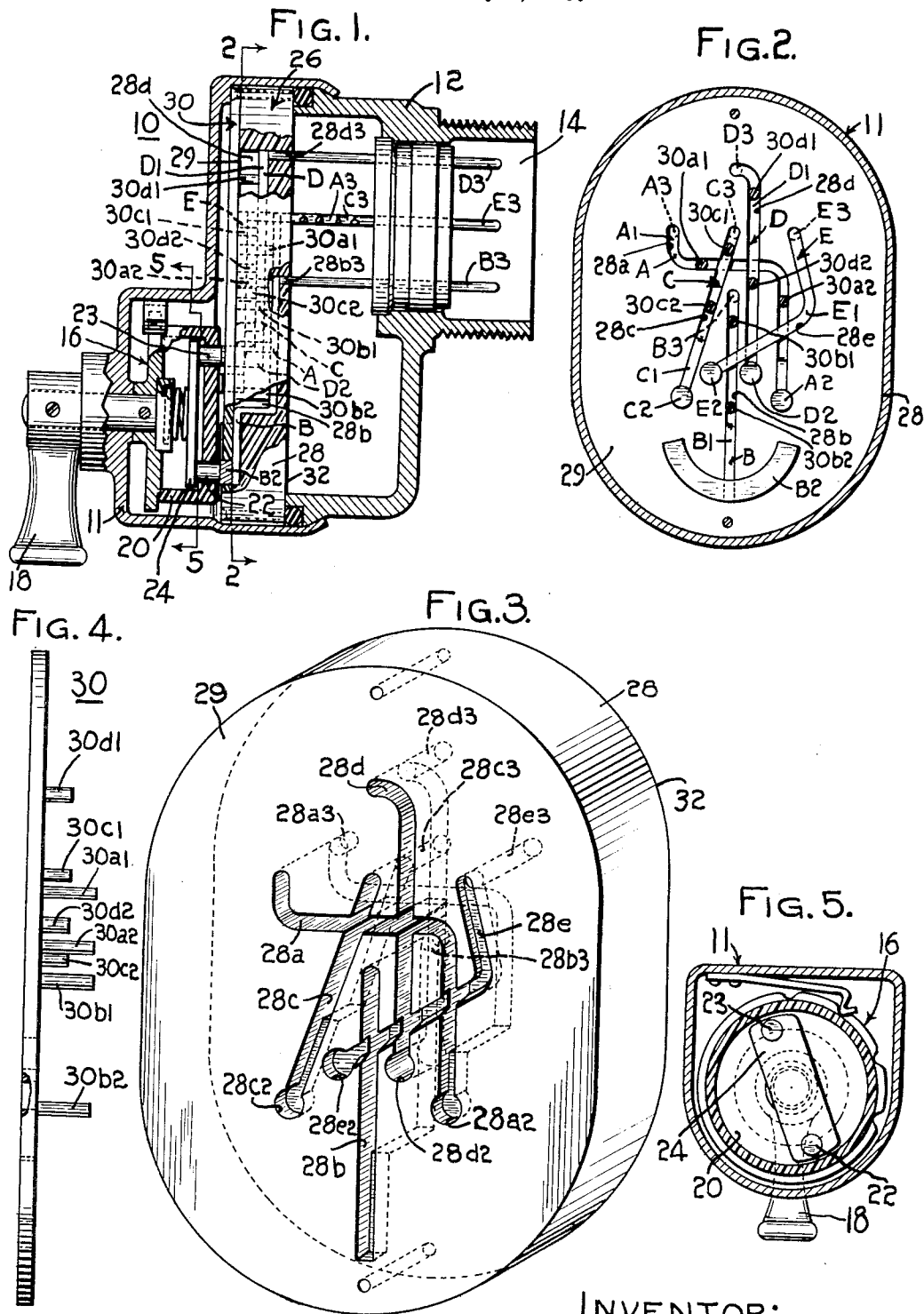


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ELECTRICAL ASSEMBLY

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ELECTRICAL ASSEMBLY

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This application is a continuation in part of my application, filed January 15, 1952, Serial No. 266,550, entitled "Electrical Assembly," now Patent Number 2,644,045, issued June 30, 1953.

This invention relates generally to electrical assemblies, and has particular reference to circuit continuing member such as an electrical switch or the like.

In certain types of electrical switches, where a great many different circuits are to be controlled, it is customary to provide a housing having one or more circuit-completing rotors disposed therein which are operable from outside the housing, and a contact plate disposed opposite the rotors having a plurality of contact members disposed thereon for electrical contact with shorting members mounted on the rotors. Wire are commonly attached to the contacts on the plate and extend rearwardly therefrom to a rear opening in the housing. When the switch is required to complete a great many circuits in various combinations, as is the case, for example, in the master lighting switch in a military vehicle such as a truck or a tank, a great many wires are required to be assembled onto the plate, which necessitates a relatively large housing. Such an assembly also is relatively expensive, due to the cost of labor involved in assembling the wires thereon, and if the device is to carry large amounts of current, there is always the danger that the heat generated thereby will damage the insulation on the wiring and cause short circuits to develop between the wires, which are usually crowded closely together. Since the wires extending from the rear of the housing must be arranged in a predetermined manner to fit into a mating connector which has the connections to the various circuits disposed thereon in a predetermined arrangement, it is easily possible for errors to occur in wiring the switch.

The object of the invention is to provide an electrical switch assembly in which no internal wiring is required.

A further object of the invention is to provide an electrical switch in which the internal portions thereof are so designed that it is possible to assemble the switch only with the various circuit-completing members disposed in the proper relation to one another.

A still further object of the invention is to provide an electrical assembly having a plurality of electrical paths extending therethrough in such a manner that some of the paths cross each other, in which a support is provided with a series of transverse recesses having various depths to receive conductor members so that said conductor members may cross each other without contact therebetween.

In the drawing:

Fig. 1 is a view in section of a switch assembly embodying the features of the invention;

Fig. 2 is a view in section taken on line 2—2 of Fig. 1;

Fig. 3 is a perspective view of the support member portion of the switch of Fig. 1;

Fig. 4 is a view in side elevation of a cover plate for assembly onto the support member; and

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Fig. 5 is a view in section taken on line 5—5 of Fig. 1. Referring to the drawing, there is illustrated a switch assembly 10, which comprises generally a housing having a front portion 11 and a rear portion 12 with a rear opening 14, and circuit-completing means assembled in the housing which comprises a contact rotor 16 which is operable from outside the housing by a suitable lever 18.

The rotor 16 comprises an insulating support 20 having a pair of contact members 22 and 23 assembled thereon and joined by a shorting plate 24, so that said contact may complete electric circuits in a manner to appear hereinafter.

To conduct the electrical circuits from the rear opening 14 to the rotor, a circuit continuing assembly 26 is provided in the housing adjacent the rotor, which comprises a support member 28, a cover plate 30, and a group of conductor members assembled therewith.

The conductor bars are designated by letters A through E, and are preferably formed of relatively rigid material so as to be adapted for the assembly operation to be described hereinafter. A typical conductor bar comprises a medial portion with a front contact member extending therefrom for electrical contact with a rotor contact and a rear connector extending therefrom to protrude through the rear opening 14.

For example, connector member A, comprises a medial portion A1, a front contact A2 extending forwardly therefrom and a rear connector A3 extending rearwardly therefrom. The portions of the other conductor bars have analogous designations. In each case, the medial portion of a conductor bar is indicated by the designating letter of the bar of which it is a part, followed by the number 1, such as A1, B1, etc. In each case, the forwardly projecting contact portion of the conductor bar is indicated by the designating letter of the bar followed by the number 2, such as A2, B2, etc. In each case, the rearwardly extending connector is indicated by the designating letter of the bar of which it is a part followed by the number 3, such as A3, B3, etc.

To provide means in the support for receiving the conductor bars in such a manner that the bars may cross each other without touching each other, support 28 is provided with a group of elongated grooves or recesses of various depths in the front face 29 thereof. (See Fig. 3.) In the illustrated embodiment, elongated recesses of three different depths are provided. Grooves 28a and 28b have the greatest depth, grooves 28c and 28d have a depth less than that of the grooves 28a and 28b, and groove 28e has a depth less than the depth of grooves 28c and 28d. At one end of each groove, an aperture extends therefrom to the rear face 32 to receive the rearwardly extending portion of the conductor bar assembled therein. For example, groove 28a has an aperture 28a3 extending rearwardly therefrom to the rear face 32 of the support to receive the connector A3 of the conductor bar A. The apertures 28a3, 28b3, 28c3, 28d3, and 28e3 are disposed in a predetermined position in relation to each other so that when the switch is assembled, the connector portions will protrude in a group into the rear opening 14 of the housing. Each recess, with the exception of 28b, is provided with an enlarged portion at the end thereof opposite the rearwardly extending aperture to receive the forwardly extending contact portion of the conductor bar disposed therein. For example, recess 28a is provided with an enlarged portion 28a2 to receive the connector portion A2 of conductor bar A, recess 28c is provided with an enlarged portion 28c2 to receive portion C2 of conductor bar C, etc.

By reason of the different depths of the grooves, the conductor bars are able to extend between the desired points on the support without contact between conductor

bars that must cross each other. For example, conductor bar A, which is disposed in one of the deepest grooves 28a, is crossed by conductor bars C and D in the shallower grooves 28c and 28d, and also by conductor bar E in the shallowest groove 28e. Similarly, conductor bar D is crossed by conductor bar E.

Although the grooves have the necessary difference in depth at the points of crossing, they may all have the same depth at other points, such as, for example, adjacent the contact portions. This portion of each groove is relatively shallow to reduce the length of the forwardly extending contact portions.

The contact portions A2, C2, D2, E2, when the conductor bars are assembled with the support, are disposed in the enlarged portions 28a2, 28c2, 28d2, and 28e2, respectively, and protrude therefrom so as to enter suitably spaced apertures in the cover plate, with the ends thereof substantially flush with the cover plate for contact with the rotor contacts.

The forwardly extending contact portions A2, C2, D2, and E2 are disposed in an arc about the center line of the rotor 16, and the contact portion B2, which has a curved and elongated shape, is disposed on the opposite side of the center line of the rotor. The rotor contacts are arranged so that contact 22 rides on the contact member B2, and contact 23 makes contact with one of the contact members A2, C2, D2, or E2 to complete an electric circuit in a predetermined manner.

To retain the conductor bars seated in the grooves on the support, a number of pins may be provided on the rear face of the cover to project into the grooves and bear against the conductor bars. The pins are, of course, of various lengths depending on the depth of the recess into which they project. In the illustrated embodiment, two pins are provided for each conductor bar, with the exception of conductor bar E, since the groove 28e receiving this bar need be only as deep as the thickness of the bar, so that the bar is retained in place by the rear surface of the cover plate.

The pins are each designated by the number 30, followed by a letter corresponding to the bar against which it bears.

For example, pins 30a1 and 30a2 bear against conductor bar A, pins 30b1 and 30b2 bear against conductor bar B, etc. The cover plate may be retained in assembly with the support by means of rivets or the like.

Although in the illustrated embodiment, the grooves have substantially a uniform depth throughout most of their length, it will be understood that in some cases the grooves may have continuously varying depth or may have various depths at various points, according to the requirements of the particular circuit.

It is evident that any particular conductor bar will fit properly into only one particular groove, thereby greatly simplifying the assembly operation, and making it impossible to assemble the switch improperly.

The illustrated device shows a particular embodiment of the features of the invention. However, the teachings of the invention may be applied to other electrical devices, such as connectors, plugs, and the like. In such a case, where it is desired to rearrange the relative position of the circuits passing therethrough, or to combine various circuits in a predetermined manner, a support

plate may be provided with conductor bars assembled therewith generally in the manner illustrated, and the conductor bars may either terminate so as to be flush with each end of the stack for contact with rotors at each end, or may be provided with either male or female connectors at either end, depending on the application in which it is to be used.

In the illustrated embodiment, the grooves to receive the conductor bars are disposed on the front face of the support. However, in some cases, the grooves may be disposed on the rear face or on both front and rear faces, depending on the most convenient arrangement for the particular circuit.

Since certain obvious modifications may be made in the device without departing from the scope of the invention, it is intended that all matter contained herein be interpreted in an illustrative and not in a limiting sense.

I claim:

1. An electrical assembly, comprising an insulating support and a series of conductor members assembled therewith so as to provide a series of electrical paths in the support which change position in passing therethrough in such a manner that some of said paths cross each other, said support having a series of transversely extending recesses extending between predetermined positions on one face thereof so that some of the recesses intersect each other, said intersecting recesses having portions adjacent the intersection having different depths, said conductor members having medial portions seated in said recesses and other portions extending therefrom for making electrical contact to an external circuit, and a cover plate disposed on said one face of the support, said cover plate having means projecting therefrom and extending into the recesses to bear against said conductor members to retain them in assembly therein.

2. An electrical assembly, comprising an insulating support and a series of conductor members assembled therewith so as to provide a series of electrical paths from the front face of the support to the rear face in such a manner that some of the paths cross each other in passing through the support, said support having a series of transverse recesses disposed in the front face, some of said recesses intersecting each other and having portions of different depths adjacent the intersection, said conductor bars having medial portions seated in said recesses, connector portions extending therefrom through suitably positioned apertures in the recesses to protrude from the rear face of the support, and contact portions extending beyond the front face of the support, said portions of the intersecting recesses of different depths permitting said medial portions disposed therein to cross each other without contact therebetween, and a cover plate disposed on said front face, said cover plate having apertures receiving said contact portions and having means projecting into the recesses to bear against the medial portions of the conductor members disposed therein and retain them seated in the recesses.

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