May 31, 1966 J. W. HUFFMAN ETAL 3,254,184

SEQUENTIAL THERMALLY RESPONSIVE SWITCH MECHANISM

Filed July 9, 1964

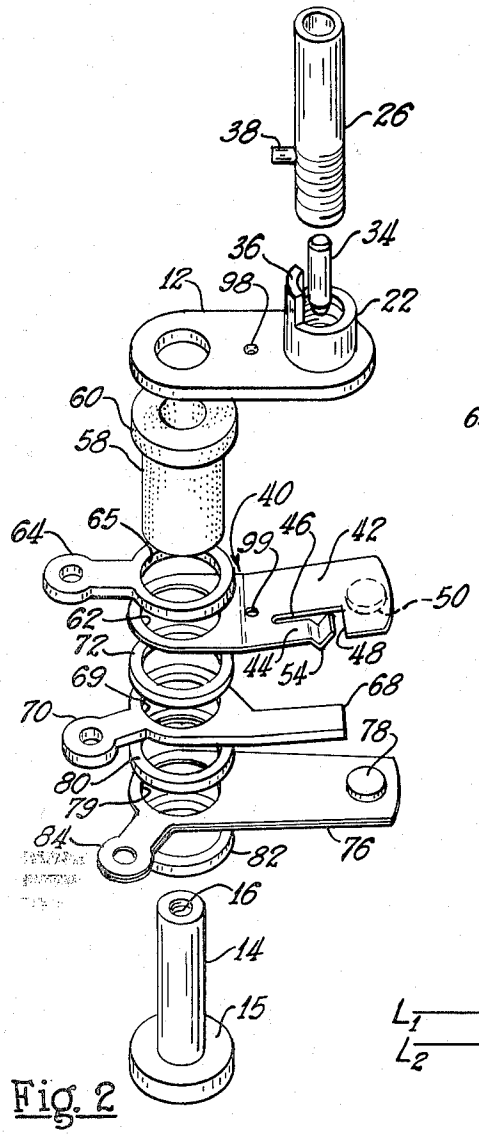



Fig. 2

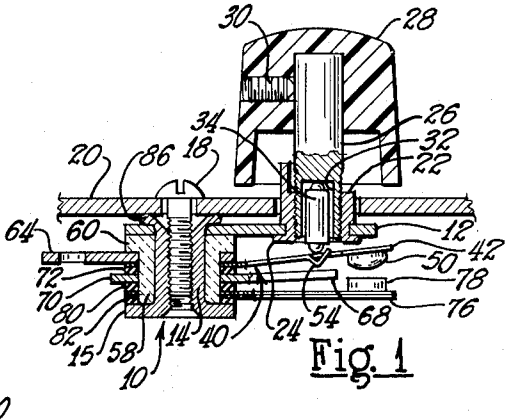



Fig. 1

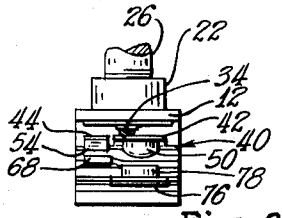



Fig. 3

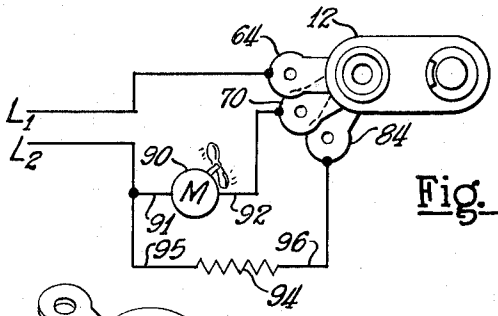



Fig. 4

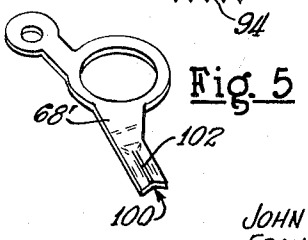



Fig. 5

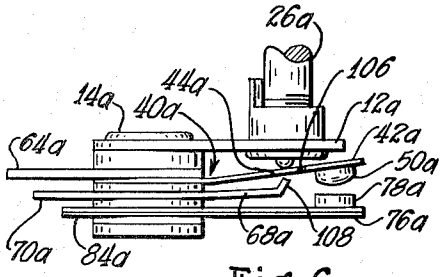



Fig. 6


INVENTORS
JOHN W. HUFFMAN &
FRANK T. PIACENT
BY
Harry O. Ernsberger
ATTORNEY

United States Patent Office 3,254,184 Patented May 31, 1966



3,254,184

# SEQUENTIAL THERMALLY RESPONSIVE SWITCH MECHANISM

John W. Huffman and Frank T. Piacent, Mansfield, Ohio, assignors to Pace, Inc., Mansfield, Ohio, a corporation of Ohio

Filed July 9, 1964, Ser. No. 381,352
11 Claims. (Cl. 200—138)

This invention relates to switch mechanism and more especially to a dual switch mechanism in which a single manually adjustable means is arranged to establish dual circuits in association with thermoresponsive means for automatically controlling one of the circuits after its initial establishment by the manual means.

In certain instrumentalities or appliances it is imperative to effect the energization of one current consuming instrumentality or component prior to the energization of a second current consuming instrumentality, especially where the latter instrumentality may be dependent for its effective use upon the prior energization of the first instrumentality. One example of the utility of a dual switch means of this character is in association with a conventional hair dryer unit embodying a motor driven air blower or fan which is brought into operation prior to the energization of the heating element of the hair dryer unit and wherein the heating element is de-energized prior to the de-energization of the motor driving the blower or fan.

In most conventional hair dryers in use at the present time, a blower motor circuit is energized and thereafter resistance heaters are successively brought into operation by step switch means, different degrees of temperature being provided by manual adjustment of the step switch to successively intercalate resistance heaters in an energizing circuit through successive manual adjustments. In such hair dryer constructions, the heat is increased or decreased in stepped increments as the individual resistance heaters of fixed values are successively energized or de-energized to provide different temperatures without gradation from one temperature to another.

The present invention pertains to a switch mechanism providing a dual circuit control means for two energizable circuits wherein manipulation or adjustment of one switch member initiates energization or de-energization of dual current consuming instrumentalities.

An object of the invention is the provision of a switch mechanism wherein one switch means through manual manipulation effects sequential control of two circuits and, when the means is adjusted for a particular temperature for an electrically energizable heater, that such temperature is automatically maintained by a thermoresponsive medium operative upon a portion of the switch means without affecting one of the circuits.

An object of the invention embraces the provision of a dual switch mechanism in which dual circuit establishing switch means is manually adjustable in association with a thermoresponsive medium or component arranged to maintain control of one of the circuits after its initial establishment by the manually adjustable means.

Another object of the invention is the provision of a dual switch mechanism having particular utility in controlling dual current consuming instrumentalities through manual adjustment of a single member which is distortable to sequentially energize or de-energize two circuits wherein the member may be adjusted to a particular setting for obtaining a desired temperature for an instrumentality in one of the circuits and the desired temperature maintained automatically by thermoresponsive means.

Another object of the invention is the provision of a switch mechanism embodying a compound switch member for sequentially controlling two circuits, the switch member being fashioned with two flexible or distortable portions functioning as dual controls for two circuits whereby one portion is effective to control one circuit and another portion rendered effective to control the other circuit in conjunction with a thermoresponsive medium effective to control one circuit but having no effect upon the other circuit.



Another object of the invention is the provision of a dual switch mechanism embodying manual control for a distortable switch component for establishing or interrupting both circuits in conjunction with a thermoresponsive control for one circuit wherein the mechanism embodies a minimum number of components and is of compact character occupying a comparatively small space and which is inexpensive to manufacture and is reliable in operation.

Further objects and advantages are within the scope of this invention such as relate to the arrangement, operation and function of the related elements of the structure, to various details of construction and to combinations of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent from a consideration of the specification and drawing of a form of the invention, which may be preferred, in which:

FIGURE 1 is a longitudinal sectional view through the switch mechanism of the invention, the view being on an enlarged scale;

FIGURE 2 is an isometric expanded view of the several components of the switch mechanism;

FIGURE 3 is an end view of the construction shown in FIGURE 1;

FIGURE 4 is a top plan view of the switch mechanism and including a schematic circuit diagram for two current consuming instrumentalities controlled by the switch mechanism;

FIGURE 5 is an isometric view showing a modified form for one of the components of the switch mechanism, and

FIGURE 6 illustrates a modified form of the switch construction.

While the switch mechanism of the invention is particularly adapted for controlling an air blower and electrically energizable heating means of a hair drying apparatus, it is to be understood that the switch mechanism may be employed for other purposes for controlling other instrumentalities wherever it may be found to have utility.

Referring to the drawings in detail and initially to the form of the invention shown in FIGURES 1 through 4, the switch mechanism is inclusive of a support means **10** which, in the embodiment illustrated comprises a planar member or plate **12** and a hollow cylindrical metal member **14**, the latter being interiorly threaded as at **16** to accommodate a mounting member or screw **18**. A portion of a housing **20** illustrated in FIGURE 1, which may be the housing construction of a hair dryer, the screw **18** serving to secure the switch mechanism to the housing **20**.

The switch mechanism of the invention is inclusive of a manually operable means for adjusting the relative position of a single switch member configurated or fashioned to energize and de-energize dual circuits as hereinafter described. The support plate or component **12** is provided with an opening to receive a tenon portion of a bushing **22**, the lower end of the bushing being swaged in assembly as at **24** into securing relation with the plate **12**, as particularly shown in FIGURE 1.

The bushing **20** is interiorly threaded to receive a threaded shaft or stem **26**, the upper end of the shaft **26** supporting a manipulating knob **28** of suitable insulating material, the knob being provided with a transverse

threaded opening accommodating a securing screw **30** adapted to be drawn into engagement with the shaft **26** to secure the knob on the shaft. The lower end of the shaft **26** is provided with a bore **32** in which is disposed a rigid member or strut **34** of lava or other suitable high temperature resistant insulating material.

The rotational movement of the shaft or stem **26**, through its threaded engagement with the bushing **22**, adjusts the position of a switch member hereinafter described. The bushing **22** is provided with an upwardly extending projection or abutment **36**, and the shaft **26** is equipped with a transversely extending pin **38**, the pin **38** cooperating with the projection or abutment **36** for limiting the rotational movement of the shaft **26**.

The switch mechanism is inclusive of a first switch member **40**, herein referred to as a compound switch member in that it is of flexible metal fashioned with a first switch arm or section **42** and a second switch arm or section **42** and a second switch arm or section **44**. The shape of the switch member **40** is particularly shown in FIGURE 2 where it will be seen that a slot **46** is formed lengthwise of the switch member **40**, the slot terminating at its forward end at a lateral edge **48**. The forward end region of the switch arm or section **42** is provided with a contact **50**.

The switch arm or section **44** of the compound switch member **40** is formed by slitting the material to form the lateral edge **48** and forming or bending the terminal region of the portion **44** to a V-shaped configuration, as shown in FIGURES 1 and 2, the apex **54** of the V-shaped configuration being a contact or a contact portion for the switch arm or section **44**. The several components of the switch mechanism are arranged or mounted in stacked relation on an insulating means such as a sleeve or bushing **58** which is telescoped onto the cylindrically shaped member **14**, the insulating means **58** having at its upper end an outwardly extending flange **60**.

The compound switch member **40** is fashioned with an opening **62** whereby the switch member is snugly received on the insulating bushing **58**. A first terminal member **64** is fashioned with an opening **65** to be received on the insulating bushing **58** and engages or abuts the flange **60**. The compound switch member **40** is assembled on the sleeve in metallic engagement or contact with the first terminal member **64**, as particularly shown in FIGURE 1. A third switch member **68** is fashioned with an opening **69** of a dimension to be received on the insulating bushing **58**, the switch member **68** being fashioned with a terminal portion **70**, herein referred to as a second terminal means.

The switch member **68** is assembled on the insulating bushing **58** with an insulating member or washer **72** disposed between the compound switch member **40** and the switch member **68**. The arrangement embodies a thermoresponsive medium or bimetal element **76** which, in the embodiment illustrated, serves or functions as a fourth switch arm. The bimetal element or fourth switch arm is provided with a contact **78** arranged for cooperation with the contact **50** carried by the first switch arm or section **42** of the compound switch member **40**.

The bimetal element **76** is fashioned with an opening **79** of a dimension whereby the bimetal element is received on the insulating means or bushing **58** in the manner illustrated in FIGURE 1. An insulating member or washer **80** is assembled on the bushing **58** disposed between the third switch member **68** and the bimetal element or fourth switch member **76**. In assembly, a washer or spacer **82** of insulating material is disposed between a flange **15** formed on the lower end of the support member **14** and the bimetal element **76** to insulate the bimetal element from the metal support. The bimetal element **76** is formed with a terminal portion **84** herein referred to as the third terminal portion.

After the several components of the switch mechanism hereinbefore described are assembled on the insulating sleeve or bushing **58**, an end region of the tubular portion **14** of the support means projects through the bushing **58**.

The upper end thereof, extending above the support plate **12**, is swaged as shown at **86** into snug engagement with the upper surface of the support member or plate **12** as shown in FIGURE 1 to retain the several switch components in assembled relation.

The compound switch member **40** is preferably fashioned of beryllium copper, an alloy of beryllium and copper having high strength properties and good current conducting characteristics and which is not subject to appreciable oxidation where it is used as a contact making and breaking means in an electric circuit of low amperage. As shown in FIGURE 1 a compound switch member **40** which includes both the first switch arm portion **42** and the second arm portion **44** is prestressed or inherently tensioned so as to be normally biased upwardly into contact with the end of the strut member or insulating means **34** disposed in the recess of the shaft **26**.

In an "off" position of the manually rotatable shaft **26** with the pin **38** in engagement with the abutment **36**, the contacts **50** and **78** are out of engagement and the contact portion **54** of the switch arm **44** is out of contact with the switch member **68**.

FIGURE 4 illustrates schematically the circuit connections for the switch mechanism in installations where the switch mechanism is arranged to control a blower drive motor and a heater construction of a hair dryer appliance.

As shown in FIGURE 4, the current conductors or lines **L1** and **L2** are conected with a conventional current supply. The power supply line **L1** is connected to the first terminal portion **64** which is in metallic contact with the compound switch member **40**.

The motor **90**, adapted to drive or rotate a fan or air blower of the hair dryer appliance, is connected by a lead **91** with the current supply line **L2** and with a second lead **92** with the second terminal portion **70** formed as an integral part of the switch member **68**. The heater element **94** of the hair dryer appliance is connected by a lead or conductor **95** with the line **L2** and by a conductor **96** with the third terminal portion **84** which is an integral component of the bimetal element **76** providing the fourth switch member of the switch mechanism.

The bimetal element **76** is fashioned of metals having different coefficients of expansion whereby an increase in ambient temperature causes the bimetal element to flex downwardly, as viewed in FIGURE 1, in a direction to separate the contacts **50** and **78** and to flex upwardly upon a decrease in the ambient temperature.

In the use of the switch arrangement in a hair dryer appliance it is essential that the air blower, driven by the motor **90**, be in operation at all times during energization of the hair dryer heating element **94**, and it is therefore important that the blower motor **90** be energized prior to energization of the heater element **94**, and that the de-energization of the motor **90** take place after the heating element **94** has been de-energized.

The operation of the switch mechanism of the invention is as follows: The components of the switch mechanism, as illustrated in FIGURE 1, are in circuit de-energizing positions. In this "off" position, the pin **38** shown in FIGURE 2 is in engagement with the abutment **36**. As the shaft **26** is rotated by the knob **28** in a clockwise direction, as viewed in FIGURE 2, the strut **34** in engagement with the upper surface of the compound switch member **40** flexes the switch member downwardly including both flexible switch arms **42** and **44**.

This initial partial rotation of the knob **28** and shaft **26** engages the apex or raised contact portion **54** of the second switch arm or switch section **44** with the third switch arm **68**, thus completing the circuit through the motor **90** thereby initiating operation of the air blower. Rotation of the manipulating knob **28** is continued, depending upon the degree of heat to be maintained in the appliance. A dial (not shown) may be mounted on the

housing **20** containing graduations indicating various degrees of heat and the knob provided with an index for cooperation with the graduations on the dial in a conventional manner.

This further rotation of the knob **28** then engages the contact **50** of the first switch arm **42** with the contact **78** on the bimetallic element or fourth switch arm **76**, thereby completing the circuit to the heater **94** and energizing the heater.

As the ambient temperature in the region of the bimetal element **76** is increased under the influence of the heat generated by the electrically energizable heater **94**, the bimetal element **76** flexes downwardly and interrupts the circuit through the heating element **94** by moving the contact **78** out of engagement with the contact **50**.

This action of the thermoresponsive element or bimetal element **76** occurs independently of the position of the contact member **54** which remains in engagement with the switch member **68** by the strut **34** to maintain the air blower driven by motor **90** in operation. When the ambient temperature decreases by de-energization of the heater element **94**, the bimetal element **76** flexes upwardly to again engage the contacts **50** and **78** and re-energize the heater **94**. In this manner the temperature desired is maintained substantially constant through the repeated or cycling engagement and disengagement of the contacts **50** and **78** to control the heater circuit.

If an increased degree of heat is desired for the hair dryer appliance, the knob **28** is rotated further in a clockwise direction which moves the switch arm **42** and contact **50** further downwardly whereby a higher temperature is required in the region of the bimetal element to disengage the contacts **50** and **78**. Thus, through manipulation of the knob **28** to a particular adjusted position, any desired degree of heating may be attained within the range of rotation of the shaft **26** and the temperature desired maintained substantially constant for the particular temperature setting.

The switch arm **68** is fashioned of metal of a thickness greater than that of the compound switch means **40** so as not to be distortable under the pressure exerted by the switch arm or portion **44** of the switch member **40**. The material of the switch member **68** is however of a thickness such that it may be bent a slight amount in order to calibrate its initial position with respect to the contact portion **54** of the switch arm **44** when the knob **28** and shaft **26** are in an "off" position whereby in such position the contact portion **54** is out of contact with the switch member **68**.

In assembly, the switch member **68** may be slightly deformed or bent to attain this calibration. For such purpose the support plate **12** is fashioned with an opening **98** and the compound switch member **40** fashioned with an opening **99** which, in assembly, is aligned with the opening **98** to receive a suitable tool for calibrating or adjusting the initial position of the distal portion of the switch member **68**.

FIGURE 5 illustrates a modified form of the third switch member or arm engaged by the contact portion **54** of switch arm **44**. In this form the switch member **68'** has the switch arm portion formed into V-shaped configuration as indicated at **100** providing an apex line **102** which, when embodied in the switch assembly, is adapted to be engaged by the contact portion **54** of the switch arm **44** to complete the circuit through the air blower motor **90**.

By fashioning the switch arm portion **100** of V-shaped configuration, the region of engagement of the apex **54** of the switch arm **44** with the apex line **102** of the switch member **68'** provides substantially a point-to-point contact in circuit closing position.

FIGURE 6 illustrates the switch mechanism embodying a modification of the switch arm construction for controlling one of the circuits. The plate **12*a*** and the member **14*a*** provides support means for the switch components in the same manner as illustrated in FIGURE 1, the components including a compound switch member **40*a***, a third switch arm **68*a***, a bimetal element **76*a*** forming the fourth switch arm, and terminal members or portions **64*a***, **70*a*** and **84*a*** assembled in the same manner as the corresponding components shown in FIGURE 1.

In the form shown in FIGURE 6, the compound switch member **40*a*** is fashioned with an L-shaped slot **106** which provides a flexible first switch arm **42*a*** and a flat flexible second switch arm **44*a***, the arms **42*a*** and **44*a*** being fashioned as integral components of the compound switch member **40*a***. In this form of construction, the member **68*a*** is preferably fashioned with an upwardly extending distal end portion **108** which is adapted to be engaged by the flexible switch arm or section **44*a*** when the shaft **26*a*** is initially rotated away from "off" position.

Thus, in this form, a line contact is made between the upwardly extending portion **108** of the comparatively-rigid switch arm **68*a*** and the flat flexible switch arm **44*a*** for controlling the circuit of the motor **90** driving an air blower or fan. The flexible switch arm **42*a*** is provided with a contact **50*a*** arranged for cooperation with the contact **78*a*** mounted on the bimetal element **76*a***, these contacts cooperating to control the circuit through the heater **94** in the manner hereinbefore described in reference to the construction shown in FIGURES 1 through 4.

When the shaft **26*a*** is rotated from a circuit-closing position to "off" position, the switch arm **44*a*** and the contact portion **108** are out of engagement and the contacts **50*a*** and **78*a*** are out of engagement. Upon rotation of the shaft **26*a*** in a circuit-closing direction, the circuit for the motor **90** is completed through engagement of the switch arm **44*a*** with the contact portion **108** and, upon further rotation of the shaft **26*a***, the flexible switch arm **42*a*** is flexed further downwardly to engage the contacts **50*a*** and **78*a*** to complete a circuit through the heater **94**. Thereafter, the bimetal element or thermoresponsive medium **76*a***, under the influence of heat generated by the heater **94**, automatically controls current flow through the heater **94** substantially at a temperautre for which the rotatable shaft **26*a*** has been adjusted.

It is apparent that, within the scope of the invention, modifications and different arrangements may be made other than as herein disclosed, and the present disclosure is illustrative merely, the invention comprehending all variations thereof.

We claim:

**1.** Switch mechanism comprising, in combination, support means, a switch member mounted by the support means shaped to provide a first switch arm and a second switch arm, said first and second switch arms being flexible, manually operable means mounted by the support means engageable with the switch member for actuating the first and second switch arms, a substantially rigid third switch arm mounted by the support means arranged to be engaged by the second switch arm to control a first circuit, a thermoresponsive element mounted by the support means, contacts carried by the first switch arm and said element arranged to be engaged and disengaged for controlling a second circuit, said first and second switch arms being movable by said manually operable means to positions whereby the first circuit is established during the periods that the second circuit is established through the first switch arm and the thermoresponsive element.

**2.** Switch mechanism comprising, in combination, support means, a switch member of beryllium copper alloy mounted by the support means shaped to provide a first switch arm and a second switch arm, said first and second switch arms being flexible, manually operable means mounted by the support means engageable with the switch member for actuating the first and second switch arms, a third switch arm mounted by the support means arranged to be engaged by the second switch arm to control a first circuit, a thermoresponsive element mounted by the support means, contacts carried by the first switch arm and

said element arranged to be engaged and disengaged for controlling a second circuit, said first and second switch arms being actuated by said manually operable means to positions whereby the first circuit is established during the periods that the second circuit is established through the first swtich arm and the thermoresponsive element.

3. Switch mechanism comprising, in combination, support means, a switch member mounted by the support means shaped to provide a first switch arm and a second switch arm, said first and second switch arms being flexible, said second switch arm having a raised contact portion, manually operable means mounted by the support means engageable with the switch member for flexing the first and second switch arms, a third switch arm mounted by the support means arranged to be engaged by the raised contact portion of the second switch arm to control a first circuit, a bimetal element mounted by the support means, contacts carried by the first switch arm and said element arranged to be engaged and disengaged for controlling a second circuit, said first and second switch arms being flexed by said manually operable means to positions whereby the first and second circuits are established in sequence.

4. Switch mechanism comprising, in combination, support means, a switch member of beryllium copper alloy mounted by the support means having an L-shaped slot providing a first switch arm and a second switch arm, said first and second switch arms being flexible, manually operable means mounted by the support means engageable with the switch member for flexing the first and second switch arms, a substantially rigid third switch arm mounted by the support means arranged to be engaged by the second switch arm to control a first circuit, a thermoresponsive element mounted by the support means, contacts carried by the first switch arm and said element arranged to be engaged and disengaged for controlling a second circuit, said first and second switch arms being arranged to be flexed by said manually operable means to positions whereby the first circuit is established during the periods that the second circuit is established through the first switch arm and the thermoresponsive element.

5. Switch mechanism comprising, in combination, support means including a plate member and a cylindrical member, said members being secured together, insulating means mounted on the cylindrical member, a flexible switch member mounted by the insulating means, a slot in said switch member providing a first switch arm and a second switch arm, a third switch arm mounted by the insulating means, said third switch arm being substantially rigid and arranged to be engaged by the second switch arm, a flexible bimetal element mounted by the insulating means, said first switch arm and bimetal element being provided with cooperating contacts, a threaded bushing mounted on the support plate, a rotatable shaft having a threaded portion cooperating with the threaded portion of the bushing, strut means of insulating material disposed between said rotatable shaft and the switch member, said shaft and strut being arranged whereby rotation of the shaft in one direction flexes said second switch arm into contact with the third switch arm and flexes the first switch arm to engage the contact on the first switch arm with the contact on the bimetal element.

6. Switch mechanism comprising, in combination, support means including a plate member and a cylindrical member, said members being secured together, insulating means mounted on the cylindrical member, a flexible switch member of beryllium copper alloy mounted by the insulating means, an L-shaped slot in the switch member providing a first switch arm and a second switch arm, a third switch arm mounted by the insulating means, said third switch arm being substantially rigid and arranged to be engaged by the second switch arm, a flexible bimetal element mounted by the insulating means, said first switch arm and bimetal element being provided with cooperating contacts, a threaded bushing mounted on the support plate, a rotatable shaft having a threaded portion cooperating with the threaded portion of the bushing, strut means of insulating material disposed between said rotatable shaft and the switch member, said shaft and strut being arranged whereby rotation of the shaft in one direction flexes said second switch arm into contact with the third arm and upon further rotation to engage the contact on the firts switch arm with the contact on the bimetal element to sequentially energize a first circuit through the second and third switch arms and a second circuit through the first switch arm and the bimetal element.

7. Switch mechanism comprising, in combination, support means including a plate member and a cylindrical member, said members being secured together, insulating means mounted on the cylindrical member, a flexible switch member mounted by the insulating means and having a slot therein providing a first switch arm and a second switch arm, a first terminal for said switch member, a third switch arm mounted by the insulating means and shaped to provide a second terminal, said third switch arm being substantially rigid and arranged to be engaged by the second switch arm, a flexible bimetal element and a third terminal associated therewith, said first switch arm and bimetal element being provided with cooperating contacts, a threaded bushing mounted on the support plate, a rotatable shaft having a threaded portion cooperating with the threaded portion of the bushing, strut means of insulating material disposed between said rotatable shaft and the switch member, said shaft and strut being arranged whereby rotation of the shaft in one direction flexes said second switch arm into contact with the third switch arm and upon further rotation to engage the contact on the first switch arm with the contact on the bimetal element to energize a first circuit through the second and third switch arms and a second circuit through the first switch arm and the bimetal element, said first terminal being connected with one side of a power supply and the second and third terminals connected with correct consuming instrumentalities and the current consuming instrumentalities connected with the other side of the power supply.

8. Switch mechanism comprising, in combination, support means including a plate member and a cylindrical member, said members being secured together, insulating means mounted on the cylindrical member, a flexible switch member mounted by the insulating means having a slot therein providing a first switch arm and a second switch arm, said second switch arm having a raised portion, a third switch arm mounted by the insulating means, said third switch arm being substantially rigid and adapted to be engaged by the second switch arm, a flexible bimetal element mounted by the insulating means, said first switch arm and bimetal element being provided with cooperating contacts, individual terminal means associated with the switch member, the third switch arm and the bimetal element, a threaded bushing mounted on the support plate, a rotatable shaft having a threaded portion cooperating with the threaded portion of the bushing, a rigid strut of insulating material disposed between the rotatable shaft and the switch member, the terminal associated with the switch member being adapted to be connected with one side of a current supply, the terminals associated with the third switch arm and the bimetal element being adapted to be respectively connected with a motor and an electrically energizable heater, said switch arms being arranged whereby rotation of the shaft in one direction first engages the second and third switch arms to energize the circuit through the motor and further rotation of the shaft engaging the contacts on the first switch arm and bimetal element to energize the circuit through said heater.

9. Switch mechanism comprising, in combination, support means including a plate member and a cylindrical member, said members being secured together, insulating

means mounted on the cylindrical member, a flexible switch member mounted by the insulating means having a slot therein providing a first switch arm and a second switch arm, a third switch arm mounted by the insulating means, said third switch arm being substantially rigid and the distal portion thereof configurated with a V-shape providing an apex adapted to be engaged by the second switch arm, a flexible bimetal element mounted by the insulating means, said first switch arm and bimetal element being provided with cooperating contacts, a threaded bushing mounted on the support plate, a rotatable shaft having a threaded portion cooperating with the threaded portion of the bushing, a rigid strut of insulating material disposed between the rotatable shaft and the switch member, said switch arms being arranged whereby rotation of the shaft first engages the second and third switch arms to establish a first circuit and upon further rotation engaging the contacts on the first switch arm and bimetal element to establish a second circuit.

10. Switch mechanism comprising, in combination, support means including a plate member and a cylindrical member, said members being secured together, insulating means mounted on the cylindrical member, a flexible switch member of beryllium copper alloy mounted by the insulating means having an L-shaped slot therein providing a first switch arm and a second switch arm, a third switch arm mounted by the insulating means, said third switch arm being substantially rigid and adapted to be engaged by the second switch arm, a flexible bimetal element mounted by the insulating means, said first switch arm and bimetal element being provided with cooperating contacts, individual terminal means associated with the switch member, the third switch arm and the bimetal element, a threaded bushing mounted on the support plate, a rotatable shaft having a threaded portion co-



operating with the threaded portion of the bushing, a rigid strut of insulating material disposed between the rotatable shaft and the switch member, the terminal associated with the switch member being adapted to be connected with one side of a current supply, the terminals associated with the third switch arm and the bimetal element being adapted to be respectively connected with a motor and an electrically energizable heater, said switch arms being arranged whereby rotation of the shaft in one direction first engages the second and third switch arms to establish a circuit through the motor and upon further rotation of the shaft to engage the contacts on the first switch arm and bimetal element to energize the circuit through said heater.

11. Switch mechanism comprising, in combination, support means, a switch member mounted by the support means shaped to provide a first switch arm and a second switch arm, said first and second switch arms being flexible, manually operable means mounted by the support means engagable with the switch member for actuating the first and second switch arms, a substantially rigid third switch arm mounted by the support means arranged to be engaged by the second switch arm to control a first circuit, a thermoresponsive element mounted by the support means, contacts carried by the first switch arm and said element arranged to be engaged and disengaged for controlling a second circuit, said first and second switch arms being movable by said manually operable means to positions whereby one circuit is established during periods that the other circuit is established.

No references cited.

BERNARD A. GILHEANY, *Primary Examiner.*

L. A. WRIGHT, *Assistant Examiner.*