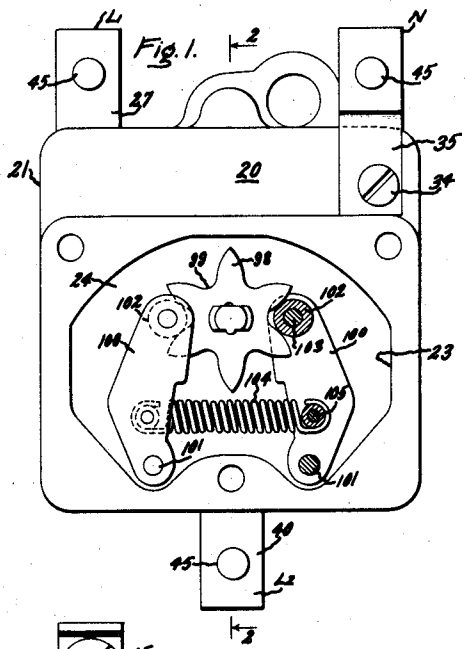
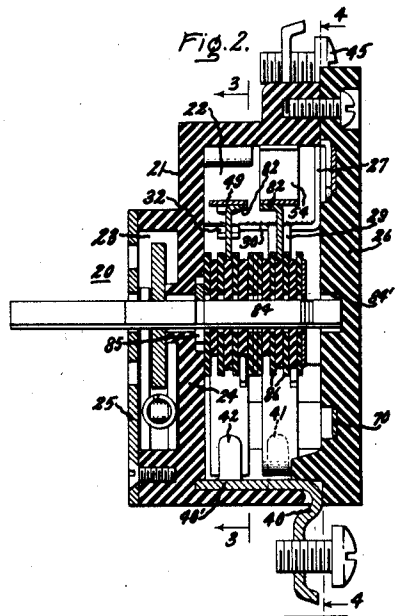
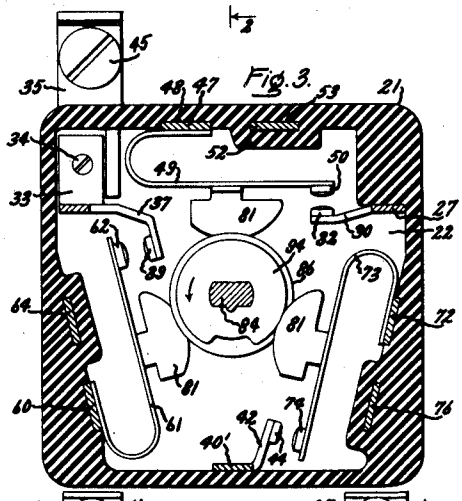
March 26, 1940. D. G. KIMBALL 2,195,251

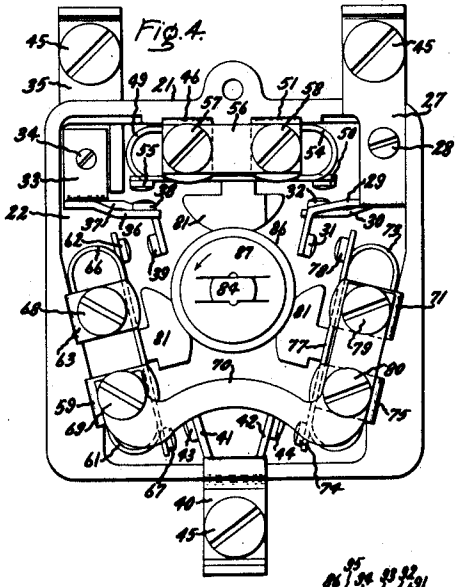
ELECTRIC SWITCH

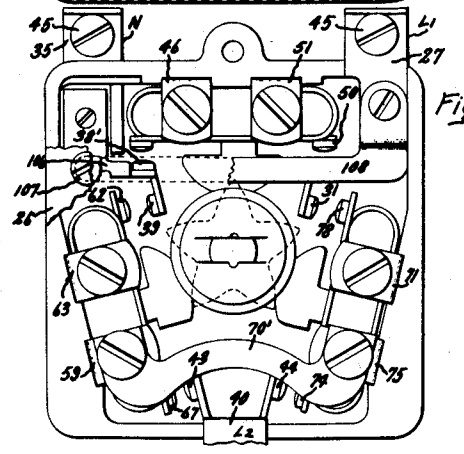
Filed April 29, 1939 3 Sheets-Sheet 1

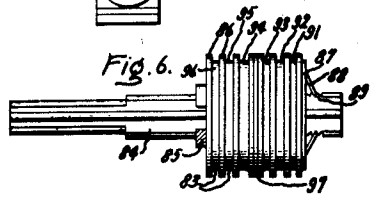












Inventor:
Donald G. Kimball,
by Harry E. Dunham
His Attorney.

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ELECTRIC SWITCH

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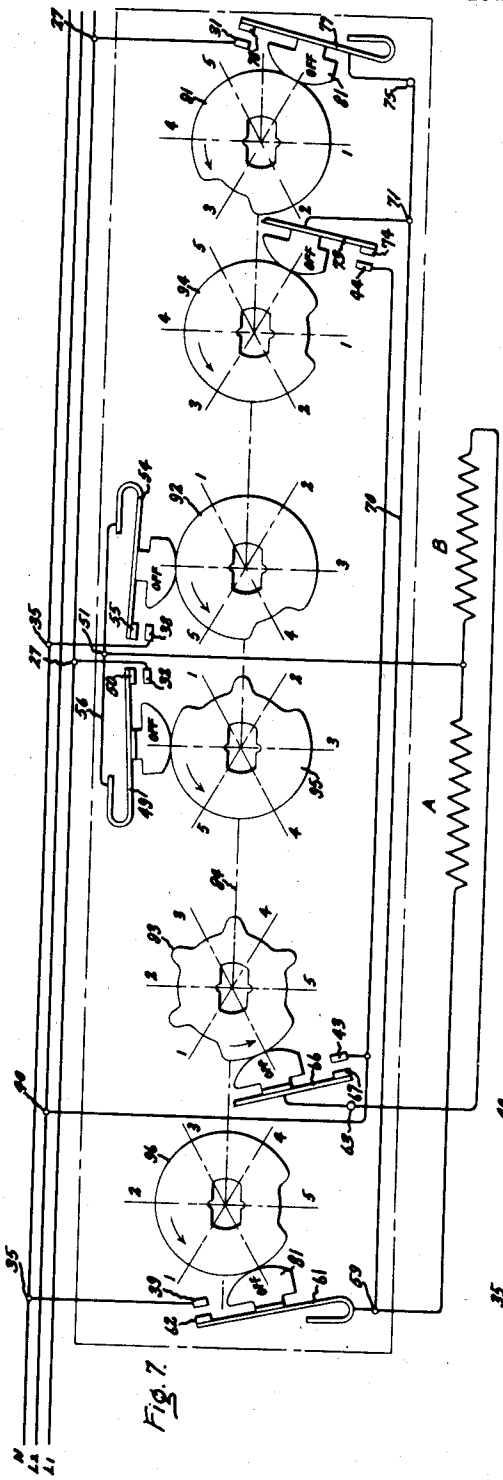

Fig. 7.

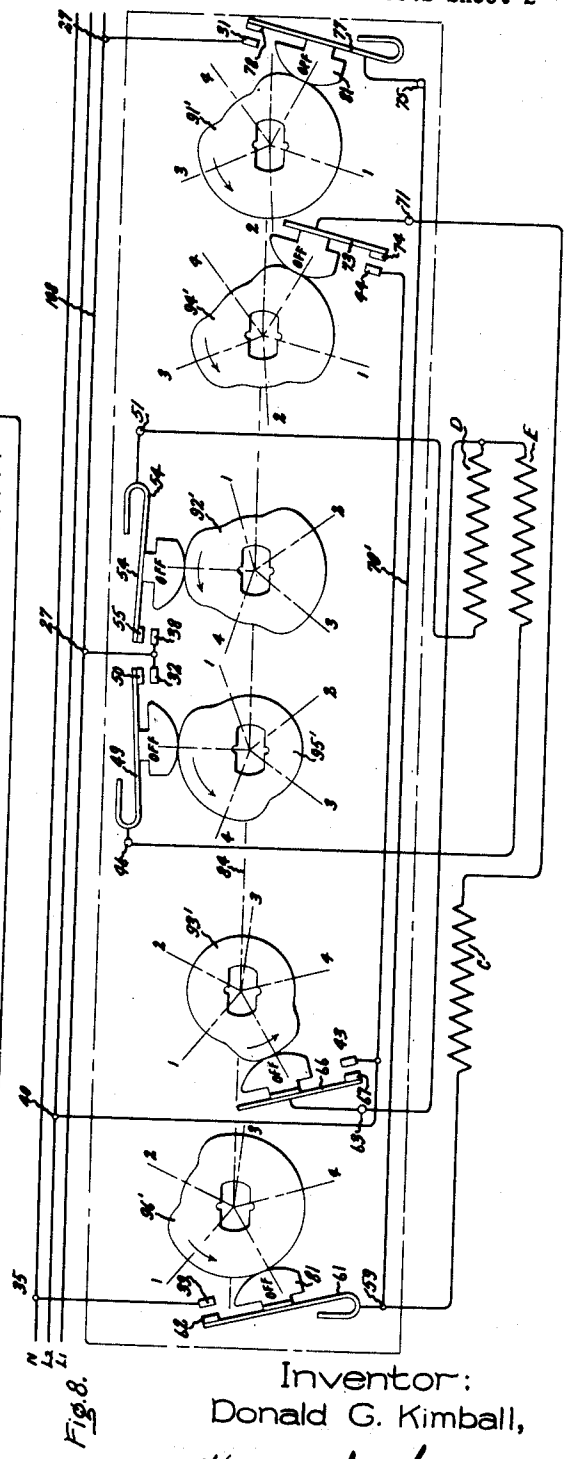

Fig. 8.

Inventor:
Donald G. Kimball,
by Harry E. Dunham
His Attorney.

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ELECTRIC SWITCH

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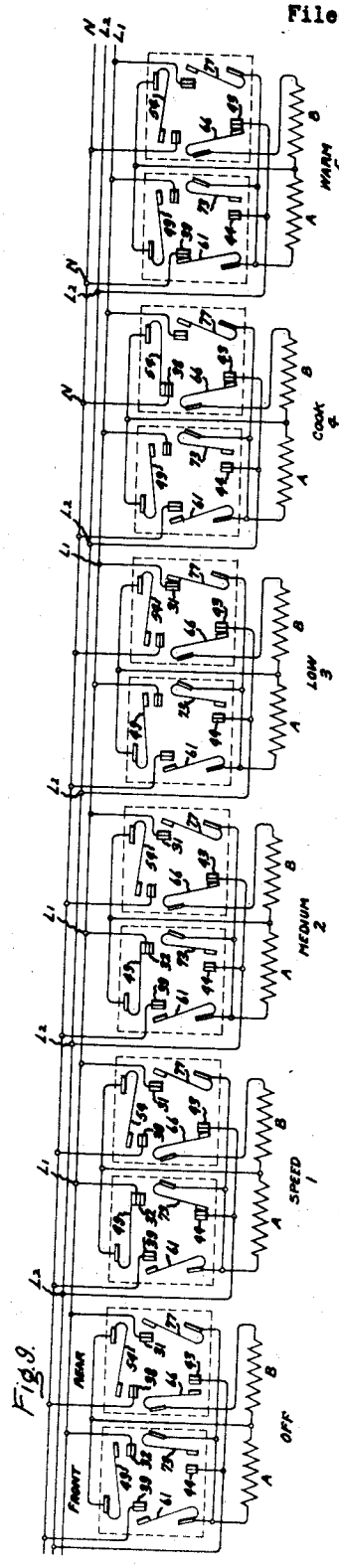

Fig. 9.

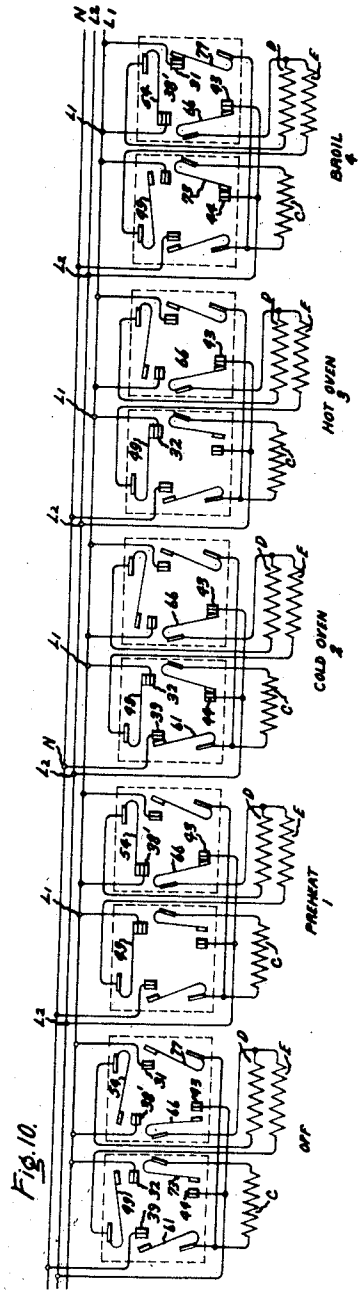

Fig. 10.

Inventor:
Donald G. Kimball,
by Harry C. Dunham
His Attorney.

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UNITED STATES PATENT OFFICE

2,195,251

ELECTRIC SWITCH

Donald G. Kimball, Stratford, Conn., assignor to General Electric Company, a corporation of New York

Application April 29, 1939, Serial No. 270,882

13 Claims. (Cl. 200—6)

This invention relates to electric switches, and more particularly to electric switches for use with electric ranges.

An object of the invention is the provision of an improved construction and arrangement in switches of the type described, in which the switch mechanism is arranged compactly within the switch housing and in which the switch mechanism may be manufactured at low cost.

In the accompanying drawings Fig. 1 is a plan view of the switch with the front cover removed showing the positioning mechanism; Fig. 2 is a sectional view through the switch along the line 2—2 of Fig. 1; Fig. 3 is a sectional view through the switch at right angles to the showing of Fig. 2 along the line 3—3 of Fig. 2; Fig. 4 is a view looking at the rear of the switch with the cover removed substantially along the line 4—4 of Fig. 2; Fig. 5 is a view of a modified form of the invention similar to the showing of Fig. 4; Fig. 6 is a view of a portion of the switch mechanism; Fig. 7 is a diagrammatic view of the switch of Figs. 1 to 4, inclusive, showing the arrangement of the operating cams; Fig. 8 is a diagrammatic view of the modified form of switch shown by Fig. 5 illustrating the arrangement of the operating cams; Fig. 9 is a diagrammatic view of the switch of Figs. 1 to 4, inclusive, showing the switch connected to a heater system, and Fig. 10 is a diagrammatic view of the modified form of switch of Fig. 5, likewise showing this switch connected to a heater system.

In the accompanying drawing, the switch designated generally by the numeral 20 is provided with a housing 21 having recesses 22 and 23 on opposite sides thereof which are separated by a partition 24. The recess 23 is formed in the front part of the housing and receives a switch positioning mechanism to be described later, while the recess 22 is formed in the rear portion of the housing and is adapted to receive the fixed and movable contacts of the switch. The recess 23 is closed by a cover plate 25 while the recess 22 is closed with a cover plate 26. Both the cover plate 26 and the housing 21 are formed of insulating material, for example, a phenolic condensation product and filler while the cover plate 25 may or may not be formed of insulating material and is shown being formed of metal.

The portion of the switch mechanism comprising the stationary and movable contacts is located within the recess 22 and is shown more particularly by Figs. 2, 3 and 4. These elements are arranged symmetrically within the confines of the recess 22 with the movable contacts disposed around the periphery of the wall of the recess. The movable contacts include flexible spring blades which are arranged at two different levels one above the other. These levels will be designated hereinafter as "lower" and "upper" levels, the contacts disposed at the "lower" level being located in the front of the housing, as shown by Fig. 2, and being shown in plan view by Fig. 3, and the contacts disposed at the "upper" level being located at the rear of the housing, as shown by Fig. 2, and being similarly shown in plan view by Fig. 4. By this arrangement it is possible to secure double the number of contacts within the area of the recess and, at the same time, provide a switch mechanism which is of a rugged and compact nature.

Referring now to the fixed contact means of the switch mechanism a terminal member 27 is secured to the rear face of the housing by means of a screw 28 tapped into a wall of the housing. The terminal member 27, in this case the first terminal member, is provided with two integral arms 29 and 30 having contact buttons 31 and 32, respectively, at their outer ends for engagement with movable contacts. The contact buttons or surfaces 31 and 32 extend in opposite directions and are located at two different levels, the contact button 32 being located at the front or "lower" level and the contact 31 being located at the rear or "upper" level. A stationary contact element 33 is mounted at the bottom of the recess opposite the terminal member 27 and is electrically connected by means of a screw 34, or other suitable fastening means, to a terminal member 35, in this case the second terminal member, which is mounted on the front face of the housing, as shown by Fig. 1. The contact element 33 is provided with two integral contact arms 36 and 37 each provided with a contact button or surface 38 and 39, respectively, and which extend into the recess in opposite directions similar to the contact surfaces on the terminal member 27. As shown most clearly by Figs. 3 and 4, the contact 38 is located at the "upper" level in the recess while the contact 39 is located at the "lower" level. A terminal 40, in this case the third terminal member, is located within the recess on a side opposite that on which the previously described terminal members are mounted and is provided with an integral extension 40' arranged along the wall of the recess, the latter being formed with two integral arms 41 and 42 having contact buttons or surfaces 43 and 44, respectively. As shown most clearly by Fig. 2, the contact button 41 is located at the "upper" level

while the contact button 42 is located at the "lower" level.

In the form of the invention illustrated, it will be noted that the recess 22 is of substantially rectangular configuration, and that the terminal members 27 and 35 are located at opposite corners of the recess on a side opposite from that at which the terminal member 40 is located. The terminal member 40 is located at a point midway between the corners of the recess on the opposite side. This means that the various stationary contacts formed on the contact arms of the terminal members are located substantially equidistant from the geometric center of the recess 22 for cooperation with a single switch operating means, thereby providing a compact arrangement of the switch elements. Each of the terminal members is provided with a terminal screw 45 for clamping an electric conductor.

The movable contact means includes a plurality of flexible spring contact blades carried by relatively rigid strap members. To this end, a strap member 46 is provided with a leg 47 disposed in a groove 48 in the wall of the recess and secured to the leg is a flexible spring contact blade 49. One end of the blade is bent as a U and spot welded, or otherwise secured, to the leg 48, while the other end of the blade is provided with a contact button 50 for engagement with the contact button 32 on the terminal member 27. Another strap member 51 is provided with a leg 52 seated in a groove 53 in the wall of the recess. Attached to the leg 52 is a flexible spring contact blade 54. One end of the contact blade 54 is bent in the form of a U and spot welded or otherwise attached to the leg 52 while the other end of the contact blade is provided with a contact button 55 for engagement with the contact button 38. It will be apparent from an examination of Figs. 3 and 4 that the strap members 46 and 51 are seated in a wall of the recess between the fixed terminal members 27 and 35, and that they are separated by a portion of the wall of the recess which insulates them from one another. The contact blades themselves extend in opposite directions and cooperate with the corresponding terminal members 27 and 35 at opposite sides of the recess. As shown most clearly by Figs. 2 and 4, the contact blades are disposed one above the other and are separated from each other by a distance sufficient to insulate them from one another. The straps 46 and 51 are exposed and lie flat on the upper or rear surface of the housing. They are electrically interconneeted by means of a conducting strip 56. The strip 56 is secured at one end to the strap 46 by a screw 57, or other suitable fastening means, while the other end of the strip is secured to the strap 51 by a screw 58. The strap 51 and screw 58 cooperate to form terminal means for receiving an electric conductor for a purpose to be described later. By the construction described it will be seen that the movable contact blades are arranged in pairs between the corresponding fixed terminal members 27 and 35.

Similarly, a pair of the movable contact blades is disposed between the terminal members 35 and 40. To this end, a strap 59 is provided with a leg 60 seated in a groove in the wall of the recess for mounting a flexible spring contact blade 61 at the "lower" level in the recess. At one end, the contact blade 61 is bent in the form of a U and is electrically connected to the leg 60 by spot welding, or the like, while the other end of the blade is provided with a contact button 62 which cooperates with the fixed contact 39. Another strap member 63 is provided with a leg 64 mounted in a groove in the wall of the recess and carries a contact blade 66. One end of the contact blade is bent in the form of a U and electrically connected, as by a spot weld, with the leg 64, while the other end of the blade is provided with a contact 67 cooperating with the fixed contact 43. The strap 63 is provided with a terminal screw 68 for receiving an electric conductor for a purpose to be described later. The other strap 59 is provided with a screw 69 engaging one end of a shorting strip 70. The pair of contact blades 61 and 66 are disposed in opposite relation one above the other similar to the other pair of contact blades 49 and 54.

Disposed between the terminal members 40 and 27 is a third pair of contact blades. A strap 71 having a leg portion 72 is mounted in a groove in the wall of the recess and carries a flexible spring contact blade 73. One end of the blade is bent in the form of a U and spot welded, or otherwise secured, to the leg 72, while the other end of the blade is provided with a contact button 74 for cooperation with the stationary contact 44. Another strap member 75 having a leg portion 76 mounted in a groove in the wall of the recess carries a contact blade 77 overlying the contact blade 73. One end of the contact blade 77 is bent in the form of a U and is spot welded, or otherwise secured to the leg 76, while the other end of the blade carries a contact button 78 for cooperation with the fixed contact 31. The pair of contact blades 73 and 77 are disposed in opposite directions and are placed one above the other similar to the blades of the pairs of contacts previously described. The strap 71 is provided with a terminal screw 79 which is adapted to receive an electric conductor for a purpose to be described later. In addition, the terminal screw acts to secure the other end of the shorting strip 70 to the strap 71. The strap 75 is likewise secured to the shorting strip 70 by a screw 80, or other suitable fastening means. In this manner the contact blades 61, 73 and 77 are electrically interconnected by the shorting strip 70.

By the construction described, it will be seen that various ones of the contact blades are arranged in pairs between the respective fixed stationary contacts or terminal members, and that are arranged symmetrically about the geometric center of the recess 22. The contact blades of each pair are placed one above the other and the contact buttons face in opposite directions so that the blades may cooperate with a corresponding fixed contact. The movable contact elements may be easily assembled within the recess simply by slipping the leg portions of the strap members into the corresponding grooves in the walls of the recess where they are held in position by the cover 26. The strap members are made of relatively heavy sheet metal and hold the flexible spring contact blades rigidly in position. Since each of the strap members is identical in size and shape and each of the flexible blade members and contact buttons are similarly identical in size and shape, these parts may be manufactured from single sets of dies and assembled together before being inserted within the switch housing. By providing the end of each of the contact blades with a U bend, it is possible to space the contact blades themselves from the wall of the recess leaving a space between the var-

ious blades and the walls of the recess for receiving the extending ends of the terminal screws which are mounted on the strap members. In addition, the U bend makes it possible to provide a contact blade which may be moved a sufficient distance from the fixed contacts to insure complete interruption of the circuit without necessitating a contact blade of undue length so that a more compact switch structure is attained.

In order to cooperate with an operating mechanism, each one of the spring contact blades is provided with a slider 81. Each slider has an integral flange 82 which is spot welded or otherwise secured to the corresponding contact blade. Cooperating with the sliders are a plurality of cam members 83 formed of insulating material, such as sheet fiber, and which are mounted on a shaft 84. The shaft is supported at one end in a bearing 84' in the wall of the cover 26 and at the other end in a bearing in the partition 24. The cam disks are separated from one another by plates 86 which may likewise be formed of insulating material, such as sheet fiber, and the cams and insulating separating plates are assembled together on the shaft 84, in a manner shown by Fig. 6, the assembly being held in position against an abutment 85 by a washer 87 having tangs 88 engaging serrations 89 on the outer periphery of the shaft. The cover 26 is held in position on the casing by the screws 90 and serves to hold the cam disk assembly in position within the recess. For connection with electric circuits, the various terminal screws on the strap members extend through openings (not shown) in the cover.

The arrangement of the different cam members with the respective slider elements and contact blades will now be described with particular reference to Fig. 7. In this figure the contact blades have been spaced apart to show the arrangement and shape of the individual cam disks. In the form of the invention illustrated, the switch is adapted to be moved to six positions which are indicated in dotted lines by the numerals 1, 2, 3, 4 and 5 on the respective cam members, the sixth position being indicated by "off". Inasmuch as the contact blades 77, 54 and 66 are located in the "upper" level of the recess, these contact blades will be operated by cam members 91, 92 and 93 through the medium of the sliders 81. The cam disk 91 cooperates with the contact blade 77 and is provided with a depression to close the contact blade when the switch is moved to the third position; the cam disk 92 operates with the contact blade 54 and is provided with a depression to close the contact in the fourth position; whereas, the cam disk 93 cooperates with the contact blade 66 and closes this blade in every position of the switch except the "off" position. The contact members 73, 49 and 61 are located at the "lower" level within the recess and are operated by the cam disks 94, 95 and 96, respectively. To this end, the cam disk 94 cooperates with the contact blade 73 and is provided with a depression to close the contact blade in the first position of the switch; the cam disk 95 cooperates with the contact blade 49 and is provided with depressions to close the contact blade in the first and second positions of the switch; while, the cam disk 96 cooperates with the contact blade 61 and is provided with a recess to close the contact blade in the fifth position of the switch. Inasmuch as the cam disks are rigidly secured to the shaft 84, they may be assembled as a unit, as shown in Fig. 6, prior to insertion in the recess. The cam disks are separated from one another by the insulating plates 86 which serve to guide the slider elements 81 over the outer periphery of the respective cam disks without danger of the slider becoming unseated and moving into engagement with an adjacent cam disk. The two groups of cam disks, which are located at the "upper" and "lower" level in the recess, are separated by three insulating plates 97, as shown most clearly by Fig. 6.

The positioning mechanism for the switch includes a star wheel 98 provided with a plurality of teeth forming indexing depressions 99 corresponding to the number of positions to which the switch is to be moved, in this case, six. Two lever elements 100 are pivoted at one end by means of pins 101 on opposite sides of the shaft 84 and are provided at their other ends with rollers 102 which engage the teeth in the star wheel 98. The pins 101 rest in depressions formed in the partition 24 and the cover 25. The rollers are pivotally mounted on pins 103 and are forced into engagement with the star wheel by a spring 104 which is secured at each end to one of the levers by means of pins 105. It will be apparent that as the switch shaft is rotated the teeth on the star wheel will force the lever members outwardly permitting the rollers 102 to roll over the edges of the teeth into engagement with the adjacent depressed portions so that the different positions of the switch mechanism are identified.

One of the uses to which the switch may be put is to control a heater system for an electric range. As shown most clearly by Figs. 7 and 9, the switch has been connected to a heater system having two heater units A and B and the switch is designed to be moved to six positions giving an "off" and five varying heat values of the heater system. In connecting up the heater system to the switch one end of the heater unit A is connected to the terminal strap 71 and since the shorting strip 70 interconnects the straps 71, 75 and 59, this end of the heater element is placed in communication with the contact blades 77, 73 and 61. One end of the heater unit B is connected to the terminal strap 63 and thus to the contact blade 66. The other ends of each of the heater units A and B are joined together and are connected to the terminal strap 51. Inasmuch as the terminal strap 51 is electrically connected to the strap 46 by the shorting strip 56, the contact blades 49 and 54 are electrically connected between the heater units A and B.

In connecting the heater system and switch to a power source, a three-line power supply is employed, designated by the lines L_1, L_2 and N. Customarily, the N line is a neutral, and the voltage across the lines L_1 and L_2 is of the order of 220 volts while that from either of the lines L_1 or L_2 to the line N is of the order of 110 volts. In this manner various voltages may be impressed on certain of the heater units to attain a wide variety of heating values from the heater system. To connect the switch to the power source the line L_1 is connected to the terminal 27, the line L_2 to the terminal 40 and the line N to the terminal 35.

The various positions of the switch and various heating values attained from the heater system are shown diagrammatically by Fig. 9, although the "off" position is shown diagrammatically by Fig. 7 as well as Fig. 9. When the switch is moved to the first or "speed" position, current

flows from the line L_1 through the contact blade **49** to a point between the two heater units A and B where the current divides, one portion flowing through the heater unit B, contact blade **66** to the line L_2, the other portion flowing through the heater unit A, movable contact **73** to the line L_2. In this manner, both the heater units A and B are subjected to the full voltage across the lines L_1 and L_2 so that a maximum output from the heater system is attained. Various other positions of the switch and the heating values attained from the heater system will be manifest from an examination of Fig. 9. In the second or "medium" position the heater unit B is placed across the lines L_1 and L_2. In the third or "low" position of the switch, both the heater units A and B are connected in series across the power lines L_1 and L_2. In the fourth or "cook" position of the switch, the heater unit B is connected across the lines L_2 and N. In the fifth or "warm" position the heater units A and B are connected in series across the power lines L_2 and N.

While the invention has been shown and described as incorporated in a switch having six positions for controlling a two-unit heater system, it should be apparent that the switch may be adapted to control heater systems having other arrangements of the heater units. For example, in Figs. 5, 8 and 10 a five-position switch is shown as controlling the current to a plurality of heater units C, D and E.

The switch shown by Fig. 5 is in all respects similar to that shown by Figs. 1 to 4, inclusive, with the exception that the shorting strip **56** is omitted and the shorting strip **70** interconnects the terminal straps **59** and **75**, only, and is hereinafter designated **70'**. One other change is made in the fixed contact member **33** by omitting the contact arm **36** and the contact button **38**. In place of these elements a contact arm **106** having a contact button **38'** is secured to the cover **26** of the switch by a screw **107**, and this contact is electrically connected to the terminal member **27** by a shorting strip **108** which lies against the inner face of the cover plate.

The operating cam disks for the movable contact blades are changed to the forms shown by Fig. 8 corresponding to the number of positions to which the switch is to be moved, in this case five, and are designated by the numerals **91'** to **96'**, inclusive. The four "on" positions of the switch are designated by the dotted lines **1**, **2**, **3** and **4**. The points at which the cam disks **91'** to **96'**, inclusive, are formed with depressed portions to permit closure of the movable contact blades will be apparent from an examination of Fig. 8. Of course, the star wheel of the positioning mechanism is changed to provide five indexing depressions corresponding to the number of positions to which the switch may be turned.

The modified form of the switch has been shown in one use as controlling the current to the oven heater units of an electric range, for example, the units C, D and E. The source of supply is a three-wire supply system similar to that employed in the six-position switch previously described. The heater units C and D are customarily placed at the top of the oven, while the heater unit E is placed at the bottom of the oven. In connecting the heater units to the switch, one end of the unit C is connected to the terminal strap **75** and by means of the shorting strip **70'** to the terminal member **59**. In this manner the contacts **61** and **77** are electrically connected to the said end of the heater unit C. The other end of the heater unit C is connected to the terminal strap **71** and thus to the movable contact **73**. One end of the heater unit E is connected to the terminal strap **46** and thus to the movable contact blade **49**. Similarly, one end of the heater unit D is connected to the terminal strap **51** and thence to the movable contact blade **54**. The other ends of the heater units D and E are electrically connected together and are likewise connected to the terminal strap **63**, and thus to the movable contact blade **66**. The three-power supply line is connected to the switch by connecting the neutral or N line to the terminal member **33**, the line L_1 to the terminal member **27** and the line L_2 to the terminal member **40**.

The various positions of the movable contact blades in the five positions of the switch are shown diagrammatically by Fig. 10 and the "off" position of the switch is shown by Fig. 8 as well as by Fig. 10. In the first or "preheat" position current flows from the line L_1 through the contact blades **49** and **54** to one side of each of the heater units D and E, and thence from the other side of these units to contact blade **66** and line L_2. In this manner the heater units D and E are placed in parallel across the 220 volt lines L_1 and L_2. In the second or "cold oven" position of the switch, the heater unit C is subjected to a potential of 110 volts across the power lines L_2 and N, while the heater unit E is placed across the heater lines L_1 and L_2. In the third or "hot oven" position of the switch only the heater unit E is placed in the circuit across the lines L_1 and L_2. In the fourth or "broil" position of the switch the heater units C and D are placed in parallel across the parallel lines L_1 and L_2.

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

1. In an electric switch, a housing having a recess therein, a plurality of terminal members arranged around the periphery of said recess, stationary contact means secured to said terminal members, at least one of said terminals having two integral arms extending in opposite direction and each carrying one of said stationary contact means, a plurality of flexible spring contact blades co-operating with said stationary contacts, and cam means for operating said spring contacts into and out of engagement with said fixed contacts.

2. In an electric switch, a housing having a recess therein, a plurality of terminal members arranged around the periphery of said recess, stationary contact means secured to said terminal members, at least two of said terminal members having two integrally formed arms, each arm carrying one of said stationary contacts, a plurality of flexible spring contact blades co-operating with said stationary contacts, and cam means for operating said spring contacts for engagement with said fixed contacts.

3. In an electric switch, a housing having a recess therein, an operating member having a plurality of cam surfaces disposed in said recess, a plurality of terminal members each having two stationary contact arms, said terminal members being disposed symmetrically around said operating member with the contact arms of each terminal member being arranged at two different levels and a plurality of flexible spring contact blades disposed symmetrically around said operating member and co-operating with said stationary contacts, said contact blades being arranged at two different levels for engagement with said stationary contacts.

4. In an electric switch, a housing having a recess therein, an operating member having a plurality of cam surfaces disposed substantially centrally of said recess, three terminal members each having two integrally formed stationary contact arms, said terminal members being disposed symmetrically around said operating member with the arms of each terminal member being arranged at two different levels, six flexible spring contact blades disposed symmetrically around said operating member and co-operating with said stationary contacts, said contact blades being arranged in groups of three at two different levels for engagement with said stationary contacts.

5. In an electric switch, a housing having a recess therein, an operating member having a plurality of cam surfaces disposed substantially centrally of said recess, a plurality of terminal members each having two stationary contact arms, said terminal members being disposed symmetrically around said operating member with the arms of each terminal member arranged at two different levels, and a plurality of U-shaped flexible spring contact blades disposed in pairs symmetrically around said operating member and co-operating therewith, said contact blades being arranged at two different levels with the bends of the U of the contact blade of each pair extending in opposite direction for co-operation with said stationary contacts.

6. In an electric switch, a housing having a recess therein, an operating member having a plurality of cam surfaces disposed in said recess, three terminal members each having two integrally formed stationary contact arms, said terminal members being disposed symmetrically around said operating member, with the arms of each terminal member being arranged at two different levels, and six U-shaped flexible spring contact blades disposed in pairs symmetrically around said operating member, and co-operating therewith, said contact blades being arranged in groups of three at two different levels with the bends of the U of the contact blades of each pair extending in opposite directions whereby said contact blades co-operate with said respective stationary contacts.

7. In an electric switch, a housing having a recess therein, first, second and third terminal members each being disposed within said housing and each having two contact arms forming stationary contacts, a pair of flexible spring blades disposed between the first and second of said terminal members, the second and third of said terminal members and the third and first of said terminal members, and rotatable cam means in said recess located centrally of said pairs of contact means and co-operating therewith to move said contact blades into and out of engagement with said stationary contacts, each blade of said pairs co-operating with a corresponding stationary contact.

8. In an electric switch, a housing having a substantially rectangular recess therein, first, second and third terminal members disposed within said housing and each having two integral arms forming stationary contacts, the first and second of said terminal members being located at opposite corners of said recess at one side thereof, and the third terminal member being located on the opposite side of said recess intermediate said first and second terminal members, a plurality of pairs of flexible spring contact blades in said recess, one pair being located between said first and second terminal members, another pair being located between said second and third terminal members and still another pair being located between said third and first terminal member, each contact blade of each pair co-operating with a corresponding stationary contact, and rotatable cam means disposed substantially centrally of said contact blades and co-operating therewith to move them into and out of engagement with said stationary contacts in a predetermined sequence.

9. In an electric switch, a housing having a recess therein, first, second and third terminal members each being disposed within said housing and each having two integral arms forming stationary contacts, a first contact blade located between said first and second terminal members and co-operating with one of the contact arms of said first terminal member, a second contact blade located between said first and second terminal members and co-operating with one of the contact arms of said second terminal member, a third contact blade located between said second and third terminal members and co-operating with the other of the fixed contacts on said second terminal member, a fourth contact blade located between said second and third terminal members and co-operating with one of the fixed contacts on said third terminal member, a fifth contact blade located between said third and first terminal members and co-operating with the other contact on said third terminal member and a sixth contact blade located between said third and first terminal members and co-operating with the other fixed contact on said first terminal member, and rotatable cam means located substantially centrally of said contact blades and co-operating therewith to force them into and out of engagement with said stationary contacts in a predetermined sequence.

10. In an electric switch, a housing having a recess therein, first, second and third terminal members each being disposed within said housing and each having two integral arms forming stationary contacts, a first contact blade located between said first and second terminal members and co-operating with one of the contact arms of said first terminal member, a second contact blade located between said first and second terminal members and co-operating with one of the contact arms of said second terminal member, a third contact blade located between said second and third terminal members and co-operating with the other of the fixed contacts on said second terminal member, a fourth contact blade located between said second and third terminal members and co-operating with one of the fixed contacts on said third terminal member, a fifth contact blade located between said third and first terminal members and co-operating with the other contact on said third terminal member and a sixth contact blade located between said third and first terminal members and co-operating with the other fixed contact on said first terminal member, rotatable cam means located substantially centrally of said contact blades and co-operating therewith to force them into and out of engagement with said stationary contacts in a predetermined sequence, and a shorting member interconnecting said first and second contact blades and another shorting member interconnecting said third, fifth and sixth contact blades.

11. In an electric switch, a housing having a recess therein, first, second and third terminal members disposed within said recess and each

having two arms forming stationary contacts, a plurality of pairs of contact blades in said recess, each contact blade being a U-shaped flexible spring strip and the blades of each pair being reversely arranged relative to one another, a pair of said contact blades being arranged between said first and second terminal members, another pair of said blades being located between said second and third terminal members, and still another pair of said blades being located between said third and first terminal members whereby a contact blade co-operates with each of said respective fixed contacts, and rotatable cam means located substantially centrally of said contact blades and co-operating therewith to move them into and out of engagement with said fixed contacts in a predetermined sequence.

12. In an electric switch, a housing having a recess therein, first, second and third terminal members disposed within said recess and each having two arms forming stationary contacts, a plurality of pairs of contact blades in said recess, each contact blade being a U-shaped flexible spring strip and the blades of each pair being reversely arranged relative to one another, a pair of said contact blades being arranged between said first and second terminal members, another pair of said blades being located between said second and third terminal members, and still another pair of said blades being located between said third and first terminal members whereby a contact blade co-operates with each of said respective fixed contacts, rotatable cam means disposed substantially centrally of said contact blades and a slider element mounted on each of said contact blades and co-operating with said cam means whereby said contact blades are moved into and out of engagement with said fixed contacts in a predetermined sequence.

13. In an electric switch, a housing having a recess therein, first, second and third terminal members disposed within said recess and each having two arms forming stationary contacts, a plurality of pairs of contact blades in said recess, each contact blade being a U-shaped flexible spring strip and the blades of each pair being reversely arranged relative to one another, a pair of said contact blades being arranged between said first and second terminal members, another pair of said blades being located between said second and third terminal members, and still another pair of said blades being located between said third and first terminal members whereby a contact blade co-operates with each of said respective fixed contacts, a rotatable operating element located substantially centrally of said contact blades, said element comprising a plurality of cam disks separated by plates of insulating material, each of said contact blades being provided with a slider element co-operating with a respective cam disk, the plates separating said disks guiding said slider elements into engagement with said cam disks.

DONALD G. KIMBALL.