March 20, 1951 R. T. BASNETT 2,545,986

AUXILIARY CONTACT DEVICE FOR ELECTRIC CONTACTORS

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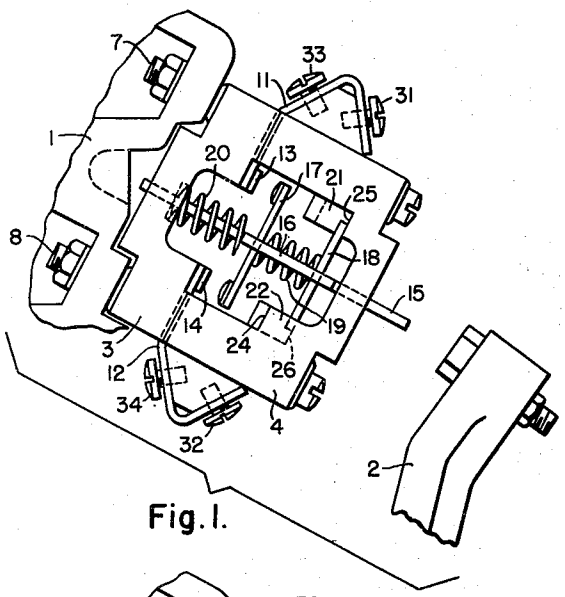


Fig. 1.

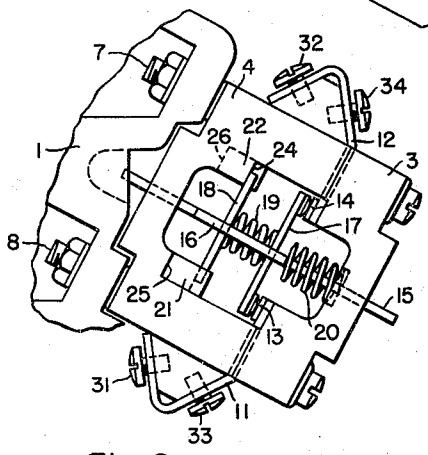
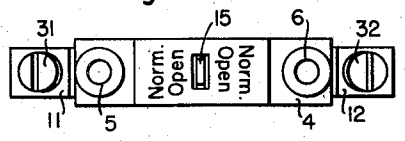


Fig. 2.

Fig. 4.



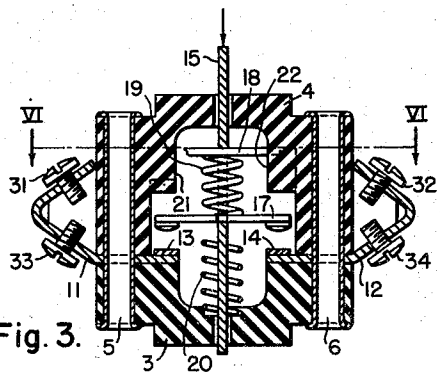


Fig. 3.

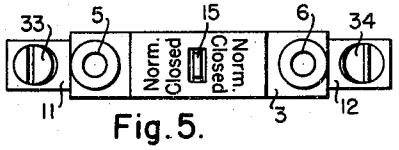


Fig. 5.

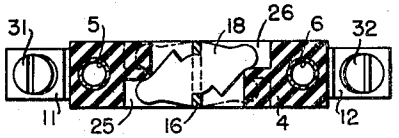


Fig. 6

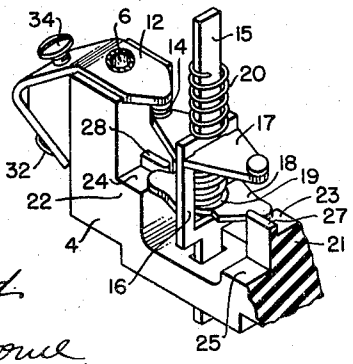


Fig. 7.

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AUXILIARY CONTACT DEVICE FOR ELECTRIC CONTACTORS

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My invention relates to interlock contacts and the like auxiliary contact devices for use on electromagnetic contactors to be actuated by the magnetic armature or other actuating member of such contactors.

The conventional auxiliary or interlock contact devices of this type are designed either as a make contact or as a break contact so that different devices are to be employed dependent upon the required operation. It has also been proposed to design the auxiliary contact devices in such a manner that one and the same unit can operate as a make contact or as a break contact. In order to change such a unit from make to break operation or vice versa, the device must be taken apart and one or several of its parts must be exchanged or must be removed and reinserted in a different position and location.

It is an object of my invention to improve auxiliary contact devices of the above-mentioned type so that they can be more readily set for either make or break operation. More specific objects of my invention are to provide an auxiliary contact device which combines within a single unit the parts for make operation as well as those for break operation, and which need not be taken apart for changing from one to the other operation, has no loose parts, and is compact and inexpensive.

In order to achieve these objects, and in accordance with a feature of my invention, I provide the insulating structure, which carries the stationary contact means as well as a spring-biased plunger for actuating the movable contact member of the device, with stop faces that are axially and angularly displaced from each other relative to the plunger axis; and I dispose on the plunger a slidable and angularly displaceable positioning member that is spring-biased away from the movable contact member and selectively engageable with the respective stop faces. When the positioning member is placed against one stop face, the movable contact member is normally disengaged from the stationary contact means and can be moved into contact-closed position by pushing against the plunger at one side of the insulating structure. When the positioning member is angularly and axially displaced and abuts against another stop face, the movable contact member is normally in engagement with the stationary contact means and can be moved to the open position by pushing against the plunger at the other side of the structure. Therefore, in order to change from make to break operation or vice versa, it is only necessary to change the

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setting of the positioning member and to reverse the position of the device relative to the base on which it is mounted, without taking the device apart or removing any of its elements.

These and other objects and features of the invention will be apparent from the embodiment exemplified by the drawing, in which:

Figure 1 shows an interlock contact device according to the invention mounted on a contactor and set for make operation;

Fig. 2 shows the same device in reversely mounted position and set for break operation;

Fig. 3 shows an axial section of the same device set for make operation;

Figs. 4 and 5 are top and bottom views, respectively, relative to the showing of Fig.3;

Fig. 6 is a cross-section taken along a plane denoted in Fig. 3 by the line VI—VI; and

Fig. 7 is a part sectional perspective view of the device set for break operation.

In Figure 1, an electromagnetic contactor is represented only by an insulating base member 1 and a movable actuating member 2. When the contactor is energized and moves its main contacts (not illustrated) into circuit-closing position, the actuating member 2, which is attached to the contactor armature assembly or is an integral part thereof, moves from the illustrated position toward the base 1 and thereby actuates the auxiliary contact device described in the following.

The device according to the invention has an insulating structure composed of two substantially U-shaped bodies 3 and 4 which are rigidly attached to each other so that their respective bights face each other and form together an opening between the two bodies. Two rivet sleeves 5 and 6 pass through matching holes of bodies 3 and 4 and hold them rigidly together while also forming eyelets for respective mounting screws 7 and 8 with which the device, as a unit, is attached to the contactor base 1.

The two bodies 3 and 4 have grooves at their mutually engaging surfaces. These grooves accommodate two contact straps 11 and 12 which extend from the outside of the insulating structure into the opening and, within the opening, are equipped with contact buttons 13 and 14, respectively, to provide stationary contact surfaces. A rectangular central opening is provided in the bottom portion of each body 3, 4 so that both openings lie on the centerline of the structure. A plunger strap 15 passes through the two rectanguglar openings with sufficient play to permit an axial displacement of the plunger. The

plunger has a frame-shaped middle portion 16. A contact member 17 is seated in the frame portion and has two contact buttons engageable with the stationary contact buttons 13 and 14 for electrically bridging the two contact straps 11 and 12. The engagement between contact member 17 and the frame portion 16 of the plunger is such that the contact 17 is prevented from revolving relative to the plunger but can slide axially. A positioning member 18 is also seated in the frame portion 16 so that it is slidable relative to the plunger. However, the positioning member is also angularly displaceable relative to the plunger between the position shown by full lines in Fig. 6 (also shown in Figs. 1 and 3) and the position shown in Fig. 6 by dotted lines (also shown in Figs. 2 and 7). A helical compression spring 19 is disposed between the two members 17 and 18 and biases them away from each other toward the respective axial sides of the frame portion 16 which thus act as stops. Another helical compression spring 20 is disposed on the plunger 15 between the frame portion 16 and the bottom portion of body 3. In the assembled condition of the device, the spring 19 is stronger than spring 20 at least when spring 19 is in the compressed condition shown in Figs. 2 and 7.

Measured along the centerline or axis of plunger 15, the body 3 is shorter than body 4. The longer body 4 is equipped with shoulders 21 and 22 at opposite sides, respectively, of the plunger axis. These shoulders have respective stop faces 23 and 24 located diametrically opposite each other relative to the plunger axis and facing the stationary contact buttons 13, 14. The two stop faces 23 and 24 are simultaneously engageable by the positioning member 18 when this member is in the angular position shown in Figs. 2 and 7. The body 4 is further equipped with another pair of stop faces 25 and 26 which are adjacent to the respective stop faces 23 and 24 but located axially farther away from the stationary contacts of the device. The stop faces 25 and 26 are also located at diametrically opposite points and are engageable by the positioning member 18 when this member is in the angular position shown in Figs. 1, 3 and 6. The shoulder 21 of body 4 has a ridge 27 which is located between the stop faces 23 and 25 and projects from face 23 toward the stationary contacts. A similar ridge 28 is provided between the stop faces 24 and 26 of body 4. The ridges 27 and 28 prevent the positioning member 18 from accidentally sliding off the stop faces 23 and 24 when the device is set for break operation as shown in Figs. 2 and 7.

Each contact strap 11 and 12 has a terminal portion located at the outside of the insulating structure and bent to an angular shape. The corner portion of the angle lies away from the insulating structure and the angle legs extend from the short body 3 toward the long body 4. Each terminal portion is equipped with two terminal screws 31 and 33, or 32 and 34. The exterior shape of the insulating structure and the shape and location of the angular terminal portions is such that the plunger axis and the connecting line between the corners of the angular terminal portions define approximate symmetry axes, respectively.

When the device is mounted and set for make operation as shown in Fig. 1, the short body 3 is seated on the base 1 and the positioning member 18 is in engagement with the stop faces 25 and 26. With this mounting and setting, the spring 19 normally holds the contact member 17 and the positioning member 18 toward the respective adjacent stops of the plunger frame portion, while the spring 20 is effective between body 3 and frame portion 16 to hold the plunger assembly in the contact-open position. When the actuating arm 2 of the contactor moves against the plunger 15, the spring 20 is compressed until the contact member 13 bridges the contact buttons 13 and 14. Thereafter, a slight additional movement of plunger 15 causes the spring 19 to be compressed, thus providing the necessary overtravel to maintain contact pressure as the contacts wear.

In order to have the same device operate as a break contact, it is to be mounted on the base 1 in reversed position so that the long body 4 is seated on the base 1 as shown in Fig. 2. It is then merely necessary to lift the positioning member 18 against its spring bias over the ridges 27 and 28 and turn it into engagement with the stop faces 23 and 24 as shown in Figs. 2 and 7. With this setting, the spring 19 is compressed and, being stronger than spring 20, forces the contact member 17 into contact-closing engagement with the stationary contact buttons. Now the other end of plunger 15 lies in the path of the actuating member of the contactor as compared with the mounting and setting shown in Fig. 1. Consequently, when the actuating arm of the contactor entrains the plunger 15 (Fig. 2), the spring 19 is further compressed and the contact member 17 is moved away from the stationary contacts, thus opening the circuit.

When the device is mounted and set for make operation according to Fig. 1, the two terminal screws 31 and 32 of contact straps 11 and 12, respectively, are readily accessible from the front of the device for attachment of the circuit leads. When the device is mounted and set for break operation according to Fig. 2, the terminal screws 33 and 34 of the two respective straps lie substantially in the same conveniently accessible position that was previously occupied by screws 31 and 32. Consequently, the above-described angular and symmetrical design of the terminals, each with two terminal screws, has the advantage that the device is serviceable with equal ease and convenience regardless of the selected mounting and setting. While I have shown simple terminal screws, it is obvious that, if desired, four terminals of different design may be used instead.

Once a device according to the invention is assembled, the bodies 3 and 4, held together by the tubular rivets 5 and 6, secure all other elements of the device so that none of the elements of the device can become separated when the mounting screws are removed, for instance, for changing the mounting and setting of the device. Consequently, the device is not only easily adjustable for the desired kind of operation, but it also excludes an accidental coming apart of the device elements or the necessity of removing and reinserting an element that may become lost.

It will be understood by those skilled in the art after a study of this disclosure that devices according to the invention can be modified in various respects, for instance, as regards the design, shape, and number of its individual elements without departing from the objects of my invention and within the scope of the essential features of the invention set forth in the claims annexed hereto.

I claim as my invention:

1. An auxiliary contact device for electric contactors, comprising an insulating structure, sta-

tionary contact means mounted on said structure, a plunger axially displaceable relative to said structure, a movable contact member disposed on said plunger and engageable with said stationary contact means, a first spring disposed between said structure and said plunger to bias said plunger in the disengaging direction of said member, a positioning member disposed on said plunger and angularly displaceable and slidable relative to said plunger, said two members being spaced from each other in the axial direction of said plunger, a second spring disposed on said plunger and engaging said positioning member to bias it away from said contact member, said structure having two stop faces angularly and axially displaced from each other relative to said plunger and selectively engageable by said positioning member dependent upon its selected angular position, said contact member being normally disengaged from said stationary contact means due to the bias of said first spring when said positioning member engages one of said faces, and said contact member being normally in engagement with said contact means due to the bias of said second spring when said positioning member engages said other face.

2. An auxiliary contact device for electric contactors, comprising an insulating structure, stationary contact means mounted on said structure, a plunger axially displaceable relative to said structure, a movable contact member disposed on said plunger and engageable with said stationary contact means, a first spring disposed between said structure and said plunger to bias said plunger in the disengaging direction of said member, a positioning member disposed on said plunger and being angularly displaceable relative thereto, said two members being axially spaced from each other and being both axially movable relative to said plunger, said plunger having two axially spaced stops, a second spring disposed between said two members to bias them away from each other against said respective stops, said structure having two stop faces angularly and axially displaced from each other relative to said plunger and selectively engageable by said positioning member dependent upon its angular position, said contact member being normally disengaged from said stationary contact means due to the bias of said first spring when said positioning member engages one of said faces, and said contact member being normally in engagement with said contact means due to the bias of said second spring when said positioning member engages said other face.

3. An auxiliary contact device for electric contactors, comprising an insulating structure, stationary contact means mounted on said structure, a plunger axially displaceable relative to said structure, a movable contact member disposed on said plunger and engageable with said stationary contact means, a first spring disposed between said structure and said plunger to bias said plunger in the disengaging direction of said member, a positioning member disposed on said plunger and axially spaced from said contact member at the side of said contact member away from said stationary contact means, said positioning member being angularly displaceable and slidable relative to said plunger, a second spring disposed on said plunger and engaging said positioning member to bias it away from said contact member, said structure having two stop faces angularly displaced from each other and selectively engageable by said positioning member

under the bias of said second spring, one of said stop faces being axially spaced from said stationary contact means a larger distance than said other stop face, said contact member being normally disengaged from said contact means when said positioning member engages said one stop face, and said contact member being normally in engagement with said contact means when said positioning member engages said other stop face.

4. In a contact device according to claim 3, said insulating structure having a ridge between said two stop faces and projecting from said other stop face toward said stationary contact means so that said positioning member must be lifted from said other stop face in opposition to said second spring before it can be placed onto said one stop face.

5. An auxiliary contact device for electric contactors, comprising an insulating structure, stationary contact means mounted on said structure, a plunger axially displaceable relative to said structure, a movable contact member disposed on said plunger and engageable with said stationary contact means, a first spring disposed between said structure and said plunger to bias said plunger in the disengaging direction of said member, a positioning member disposed on said plunger and being angularly displaceable relative thereto, said two members being axially spaced from each other and being both axially movable relative to said plunger, said plunger having two axially spaced stops, a second spring disposed between said two members to bias them away from each other toward said respective stops, said structure having two pairs of stop faces angularly displaced from each other and selectively engageable by said positioning member, the stop faces of each pair being located at diametrically opposite sides of the plunger axis, one of said pairs of stop faces being axially spaced from said stationary contact means a larger distance than said other stop face, said contact member being normally disengaged from said contact means when said positioning member engages said one stop face pair, and said member being normally in engagement with said contact means when said positioning member engages said other pair.

6. An auxiliary contact device for electric contactors, comprising an insulating structure having two mutually spaced stationary contact elements, a plunger non-revolvably slidable in said structure and having a frame-shaped middle portion, a contact member adapted for bridging said contact elements and slidably seated in said frame portion in fixed angular relation thereto, a first spring disposed on said plunger and abutting against said frame portion and said structure to bias said structure in the contact-opening direction of said contact member, a positioning member slidably seated in said frame and angularly displaceable relative thereto, a second spring disposed between said two members to bias them away from each other against the respective axial ends of said frame portion, said structure having two pairs of stop faces angularly displaced from each other and selectively engageable by said positioning member, the stop faces of each pair being located at diametrically opposite sides of the plunger axis, one of said pairs of stop faces being axially spaced from said stationary contact means a larger distance than said other pair, said contact member being normally disengaged from said contact means when said positioning member engages said one stop face pair, and said member being normally in engagement with said

contact means when said positioning member engages said other pair.

7. An auxiliary contact device for electric contactors, comprising an insulating structure composed of two substantially U-shaped bodies placed together with their respective bights facing each other to jointly form an opening, each body having a center hole in its bottom portion aligned with the corresponding hole of the other body, a non-revolvably slidable plunger extending through said holes of said two bodies and across said opening, two contact straps disposed between said bodies at opposite sides respectively of said plunger and having respective contact surfaces located in said opening, said plunger having two axially spaced stops in said opening, a contact member non-revolvably slidable on said plunger between said stops and engageable with said contact surfaces, a positioning member slidable on said plunger between said stops at the side of said contact member away from said contact surfaces and being angularly displaceable relative to said plunger, a second spring disposed between said two members and tending to hold them against said respective stops, one of said two bodies of said structure having two pairs of stop faces angularly displaced from each other and selectively engageable by said positioning member, the stop faces of each pair being located at diametrically opposite sides of the plunger axis, one of said pairs of stop faces being axially spaced from said stationary contact means a larger distance than said other stop face, said contact member being normally disengaged from said contact means when said positioning member engages said one stop face pair, and said member being normally in engagement with said contact means when said positioning member engages said other pair.

8. An auxiliary contact device for electric contactors, comprising an insulating structure composed of two substantially U-shaped bodies placed together with their respective bights facing each other to jointly form an opening, each body having a center hole in its bottom portion aligned with the corresponding hole of the other body and one body being shorter than the other along said centerline, a plunger extending through said two holes across said opening and being non-revolvably slidable along said line, two stationary contact straps mounted between said bodies and having respective contact surfaces located in said opening at radially opposite sides respectively of said plunger, said plunger having two axially spaced stops in said opening, a first compression spring disposed on said plunger and abutting against said short body and against the nearest one of said stops, a contact member non-revolvably slidable on said plunger between said stops and engageable with said contact surfaces, a positioning member slidable on said plunger between said stops at the side of said long body and being angularly displaceable relative to said plunger, a second compression spring stronger than said first spring and disposed between said two members to bias them away from each other toward said respective stops, said long body having two stop faces angularly and axially displaced from each other relative to said centerline and selectively engageable by said positioning member dependent upon its selected angular position to set the device for make and break operations respectively.

9. An auxiliary contact device for electric contactors, comprising an insulating structure composed of two substantially U-shaped bodies placed together with their respective bights facing each other to jointly form an opening, each body having a center hole in its bottom portion aligned with the corresponding hole of the other body, a plunger extending through said holes of said two bodies and across said opening, two contact straps disposed between said bodies at opposite sides respectively of said plunger and having respective contact surfaces located in said opening, said plunger having two axially spaced stops in said opening, a contact member non-revolvably slidable on said plunger between said stops and engageable with said contact surfaces, a positioning member slidable on said plunger between said stops at the side of said contact member away from said contact surfaces and being angularly displaceable relative to said plunger, a second spring disposed between said two members and tending to hold them against said respective stops, one of said two bodies having two stop faces angularly and axially displaced from each other relative to said centerline and selectively engageable by said positioning member dependent upon its selected angular position to set the device for make and break operation respectively, and two tubular fastening means transversing said two bodies and said respective straps at opposite sides of said opening and being rigidly secured to said bodies to hold said bodies and all other specified elements of the device together while forming respective mounting eyelets.

10. In a contact device according to claim 8, each of said contact straps having an angularly bent terminal portion outside said structure, said portion having its bight facing said structure and having its two angle legs extending from said short body toward and over said long body, and two terminal means mounted on said two legs respectively of each terminal portion.

11. An auxiliary contact device for electric contactors comprising an insulating structure mountable in two mutually inverse positions respectively, a spring-biased plunger slidably mounted on said structure and extending at both sides beyond said structure to be depressible from either side depending upon the mounting position of said structure, stationary contact straps disposed on said structure, movable contact means disposed on said plunger and engageable with said straps, said movable contact means being adjustable relative to said straps for make and break operations respectively according to said position of said structure, each of said contact straps having an angularly bent terminal portion outside said structure, said portion having its bight facing said structure and having its two angle legs oppositely inclined relative to said structure, and two terminal means mounted on each of said two legs so that one terminal means of each strap is accessible from the actuating side of the mounted device regardless of the selected mounting position.

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