THERMAL CYCLING HEAT RANGE SWITCH WITH WIPING ACTION

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REFERENCES CITED

UNITED STATES PATENTS
3,110,789 11/1963 Hild et al.........................337/93
2,944,136 7/1960 Holtkamp..........................337/92 X
2,813,173 11/1957 Risacher et al..................337/93
2,798,131 7/1957 Collier.........................337/92 X

FOREIGN PATENTS OR APPLICATIONS
710,259 6/1954 Great Britain......................337/51

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A thermal cycling switch device including a bimetallic current carrying cycling blade operable to control the rate of energization of an electric heater particularly of the type used in range surface units. A front contact on the free end of the self-heated cycling blade is constantly biased in a contact open direction by cam loading means. A thrust spring operates on the free end of the cycling blade to apply a snap action force in both the make and break directions depending upon the thermal condition of the cycling blade. The switch employs a resiliently mounted back contact supporting blade having a radius arm substantially less than the cycling blade wherein wiping action is attained between the contacts to insure the snap action of the switch.

3 Claims, 11 Drawing Figures
THERMAL CYCLING HEAT RANGE SWITCH WITH WIPING ACTION

This invention relates to a thermal cycling switch for controlling the rate of energization of an electric heater, particularly in those type of devices where a large heat surface is provided. As is well known, it is desirable that the electrical switches used for controlling the heat dissipation of an electrical heating element in household appliances, such as ranges, be of an infinite range in order to obtain an infinite range of heat dissipation from the heating element. Here-tofore, switches of this type have employed relatively expensive components which have, in many instances, required careful handling in assembly in order to prevent their being damaged and in order to insure their proper functioning. As can be appreciated, such procedures have increased the cost of the switch. Furthermore, snap action cycling switches heretofore have not been able to operate with a low-actuating force because an overcenter snap action toggle spring arrangement has been used to supply the actuation force to close the contacts.

It is among the objects of the present invention to provide a control mechanism of simple structure and design adapted for cycling on-off switching with a quick snap action in accordance with variations in temperature without requiring toggle spring action to thereby reduce the switch actuating force required while providing a wiping action between the contacts.

It is another object of my invention to provide an inexpensive versatile form of bimetal thermal cycling switch having ambient temperature compensating means.

It is a further object of the invention to provide a switch controlling mechanism with manual thrust spring adjusting means adapted to adjust a cycling bimetallic blade so as to extend the range of usage of the switch without the replacement of parts.

Another specific object of my invention is to provide a new and improved electrical switch of simplified construction having an infinite number of control positions within given limits and having a pair of coextending bimetallic members comprising a bimetallic cycling blade and bimetallic lever spring cam follower each of which has a hook-shaped end portion, such that the hook portion of the cycling bimetallic blade is adapted for cantilevered adjustable engagement with a bracket member and the cam follower lever spring is secured by its hook portion to the cycling blade whereby their high expansion sides face in a common direction and the cam follower lever spring engages the race of a rotatable cam member so as to allow for ambient compensation of the cycling blade. A thrust spring applies a relatively constant force over a limited arc of travel while the lever spring cam follower biases the cycling blade in a contact open direction whereby the self-heated cycling blade in combination with a resiliently mounted back contact provide fast break snap action.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein is shown a preferred embodiment of the present invention is clearly shown.

IN THE DRAWING

FIG. 1 is a perspective view of the exterior of a housing for a thermally actuated switch;
FIG. 2 is a plan view of the contents of the housing, with the cover plate removed;
FIG. 3 is a sectional view taken along the line 3--3 of FIG. 2;
FIG. 4 is a sectional view taken along the line 4--4 of FIG. 2;
FIG. 5 is a fragmentary sectional view taken along the line 5--5 of FIG. 4;
FIG. 6 is a perspective view showing cycling blade and toggle spring mounting arrangement;
FIG. 7 is a plane view of the toggle spring of the invention;
FIG. 8 is an elevational view of the control cam of the invention;
FIG. 9 is a development view of the control cam;
FIG. 10 is an elevational view of the underside of the switch casing;
FIG. 11 is a schematic illustration of the cycling blade illustrating the contact closed positions of the various elements when the cam follower is in its high position in the cam track.

Referring now to the drawings, in FIG. 1, there is shown the switch device 10 illustrated comprising an open ended casing 11 formed of insulating material such as Bakelite, a base or baseplate member 12 carried by the casing (FIG. 3) and a front cover plate 13 which is formed of metal and adapted to be removable secured to the casing 11 as by resilient U-shaped engaging projections 15 formed on the casing walls. The boxlike casing 11 and cover 13 form a housing for the component parts of the switch. The switch is manually adjustable by means of a rotatable knob 16 having suitable indicia corresponding to an off position and various heat positions.

The casing 11 is shown in FIG. 5 having a bottom wall designated at 18, including an offset wall portion 20, sidewalls 22, 23 and end walls 24, 25 (FIG. 4). At the left-hand side of the casing as viewed from the front in FIG. 2 there is located an adjustable thermostat control switch assembly indicated generally at 26 and a line switch control assembly indicated at 27 located at the right-hand side of the casing. Thermostat control assembly switch 26 has a cycling type of bimetallic flexible current-carrying blade 28 and a bimetallic lever spring cam follower 29 operatively to obtain in a cooking unit the desired heat intensity by controlling or determining the average wattage input to the unit. By adjusting the cycling time of operation of the thermostat control low, medium or high heat or any one of a plurality of heat intensities therebetween may be had.

Turning first to a description of the line switch control assembly 27, which, as seen in FIG. 4 provides a pair of single-pole, single-throw switches each of which includes one fixed and one movable contact. The movable spring blade 31 has a split end providing strut 32 which supports at its free end contact 33 while the free end of the spring blade 31 has a contact 34 fixed thereto or a part thereof. The spring blade 31 is secured to the base 12 at its opposite end by suitable means such as rivet member 35 which rivet also retains terminal bracket 36 (FIG. 2) to the baseplate 12. In addition the terminal bracket 36 has an integral terminal 36a extending through the switch casing (FIG. 8) and projections 37, 38, therefrom which extend through the baseplate 12 to provide expansive tape fasteners for the terminal bracket 36. The spring blade 31 provides an on-off line switch for its associated surface unit by means of movable contact 34 engaging fixed contact 38 located on terminal bracket 39 having integral output terminal post 39a (FIG. 10). The neon indicator light strut 32 has its movable contact 33 engaging fixed contact 41 of terminal bracket 42 integral with output terminal post 42a extending through a slot 43 in base 20 so as to be externally accessible of the casing 11. The spring blade 31 has a lanced projection 44 extending through rectangular aperture 46 in baseplate 12 coacts with the inner race 47 of a control cam indicated at 48. The control assemblies 26 and 27 are laterally positioned within the casing 11 and extending upwardly between them is an operating and control adjusting stem 49 which is journaled in axial bore 51 of tubularlike boss member 52 and stem 49 projects through the cover plate 13 to receive the operating knob 16.

The bimetallic blade 28 of the thermostat control assembly 26 has one end thereof fixed in cantilever fashion to a generally channel-shaped terminal bracket member 53 which is in turn secured in edge engagement to the baseplate 12 by means of a pair of integral projections 54, 55 (FIG. 2) extending through the baseplate 12. The movable end of the cycling blade 28 carries a movable front contact 56 which mates with back contact 57 to control the flow of current to the surface unit resistance element. The back contact 57 is resiliently located on the free end of a leaf spring back contact blade support having a reversely bent back contact blade 65 which extends in the same direction as the cycling blade 28 and has a
length of the order of one-third the length of the cycling blade 28. The support 58 is secured to L-shaped terminal bracket 59 which includes output terminal post 59a and integral projections 60. It will be noted that both contacts 56 and 57 are of the radiused surface type and by virtue of each being moveable supported there is produced a contact wiping or shearing action therebetween to be described.

The bimetallic cycling blade 28 is selected from a material having a high coefficient of electrical resistivity enabling it to quickly self-heat itself. The cycling blade is formed with its high expansion side 28a facing upwardly toward the control cam 48. Thus, whenever contacts 56 and 57 are engaged current flows through the blade 28 causing it to self-heat resulting in a deflection or arching of the cycling blade and a movement of the front contact 56 toward the bottom wall 18 as viewed in FIG. 3. Because the back contact 57 is resiliently mounted on contact blade 65 the back contact is depressed when engaged by the snap action movement of front contact 56 during the contact making phase of the cycle as seen in FIG. 11. During the contact breaking phase the back contact 57 follows the front contact 56 and maintains contact pressure therewith until the front contact 56 is caused to execute a quick break snap action with the back contact 57 and opens the electrical circuit to the surface heating unit without the drawing of arcs between contacts which leads to oxidation and pitting of the contact surfaces.

As seen in FIGS. 3 and 6 the cycling blade 28 has its cantilevered end provided with a hook-shaped portion defining a bottom 64 projecting downwardly substantially right-angulately from the cycling blade 28, and a tab 63 joined to the outer end of the bottom 64 and extending generally perpendicularly thereto so as to be generally parallel to the baseplate 12. It will be seen in FIG. 3 that the hook-shaped portion of the cycling blade 28 is inserted in the bracket 53 by having the tab 63 enter a slot 66 formed in outer bracket flange 67. A recess 68 is formed in the marginal edge of bracket flange 67 directly above slot 66, such that the slot and recess have sufficient depth to permit movement of the cycling blade when the bracket 53 is assembled to the baseplate 12. The bracket 53 has a bearing plate 69 extending normally inwardly from the lower edge of the outer flange 67 and overlying the tab 63 so as to be coextensive therewith. The free end of the tab 63 is suitably affixed to the bearing plate 69 such as by spot welds 70. A threaded opening 72 is provided in bearing plate 69 for reception of threaded set screw 73 whose driven end engages tab 63 to permit vertical adjustment of the thermostatic control switch 26 in the slot 68 and recess 66.

It is necessary to provide the aforementioned wiping action to shear apart the contact arc welds produced by current passing through the contacts 56, 57 in their make position. As seen in FIG. 3 the back contact blade 65 is substantially shorter in length than the cycling blade 28. In the disclosed form the back contact blade 65 is of the order of one-third the length of the cycling blade 28 measured from its cantilevered support furnished by outer bracket flange 67 resulting in the front contact 56 traveling through an arcuate path having the cycling blade 28 providing a radius arm approximately three times greater in length than the radius arm provided by back contact blade 65 controlling the arcuate path of back contact 57. The relative movement in a radial direction between the faces of contacts 56 and 57 produces a shearing force that acts substantially normal to the contact faces and assists in breaking the contact welds.

As best seen in FIG. 6 the inner flange 74 of the bracket 53 is U-shaped forming a pair of laterally spaced arms 75, 76 projecting perpendicularly away from the bracket 53 and intermediate the cantilevered and free ends of the blade defining an opening 77 for receiving the blade 28 to allow for cycling travel therein. Each of the arms 75, 76 has a plurality of spaced serrations 78 thereon oriented transversely of the length of the arms so as to be aligned with matching serrations in the remaining arm for a purpose to be explained.

A thrust spring 62 is provided which extends between the arms 75, 76 and the V-shaped indent 79 formed in the free end of the blade 28. As shown in the elevation view of FIG. 7 the spring 62 has a second bifurcated end forming a pair of reverse bent projecting tongues 81, 82 each having notched shoulders 83, 84. The tongues 81, 82 of thrust spring 62 are abutted against the serrated portions of their associated bracket arms 75, 76, such that the notched shoulders 83, 84 provide sharp rear corners that extend into aligned serrated slots, thereby providing a precise flexure support for the thrust spring 62.

As seen in FIG. 6 and 7 the thrust spring 62 is held against side-wise movement by means of prongs 85, 86 forming notch 87 on the first reverse bent end of the thrust spring 62 for receiving the V-shaped indent 79 of the cycling blade 28. The notched shoulders 83, 84 of the thrust spring 62 engage the inner edges of the arms 75, 76 respectively to prevent lateral movement of the bifurcated end of the spring 62. The center of the thrust spring 62 is reduced at 88 so as to concentrate bending forces on the arched portion thereof to preserve the outer thrust of the end portion thereof.

The cycling blade 28 is thus spring loaded in tension by the thrust spring 62 and the thermostat may be set to acquire a desired heat by changing the time period of cycling the cycling blade 28 which is accomplished by rotating the control cam carrier 48. As viewed in FIG. 3 it will be seen that as the tongues 81, 82 of the thrust spring 62 are moved downward toward the bottom wall 18 of the casing more spring tension is placed on the cycling blade 28 with the result that an increased current flow is required through the blade 28 to provide the same timing cycle achieved with a prior setting of the spring tongues 81, 82 toward the baseplate 12. Thus by means of moving the thrust spring tongues 81, 82 up or down to engage in corresponding serrations in the arms 75, 76 will accordingly increase or decrease the compression of thrust spring 62 thus providing a factory or production adjustment for producing switches of common or identical design but with different current ratings. The threaded fine adjustment setscrew 73 serves as the field or installation adjustment which allows for final exact setting of the switch depending upon the particular appliance or range circuit involved.

The rotatable control cam carrier 48, fixed to the operating stem 49 by suitable means such as cross pin 89 engaging cam carrier slots 91, has its outer surface 92 engaging cover reference projections 93 for cam positioning. The inner side of the control cam has an annular inner race 47 which functions to energize the switch by changing the tension of the line spring 31. Intermediate its outer surface 92 and the upwardly lanced or bent portion 44 which engages or rides on race 47 by means of a low friction follower adapted to lodge in detects 95, 96, 97 corresponding to Off, Simmer and High heat positions. It will be noted that as shown in FIG. 4 the projection 44 is shown engaged in center notch 95 which is formed deep to prevent spring blade 31 from being biased into line contact via its contact 34.

An annular outer cam track 98 on control cam 48 functions to set the thermostat assembly 26 by changing the spring loading on the bimetallic cam follower lever spring 29 fixedly secured to the cycling blade 28 by means of an L-shaped portion 101 extending through a suitable aperture 102 in baseplate 12 providing a cycling blade mounting flange 103. The mounting flange 103 underlies the cycling blade 28 a defined distance outwardly from the bottom 64 to thereby exert a loading force tending to bow or curve the center portion of the cycling blade 28 away from the base plate 12 in a first direction (FIG 11). Suitable means such as rivet 104 is used to secure the mounting flange 103 to the cycling blade 28. It will be seen in FIG. 9 that the cam track 98 has a steeply inclined surface 99 and a gradually inclined surface 100 from its high point which serves as the Off position. The cam follower lever spring 29 is so designed that rotation of the control cam 48 in either direction from the Off position will decrease the loading of the lever spring 29 and that this will cor-
respondingly increase the period that cycling blade front contact 56 is in closed relation with back contact 57 to increase the period that the thermostat allows current to flow to the range resistance element with corresponding increase in heat intensity of the surface heating unit.

The lever spring 29 is formed of the same bimetallic material as the cycling blade 28 with its high expansion side 29a facing in a common direction with side 28a of the cycling blade 28 which in FIG. 3 is upward toward the cover 13. Thus, the lever spring 29 also serves as an ambient compensating thermomotive element and is primarily affected by the ambient or environmental temperature and by virtue of being shielded by baseplate 12, is not primarily affected by heat conducted along flange 103 from the cycling blade 28. As the ambient or environment temperature rises, the end of the cam follower lever spring 29 curves or deflects away from the base plate 12 so as to compensate for the bowing of the cycling bimetal blade 16. Thus for a setting of contact resistance 56, as the ambient temperature increases the contacts 56, 57 will want to open sooner but the bowing of the cam follower lever spring 29 will decrease its loading action to thereby decrease the contact opening biasing force applied to cycling blade 28.

An important feature of the switch is the snap action of contacts 56, 57 attained by the thrust spring 62 acting either in conjunction with or in opposition to the loading by the cam follower lever spring 29 depending upon the configuration of the contacts 56, 57 are in either a breaking or making phase respectively. It will be noted that the switch employs a stop bar 106 that extends normal to the bracket extension 107 seen best in FIG. 6. This stop bar 106 engages the cycling blade V-shaped indent 79 during a contact breaking phase to establish a fixed reference for contact breaking or opening travel of the front contact 56 such that the thrust spring 62 is restricted from flexing to an overcenter position. At this instant the cycling blade in response to its self heating has its center portion arched or curved toward the baseplate in a second contact break attitude (i.e., opposite to the direction of travel of its contact 56) because of the expansion of high expansion side 28a as seen in FIG. 3 resulting in V-shaped indent 79 engaging stop bar 106. After a time interval the thermally heated cycling blade 28 cools in its contact open position whereby the thrust spring 62 now opposes the bias spring loading applied by the cam follower lever spring 29 causing the cycling blade 28 to bow or curve to an opposite curvature away from the base plate 12 in a first contact make attitude with a resultant snap action movement of the contact 56 toward the contact 57. This snap action movement of the bend of blade 65 toward the base plate 12 to substantially the position shown in the diagrammatic illustration of FIG. 11 to complete the circuit for energizing a heating element.

It will be noted that ordinarily in the contact opening phase the movement of the cycling blade 28 is relatively slow and the break between the contacts 56 and 57 would result in an arcing condition between the contacts. As arcing results from a loss of contact pressure applicant avoids this problem by resiliently supporting the back contact 57 in leaf spring fashion. Thus, when the resistance heating of the cycling blade 28 initiates deflection of the cycling blade contact 56 toward the stop bar 106 in a contact opening direction the back contact 57 follows the front contact 56 maintaining the contacts closed with sufficient contact pressure until the cycling blade 28 snaps to the opposite curvature as a result of attaining a certain rise in resistance heat in cooperation with the loading force applied by the thrust spring 62 so that contact 56 is instantly snapped away from contact 57 to its position shown in FIG. 3 to prevent arcing of the contacts. Thus, by virtue of the described arrangement not only the front contact blade 65 maintain contact pressure between the contacts 56, 57 until the reverse curvature movement of the cycling blade 28 occurs but that the above-described wiping action resulting therebetween assists in shearing the contact weld to insure snap action movement of front contact 56 away from back contact 57.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is:

1. A thermal cycling switch assembly comprising a casing having a bottom wall and a cover, a transversely extending baseplate intermediate said bottom wall and said cover formed of electrical insulating material, a terminal bracket fixed to the bottom wall said of said baseplate, a resilient current conducting self-heating bimetallic cycling blade supported in cantilever fashion at one end by said terminal bracket, said cycling blade having a movable front contact on the free end thereof, a resilient bimetallic cam follower lever spring fixed to said cycling blade in a spaced manner outwardly from the cantilevered end thereof, said cam follower lever spring and said cycling blade being vertically spaced and extending in the same general direction on opposite sides of said base plate, said cycling blade and said cam follower lever spring having their high expansion sides facing in a common direction toward said cover, a leaf spring contact blade supported on the bottom wall side of said baseplate, said contact blade extending in the same direction as said cycling blade and having a back contact at the free end thereof for cooperative engagement with said front contact, rotatable cam means positioned intermediate said baseplate and said cover portion operable to vary the location of said lever spring, said lever spring acting to bias said cycling blade such that said cycling blade is curved away from said baseplate in a first contact make attitude, said cycling blade being curved toward said baseplate in a second contact break attitude opposite to said first attitude in response to being self-heated, indent means located on the free end of said cycling blade, laterally spaced abutting means in the main blade portion intermedial the ends of said cycling blade providing an opening therebetween through which said cycling blade extends, a thrust spring having a first reverse bent end portion engaging said cycling blade indent means, said thrust spring second end being bifurcated forming a pair of tongues each of which is reverse bent to engage, respectively, said laterally spaced abutting means, fixed reference means vertically spaced intermediate said bottom wall and said cycling blade free end to restrict said thrust spring from flexing to an overcenter position, said thrust spring operatively with said cam follower lever spring to actuate reverse curvature of said cycling blade to provide snap action movement in both the contact make and break directions in response to the thermal condition of said cycling blade.

2. A thermal cycling switch assembly comprising a casing having a bottom wall and a cover, a transversely extending baseplate intermediate said bottom wall and said cover formed of electrical insulating material, a terminal bracket fixed to the bottom wall side of said baseplate, a resilient current conducting self-heating bimetallic cycling blade supported in cantilever fashion at one end by said terminal bracket, said cycling blade having a movable front contact on the free end thereof, a resilient bimetallic cam follower lever spring fixed to said cycling blade in a spaced manner outwardly from the cantilevered end thereof, said cam follower lever spring and said cycling blade being vertically spaced and extending in the same general direction on opposite sides of said base plate, said cycling blade and said cam follower lever spring having their high expansion sides facing in a common direction toward said cover, a leaf spring contact blade supported on the bottom wall side of said baseplate, said contact blade extending in the same direction as said cycling blade and having a back contact at the free end thereof for cooperative engagement with said front contact, rotatable cam means positioned intermediate said baseplate and said cover operable to vary the location of said lever spring, said lever spring acting to bias said cycling blade such that said cycling blade is curved away from said baseplate in a first contact make attitude, said cycling blade being curved toward said baseplate in a second contact break attitude opposite to said first at-
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In response to being self-heated, a V-shaped indent formed on the free end of said cycling blade, a pair of laterally spaced arms on said terminal bracket projecting perpendicularly away from said baseplate and positioned intermediate the ends of said cycling blade providing an opening therebetween through which said cycling blade extends, each of said spaced arms having a plurality of serrations formed therein extending transversely of their length, a thrust spring having a first reverse bent end portion engaging said cycling blade indent means, said thrust spring second end being bifurcated forming a pair of tongues each of which is reverse bent to adjustably engage the serrations formed on an associated arm, said reference means vertically spaced intermediate said bottom wall and said cycling blade V-shaped indent to restrict said thrust spring from flexing to an overcenter position, said thrust spring operative with said cam follower lever spring to actuate reverse curvature of said cycling blade to provide snap action movement in both the contact make and break directions in response to the thermal condition of said cycling blade, said contact blade having a length of the order of one-third the length of said cycling blade wherein movement of said cycling blade in the contact make direction produces a related flexing of said contact blade and wherein movement of said cycling blade in the contact break direction causes said back contact blade to so follow said cycling blade thereby producing a shearing action between said front and back contacts to insure quick breaking of said contacts.

3. A thermal cycling switch assembly comprising a shell casing having a bottom wall and a cover, a baseplate of insulation material supported in said casing intermediate said bottom wall and said cover portion, a shaft extending into said casing and rotatably supported thereby, a circular cam keyed on said shaft within said casing positioned between said baseplate and said cover, terminal bracket means fixed to one surface of said baseplate facing said bottom wall, said terminal bracket means being channel-shaped in cross section providing outer and inner substantially parallel flanges and supported in edgewise engagement on said baseplate, a resilient current conducting bimetallic blade having a hook-shaped portion at one end defining a bottom projecting toward said bottom wall substantially right-angicularly from said cycling blade, a tab joined to the outer edge of said bottom and extending perpendicularly therefrom so as to be generally parallel to said baseplate, a bearing plate extending normally inwardly from the free edge of said first flange generally parallel to said baseplate, said outer flange edge adjacent said baseplate having a recess formed therein and having a slot spaced outwardly from said recess by an intervening web portion of the flange, said slot and said recess having sufficient depth to permit vertical movement of said cycling blade bottom relative to the outer surface of said outer flange web portion when said tab is received in said slot and said cycling blade is received in said recess, said tab being coextensive with the underside of said bearing flange and welded thereto adjacent their free ends to support said cycling blade in cantilever fashion from said outer flange arm, setscrew means threaded in said bearing flange for fine vertical adjustment of said cycling blade bottom relative to said outer flange web portion, said cycling blade having a movable front contact on the free end thereof, a resilient bimetallic cam follower lever spring, said lever spring having an L-shaped end portion providing a mounting flange substantially parallel to said lever spring, said L-shaped end portion extending through aperture means in said baseplate for attachment to the high expansion side of said cycling blade outwardly from the cantilevered end thereof, said follower lever spring and said cycling blade being vertically spaced and extending in the same general direction thereof being coextensive on said baseplate, said cycling blade and said cam follower lever spring having their high expansion sides facing in a common direction toward said cam means, a leaf spring contact blade supported on the bottom wall side of said baseplate, said contact blade extending in the same direction as said cycling blade and having a movable back contact at the free end thereof for cooperative engagement with said front contact, rotatable can means positioned intermediate said baseplate and said cover operable to vary the loading of said lever spring, said lever spring acting to bias said cycling blade such that said cycling blade is curved away from said baseplate in a first contact make attitude, said cycling blade being curved toward said baseplate in a second contact break attitude opposite to said first attitude in response to being self-heated, a V-shaped indent formed on the free end of said cycling blade, a pair of laterally spaced arms on said terminal bracket projecting perpendicularly away from said baseplate and positioned intermediate the ends of said cycling blade providing an opening therebetween through which said cycling blade extends, each of said spaced arms having a plurality of serrations formed therein extending transversely of their length, a thrust spring having a first reverse bent end portion engaging said cycling blade indent means, said thrust spring second end being bifurcated forming a pair of tongues each of which is reverse bent to adjustably engage the serrations formed on an associated arm, fixed reference means vertically spaced intermediate said bottom wall and said cycling blade V-shaped indent to restrict said thrust spring from flexing to an overcenter position, said thrust spring operative with said cam follower lever spring to actuate reverse curvature of said cycling blade to provide snap action movement in both the contact make and break directions in response to the thermal condition of said cycling blade, said contact blade having a length of the order of one-third the length of said cycling blade wherein movement of said cycling blade in the contact make direction produces a related flexing of said contact blade and wherein movement of said cycling blade in the contact break direction causes said back contact blade to so follow said cycling blade thereby producing a shearing action between said front and back contacts to insure quick breaking of said contacts.