship between the cam member and the sets of contacts. In order to effectuate variable cut-off temperatures for each of the electrical circuits, the cam member is adjustably mounted so as to be movable to a plurality of positions, each one of which constitutes a different control setting in that it presents different portions of the cam surfaces having different operational characteristics to the sets of contacts, and therefore, provides for in-

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dependently disengaging the sets of contacts at different predetermined temperatures, depending upon the precise dispositional relationship between the cam member and the pairs of contacts.

The above and other objects and further details of that which I believe to be novel and my invention will be clear from the foregoing description and claims taken with the accompanying drawing wherein:

Fig. 1 is a perspective view of the improved control showing an element thereof, viz., the control adjusting slide, in a number of different, representative positions which it may occupy during normal use of the control;

Fig. 2 is a perspective view of the control supporting bracket, which is an element of the control;

Fig. 3 is a perspective view of one of the control elements, viz., the cam member illustrated in Fig. 1;

Fig. 4 is a side elevational view showing the control in one representative setting, in "cold" condition, i.e., prior to the temperature for which the control is set to respond for disengaging either of the pairs of contacts being reached;

Fig. 5 is a view similar to Fig. 4, but showing the control elements after the temperature set for disengaging both sets of contacts has been reached;

Fig. 6 is a view similar to Fig. 4, but showing a different control setting;

Fig. 7 is a view similar to Fig. 6, but showing the control elements after the temperature set for disengaging both sets of contacts has been reached;

Fig. 8 is a view similar to Fig. 4, but showing a still different setting of the control;

Fig. 9 is a view similar to Fig. 8, but showing the control elements after the temperature set for disengaging one set of contacts has been reached, and

Fig. 10 is a wiring diagram showing the circuit of an electrical device having two electrical heating units and a control having two sets of electrical contacts, each pair for separately controlling the energization of one of the heating units.

The instant invention contemplates providing an improved control for an electrical device having a plurality of electrical heating units, wherein each heating unit may be deenergized at a different predetermined temperature and the control provides for selective simultaneous variation of the temperature at which each of the heating units is deenergized. As stated above, an automatic, electric coffee maker is one type of appliance into which controls contemplated by the instant invention may be effectively incorporated; by reference to the referred-to patent, this exemplary application of the instant invention may be understood. In such a coffee maker application, it is desired that a plurality of electrical heating units be independently controlled, and particularly to selectively vary the deenergization temperature of each of the heating units independently so as to achieve desirable results when brewing coffee. It will readily be appreciated, however, that the invention is not limited to coffee makers, and there are numerous other applications of the invention, viz., wherever it is desirable to independently control a plurality of electrical heating units. It will be further appreciated that depending upon the specific application of the control, different operating objectives will be desired. For purposes of exemplification, I have illustrated an embodiment of my invention in the form of a control wherein it is desired to selectively, automatically, inversely vary temperatures at which two electrical heating units are deenergized; in order to accomplish these objectives, a cam member having a configuration to produce empirically determined operating characteristics is selected. It will be understood, however, that depending upon the operating objectives, other cam member configurations may be employed having

other operational characteristics. The term "operating characteristics" as used herein is intended to mean the individual temperatures at which the electrical heating units are deenergized for the various control settings.

By reference to Fig. 10, a wiring diagram of an exemplary circuit for an electrical device including a pair of electrical heating units to be individually controlled may be observed. It will there be seen that the heating units are designated H1 and H2, and their controlling sets of contacts are respectively designated C1 and C2. It will be understood that each heating unit and its set of controlling contacts is mounted in the circuit in parallel, and therefore, that the heating units are susceptible of being independently energized and deenergized by engagement and disengagement of their respective sets of controls.

In Fig. 1 of the drawing, the sets of contacts C1 and C2 are indicated as being part of the improved control 8. The heating units and other parts of the circuit may be physically associated with control 8 in accordance with known electrical wiring techniques. Set C1 of contacts comprises upper contact 10, which is rigidly carried by elongated, flexible, electrical blade 12 at one end thereof, the other end 14 of which is rigidly secured to supporting portions of the control and is bent to form an electrical terminal. Set C1 of contacts also comprises lower contact 16, which is rigidly carried by elongated, rigid, electrical blade 18 at one side of one end thereof, the other end 20 of which is rigidly secured to supporting portions of the control. The set C2 of contacts also comprises an upper and lower contact. The upper contact 22 of set C2 is rigidly carried at one end of the elongated, flexible, electrical blade 24, the other end 26 of which is rigidly supported by the control supporting portions and is formed into an electrical terminal. Lower contact 28 of set C2 is rigidly connected to the other side of the end of elongated, rigid, electrical blade 18 that carries contact 16. In the drawing, rigid blade 18 is spaced below the flexible blades 12 and 24. All of the blades are generally parallel, supported at the same end, and carry the contacts at the same end. It will be observed that rigid blade 18 has a pair of laterally spaced, cut-out portions 30 and 32, and that flexible blades 12 and 24 have threaded apertures 34 and 36, respectively, which adjustably support depending threaded screws 38 and 40, respectively. The cut-out portions 30 and 32 allow screws 38 and 40, respectively, to pass by and extend below the rigid blade 18. As will become subsequently apparent, adjusting screws 38 and 40 constitute both means which are independently actuated by other elements of the control to independently cause disengagement of the sets of contacts, and means for calibrating the control.

The mentioned control supporting portions support the electrical blades in a properly electrically insulated manner, and generally comprise a control supporting bracket 42, many of the details of which can be observed in Fig. 2. Bracket 42 generally comprises a bent, plate-like member having a lower, flat portion 44, a spaced, upper, flat portion 46, an interconnecting, web portion 48, and a bifurcated portion 50 that projects from the upper, flat portion. Bifurcated portion 50 comprises a pair of inclined, spaced legs 52 that terminate in flat, spaced tabs 54. The upper, flat portion 46 is apertured and rigidly supports above it the electrical blades and appropriate insulating members in the form of a stack, as illustrated in the drawings, by appropriate securing means, such as the illustrated rivets 62. The stack comprises the following: immediately above the upper, flat wall 46 there is positioned an electrical insulating plate 56, above which is located the end 20 of the rigid electrical blade 18, above which is located another electrical insulating plate 58, above which is located the laterally spaced ends 14 and 26 of the flexible electrical blades 12 and 24, respectively, and above which is located electrical insulating plate 60. It will be understood that the

illustrated securing rivets 62 cooperate with appropriate openings (unillustrated) in the elements which comprise the stack to rigidly support the stack above the bracket upper, flat wall 46.

The bracket 42 supports an adjustable slide which controls the setting of the control and is in the form of an elongated, semi-flexible member, which hereinafter will be referred to as slide 66, near one end of the slide. Slide 66 rigidly carries a specifically configured, cam member 68 at its other end, which is disposed adjacent to and below the screws 38 and 40. At its supported end, slide 66 has two laterally spaced notches 70 formed. The bracket web 48 of the bracket 42 includes an inverted, T-shaped slot 64 having a restricted upper portion 72. The portion of the slide 66 between the notches 70 is disposed in the restricted portion 72 of the slot 64 in the bracket web 48, and is slidably movable therein in a generally horizontal plane. A portion 74 of the slide 66 extends beyond the slot 64 and supports a manually grippable control rod 76 near its free end. The mid-portion of the slide 66 is slidably supported on top of tabs 54. The slide is retained in operating, mounted position, as shown in Fig. 1, by a leaf spring member 78 that is rigidly secured to the upper side of lower, flat portion 44 of the bracket 42 and has a flexible portion 80 that engages the underside of slide portion 74 and urges it upwardly. The slide 66 remains in mounted position by having portions thereof engaged by the tabs 54, upper edge portion 82 of the bracket web 48 that defines restricted portion 72 of the slot 64, and the flexible portion 80 of the spring member 78. It will be observed further that this mounting permits the slide 66 to be slid in a generally horizontal plane between the limits afforded by the notches 70 in the slide, and that this sliding may be effected simply by manually grasping the rod 76 and pushing it toward or away from the control bracket 42. It will be observed further that the mounting of the slide 66 also permits, during operation of the control and device of which it forms a part, pivoting of the slide on the edge portion 82; this pivoting is operationally significant, as will become subsequently apparent.

The lower, flat portion 44 of the bracket 42, in addition to supporting the spring member 78 on its upper side, rigidly supports on its underside one end of an elongated bimetallic member 84. The same securing means, which may be the illustrated rivet 86, may be utilized to secure both the spring member and the bimetallic member to the lower flat portion 44. The free end of the bimetallic member 84 is bent into an actuating portion 90 which is disposed adjacent and below the cam member 68. The lower, flat portion 44 also includes a plurality of openings 88 which may be utilized to secure the entire control 8 as a unit in position in or with relation to an electrical device with which it is associated.

When utilizing the control for the purpose of controlling an electrical appliance, such as a coffee maker of the type disclosed in the referred-to patent, it is desirable to control two, separate, electrical heating units in such a manner that the temperatures at which the heating units are independently deenergized may be selectively varied inversely by adjusting the control. In other words, at one control setting, one of the heating units is deenergized at a lower temperature than the other, and at another setting, the first heating unit is deenergized at a higher temperature than at the first setting, and the other heating unit is deenergized at a lower temperature than at the first setting. It should be understood that the foregoing explanation is merely to facilitate an understanding of one manner in which the control may operate. When it is desired to operate in this manner, the cam member 68 which is most clearly seen in Fig. 3, is formed with two, oppositely inclined, cam surfaces 92 and 94. The precise configuration of the cam surfaces may be empirically determined in accordance with known principles, and determines the operating characteristics of the control. As

was previously stated, the cam member 68 is rigidly secured at the free end of the slide 66; this connection may be effected in any known manner. From the drawings it will be observed that the cam member is disposed below and adjacent to the screws 38 and 40, and has its cam surfaces facing said screws.

The slide 66 may be a metallic member, but the cam member 68 is made of an electrical insulating material. The cam surfaces are operatively associated with the screws 38 and 40 as follows: cam surface 92 is disposed below and adjacent to screw 38 and cooperates with it during operation of the control, and cam surface 94 is related to screw 40 in a similar manner.

The entire control 8 is a unitary structure which may be physically secured to or in association with an appropriate electrical device as a unit. When incorporated in an automatic, electric coffee maker of the type disclosed in the referred-to patent, it may be physically attached to a portion of the water reservoir forming walls of the coffee maker, because it is desired in such an application to sense the temperature of the liquid in the reservoir and control the operation of the coffee maker in response to the temperature of the liquid. It is convenient in a coffee maker application to secure the control to the bottom wall of the reservoir in the base of the coffee maker. When mounting the control, the openings 88 in the lower, flat wall 44 of the control bracket may be conveniently utilized to secure the control to the bottom wall of the reservoir with the bimetallic member 84 contiguous with or adjacent to said bottom wall. It will, of course, be understood that the control may be incorporated in other electrical devices, and when so applied may be mounted in any convenient manner by the control bracket 42 so as to locate the bimetallic member 84 adjacent to or contiguous with the heat source being sensed.

Assuming that the control is mounted for operation with the bimetallic member 84 sensitively and accurately sensing the temperature of the heat source which is being sensed and which will be utilized by the control to independently control two, electrical, heating unit circuits of an electrical device, the general operation is as follows: assuming the parts are generally located as shown in Fig. 1, on an increase in temperature, the bimetallic member 84 deflects in such a manner that its bent end 90 moves upwardly toward the lower face of the cam member 68. On a further increase in temperature, the cam member 68 is contacted by the bent end 90 and moved into contact with the screws 38 and 40, thereby independently urging them upwardly. As each screw is moved upwardly, it forces the electrical contact which is carried by the flexible, electrical blade that supports the screw to move upwardly away from its associated electrical contact which is carried by the rigid, electrical blade 18. On sufficient upward movement of the screws 38 and 40, their respective, flexible, electrical blades 12 and 24 are moved upwardly and move their associated, upper, electrical contacts out of engagement with their associated lower electrical contacts. It will be understood that as each set of contact C1 and C2 is disengaged, the electrical heating unit which it controls, namely, H1 and H2, respectively, is deenergized. When both heating units are deenergized, the controlled heating operation is terminated. If desired, a conventional signal may be placed in the circuit to give warning that the controlled heating operation is terminated, or some other conventional manner of terminating the controlled heating operation may be utilized.

It will be also realized that the precise manner in which the pairs of contacts are disengaged, that is, the sequence of disengagement, will be determined by the configuration of the cam surfaces of the cam member 68. When utilized in an appliance wherein it is desired to provide for selective inverse variation of the deenergization temperatures of two, electrical, heating units, the illustrated cam member will satisfy these purposes. When utilizing the

illustrated cam member, three general types of operation may obtain.

By reference to Figs. 4 and 5, one general type of operation will be seen. It will there be observed that the slide 66 has been moved to a position which corresponds to the dotted line position of the slide in Fig. 1, and that in this position, the slide has been moved to the right, as viewed in the figures, as far as it will go; that is, as far as is allowed by the left-hand edges 71 of the slide notches 70 and the bracket web portions that form the restricted portion 72 of slot 64. In this setting, the cam surface 92 of the cam member 68 is considerably closer to the lower end of screw 38 than the cam surface 94 is to the lower end of screw 40. This means that on initial warming up and deflection of the bimetallic member 84, the bent end 90 will move the cam member 68 toward the screws 38 and 40, and the cam surface 92 will contact and move the screw 38 and cause contact 10 to be moved upwardly and disengage the contact 16 (set C1) before the cam surface 94 even contacts the screw 40. The initial or "cold" condition of the control for this setting is shown in Fig. 4, and Fig. 5 illustrates the condition of the control just about the time when the cam surface 94 is contacting the screw 40. It will be observed in Fig. 5 that at this time, contact 10, flexible, electrical blade 12, and the screw 38 have already been moved upwardly by the cam surface 92, and that the set C1 of contacts have been disengaged. It will be understood that on being heated up further after reaching the Fig. 5 condition, the bimetallic member 84 moves the cam member 68 upwardly further, and the cam surface 94 ultimately forces the screw 40 upwardly to cause disengagement of contact 22 from contact 28 (set C2), at which time both sets of contacts are disengaged and the controlled heating operation is terminated. Therefore, when the control is set as illustrated in Figs. 4 and 5, set C1 of contacts will be disengaged, and therefore electrical heating unit H1 will be deenergized, prior to disengagement of set C2 of contacts and the consequential deenergization of electrical heating unit H2.

The manner in which the control may be utilized to deenergize electrical heating unit H1 before electrical heating unit H2 has just been described. It may be desired to deenergize the heating units simultaneously, and this constitutes a second general type of operation for the control 8. To set the control for the second type of operation, the rod 76 is utilized to manually move the slide 66 to its solid line position in Fig. 1, which is illustrated in Figs. 6 and 7. In this setting, the bracket web 48 is located centrally in the notches 70. In Fig. 6, which is the "cold" condition of the control when set for the second type of operation, it will be observed that the screw 40, and the screw 38, which is located immediately behind the screw 40 in this view, are located relative to the cam member 68 in such a manner that portions of cam surfaces 92 and 94 that are substantially equally distant from the lower ends of the screws are located adjacent to and below the screws. On being warmed up, the free end 90 of the bimetallic member 84 deflects upwardly and contacts the cam member 68 and moves it upwardly; on sufficient movement of the cam member, the cam surfaces 92 and 94 simultaneously contact the lower ends of screws 38 and 40, respectively, move them upwardly and cause both sets C1 and C2 of contacts to disengage at about the same time, thereby deenergizing both electrical heating units H1 and H2 simultaneously.

The third general type of operation is to adjust the control so that the electrical heating unit H2 will be deenergized before the electrical heating unit H1. This may be effected by manually moving the slide 66 to its dot-dash line position in Fig. 1, which is also shown in Figs. 8 and 9. In this setting, the slide has been moved as far to the left as the right-hand edges 73 of notches 70 will allow. By viewing Fig. 8, which is the "cold" condition of the control, it will be observed that the cam surface 92

is spaced farther away (relative to its position for the second type of operation) from the lower end of screw 38, which is located directly behind the screw 40 in this view, and that the cam surface 94 is located rather close to the lower end of screw 40. This type of setting is the converse of the first type shown in Figs. 4 and 5. This means that on being heated up, the bent end 90 of the bimetallic member 84 deflects upwardly and moves the cam member 68 upwardly, and the cam surface 94 contacts and moves the lower end of screw 40 upwardly, thereby moving the flexible, electrical blade 24 and the contact 22 upwardly, and causing disengagement of the contacts 22 and 28 before the cam surface 92 even contacts the screw 38. Of course, on further heating up and deflection of the bimetallic member, the bent end 90 moves the cam member 68 upwardly further until the cam surface 92 contacts the lower end of the screw 38 and moves it, the flexible, electrical blade 12, and the contact 10 upwardly to cause disengagement of set C1 of contacts.

It will, therefore, be seen that three general types of operation are possible, but it should be understood that there are an infinite number of intermediate settings between the two extreme settings of Fig. 4 and Fig. 8, which are determined by the notch forming edges 71 and 73, respectively, of the slide 66. It is simply necessary in order to effect any desired setting of the control between these two extreme settings to grip the rod 76 and move it to the desired position. It will be understood that the precise operational effect desired by various control settings may be empirically determined in terms of temperatures at which desired contact disengagement is required, and these may be translated into the specific configuration of the cam member in order to produce the desired operation. Furthermore, where appropriate, suitable indicia may be associated with the control rod 76 to visually indicate to the user of the electrical device the type of operation which he is setting in functional terms. For example, in the coffee maker application alluded to, various settings may determine the strength of brew of the coffee made by the coffee maker, and therefore, functional indicia such as "Mild," "Weak," and "Strong" may be associated with the control rod 76 to enable the user to automatically select the type of operation he desires.

By altering the configuration of the cam member 68, alternative "types" of controlled operation of plural electrical heating units may be effected, other than the one discussed wherein the deenergization temperatures are automatically varied inversely by adjusting the control. It is also possible, in the illustrated cam member, and in other cam member configurations that could be readily designed, to provide a setting for deenergizing one of the heating units throughout the entire operation. In other words, with the illustrated cam member, if it is desired to utilize only electrical heating unit H1, the control may be modified slightly so as to permit the cam member to be located farther toward the right than is illustrated in Fig. 4, in position to cause disengagement of set C1 of contacts in the cold condition. Conversely, another setting may be provided, if desired, wherein the electrical heating unit H2 is deenergized throughout the entire operation, and this could be effected by providing a cam member position farther to the left of the Fig. 8 position, wherein the set C2 contacts would be disengaged even when in the cold condition.

As previously mentioned, screws 38 and 40 constitute means for calibrating the control. It will readily be understood by those skilled in this art that initial adjustment of these screws relative to their supporting blades alters the distance the cam member must move before causing contact disengagement, hence, alters the temperature at which disengagement occurs. This calibration is a "factory type" of adjustment, and not normally made by a user of a device possessing the control.

The structure and operation of one embodiment of my invention have been herein disclosed. There are several important advantages that my invention possesses over the prior art which taken alone and in combination constitute advances thereof. In the first place, my invention provides a simple, compact structure which is adapted to be readily incorporated as a unit in an electrical device, and which is of minimum size. It will be readily understood that it is extremely desirable in many applications, particularly household electrical appliances, to maintain the size of the control at a minimum.

In addition, controls contemplated by my invention possess the advantage of providing uniform pressure between the electrical contacts of each set regardless of the setting to which the control is adjusted. Many prior art controls achieve different temperature settings by physically forcing sets of contacts away from a temperature responsive, actuating member. It will be observed that in the instant invention, it is the actuating cam member 68 which is adjusted relative to the sets of contacts and their associated supporting blades to adjust the control setting, and that regardless of the position of the cam member, pressure between the contacts in each set is always the same. This, of course, enhances the life expectancy of the contacts, and is generally recognized in this art as being desirable.

Further still, controls contemplated by my invention possess the advantage of providing for uniform disengagement load on the bimetallic member regardless of the control setting. Stated differently, the cam member 68 must overcome substantially the same load when forcing either set of contacts to be disengaged regardless of the setting of the control. This is to be contrasted with prior art controls wherein contact supporting members, usually electrical blades, are stressed differently for different control settings in order to achieve adjustability, and therefore, wherein the electrical blade which carries the contact that is forced away from the other contact is loaded to varying extents depending upon the control setting. In the improved control, the same force must be overcome to disengage either set of contacts regardless of the setting of the control.

It should be noted that although the invention has been disclosed as being embodied in a control for controlling a plurality of electrical heating units, that the enumerated advantages of the invention will flow if the inventive concept of providing control adjustability by moving a cam member between a bimetallic member and the electrical contacts and their associated supporting structure, rather than moving the latter relative to the bimetallic member, is incorporated in a control for controlling a single, electrical heating unit. It will be understood that the size, contact pressure and contact disengagement load advantages discussed are significant even if the control is utilized for controlling only a single, electrical heating unit. Furthermore, it should also be noted that any number of electrical heating units may be controlled, and that additional sets of contacts with associated supporting structure, and additional cam surface formations on the cam member, may be added in order to provide an infinite variation of operational relationships between these elements to provide a wide variety of types of operations.

As will be evident from the foregoing description, certain aspects of my invention are not limited to the particular details of construction of the example illustrated, and I contemplate that various and other modifications and applications will occur to those skilled in the art. It is, therefore, my intention that the appended claims will cover such modifications and applications as do not depart from the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A temperature responsive control comprising: a first pair of spaced electrical blades; a first set of electrical

contacts carried by said first pair of blades, said first set of contacts being arranged to control a first electrical circuit and normally being engaged, but adapted to be disengaged by movement of one blade relative to the other; a second pair of spaced electrical blades; a second set of electrical contacts carried by said second pair of blades, said second set of contacts being arranged to control a second electrical circuit and normally being engaged, but adapted to be disengaged by movement of one blade relative to the other; temperature responsive means spaced from said blades and adapted to move toward said blades in response to a temperature increase in a heat source; cam means having a portion thereof operatively disposed between said blades and said temperature responsive means and being arranged to be contacted and moved by said temperature responsive means when the latter moves in response to a temperature increase in the heat source and thereby cause movement of one of said blades relative to the other to disengage the contacts; said cam means including a pair of dissimilar cam surfaces having sections of different operating characteristics which are jointly movable toward said pairs of blades during operation of the control and adapted to cause independent disengagement of said sets of contacts by causing one blade of each pair to be separately moved relative to the other blade associated with it; and means for adjustably mounting said cam means whereby other portions of said cam means of different operating characteristics than said first-mentioned portion may selectively be operatively disposed between said pairs of blades and said temperature responsive means to thereby vary the temperatures at which said sets of contacts are disengaged.

2. A control as defined in claim 1 wherein said one blade of each pair of blades includes a member that extends toward and adjacent to said cam means; each of said cam surfaces is associated with and spaced from one of said members, and said cam surfaces are movable to different positions relative to said members by adjustment of said cam means to thereby vary the temperature at which each set of contacts is independently disengaged.

3. A control as defined in claim 2 wherein said cam surfaces are inclined, and movement of said cam means relative to said members varies the respective individual distances between said members and said cam surfaces to thereby vary the individual disengagement temperatures of the set of contacts.

4. A temperature responsive control comprising: a support; an elongated rigid electrical blade secured near one of its ends to said support and carrying two spaced electrical contacts at its free end; a pair of spaced elongated flexible electrical blades, each secured near one of its ends to said support and extending therefrom generally parallel to, spaced from and co-extensive with said rigid blade on one side thereof; each of said flexible blades carrying an electrical contact at its free end which

cooperates with one of the electrical contacts carried by said rigid blade in such a manner as to form a set of electrical contacts that is normally engaged, but adapted to be independently disengaged by movement of the flexible blade which carries it away from said rigid blade; an elongated bimetallic member secured near one of its ends to said support and extending generally parallel to and spaced from said rigid blade on the other side thereof; an elongated semi-flexible slide member slidably supported near one of its ends by said support and extending between, normally spaced from, and generally parallel to said rigid blade and said bimetallic member; each of said flexible blades supporting a member that extends past said rigid blade and generally toward and adjacent to the other end of said slide member but being spaced therefrom; said slide member having cam means rigidly supported at said other end and located generally between the free end of said bimetallic member and said extending members; said cam means having adjacent portions that are spaced from and independently cooperate with separate members; said slide member being slidably supported by said support so as to be longitudinally movable relative to said blades and said bimetallic member, whereby different portions of said cam means having different operating characteristics may be disposed between said extending members and the free end of said bimetallic member to thereby vary the individual distances between said extending members and said cam means; said bimetallic member being arranged to deflect in response to temperature increases in a heat source in such a manner that its free end moves toward said other end of said slide member, and on sufficient deflection of said bimetallic member contacts and moves said cam means toward and into contact with said extending members to move the latter and their supporting flexible blades individually away from said rigid blade to separately disengage the sets of contacts, whereby the temperatures at which each set of contacts is disengaged are predetermined by providing portions of desired operating characteristics on said cam means and disposing said portions adjacent to said extending members by longitudinally moving said slide member to the appropriate position to effectuate the proper dispositional relationship between said cam means and said extending members.

5. A control as defined in claim 4 wherein said cam means comprises a pair of dissimilar cam surfaces.

6. A control as defined in claim 4 wherein said cam means comprises a pair of oppositely inclined cam surfaces.

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