May 28, 1957 J. STOECKLIN 2,794,080

ROTARY MULTI-CONTACT SWITCH

Filed May 20, 1955

Fig. 1

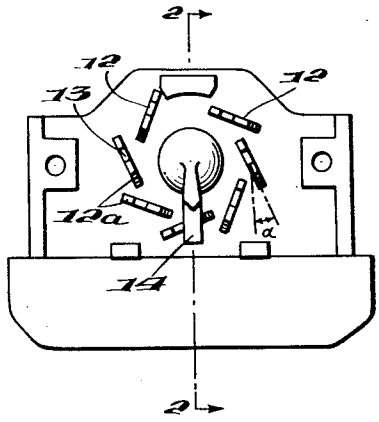
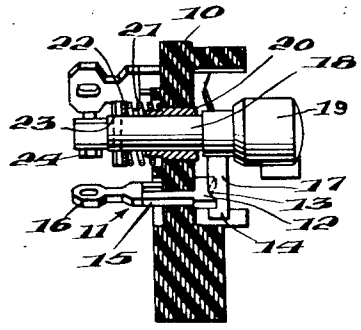


Fig. 2.



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United States Patent Office 2,794,080 Patented May 28, 1957

2,794,080

ROTARY MULTI-CONTACT SWITCH

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Application May 20, 1955, Serial No. 509,900

Claims priority, application Switzerland February 16, 1955

1 Claim. (Cl. 200—6)

In electrical circuits one often faces the problem of effecting circuit changes without interrupting the circuit. This problem arises, among other instruments, in the case of protective relays for current transformers where it is necessary to switch from one tap to another on the secondary winding without breaking the circuit in order to select a desired relay-response current. One known method for effecting this result lies in the use of plug-socket strips for protective relays, which are constructed in such manner that the circuit will be bridged whenever a plug is being pulled out. Another method utilizes screw-plugs which are inserted into the desired tap. When changing over to another tap it is necessary to screw a second plug into the tap desired before the first plug can be removed in order that the tap change can be made without interrupting the transformer secondary circuit. However, these methods are not only cumbersome with respect to construction and service but also require excessive space.

The principal object of the present invention is to provide an improved device for switching from one contact to another in changing taps on the secondary of a current transformer without interrupting the secondary circuit. This objective is attained by means of an improved rotary switch comprising one rotary arm and contact thereon adapted to make successive engagement with each of a plurality of stationary contacts arranged in a generally circular array, the stationary contacts being so constructed that the rotary contact engages the next contact in the series before disengaging the one with which it has been in contact or engaged. Consequently a circuit is always established between the rotary contact and one of the stationary contacts notwithstanding the fact that the rotary contact shifts from one to another of the stationary contacts. Actually when passing from one to another of the stationary contacts the rotary contact simultaneously engages the adjacent end portions of adjacent stationary contacts thus assuring continuity of the secondary circuit of the current transformer.

A more particular object of the invention is to provide a rotary multi-contact point switch comprising a rotary contact adapted to make successive engagement with each of a plurality of stationary contact bars arranged generally in a circular array about the center of rotation of the rotary contact, the adjacent ends of adjacent bars being overlapped as related to the path travelled by the rotary contact so that the latter will, for a brief period, in passing between adjacent contacts be engaged simultaneously with those adjacent overlapping bar ends.

In the preferred embodiment of the invention to be described the stationary contact bars are straight and each bar is provided with a centrally located notch with sloping sides to receive the rotary contact. Also, adjacent contact bars are located at an angle to each other and with the adjacent ends of adjacent bars laterally overlapped with respect to the path of travel of the rotary contact.

In the drawings which illustrate a preferred form of the invention, Fig. 1 is a front elevation of the rotary switch, while Fig. 2 is a vertical section taken on line 2—2 of Fig. 1.

With reference now to the drawings the body of the switch is seen to be comprised of a support **10** which is of insulating material and preferably made from pressed laminations of sheets of insulating material. The stationary contacts are indicated at **11** and these are seen to be constituted at their contact faces by bars **12** each having a centrally located recess **13** with sloping sides so as to permit the rotary contact member **14** to more easily move into and out of the recess. Each of the stationary contacts includes a stem portion **15** extending through the support **10** and which terminates in a lug **16** by which to make a soldered connection with the conductor end. It is also possible to press the bars **12** into the face of the laminated insulating support plate **10** at the time the plate is manufactured.

As clearly indicated in Fig. 1, the stationary contact bars **12** are arranged in a generally circular array about the center of rotation of the rotary contact member **14**. The adjacent end portions **12***a* of the contact bars are laterally overlapped as regards the path of rotation of contact member **14** to the end that contact member **14** simultaneously engages such end portions for a brief period when switching from one to an adjacent stationary contact. In this manner, circuit continuity is always maintained between the rotary contact member **14** and at least one of the stationary contact members or bars **12**. It will also be noted that each of the stationary contact bars **12** makes, or is set at, an oblique angle to its adjacent bar and that the bars form an angle α with the tangent to the circle.

The rotary contact member **14** constitutes the outer end of an arm **17** which is secured at its inner end to a spindle **18** having a knob **19** for ease in turning by hand. Spindle **18** is journalled in a bushing sleeve **20** secured within an opening extending through plate **10**. A spring **21** is located on spindle **18** at the side of plate **10** opposite that on which the rotary contact member **14** is located and the spring is retained in position on the spindle and under compression by means of a washer **22** and pin **23** which passes transversely through the outer end of the spindle. One end of the spring **21** bears against the washer **22** and the other end bears against the back face of plate **10**. The result of such arrangement is to bias spindle **18** and hence arm **17** and contact member **14** into engagement with the stationary contacts **12**. As spindle **18** is rotated to move the rotary contact member **14** from one to another of the stationary contact bars **12**, the spring **21** permits sufficient axial displacement of the spindle to enable the rotary contact member **14** to move out of and into the recesses **13** in the contact bars **12**. A screw **24** at the end of spindle **18** provides a means for connecting a conductor end to the spindle and hence to the rotary contact member **14**, it being assumed of course that all parts of the switch excepting the mounting plate **10** are made of electrically conductive material.

In conclusion it will thus be evident that the invention makes it possible to change over from one contact to another in a rotary switch device without ever interrupting the circuit between the rotary contact member and the array of stationary contacts. Also the oblique positioning of adjacent stationary contacts **12** also has the additional advantage of establishing a wider leakage path between adjacent contacts. Moreover, while a preferred embodiment of the invention has been described, it is to be understood that various minor changes in the construction and arrangement of parts may be made without, however, departing from the spirit and scope of the invention as defined in the appended claim.

I claim:

In a rotary switch the combination comprising a sup-

port plate of insulating material, a rotary contact member mounted on said support, a plurality of flat elongated stationary contact members mounted on said support in a substantially arcuate array about the center of rotation of said rotary contact member, the contact ends of said stationary contact members engaged by said rotary contact member being recessed between their narrow sides for engagement in succession by said rotary contact member, adjacent recessed ends of adjacent ones of said stationary contact members being laterally and obliquely overlapped so that said rotary contact member in moving from one to another of said stationary contact members simultaneously and temporarily engages said overlapped end portions thereby maintaining temporary circuit continuity between said rotary contact member and adjacent

ones of said stationary contact members, said stationary contact members extending through said support plate and including connection means such as lugs at the opposite ends thereof.

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