Oct. 2, 1956 E. S. PALMER 2,765,376

ROTARY MULTI-POINT SWITCH

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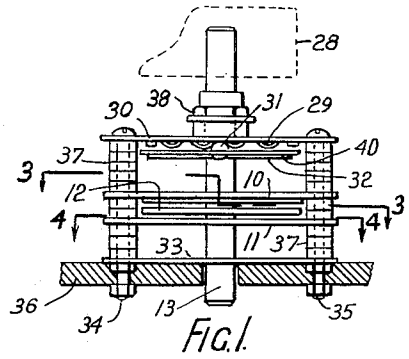


FIG. 1.

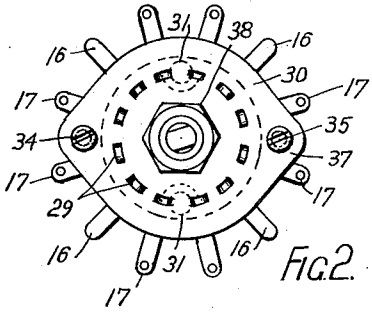


FIG. 2.

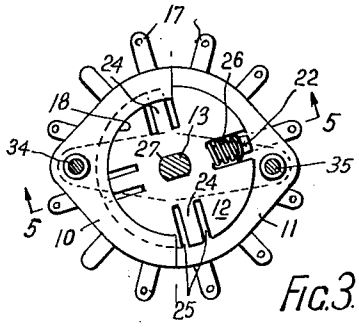


FIG. 3.

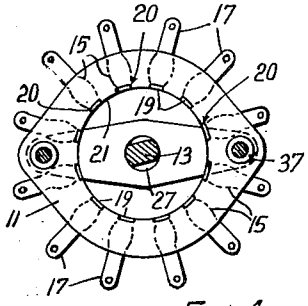


FIG. 4.

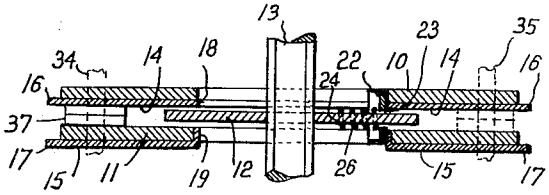


FIG. 5.

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ROTARY MULTI-POINT SWITCH

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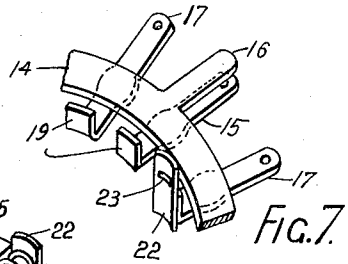


FIG. 7.

FIG. 6.

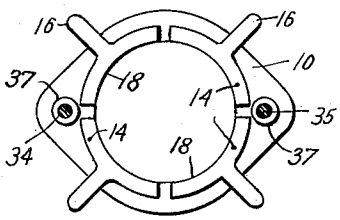


FIG. 8.

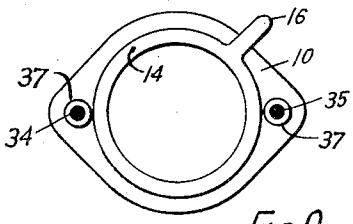


FIG. 9.

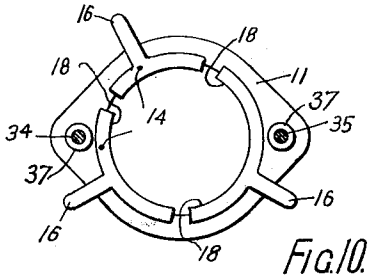


FIG. 10.

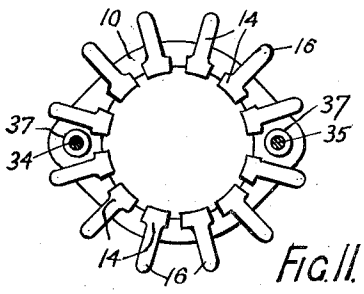


FIG. 11.

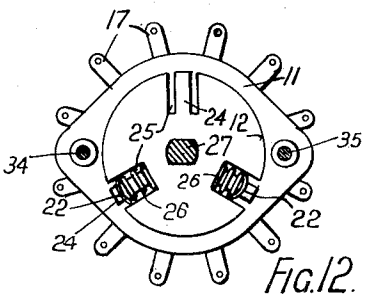


FIG. 12.

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ROTARY MULTI-POINT SWITCH

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Application May 11, 1954, Serial No. 429,036

3 Claims. (Cl. 200—8)

This invention has reference to rotary multi-point switches for selectively controlling a number of electric circuits, for instance in testing equipment or other electrical appliances or apparatus.

One object of the present invention is to provide an improved construction of a switch of the type referred to, which is compact and is easy and inexpensive to manufacture.

Another object thereof is to provide improved switching means which, although they may be manufactured to a standard design, are capable of use in a variety of different connections.

Depending on the number of contact elements and their arrangement, the improved switch permits either the completion of one selected circuit only at a time or, in a different arrangement, the simultaneous completion of two, or of more than two, circuits which may either be independent or interdependent, as the case may be.

In order to more particularly describe the invention, reference is made to the accompanying drawing which, by way of example, illustrates one specific form of the improved rotary multi-point switch as well as a variant thereof, and wherein:

Fig. 1 shows the multiple switch in elevation;

Fig. 2 is a plan of the switch shown in Fig. 1;

Figs. 3 and 4 are cross sections on line 3—3 and 4—4, respectively, of Fig. 1;

Fig. 5 is a cross section on a larger scale taken on line 5—5 of Fig. 3;

Figs. 6 and 7 are detail respective views illustrating the rotatably adjustable contact element of the switch on its carrier and in relation to the stationary contact elements of said switch;

Figs. 8, 9, 10 and 11 are reversed plan views of variants in the arrangement and number of stationary switch contact elements, and

Fig. 12 is a plan view depicting a variant in the arrangement and number of the rotatably adjustable contact elements.

In the form shown in Figs. 1 to 7 of the drawings the switch substantially comprises two spaced stationary insulating rings **10**, **11** mounted in fixed relationship to one another on a support **36**, and a disc-like insulating plate **12** disposed or sandwiched between the rings **10** and **11**, the plate **12** being secured to the rotatable operating spindle **13** of the switch.

Associated with the ring **10** are a number of metal contacts **14** and with the ring **11** a number of metal contacts **15**, each contact **14** and **15** being provided respectively with a terminal **16** and **17** which extends radially outwardly for connection to an electric circuit or branch of a circuit (not shown). The contact surface proper of each metal contact **14** is constituted by the inner edge portion **18** thereof (Fig. 5) which follows the inner edge of the ring **10**, or slightly overlaps it as shown for instance in Fig. 9. The contact surface proper of each contact element **15** on the other hand is constituted by an upstanding end portion **19** of said contact element, said

upstanding portion being accommodated within a recess **20** of the inner edge **21** of the ring **11**, as can best be seen from Fig. 4.

The arrangement of the metal contacts **14** and **15**, respectively, on the stationary rings **10** and **11** is optional, but it is of such nature that the positions of all or of a predetermined number of the contact elements register axially when the rings **10** and **11** are mounted in the assembled switch.

In the embodiment shown in Figs. 1 to 7 and in Fig. 8 for instance twelve contact elements **15** are disposed in uniform spacing around the ring **11** (Figs. 2 and 3) whereas four segment-shaped contact elements **14** are secured to the ring **10**, as can be seen from Fig. 8. In this example each element **14** bridges an angle of adjustment of 90°.

In other multiple switches according to the invention which in general construction and design are identical with or closely resemble that according to Figs. 1 to 7, the arrangement and number of the segment-shaped contact elements **14** is as shown for instance in Figs. 9, 10, 11 which illustrate variants of the ring **11** and associated stationary contact elements.

Thus for instance according to Fig. 9 only a single circular contact element **14** is provided.

Fig. 10 on the other hand illustrates an arrangement with three contact elements **14** covering different angles of switch adjustment. The width of the angle covered by each contact element **14**, however, is by no means characteristic of the invention and may be varied as may be required for any particular circuit arrangement. In a further variant illustrated in Fig. 11, the number and the arrangement of the contacts **14** correspond to those of the contacts **15** on the second ring **11** of the switch, and in this instance the multiple switch therefore serves to establish in conjunction with the contact elements **15**, in succession, any one or more than one of twelve circuits, the number of circuits completed at a time depending obviously on the number of the movable contact elements provided on the disc **12**.

A movable contact element **22** is mounted on the disc-like insulating plate **12**. This movable element **22** consists of a transversely arched appropriately square or rectangular piece of sheet metal made for instance by punching or stamping, or by cutting from metal band. About centrally this piece is formed with a transverse slot **23** (Figs. 5 to 7). By means of the slot **23** the movable contact element **22** is slidably retained on a tongue **24** of the plate **12**. The tongue **24** is constituted by the formation in the plate **12** of two spaced parallel slits or incisions **25** made in the plate **12** and extending about radially from the periphery of the plate **12** towards its centre. A coiled compression spring **26** (Figs. 3, 5 and 6) disposed around the tongue **24** between the bottom ends of the slits **25** and the arched strip **22** resiliently urges the latter outwardly whereby safe engagement of the movable contact element **22** with one pair at a time of the stationary elements **14** and **15** is assured. The transverse curvature of the contact surface of the element **22** prevents obstruction of the latter by any unevenness when the element **22** passes the stationary elements **14** and **15** during the operation of the switch.

Only one such movable contact element **22** is fitted to a tongue **24** of the disc **12** in the form shown in Figs. 3 and 5.

In an alternative form of the switch, however, the rotatable plate **12** of which is illustrated in Fig. 12 whilst the remaining parts of the switch may be as illustrated in connection with the switch shown in Figs. 1 to 7, for instance two movable contact elements **22** are provided on the disc **12** in relative positions to one another such as are required for use in a particular circuit. As will be

seen, however, from Figs. 3 and 12, a plurality of tongues 24 are provided on the disc 12, thus permitting to change the relative position of the movable contact elements 22 if the switch is assembled for use in a different circuit, or to provide more than two such movable contact elements for again a different purpose. In the form shown in Fig. 3 four such tongues are depicted at right angles to each other, thus permitting to use optionally one, two, three or four movable contact elements and, if two such contact elements 22 are used, to arrange them either at 90° to one another or in diametrically opposite relationship as may be required for any particular purpose.

In the form illustrated by way of example in Fig. 12, however, only three tongues 22 spaced from one another by 120° are used and it will be obvious to the expert in the art that in other embodiments of the invention and where required less than three or more than four such tongues can be provided for the accommodation of a required number of movable contacts of the switch.

The insulating disc 12 is provided centrally with a hole 27 which fits accurately over the substantially square operating spindle 13 of the switch. As may be seen from Fig. 1, the spindle itself is provided with an operating knob 28 and is associated with snap action or equivalent coupling means which permit retention of the disc 12 and of the movable contact 22, in register with a selected pair or pairs of stationary contacts 14, 15, as well as the easy manual control of the switch position by rotation of the spindle 13 from one position to another.

In the example shown for instance said snap action means comprise a series of recesses 29 arranged in a circle in a plate-like mounting element or bridge piece 30 of the switch, and two spring-loaded balls 31 associated with an arm 32 of the spindle 13, the balls 31 being adapted to enter, one at a time, the interspaces between adjoining recesses 29 of the plate 30.

In the construction shown in Figs. 1 to 7, the multiple switch according to the invention comprises two spaced bridge pieces 30 and 33 of sheet material, preferably sheet metal on a pair of spaced posts 34 and 35 suitable for mounting on a base 36. The required spacing between the bridge pieces 30 and 33 and the insulating rings 10 and 11 respectively, as well as that between said rings 10 and 11 themselves, is maintained by an appropriate number of spaced rings 37, washers, tubules or the like made preferably of insulating material, and disposed on the posts 34 and 35. The proper position of the rotatable insulating disc 12 between the stationary rings 10 and 11 of the multiple switch is obtained by the proper arrangement and/or adjustment of said disc 12 on the spindle 13 for instance by means of an adjustable nut 38.

The aforementioned recesses 29 are disposed along a circle concentric to the axis of the spindle 13 and are made for instance by punching or stamping. The balls 31, on the other hand, are mounted in sockets 39 of a resilient plate 40 made for instance of spring steel which is secured to the spindle 13 in proper position relatively to the bridge piece 30 and supported by the aforementioned arm 32.

What I claim is:

1. In a switch, a disc-like insulator provided with a pair of substantially radial, parallel slits which extend inwardly from the periphery of said insulator substantially towards its center, and with a tongue between said pair of parallel slits, and a movable contact mounted for movement on said tongue.

2. A multi-point switch comprising a frame, a manually rotatable switch spindle mounted in said frame, at least two spaced parallel ring-like insulators mounted on said frame and surrounding said switch spindle, the said ring-like insulators having inner circular contours concentric with the axis of the switch spindle, stationary contact elements on said ring-like insulators having contact surfaces which follow said contours, at least some of said contacts on said insulators registering axially, a disc-like insulator mounted on said spindle and sandwiched between said ring-like insulators, at least one movable contact element on said disc-like insulator for bridging selected axially registering stationary contacts on said ring-like insulators, said disc-like insulator being provided with at least one pair of spaced, substantially radially extending slits and with a tongue between said slits and said movable contact element being provided with an aperture through which said tongue projects and being displaceable on said tongue, spring means including a coiled compression spring carried by said tongue and extending between said movable contact element and the bottom ends of said slits, resiliently urging said movable contact element radially outwardly with respect to said disc-like insulator and into engagement with said stationary contact elements, and coupling elements associated respectively with said spindle and with a stationary part of the switch frame for retaining said movable contact element in a selected position relatively to said stationary contact elements.

3. A multi-point switch comprising a frame, a manually rotatable switch spindle mounted in said frame, at least two spaced parallel ring-like insulators mounted on said frame and surrounding said switch spindle, the said ring-like insulators having inner circular contours concentric with the axis of the switch spindle, stationary contact elements on said ring-like insulators having contact surfaces which follow said contours, at least some of said contacts on said insulators registering axially, a disc-like insulator mounted on said spindle and sandwiched between said ring-like insulators, at least one movable contact element on said disc-like insulator for bridging selected axially registering stationary contacts on said ring-like insulators, and said disc-like insulator being provided with at least one pair of spaced, substantially radially extending slits and with a tongue between said slits, and said movable contact element consisting of a transversely arched metal piece provided with an aperture through which said tongue projects, spring means resiliently urging said movable contact element radially outwardly with respect to said disc-like insulator and into engagement with said stationary contact elements, and coupling elements associated respectively with said spindle and with a stationary part of the switch frame for retaining said movable contact element in a selected position relatively to said stationary contact elements.

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