Aug. 17, 1937. E. UHLE 2,090,505

ROTARY SWITCH

Filed Dec. 4, 1933

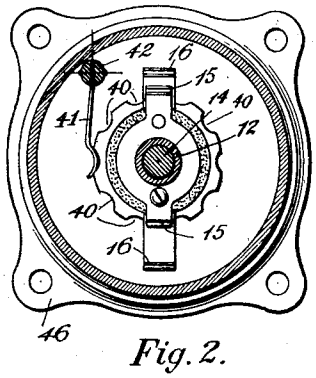


Fig. 2.

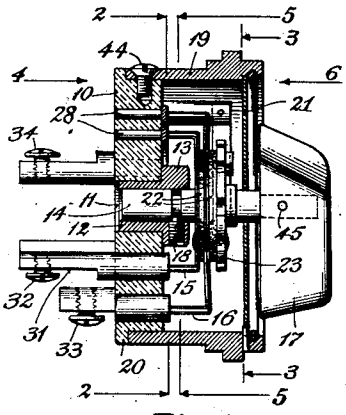


Fig. 1.

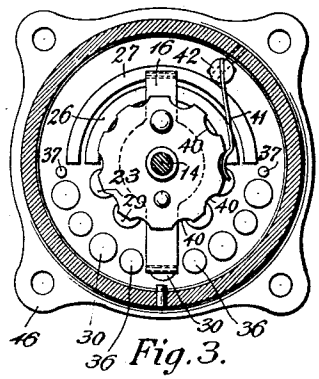


Fig. 3.

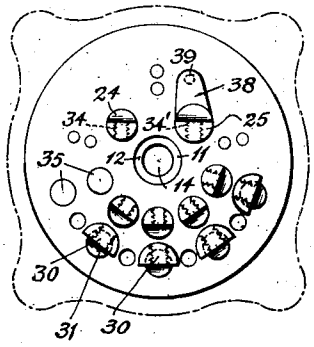


Fig. 4.

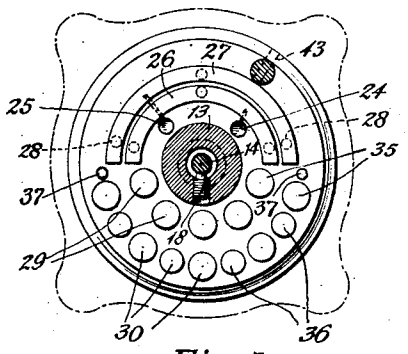
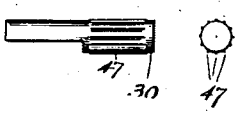
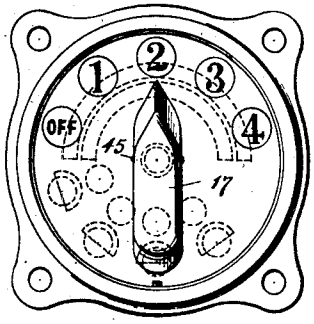


Fig. 5.

Fig. 6.

Fig. 7.





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ROTARY SWITCH

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9 Claims. (Cl. 200—6)

This invention relates to electric switches, and more particularly, to a switch of the type adapted to selectively connect a plurality of thermocouples or the like to an indicating instrument.

An object of this invention is to provide an improved switch of the kind referred to having a low resistance so as not to appreciably affect the currents to be indicated and yet be simple and durable in construction and certain in operation.

A feature of this invention is the provision of cylindrical contacts driven in or molded in the insulating disk forming the main body and back of the switch. The contacts have integral portions, preferably flattened, extending from the rear of the disk and provided with binding screws to which the ends of the wires forming the circuits to be controlled by the switch are fastened. By having the contacts and terminals made of one piece, there is avoided danger of poor contact which might exist if these parts were made separate pieces, and which might vary the current passing to the indicating instrument and cause the latter to give a false reading.

Another feature of this invention is the provision of a bearing for the shaft carrying the switch arms, which bearing is driven in or molded in the disk of insulation above referred to and constitutes the sole bearing for the shaft. The bearing is provided with a screw having a guide pin on its inner end which extends into an annular groove in the shaft and limits the longitudinal movement of the shaft.

Another feature of the invention is the provision of a detent device for the shaft to hold the shaft against casual movement and to hold the switch arms in proper engagement with the contacts. The detent device, according to the present invention, comprises a notched disk carried by the shaft and a spring mounted on a post carried by the disk of insulating material. The casing and dial for the switch are removably connected to the disk of insulating material and, with the detent and other parts of the switch arranged as disclosed herein, the switch may be completely assembled and tested before the casing is applied to the disk or main insulating body of the switch.

Other features and advantages will hereinafter appear.

In the accompanying drawing—

Figure 1 is a vertical section taken through the middle of the switch.

Fig. 2 is a transverse section taken on the line 2—2 of Fig. 1.

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 1.

Fig. 4 is a rear view of the insulating disk forming the main body of the switch, showing the outline of the casing in dot-and-dash lines.

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 1, the casing being omitted and its outline shown in dot-and-dash lines.

Fig. 6 is a front view of the switch with the casing and finger-piece attached.

Fig. 7 is an elevation of one of the contacts, showing it provided with knurling to prevent its turning in the disk.

As shown in the accompanying drawing, the switch of the present invention comprises a disk 10 of insulating material forming the main body and back of the switch. The switch is of the rotary type and designed to selectively connect thermocouples or other condition-responsive devices to an indicating instrument.

The disk 10 is provided with a central aperture 11 (see Fig. 4) into which a bearing 12 is driven. This bearing has a flange 13 engaging the front face of the disk 10. The bearing 12 receives and supports a shaft 14 which carries switch arms 15 and 16, and has at its outer end a handle or finger-piece 17. The bearing 12 forms the sole support for the shaft 14 and is provided with a locking screw 18, the end of which extends into a circumferential groove in the shaft 14 and holds the shaft against endwise movement in the bearing and insulating disk 10. The switch has a housing 19, which may be of insulating material or metal as desired, engaging a flange 20 on the disk 10 and having at its other end a dial or face 21 through which the shaft 14 extends.

The switch arms 15 and 16 are not carried directly by the shaft 14 but are carried by insulating disks 22 secured to a disk 23 fastened onto the shaft 14.

The arms 15 and 16 are insulated from each other and from the shaft 14. The switch arms are U-shaped and are superposed and nested one within the other, the switch arm 15 being shorter than the switch arm 16.

The switch of the present invention is of the two-pole type, connecting, as it does, both wires leading from a thermocouple to both wires leading to the indicating instrument. The wires from the indicating instrument are brought to terminal pieces or binding posts 24 and 25 projecting from the rear face of the disk 10. These binding posts 24 and 25 are connected respectively to inner and outer semicircular contact bars 26 and 27 lying on the front face of the

disk of insulation 10 and being held in place thereon by pins 28 driven into the disk 10. The switch arms 15 and 16 respectively continuously engage the semicircular contact bars 26 and 27.

According to the present invention, opposite the contact bars 26 and 27 the disk 10 is provided with two concentric rows of contacts 29 and 30, the contacts 29 being in position to be engaged by the switch arm 15 while the contacts 30 are in position to be engaged by the switch arm 16. These contacts are cylindrical and are driven into the disk 10 until their forward ends project slightly beyond the surface of the disk.

The contacts 30 are made long enough so that when their forward ends are in proper positions, their rearward integral ends are made to extend far enough beyond the rear face of the disk 10 to constitute terminal pieces and binding posts for the wires leading from the thermocouples or the like. To facilitate the attachment of the wires, the contact members 30 have flattened surfaces 31 and screw-threaded apertures to receive binding screws 32 and 33.

The binding screws 32 are for the inner row of contacts 30 and the binding screws 33 are for the outer row of contacts 30. The binding screws 32 and 33 have different diameters so that the eyelet or lug fastened on the end of the wire which is intended to be fastened to the inner contact 30 will not fit over the outer contact screw 33, thus insuring that the wires of desired polarity are connected to the inner and outer contacts. The binding screws 34 for the binding posts 24 and 25 are likewise of different diameters for the same purpose.

In order that the switch arms 15 and 16 may be properly supported when the switch is in its "off" position, the switch of the present invention is provided with a pair of posts 35 which are also driven in the insulating disk 10 but which do not project from the back surface thereof and are therefore electrically dead.

In order that the switch arm 16 may pass smoothly from one contact in the outer row to the next, the spaces between the contacts 30 are bridged by plugs 36 driven into the insulating disk 10 and having a height substantially equal to the height of the contacts 30. These plugs preferably terminate short of the rear face of the disk 10 and the width of the ends of the switch arm 16 is such that the advancing corner does not engage the next contact until the trailing corner has disengaged the contact which it is leaving.

Rotation of the shaft 14 is limited so that the switch arms may not pass beyond the end contacts 30 on the one side and the posts 35 on the other side by stop pins 37 driven into the insulating disk 10 and engaging the switch arm 16.

The binding post 25 has an ear 38 secured to a pin 39 which extends into the semicircular contact 27 and carries current therefrom to the binding post. The binding post 24 is similarly connected to the semicircular contact 26.

In order to hold the switch arms in adjusted position against casual movement and also to center the switch arms 15 and 16 over their contacts 30, the disk 23 is provided with a plurality of spaced notches 40 adapted to be engaged by a detent spring 41 carried by a post 42. This post is driven into an aperture in the insulating disk 10 and, after it is rotated to adjust the pressure of the spring on the disk 23, it is locked in the proper position by a pin 43 passing into the post radially through the disk 10.

It will be understood from the above that the switch of the present invention can be assembled on the disk 10 and the parts adjusted and tested before the casing 19 is applied, the shaft 14 being turned for this purpose by loosely applying the handle 17 or by applying a suitable tool. After the switch is adjusted, the casing with its dial is mounted on the disk and secured thereon by a screw 44, after which the handle 17 may be placed on the end of the shaft 14 and secured against turning by a pin 45.

The casing is provided with apertured ears 46 by means of which it may be mounted on an instrument board of the like.

In order to hold the contacts against turning after they have been driven into the insulating disk 10, the portion of the contact which lies within the disk may be provided with knurling 47 as illustrated in Fig. 7, or it may have its surface otherwise roughened.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

Having thus described the invention, what is claimed as new and for which it is desired to obtain Letters Patent, is:—

1. A rotary switch comprising a disk of insulating material having an aperture at the center thereof and a plurality of spaced apertures arranged on an arc concentric with the disk; a bearing held in said central aperture by a drive-fit; a shaft carried by said bearing; a switch arm carried by said shaft located at the front side of the disk; and a plurality of contacts held in the arcuately arranged apertures by a drive-fit and projecting through the disk for engagement by said switch arm, said contacts having portions projecting from the back side of the disk and constituting binding posts, there being binding screws applied laterally of said posts.

2. A rotary switch comprising a disk of insulating material having an aperture at the center thereof and a plurality of spaced apertures arranged on an arc concentric with the disk; a bearing held in said central aperture by a drive-fit; a shaft carried by said bearing; a switch arm carried by said shaft located at the front side of the disk; and a plurality of contacts held in the arcuately arranged apertures by a drive-fit and projecting through the disk for engagement by said switch arm, said contacts having integral backwardly projecting shouldered portions engaging the back side of the disk at their shoulders and constituting binding posts.

3. A rotary switch comprising a disk of insulating material having an aperture at the center thereof and a plurality of spaced apertures arranged on an arc concentric with the disk; a bearing driven into said central aperture; a shaft carried by said bearing; a switch arm carried by said shaft located at the front side of the disk; and a plurality of contacts driven into the arcuately arranged apertures from the back side of the disk and projecting through the disk for engagement by said switch arm, said contacts being cylindrical and having flattened portions projecting from the back face of the disk and provided with a binding screw.

4. A rotary switch comprising a disk of insulation having an aperture in the center thereof; contacts carried by the disk; a metal bearing driven in said central aperture; a shaft carried by said bearing, said shaft having an annular

groove located in a part thereof extending into the bearing; a pin in the bearing extending into said groove to hold the shaft in the bearing against endwise movement; and a switch arm carried by the shaft for engaging said contacts.

5. A rotary switch comprising a disk of insulation having an aperture in the center thereof; a bearing in said aperture; a shaft carried by said bearing; two arcuate rows of spaced contacts carried by one-half the disk and concentric therewith, one of said rows being located inwardly of the other; a pair of semicircular contact bars carried by the other half of the disk and concentric therewith, one of said bars being located inwardly of the other; and two switch blades insulated from each other and carried by said shaft, one switch blade closing circuits between the inner contact bar and the contacts of the inner row and the other closing circuits between the outer contact bar and the outer row of contacts.

6. A rotary switch comprising a disk of insulating material; two arcuate rows of contact points concentrically arranged on the disk, one row within the other; two arcuate contact bars also concentric with the disk and one inwardly spaced from the other, said bars and points being respectively at diametrically opposite sides of the disk; and two switch blades rotatably mounted in the center of the disk insulated from each other, and each engaging one arcuate contact bar and the contacts of one of said arcuate rows of contacts, said blades extending diametrically across the center of the disk.

7. A rotary switch comprising a disk of insulating material; two similarly arcuate rows of contacts concentrically arranged on the disk to project from the face thereof, one row within the other, there being the same number of contacts in both rows, and the contacts of the inner row being closely adjacent each other and the contacts in the outer row being substantially spaced from each other; two similar switch arms rotatably mounted on said disk, one to engage each row of contacts; and metal plugs located in the outer row of contacts and alternating with the contacts of the row to bridge the gap between the contacts of the outer row and permit the switch arm engaging the same to slide smoothly from one contact to the next.

8. A rotary switch comprising a disk of insulating material; a plurality of spaced contacts carried by said disk; a shaft rotatably mounted on the disk; a switch blade carried by said shaft; a notched disk carried by the shaft; a post mounted on said disk of insulating material and projecting therefrom; and a spring arm carried by said post and engaging the notches of said disk to hold the shaft and switch arm in adjusted position against casual movement.

9. A rotary switch comprising a disk of insulating material; two similarly arcuate rows of contacts concentrically arranged on the disk to project from the face thereof, one row within the other, there being the same number of contacts in both rows, and the contacts of the inner row being closely adjacent each other and the contacts in the outer row being substantially spaced from each other; two similar switch arms rotatably mounted on said disk, one to engage each row of contacts; and plugs located in the outer row of contacts and alternating with the contacts of the row to provide an outer arcuate row of alternating contacts and plugs wherein each contact is substantially as close to the adjoining plugs as a contact in the inner arcuate row is to an adjoining contact.

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