

Aug. 21, 1956

H. A. WHITE

2,759,371

SWITCHING DEVICE

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FIG. 1

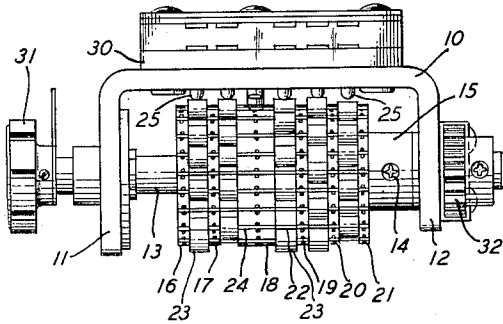


FIG. 2

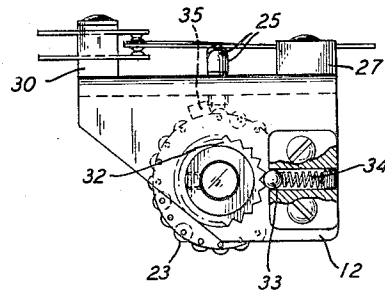


FIG. 3

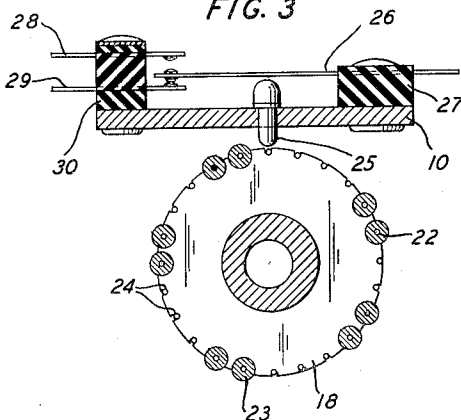


FIG. 4

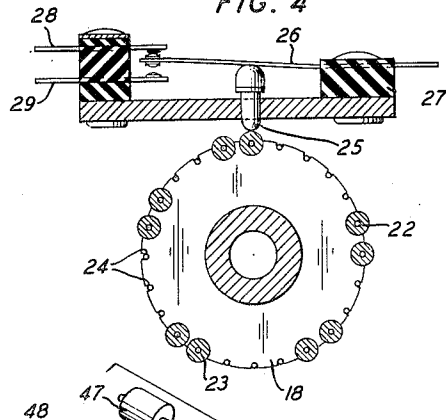


FIG. 5

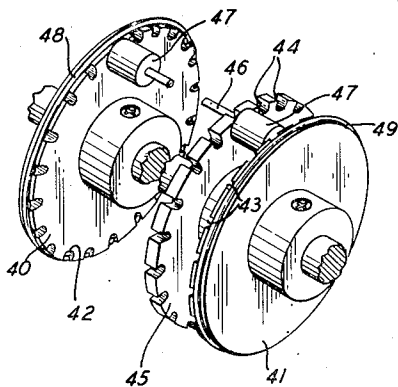
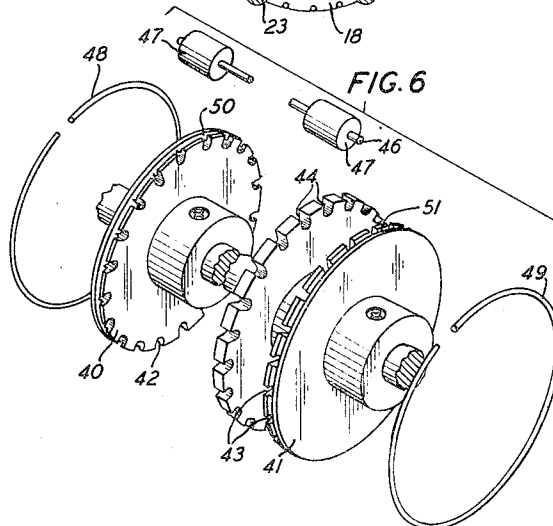


FIG. 6



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SWITCHING DEVICE

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2 Claims. (Cl. 74—567)

This invention relates to switch mechanisms and more particularly to rotary switches of the selective type.

One object of the invention is to provide a rotary switch mechanism which is capable of actuating a set of contacts in a predetermined sequence.

Another object of the invention is the provision of a rotary switch mechanism in which the sequence of operation of the contacts may be adjusted within a wide range.

The switch mechanism of this invention is of the rotary selective type and comprises a framework having spaced apart supports in which there is rotatably mounted a central shaft, having fixedly secured thereto a rotor which comprises a plurality of disc members. These members are spaced equidistant apart and provided on their peripheries with spaced apart notches which extend around the entire circumferences of the discs. The notches are adapted to receive longitudinally extending shafts which are fixedly secured therein, and have rotatably mounted thereon, between the discs, suitable sets of rollers. The rollers may be spaced around the discs, in any desired sequence or combination, depending on the sequence of operation required.

Slidably mounted in the framework and in alignment with the rollers in each set, are insulated plunger members which are located in the path of the rollers of the respective set and which are adapted to be actuated by each roller of that set as it passes thereby. Mounted on the frame and adapted to be operated by means of the sliding plungers are contact springs which are adapted to close or open electrical circuits in accordance with the rollers which have been previously set in a particular combination.

In another embodiment of the invention, the rollers are rotatably mounted on shafts which may be readily removed from discs, to change the location of the rollers and hence the sequence of operation of the contacts.

The invention will be clearly understood from the following detailed description when read in conjunction with the accompanying drawing, of which:

Fig. 1 is a side elevational view of the switch mechanism of this invention;

Fig. 2 is an end elevational view of the switch shown in Fig. 1;

Fig. 3 is a fragmentary view and shows a disc with a set of rollers mounted thereon and the contact operating plunger in its unoperated position;

Fig. 4 is a view similar to Fig. 3 but shows the contact operating plunger in its operated position;

Fig. 5 is a fragmentary perspective view of another embodiment of the invention in which the rollers and shafts may be readily removed; and

Fig. 6 is an exploded perspective view of the structure depicted in Fig. 5.

Referring now to the drawing and more particularly to Figs. 1 and 2, the switch assembly therein illustrated comprises a frame or body member 10, having right angle portions 11 and 12 extending therefrom and spaced

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some distance apart, which provide front end and rear end supports for a shaft 13 which is rotatably journaled therein. As shown more in detail in Fig. 1, there is fixedly secured to the shaft 13 by means of the set screw 14 a rotor member 15 which comprises the disc members 16, 17, 18, 19, 20 and 21, a plurality of longitudinally extending shafts 22 and the rollers 23. The shafts 22 are fixedly secured in the spaced apart notches 24, located on the peripheries of the discs 16, 17, 18, 19, 20 and 21, by staking and have rotatably mounted thereon, between the discs, the rollers 23.

Slidably mounted in the frame 10, and in alignment with the rollers 23 are the plungers 25, which are adapted to be actuated by the rollers 23 as they pass thereby. As shown in detail in Figs. 3 and 4, there is insulatingly mounted on the frame 10 and in spaced relation with respect to the surface of the frame and the plungers 25, the contact springs 26, which are adapted to be actuated by the plungers 25, as shown in detail in Fig. 4. The springs 26 are mounted on a block of suitable insulating material 27 which is secured to the frame 10, as shown, and extend transversely between suitable contact members 28 and 29 which are insulated from each other and from the frame 10 by the mounting block 30. The contact springs 26 and the contact members 28 and 29 are connected to suitable electrical circuits (not shown). An operating knob and pointer 31 is provided on the front end of the shaft 13. The rear end of the shaft 13 is provided with a suitable detent mechanism which comprises the ratchet wheel 32, the ball 33, and the spring 34 which centers the plunger 25 over the respective rollers 23 as the shaft 13 is rotated by means of the knob 31. A stop member 35 is mounted on the disc 18 to prevent the rotor from being rotated beyond the last position of the discs.

In the utilization and operation of the switch mechanism of this invention, the desired sequence of operation of the contacts 26, 28 and 29 is controlled by the setup of the rollers 23 on their respective shafts 22 and their spacing around the peripheries of the discs 16, 17, 18, 19, 20 and 21 and the relation of the spacing of each set of rollers with respect to each other.

As shown, each set of rollers, if desired, may be set up in a different combination depending upon the sequence of operation required; for example, as shown in Figs. 3 and 4, the rollers 23 are set up to disengage the contact spring 26, from its normal position, which, as shown in Fig. 3, is in engagement with the contact 29, and cause it to engage the upper contact 28 when the roller 23 engages the plunger 25. The plunger 25 will engage the rollers 23 and be actuated thereby when the disc 18 is rotated to its first position, as shown in Fig. 4, thereby opening the circuit between the contact spring 26 and the lower contact 29 and establishing a circuit between the contact spring 26 and the contact 28. The second position of the disc 18 will maintain this circuit closed since the plunger 25 will be held in its actuated position by the next adjacent roller 23. The next two positions of the disc 18 will permit the plunger 25 to retract with the consequent opening of the circuit between the contact spring 26 and the contact 28, thereby reestablishing the circuit through the spring 26 and the contact 29, since no rollers are mounted on the adjacent shafts 22. When the disc 18 is again rotated to its fifth and sixth positions, the plunger 25 will again be operated and the circuit will again be closed as heretofore described. The rotation of the disc 18 through its seventh, eighth and ninth positions will open the circuit between the spring 26 and the contact 28 and close the circuits as heretofore described. This sequence of operation is repeated until a complete revolution of the disc 18 is made and the stop 35 prevents further rota-

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tion thereof. It is of course to be understood that the foregoing description applies to only one set of rollers, and, since it is obvious that the other sets of rollers may be set up in various other combinations to obtain a predetermined sequence of operation of the contact springs associated with each set of rollers and its adjacent plunger, and the cooperation between each set, it is not believed necessary to describe in detail the particular setup of each set of rollers and the consequent operation thereof.

In the embodiment of the invention shown in Figs. 5 and 6, the operation of the rollers and the discs is the same as described above except that, in this structure, provision has been made for varying the set up of the rollers by permitting the rollers and their associated shafts to be readily removed. As shown, this is accomplished by providing end discs 40 and 41 with spaced apart recesses 42 and 43 on their peripheries which are in alignment with the notches 44 on the intermediate discs 45. The shafts 46, having rollers 47 rotatably mounted thereon, are adapted to be positioned in these notches and recesses and held in place by means of the spring rings 48 and 49 which, as shown, fit into the circumferential grooves 50 and 51 in the end discs 40 and 41 and firmly hold the shafts 46 and their rollers 47 in position. It is therefore apparent that the shafts 46 may be readily removed from their notches and recesses by removing the spring rings. This permits the rollers 47 to be readily engaged to vary their relative positions to vary the sequence of operation of the plungers 25 and the consequent operation of the contact springs 26.

While I have shown and described the preferred embodiment of my invention, it is to be understood that various changes and modifications may be made therein without departing from the spirit of the invention.

What is claimed is:

1. A rotary switch mechanism comprising a frame, a shaft rotatably journaled in said frame, a rotor element secured to said shaft and adapted to be rotated thereby, said rotor element comprising a plurality of spaced apart discs, the endmost of which are provided with circumferential grooves on their peripheries and with spaced apart notches on their inner faces and terminating in said grooves, the discs intermediate said end discs provided, on their peripheries, with spaced apart notches in alignment with each other and with the notches in said end discs, removable shafts positioned in said notches and having their ends in abutting relation with respect to the inner walls of the circumferential grooves in the

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end discs to prevent longitudinal movement of said removable shafts, said removable shafts having rollers mounted thereon, snap rings positioned in the circumferential grooves of said end discs and bearing against said removable shafts for maintaining said removable shafts in position, reciprocating members positioned in said frame and in the path of said rollers and adapted to be actuated thereby, and a set of contact springs mounted on said frame in operative relation with said reciprocating members.

2. A rotary switch mechanism comprising a frame, a shaft rotatably journaled in said frame, a rotor element secured to said shaft and adapted to be rotated thereby, said rotor element comprising a plurality of spaced apart discs, the endmost of which are provided with circumferential grooves on their peripheries and with spaced apart notches on their inner faces and terminating in said grooves, the discs intermediate said end discs provided, on their peripheries, with spaced apart notches in alignment with each other and with the notches in said end discs, removable shafts positioned in said notches and having their ends in abutting relation with respect to the inner walls of the circumferential grooves in the end discs to prevent longitudinal movement of said removable shafts, said removable shafts having rollers mounted thereon, snap rings positioned in the circumferential grooves of said end discs and bearing against said removable shafts for maintaining said removable shafts in position, reciprocating members positioned in said frame and in the path of said rollers and adapted to be actuated thereby, a set of contact springs mounted on said frame in operative relation with said reciprocating members, and a ratchet wheel on said rotor shaft in operative engagement with a detent on said frame for positioning said rollers.

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