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CIRCUIT CLOSER.

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Specification of Letters Patent

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guide portion toward said button. On the upper surface of the base block is supported the electrically conducting distortible circuit closing member 17. Said distortible member comprises essentially an electrically conductive element so constructed as to embody a capacity for temporary distortion or change of form adapted to produce dimensional changes in said element, as a result of the application of force to such element; said element however embodying a resiliency adapted to restore the same to substantially its original form and dimensions when such force is removed. Preferably said distortible member is embodied in the form of an annular member consisting of a length of helically coiled spring wire bent into a ring, with its free ends hooked together, as shown in Fig. 3, or otherwise connected in any suitable manner.

The distortible member is positioned on the surface of the base block by the plunger 13, which preferably passes through the central opening in said distortible member. The length of the helical spring from which the distortible member is formed is preferably such that the same is closely contracted around the plunger, and adapted to exert a force upon the tapering surface of the plunger sufficient to force the same to its extreme upper position as shown in Fig. 2. In such upper position the outer diameter of the distortible member, 17, and the diameter of the circular arc in which the contact strips 9 are curved are so proportioned that said distortible member is out of contact, at least with one, and preferably with both, of said curved strips. When said button is pushed the tapering portion of the plunger 13 is caused to enter more deeply within the inner opening of the distortible annular member, the increasing diameter of the plunger brought in contact with said annular member as a result of such movement causing the distortion of said annular member from its original dimensions, and producing a diametral expansion of the same which will eventually bring the outlying points of its various convolutions into contact with the curved contact strips 9 lying peripherally adjacent thereto. It is evident that when each contact strip is thus in electrical connection with the distortible member, both will be electrically connected with each other through said distortible member, thus closing the circuit.

It may be here pointed out that the distortible member should preferably be sufficiently resilient so that that coil or other point of contact on the surface of said distortible member which first comes into contact with a contact strip will yield, as an increasing pressure is applied to the plunger, until a sufficient number of the coils embodied in said distortible member or other points

of contact on its surface are in contact with the contact strips to insure a satisfactory electrical connection between the distortible member and each of the contact strips. It may further be noted the spreading of the convolutions of the distortible member incident to the diametral expansion thereof tends to produce a slight rubbing between the said convolutions and the contact strips which maintains the contacts always clean and bright, insuring perfect electrical engagement. Furthermore the movement of the plunger 13 relative to the annular distortible member is apt to cause a slight rotation of the several convolutions about the axis of the annular member which further aids in securing the rubbing contact between said distortible member and the contact strips.

In case the distortible member becomes so fouled by dirt as to seriously impair the working of the circuit closer it is a simple and inexpensive matter to replace the distortible member by a new one.

In the type of circuit closer hereinabove described it is evident that the circuit will remain closed only so long as pressure is continuously applied to the button, 12. In case it is desired to embody my invention in a circuit closer or switch adapted to remain automatically closed for an indefinite period the modification illustrated in Fig. 4 may be employed. Said Fig. 4 shows merely the operative portion of such a switch in its closed position, the outer casing, similar to that shown in Figs. 1 and 2 being omitted. As above described in connection with said Figs. 1 and 2 the operative portions of the switch comprise the distortible member 21 resting on one end of the base block 22 and centrally positioned thereon with respect to the contact strips 23 mounted on said base block 22 by the plunger 24. As before, said contact strips are connected with the conductor bars 25 on which are formed the binding posts for connecting said switch into the circuit to be controlled thereby. The distortible member 21 preferably consists of a ring of coiled spring made up substantially as previously described and contracted upon the plunger, which is longitudinally movable in said base block, within fixed limits, a knob 26 being preferably provided for the purpose of manually moving said plunger when it is desired to operate said switch. The plunger employed in the switch of Fig. 4 embodies the tapering portion 27 which increases in size from its minimum up to that diameter which is sufficient to cause a diametral expansion of the distortible member great enough to bring the same into peripheral contact with the contact strips. When the latter diameter is reached the plunger continues cylindrical in form for a short distance as shown at 28. A slight circumferential depression or groove, 29 is

formed in said cylindrical portion of the plunger, and into this groove the distortible member is adapted to seat itself when the limit of the inward movement of the plunger relative to the base block is reached, the contraction of said distortible member in said groove serving to retain the plunger in such longitudinal position. The depth of said groove is necessarily of such slight depth as to avoid a contraction of the distortible member great enough to permit the breaking of the contact between the said distortible member and the contact strips. In order to assure the disengagement of the said distortible member from the groove, 29, as the plunger is pulled outwardly from the base block, a cover, 30, is provided which is secured to the base block at its lower edge, and embodies an upper surface projecting over said distortible member, adapted to prevent the material dislodgment of the said member as the plunger is moved.

Another embodiment of my invention is presented in Figs. 5, 6 and 7 showing the same as applied in a push-button of ordinary type, and embodying a modified form of distortible member and showing a modification in the manner of causing the diametral expansion of the same. As shown in said figures the body, 31, of said push-button has a supporting shell, 32, secured in the central opening of the body, and having its lower edge turned over as shown, so as to support the operative portion of said button. The operative portion of said button comprises the base, 33, preferably of insulating material, having the plunger, 34, centrally mounted in the same by means of the guide shank, 35, which is longitudinally slidable in said base, and having its upper portion formed into a button as shown for manipulating said plunger. Said button portion of the plunger, 34, preferably has a flat lower surface as shown, which normally rests upon the upper surface of a distortible member, 36, which is preferably annular or ring shaped in form, and is adapted to closely encircle the guide shank, 35. Said annular member preferably is made up of resilient wire of high conductivity interwoven as more clearly shown in Fig. 7 so as to form an annular ring whose body is substantially circular in cross section; said ring also being constructed so as to embody a capacity for diametral expansion as it is compressed between two opposing surfaces. The lower surface of said annular distortible member rests upon the base, 33. Peripherally adjacent to, but normally out of contact with the said distortible member are the contact strips, 37, secured to the base, 33, by the screws, 38, and electrically connected to the terminals of the circuit which the push-button is designed to control. Said strips are preferably curved so as to closely

surround the said distortible member for slightly less than one-half of its circumference. If now the button be pushed so as to depress the plunger, the annular distortible member will be compressed between the lower surface of the button and the base block producing a flattening of the same as shown in Fig. 6, and causing the diametral enlargement of the same. In consequence the said distortible member will be brought into peripheral contact with both of said contact strips, 37, as is shown in Fig. 6 establishing electrical connection between the same and closing the circuit. On releasing the pressure on the button the resiliency of the distortible member will cause it to resume its original cross sectional area, resulting in a diametral shrinkage of the same which destroys the peripheral contact of the same with the contact strips, and thus opens the circuit.

Having described my invention I claim as new and desire to secure by Letters Patent—

1. An electric circuit closer comprising essentially a base block, electrically insulated contact members mounted upon said base block, and forming the terminals of an electric circuit, a distortible conducting member positioned adjacent said contact members, a plunger longitudinally movable with respect to the said base block, said plunger being adapted to secure said distortible member in its assembled relation in the circuit closer, and to position the same with reference to said contact members so that in its undistorted condition it is inoperative as an electrical connection between the same, and means rendered operative by the movement of the plunger to distort said distortible member and thereby to render it effective as an electrical connection between said contact members.

2. An electric circuit closer comprising essentially a base block, electrically insulated contact members mounted upon said base block, and forming the terminals of an electric circuit, a distortible conducting member positioned adjacent said contact members, a plunger longitudinally movable with respect to the said base block, said plunger being adapted to secure said distortible member in its assembled relation in the circuit closer and to position the same with reference to said contact members so that in its undistorted condition it is inoperative as an electrical connection between the same, said plunger and base block having cooperating surfaces which become effective, as the plunger is moved longitudinally with respect to the base block, to cause a distortion of the distortible member whereby the same is rendered operative to electrically connect said contact members.

3. An electric circuit closer comprising essentially a base block, electrically insulated

contact members mounted on said base block and forming the terminals of an electric circuit, a plunger longitudinally movable with respect to the said base block, said plunger
5 having a tapered portion, a resilient diametrically expansible conducting ring normally contracted about the said plunger adjacent the smaller end of the tapered portion of the same, said ring in such contracted
10 condition being positioned by said plunger so as to lie adjacent to said contact members but inoperative as an electrical connection between the same, the longitudinal movement of said plunger being adapted to
15 cause a diametral expansion of said conducting ring whereby it is caused to contact with both said contact members.

4. An electric circuit closer comprising essentially a base-block, electrically insulated
20 contact members mounted on said base-block and forming the terminals of an electric circuit, a plunger longitudinally movable with respect to said base-block, and having a tapering portion, a resilient diamet-
25 rically expansible conducting ring normally contracted about the plunger adjacent the smaller end of the tapering portion of the same, said ring in such contracted condition being positioned by said plunger so as to lie
30 peripherally adjacent to, but out of contact with said contact members, the longitudinal movement of said plunger being adapted to cause a diametral expansion in said ring whereby it is caused to simultaneously contact
35 with both said contact members.

5. An electric circuit closer comprising essentially a base-block, electrically insulated contact members mounted at one end of the base-block and forming the terminals of an
40 electric circuit, a resilient diametrically expansible conducting ring supported by the

base-block, and lying between but normally out of contact with said contact members, and a plunger longitudinally movable with relation to said base-block, and embodying a
45 tapering portion adapted to be entered within the central opening in said ring as said plunger is moved toward said ring, and thereby to cause a diametral expansion of said ring sufficient to bring the same into
50 simultaneous contact with said contact members.

6. An electric circuit closer comprising essentially a base-block, a diametrically expansible conducting ring laterally supported
55 on said base-block, and embodying a resiliency normally tending to keep the same in a contracted condition, contact members, forming the terminals of an electric circuit, mounted on said base-block so as to be per-
60 ripherally adjacent but out of contact with said ring in its contracted condition, and a plunger longitudinally movable in said base-block, said plunger having a tapering portion whose smaller end is adapted to pass
65 through the central opening of said ring when in its contracted condition and thereby maintain the same in a position wherein it is out of contact with said contact members, said tapering portion being adapted to be
70 forced into said central opening as the plunger is caused to move, thereby effecting a diametral expansion of said ring sufficient to bring the same into simultaneous contact
75 with said contact members.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY C. THOMSON.

Witnesses:

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