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R. H. SCHMITT

2,064,631

CONTACTOR

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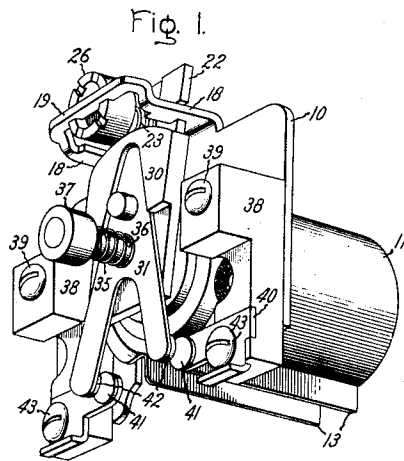


Fig. 5.

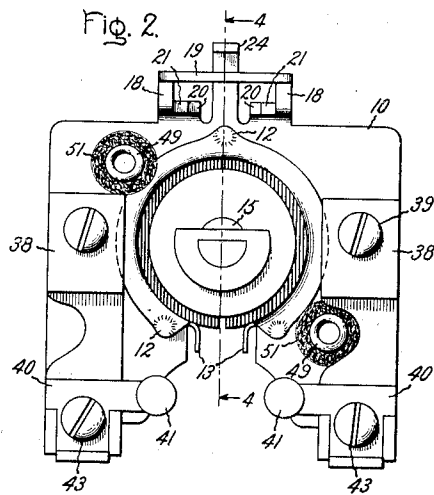
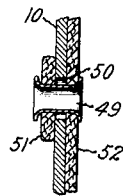


Fig. 4.

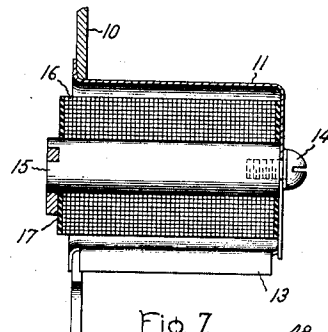


Fig. 7.

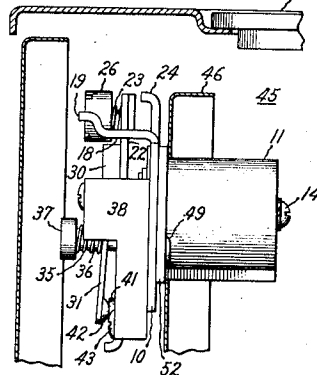


Fig. 3.

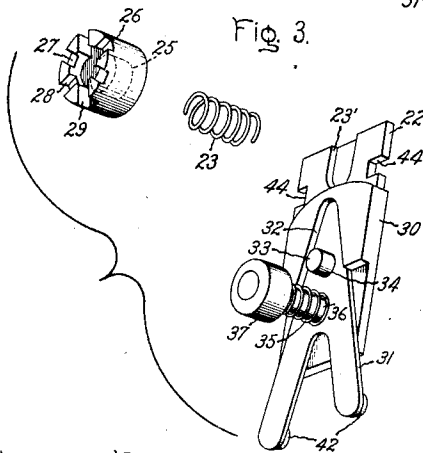
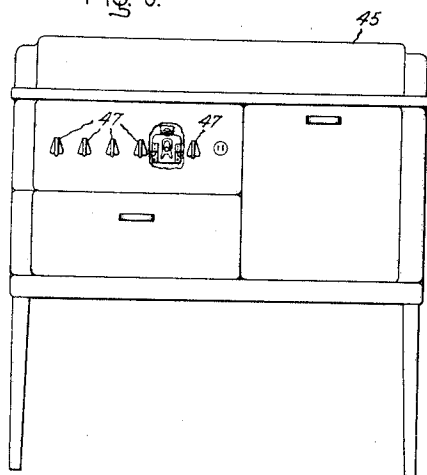


Fig. 6.



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UNITED STATES PATENT OFFICE

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CONTACTOR

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8 Claims. (Cl. 200—87)

My invention relates to electric switches or contactors, more particularly to electromagnetic switches or contactors and has for an object the provision of a simple, reliable and inexpensive device of this character.

Electromagnetic switches or contactors embodying my invention are especially adapted for controlling the heating circuit of an electric range, but certain aspects of my invention are applicable to contactors or switches generally.

Heretofore, electric ranges have been provided with electromagnetic switches or contactors for controlling the energizing circuit of the oven heating units, the operating winding of the contactor being connected in circuit with a suitable control switch and the control contacts of the contactor being connected in the heating circuit of the oven. Recent developments in the design of electric ranges tending to improve the external appearance and symmetry of the range have considerably complicated the problem of applying a contactor thereto for controlling the oven circuit. It is desirable not only that the contactor be located in an inconspicuous place but also that the contactor shall be easily accessible for adjustment and shall be so positioned relative to the control switches as to provide for simplified electrical connections.

From the standpoint of simplicity of connections, it is of course desirable to mount the contactor on the range switchboard which carries the control switches for the surface units, and for the oven heaters. The space limits, however, are such that unless special provision is made, the contactor will project from the switchboard so as to materially detract from the external appearance of the range. Further complications also arise from the necessity of providing sound insulation for the contactor to prevent the transmission of vibrations therefrom to the walls of the range. Accordingly, it is a further object of my invention to provide a simple and compact electromagnetic switch or contactor which is easily adjustable and is adapted to be mounted on a range switchboard for controlling the oven heating circuit.

In carrying out my invention in one form, I provide an electromagnetic contactor comprising a supporting plate, a movable member pivoted on one side of the plate and an operating electromagnet supported on the other side of the plate. The movable member normally is biased away from the operating electromagnet by a spring, an end of which engages the movable member, the spring being confined between

the movable member and an extending portion of the supporting plate and provided with means for varying the confinement of the spring to adjust the bias on the movable member. More specifically, the supporting plate is provided with sound-deadening means including a supporting plate for mounting the contactor on a wall of the range and the operating magnet is supported in a cup-shaped housing which extends through the range wall and protects the magnet from the injurious effects of food materials dripping from the range units, the open end of the cup-shaped housing being secured to and extending outwardly from the supporting plate on the other side of which the movable member is pivotally supported.

For a more complete understanding of my invention, reference should now be had to the drawing in which Fig. 1 is a perspective view of a contactor embodying my invention; Fig. 2 is an elevational view of the contactor with certain parts removed; Fig. 3 is a view in exploded perspective of the movable member and the adjustable biasing means for the contactor shown in Fig. 1; Fig. 4 is a fragmentary sectional view taken along the line 4—4 of Fig. 2; Fig. 5 is a fragmentary sectional view of the sound-deadening supports for the contactor; Fig. 6 is an elevational view of an electric range with a portion of a wall thereof broken away to show the contactor mounted on the range switchboard; and Fig. 7 is a fragmentary sectional view taken at right angles to the range switchboard to show the arrangement of the contactor thereon.

Referring now to the drawing, in the embodiment of my invention shown I provide a contactor comprising a supporting plate 10 having an aperture thereon through which extends the open end of a cup-shaped housing 11 secured to the plate 10, preferably by spot-welding as indicated by the reference numeral 12, so as to extend rearwardly therefrom, and provided with a slot, the portions of the cup adjacent the slot being bent to form a pair of side walls 13 for a purpose to be described later. As shown, the plate 10 forms a flange about the open end of the cup 11.

Supported within the cup 11 by means of a screw 14 is a magnetizable core 15 surrounded by an energizing winding 16, one end of the core 15 being provided with a shading winding 17 which also serves to retain the winding 16 on the core. Extending outwardly from the plate 10 is a framelike structure comprising a pair of spaced fingers 18 and a crossbar 19, the inner side of

each of the fingers 18 being provided with a plurality of shoulder portions 20 and 21 so as to form a stepped opening within which is supported a magnetizable armature 22 normally biased by a spring 23 into engagement with a stop member 24 extending upwardly from the plate 10 intermediate the fingers 18.

One end of the spring 23 rests in a recess 23' in the armature 22 and the other end of the spring engages a pocket 25 in an adjusting knob 26, the opposite face of which engages the crossbar 19 in order to confine the spring 23 and exert a biasing force on the armature 22. As shown in Figs. 1 and 3, the face of the adjusting knob 26 adjacent the crossbar 19 is provided with a plurality of diametral slots 27, 28 and 29 arranged selectively to engage the crossbar 19 which serves as a retaining bar for confining the spring 23. As shown, the slots 27, 28 and 29 are formed with progressively increasing depths, and it will be apparent that the confinement of the spring 23 and accordingly, the bias exerted on the armature 22 may be varied by adjusting the member 26 so that the proper one of the slots 27, 28 or 29 engages the crossbar 19 to vary the effective thickness of the member 26 interposed between the crossbar 19 and the spring 23. Although I have shown three slots arranged diametrically of the knob 26, it will be apparent that any suitable number of different depth slots may be provided arranged in any desired relation on the face of the knob 26.

The armature member 22 forms one part of a plural-part movable member which includes an insulating block 30 and a V-shaped contact member 31. As shown best in Fig. 3, the insulating block 30 is secured to the armature 22 in any suitable manner and is provided with a V-shaped recess 32 for positioning the upper end of the contact member 31 and with a guide pin 33 which extends through an aperture 34 in the contact member 31. In order resiliently to secure the contact member 31 to the armature 22 and the insulating block 30, I provide a spring 35 surrounding a stud member 36 which is secured to the insulating block 30 and extends through an aperture in the contact member 31, the respective ends of the spring 35 bearing against the contact member 31 and an enlarged head 37 on the stud 36.

Secured to the supporting plate 10 is a pair of insulating blocks 38, each of which is provided with a terminal screw 39 to which the energizing leads (not shown) of the winding 16 may be connected. Each of the blocks 38 also carries a terminal plate 40 for supporting a fixed contact 41 in cooperating relation with a movable contact 42 carried by the V-shaped contact member 31, and each of the terminal plates 40 is provided with a terminal screw 43 by means of which the contacts 41 may be connected in the circuit to be controlled.

In order to mount the movable member on the supporting plate 10 with the lower end of the armature 22 adjacent the magnetizable core 15 and the movable contacts 42 adjacent the fixed contacts 41, I provide the armature 22 with a pair of notches 44 arranged to cooperate with the fingers 18 extending from the plate 10. In assembling the contactor, the armature member 22 is inserted into the greatest width portion of the stepped opening between the fingers 18 and is then moved toward the plate 10, the notches 44 sliding over the fingers 18 until the armature 22 engages the shoulder portions 20 on

the fingers. The biasing spring 23 and the adjusting knob 26 may then be inserted into the frame as shown in Fig. 1, and the knob 26 adjusted so that the proper one of the slots 27, 28 or 29 engages the crossbar 19 to provide the proper bias on the armature 22, the stop member 24 preventing movement of the armature beyond the position shown in Fig. 1.

In Figs. 6 and 7, I have shown my improved contactor applied to an electric range 45 for controlling the oven heating circuit, the contactor here being shown in its closed circuit position. The contactor is mounted on the range switchboard 46, which also supports the manual control switches 47, with the cup-shaped housing 11 and the energizing winding 16 of the contactor extending through an aperture in the switchboard. As shown in Fig. 7, this arrangement of the contactor, which is necessitated by the limited space available in front of the switchboard 46, would result in the winding 16 being exposed to the harmful effects of boiling liquids or other food materials dripping from the surface unit 48 of the range if the dripproof cup 11 was not provided. Ventilation of the winding 16 is permitted by the slot in the cup 11, the straight sides 13 of the slot preventing deleterious materials from gaining access to the winding 16.

As hereinbefore mentioned, when a magnetic contactor is applied to the control of an electric range, it is desirable to provide sound-deadening means in order to prevent the transmission of vibrations from the contactor to the range walls. The provision of such means is especially desirable because of the fact that the range walls tend to amplify any vibrations transmitted thereto. Accordingly, I provide an improved sound-deadening mounting for securing the supporting plate 10 of the contactor to the range switchboard 46. It will of course be understood that any suitable supporting studs or bolts (not shown) may extend from the range switchboard and for cooperation therewith, I provide a plurality of tubular bearings 49 (Fig. 5) which extend through apertures 50 in the plate 10 in spaced relation to the plate. Interposed between the tubular bearings 49 and the plate 10, I provide a plurality of portions of sound-deadening material 51 and 52, which portions may be of any suitable sound-insulating material such as felt. As shown, the ends of the tubular bearings 49 are preferably upset so that the bearings 49 act as rivets to hold the insulating portions 51 and 52 in position to prevent vibration-transmitting contact between the plate 10 and the bearings 49.

When the contactor is mounted on the range switchboard as shown, with the supporting studs carried by the switchboard engaging the tubular bearings 49, the insulating portions 51 and 52 prevent vibration-transmitting contact between the plate 10 and the range switchboard 46. Accordingly, the necessity for external sound-deadening arrangements such as have previously been used, is eliminated.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

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

1. An electric switch comprising a member

movable between two positions, means for actuating said member to one of said positions, means including a spring arranged with an end thereof engaging said member for normally biasing said member to the other of said two positions, means including a retaining bar spaced from said member for confining said spring and an adjusting member interposed between said bar and said spring, said adjusting member having a plurality of portions of different thickness arranged selectively to engage said bar for varying the confinement of said spring to adjust the bias on said member.

2. An electric switch comprising a member movable between two positions, means for actuating said member to one of said positions, means including a spring arranged with an end thereof engaging said member for normally biasing said member to the other of said two positions, means including a retaining bar spaced from said member for confining said spring and an adjusting knob interposed between said bar and said spring, said knob being provided with a plurality of slots of different depths arranged selectively to engage said bar for varying the confinement of said spring to adjust the bias on said member.

3. An electric switch comprising a member movable between two positions, means for actuating said member to one of said positions, means including a spring arranged with an end thereof engaging said member for normally biasing said member to the other of said two positions, means including a retaining bar spaced from said member for confining said spring and an adjusting knob interposed between said bar and said spring, a face of said knob adjacent said bar being provided with a plurality of diametral slots of different depths arranged selectively to engage said bar for varying the confinement of said spring to adjust the bias on said member.

4. An electromagnetic device comprising an operating magnet, a housing for supporting said magnet having an open end, a supporting plate having an aperture therein aligned with said open end, said plate being fastened to said housing to form a flange about said open end and provided with a portion extending at an angle to said flange, said extending portion comprising a pair of laterally spaced fingers and a crossbar extending between said fingers to form a frame, an armature extending through said frame and having notches therein for cooperation with said fingers whereby said armature is pivoted on said fingers in cooperating relation with said magnet, a biasing spring confined between said crossbar and said armature with an end thereof engaging said armature normally to bias said armature away from said magnet, and adjusting means interposed between said bar and said spring for varying the confinement of said spring to adjust the bias on said armature.

5. An electromagnetic device comprising an operating magnet, a housing for supporting said magnet having an open end, a supporting plate having an aperture therein aligned with said open end, said plate being fastened to said housing to form a flange about said open end and provided with a portion extending at an

angle to said flange, said extending portion comprising a pair of laterally spaced fingers and a crossbar extending between said fingers to form a frame, an armature extending through said frame and having notches therein for engaging said fingers whereby said armature is pivoted on said fingers, a biasing spring confined between said crossbar and said armature with an end thereof engaging said armature normally to bias said armature away from said operating magnet, and an adjusting knob interposed between said bar and said spring, a face of said knob adjacent said bar being provided with a plurality of diametral slots of different depths arranged selectively to engage said bar for varying the confinement of said spring to adjust the bias on said armature.

6. A contactor comprising an operating electromagnet, a cup-shaped magnetizable housing for supporting said magnet, said housing having an open end, a flange about said open end formed of magnetizable material and extending outwardly therefrom to form a supporting plate, said plate having a portion extending therefrom to form a frame, said frame and said housing being arranged on opposite sides of said supporting plate, contacts supported on a portion of said plate remote from said frame and insulated from said plate, a magnetizable armature pivoted on said frame arranged to control said contacts, said armature having a portion adjacent said open end for attraction by said electromagnet, and means arranged in said frame for normally biasing said armature away from said electromagnet.

7. A contactor for an electric range comprising an operating electromagnet, a cup-shaped housing for said magnet, said housing having an open end, a flange about said open end, contacts mounted on said flange and insulated therefrom, an armature pivoted on said flange arranged for actuation by said magnet to control said contacts and sound-deadening means for supporting said flange on a wall of said range, said means including a tubular bearing extending through an aperture in said flange and spaced therefrom and sound-deadening material interposed between said bearing and said flange arranged to prevent vibration-transmitting contact therebetween, the ends of said bearing being upset to hold said sound-deadening material.

8. A contactor for an electric range comprising an operating electromagnet, a cup-shaped housing for said magnet, said housing having an open end, a flange about said open end, contacts mounted on said flange and insulated therefrom, an armature pivoted on said flange arranged for actuation by said magnet to control said contacts and a vibration-absorbing connection carried by said flange for cooperation with a support on a wall of said range, said connection comprising a support-accommodating tube extending through an aperture in said flange and spaced therefrom and sound-deadening material interposed between said tube and said flange to prevent vibration-transmitting contact therebetween, the ends of said tube being flared to hold said sound-deadening material.