Sept. 11, 1962 J. CLAVEL 3,053,956

ROTARY ELECTRIC SWITCHES

Filed March 13, 1959

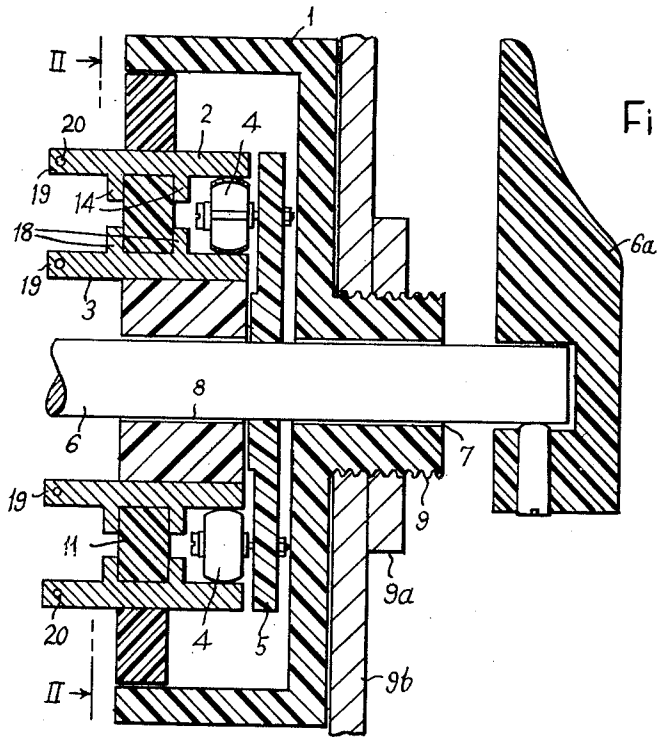


Fig.1

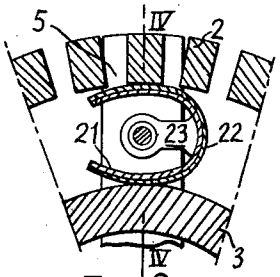


Fig.3

Fig.2

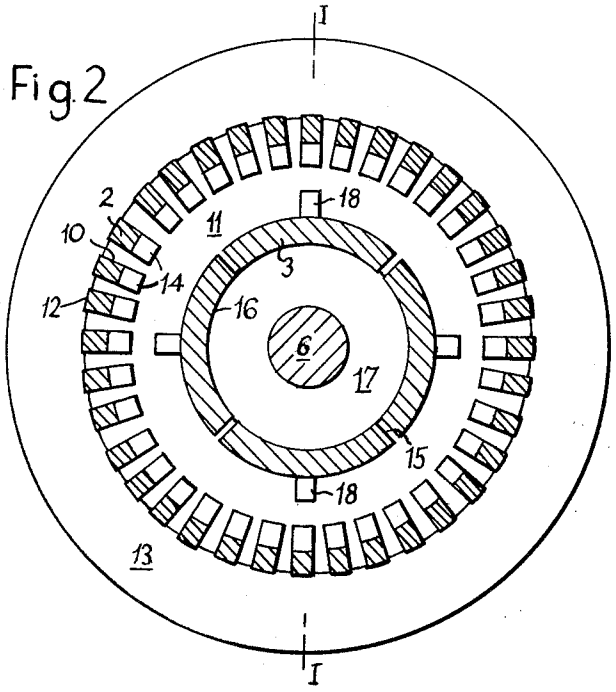
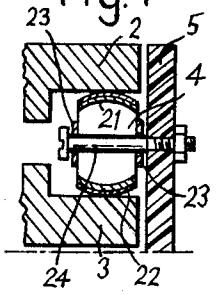


Fig.4



Inventor

Jean Clavel

By Holcomb, Dethmers & Bruchis

Attorneys

United States Patent Office 3,053,956 Patented Sept. 11, 1962

3,053,956
ROTARY ELECTRIC SWITCHES

Jean Clavel, 2 Rue du Sergent Bobillot, Nanterre, France

Filed Mar. 13, 1959, Ser. No. 799,231
Claims priority, application France Dec. 21, 1954
3 Claims. (Cl. 200—166)

The present invention relates to rotary electric switches and in particular to the mounting of the various tracks of fixed contacts on an insulating base plate of the switch whereby considerable miniaturisation is possible.

Accordingly the present invention has for an object to provide a miniature rotary electric switch comprising a plurality of concentric tracks of fixed contacts, which is of cheap and simple construction and is adapted for ease of assembly.

This application is a continuation in part of Serial No. 530,738, filed August 26, 1955, now Natent No. 2,904,-647.

In order that the present invention may be more clearly understood, reference will now be made, by way of example, to the accompanying drawings, in which:

FIGURE 1 is an axial section of a rotary switch according to the present invention on the line I—I of FIGURE 2,

FIGURE 2 is a section on the line II—II of FIGURE 1,

FIGURE 3 is an enlarged fragmentary sectional view of one of the moving contacts of the rotary switch,

FIGURE 4 is a section on the line IV—IV of FIGURE 3.

Referring to FIGURES 1 and 2 of the drawings. The rotary switch is arranged in a housing **1** and comprises concentrically arranged outer and inner tracks of fixed rigid elongated contacts **2** and **3** respectively adapted to be electrically connected together by two moving contacts **4**. The moving contacts **4** are supported from each end of an arm **5** which is rigidly connected at its centre to a shaft **6** and is rotatable thereby to move the contacts **4** along the space between the two tracks. The shaft **6** passes out of the housing **1** through a bearing **7** and is also located in a bearing **8** in the insulating support for the two tracks. The shaft **6** may be provided, for example, with a manual operating knob **6***a* on its end adjacent the bearing **7** and the outer surface of this bearing is threaded at **9** to receive a nut **9***a* in order to allow clamping of the switch to, for example, a control panel **9***b*.

The insulating support comprises three annuli of insulating material which when assembled with the tracks of contacts form a rigid base. The assembly of the contacts and annuli together is as follows. The contacts **2** of the outer track are fitted into notches **10** in the outer periphery of the intermediate annulus **11** as shown, these notches being of such a size as to allow the outer side **12** of the contacts to protrude just beyond the periphery of the annulus. The outer annulus **13**, the inner diameter of which is of substantially the same diameter as the outer periphery of the intermediate annulus, is then forced over the intermediate annulus, the fact that the sides **12** of the contacts protrude above the circumference thereof causing the outer annulus to be a force fit. The outer annulus therefore acts as a binding hoop pressing the fixed contacts into their notches, the wedging action between the two annuli effecting a rigid assembly.

The contacts **2** are provided with abutments **14** which are spaced apart therealong substantially the width of the insulating material so that they abut the surface of the intermediate annulus and prevent the contacts from moving and perhaps sliding out from between the two annuli in an axial direction.

The inner track of contacts **3** is assembled in a similar manner. These contacts are located in notches **15** in the inner periphery of the intermediate annulus **11** so that their side **16** just protrudes outside the inner periphery, and the inner annulus **17**, which has an outer diameter substantially the same as the inner diameter of the intermediate annulus, is then forced into the aperture formed by the intermediate annulus to wedge the contacts in position. The inner annulus is made wider than the other two annuli in order to provide for the bearing **8** for the shaft **6** and also to act as a backing for the contacts **3** to support these against the pressure of the moving contact. The contacts **3** are also provided with abutments **18** to prevent said contacts from moving in or sliding out of the slots in an axial direction.

As will be seen from the drawings both tracks of contacts extend completely through the insulating support in either direction and the ends **19** of said contacts remote from the moving contacts are adapted for use as terminals and in this connection are provided with apertures **20** for receiving wires.

The inner track of contacts **3** may have four large contact surfaces as shown in FIGURE 2 or the whole track may be continuous, or alternatively, two, three, or more than four contacts may be provided depending upon the desired use of the switch. The contacts **2** may be substantially rectangular in section and the ends **19** of the inner contacts **3** may be quite small for example they may be extensions in line with the abutments **18**.

A suitable construction for use as the moving contacts is shown in FIGURES 3 and 4. Each moving contact comprises a double clip **21**, **22**, the clip **21** being a resilient metal member and the clip **22** being made of conducting material. The contact of the clip **22** with the tracks of contacts is a point contact, the two clips having a transverse arch section as shown in FIGURE 4. The clip **21** is provided with ears **23** through which passes a supporting bolt **24** for bolting the moving contact to the arm **5**. The clip **22** provides the electrical connection between the two tracks of fixed contacts, it being forced against the contacts of each track by the resiliency of the clip **21**.

It will be seen that such a method of fixing the contacts **2** and **3** to the insulating support is particularly suitable for miniature rotary switches. In miniature switches it is required that the number of fixed contacts is a maximum for any given size and this results in the ends of the contacts forming the terminals becoming very close together with the result that it is difficult to attach any wires thereto and the bare ends of said wires might come into contact with one another. This difficulty can be overcome by extending the terminal end parts **19** of every other contact.

I claim:

1. A miniature rotary electric switch comprising an insulating support composed of thin flat outer and intermediate annular members and an inner circular member, all said members being located concentrically one within the other, said outer member having an inner diameter substantially the same as the outer diameter of said intermediate member, and said intermediate member having an inner diameter substantially the same as the outer diameter of said inner member, a relatively large number of individual elongated rectilinear contacts each located in a notch in one of the adjacent peripheries of said outer and said intermediate annular members, each of said contacts having a depth so as to protrude beyond said periphery to cause said outer and intermediate annular members to be a force fit together, a plurality of contacts each located in a notch in one of the adjacent peripheries of said intermediate and inner members, each of said plurality of contacts having a depth so as to protrude

beyond said periphery to cause said intermediate and inner members to be a force fit together, and each contact of the two concentric rows of contacts having a length so as to extend beyond the faces of said intermediate member, a pair of projecting abutments spaced apart longitudinally on each of said contacts, each pair of abutments respectively abutting the opposed faces of the insulating support to fix said contacts against longitudinal displacement, at least one moving contact, means mounting said at least one moving contact for movement in the space between the two concentric rows of fixed contacts to connect one of said plurality of contacts of said inner track selectively to a selected one of the contacts of said outer track, and means for moving said at least one moving contact.

2. A miniature rotary electric switch comprising an insulating support composed of thin flat outer and intermediate annular members and an inner circular member, all said members being located concentrically one within the other, said outer member having an inner diameter substantially the same as the outer diameter of said intermediate member, and said intermediate member having an inner diameter substantially the same as the outer diameter of said inner member, a relatively large number of individual elongated rectilinear contacts each located in a notch in one of the adjacent peripheries of said outer and intermediate annular members, each of said contacts having a depth so as to protrude beyond said periphery to cause said outer and intermediate annular members to be a force fit together, a plurality of contacts each located in a notch in one of the adjacent peripheries of said intermediate and inner members, each of said plurality of contacts having a depth so as to protrude beyond said periphery to cause said intermediate and inner members to be a force fit together, and each contact of the two concentric rows of contacts having a length so as to extend beyond the opposed faces of said intermediate member, a pair of projecting abutments spaced apart longitudinally on each of said contacts, each pair of abutments respectively abutting the opposed faces of the insulating support to fix said contacts against longitudinal displacement, at least one moving contact, an arm mounting said at least one moving contact for movement in the space between the two concentric rows of fixed contacts to connect one of said plurality of contacts of said inner track selectively to a selected one of the contacts of said outer track, said arm being fixed to a shaft mounted coaxially of the insulating support, and means for rotating said shaft, said at least one moving contact comprising a double clip arrangement consisting of a resilient clip member having an outside surface on which is a member made of conducting material which engages the contacts, said resilient clip member forcing said conducting member against the contacts, and means connecting said double clip arrangement to said arm.

3. A miniature rotary electric switch comprising an insulating support composed of thin flat outer and intermediate annular members and an inner annular member, all said members being located concentrically one within the other, said outer member having an inner diameter substantially the same as the outer diameter of said intermediate member, and said intermediate member having an inner diameter substantially the same as the outer diameter of said inner member, a relatively large number of individual elongated rectilinear contacts each located in a notch in the outer periphery of said intermediate annular member, each of said contacts having a depth so as to protrude beyond said periphery to cause the outer and intermediate annular members to be a force fit together, a plurality of contacts each located in a notch in the inner periphery of the intermediate annular member, each of said contacts having a depth so as to protrude beyond said periphery to cause the said inner and intermediate annular members to be a force fit together, and each contact of the two concentric rows of contacts having a length so as to extend beyond the opposed faces of said intermediate member, a pair of projecting abutments spaced apart longitudinally of each of said contacts, each pair of abutments respectively abutting the opposed faces of the intermediate annular member to fix said contacts against longitudinal displacement, two moving contacts, means mounting said two moving contacts for movement in the space between the two concentric rows of fixed contacts to connect one of said plurality of contacts of said inner track selectively to a selected one of the contacts of said outer track, and means for moving said two moving contacts.

References Cited in the file of this patent

UNITED STATES PATENTS

1,919,949	Kempton	July 25, 1933
2,549,998	Allison	Apr. 24, 1951
2,681,393	Hopkins	June 15, 1954
2,722,645	Brown	Nov. 1, 1955