

March 22, 1966

L. H. SMITH ET AL
SUPERIMPOSED ROTOR CONTACT STRUCTURE
WITH DEPRESSIBLE ACTUATOR

3,242,272

Filed June 22, 1964

2 Sheets-Sheet 1

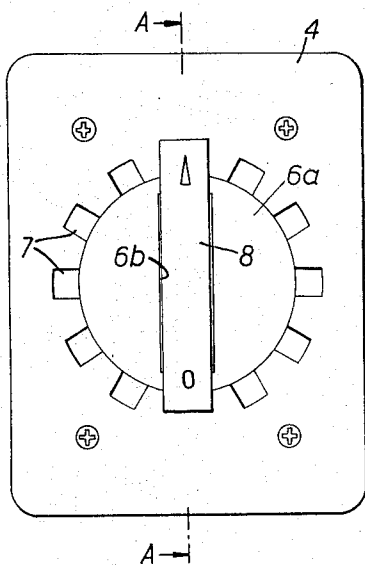


FIG. 1

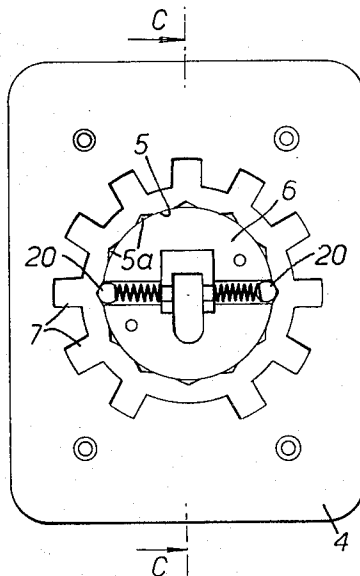


FIG. 3

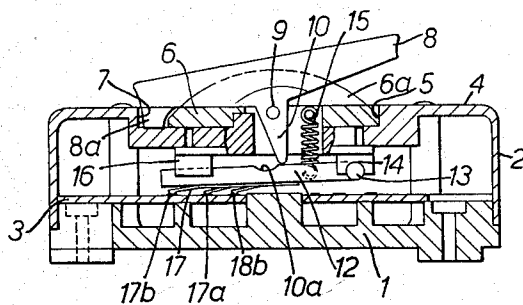


FIG. 2

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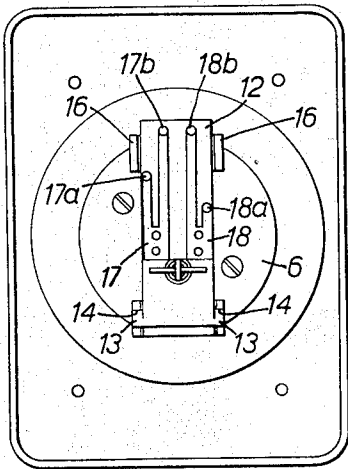


FIG. 4.

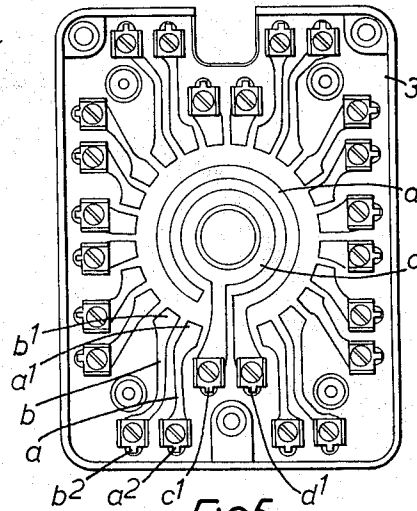


FIG. 5.

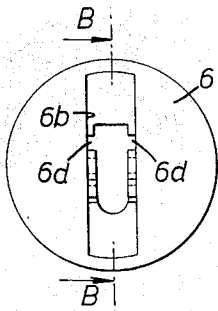


FIG. 6.

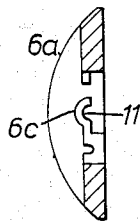


FIG. 7.

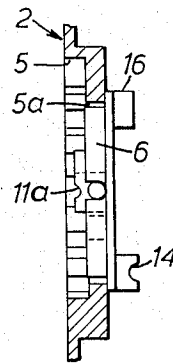


FIG. 8.

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3,242,272

**SUPERIMPOSED ROTOR CONTACT STRUCTURE
WITH DEPRESSIBLE ACTUATOR**

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2 Claims. (Cl. 200—11)

This invention relates to electrical switches of the rotary type comprising two or more fixed contacts controlled by the rotation of a rotor.

The present invention provides a rotary switches comprising a base provided with a plurality of circumferentially spaced contacts, a rotor mounted for rotation relative to the base, a member pivotally mounted on the rotor and provided with contact means adapted to make co-operative engagement with selected contacts on the base depending on the rotational position of the rotor, the said member being maintained during the rotation of the rotor in a position wherein the contact means are in spaced superposed relation to the contacts on the base and being pivotal into a position wherein the contact means engage the contacts on the base only when the rotor is stationary in a selected rotational position.

The said member may be pivoted into contact engaging position by a manually pivotal arm forming part of the rotor assembly. The rotor preferably includes a rotor plate mounted in an opening in the switch body, the said member being pivoted to the underface of the rotor plate.

Preferably the arrangement is such that when the said member is pivoted into contact engaging position, it is automatically retained in that position until released by a reverse pivotal movement by the arm. The rotor may be provided with a resilient contact or contacts for selectively bridging any pair of a plurality of fixed contacts according to the rotational position of the rotor.

To enable the invention to be fully understood, it will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a plan view of a rotary selector switch according to one embodiment of the invention;

FIGURE 2 is a sectional view on the line A—A of FIGURE 1;

FIGURE 3 is a plan view of the switch illustrated in FIGURE 1 with the rotor removed;

FIGURE 4 is an under plan view of the cover of the switch showing the under side of the rotor;

FIGURE 5 is a plan view of a printed circuit panel and the fixed electrical contacts;

FIGURE 6 is a plan view of the rotor top which carries the pivoted rotor arm;

FIGURE 7 is a sectional view on the line B—B of FIGURE 6; and

FIGURE 8 is a sectional side view of the cover taken on line C—C of FIGURE 3.

As illustrated in the said drawings, the rotary selector switch comprises a base 1 and a cover 2. Supported on the base is a panel 3 of insulating material provided on its upper surface with printed circuitry comprising a plurality of conducting lines, a , b (FIGURE 5), having inner ends arranged in circumferentially spaced relation defining the circumference of a circle. As shown, the inner ends of the conducting lines are arranged in pairs, the inner ends of each pair being designated a^1 , b^1 , the outer ends of the conducting lines extend adjacent to the outer edges of the panel and each is connected to a wiring tag designated a^2 , b^2 . Within the circle defined by the fixed contacts a^1 , b^1 , there is an inner and an outer ring-shaped

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conducting area c , d , respectively connected to wiring tags c^1 , d^1 .

The upper surface 4 of the cover 2 is formed with a circular recess 5 in which a circular rotor plate 6 is mounted, the inner peripheral edge of the recess being formed at circumferentially spaced positions with notches 5a. The upper surface 4 is also formed with a depression 7 adjacent to and aligned with each notch and extending radially outwardly.

A dome-shaped top 6a is attached to the rotor plate 6 and a rotor arm 8 is pivotally mounted in a transverse slot 6b of the top 6a by lateral pins 9 on a projecting lug 10 of the arm engaging in channel-shaped recesses 11 (FIGURE 7) on the top 6a. A plate 12, formed of insulating material, is hingedly mounted on the under face of the rotor plate 6 by means of pintles 13 engaging in channel-shaped recesses 14, the plate 12 being retained in assembly with the recesses 14 by a spring 15 having its opposite ends anchored to the plate 12 and rotor plate 6. The plate 12 is accordingly rotatable with the rotor plate 6 and top 6a and is restrained against lateral movement by ears 16 depending from the under face of the rotor plate 6.

A pair of resilient metal strips 17, 18 is mounted on the under face of the plate 12, the strips being provided respectively with contacts 17a, 17b and 18a, 18b. The contacts 17a, 18a are adapted for engagement with the outer and inner ring-shaped conducting areas d , c respectively, and the contacts 17b, 18b with respective fixed contacts b^1 , a^1 of any pair of such contacts. It will be noted that the contact strips 17, 18 are anchored to the plate 12 at the end remote from the contacts and the strips are inclined downwardly at the contact ends towards the printed panel 3.

It will be noted that the rotor arm 8 is rotatable with the rotor plate 6 and is also pivotal relative thereto in a plane extending normal to the upper face 4 of the cover. As shown in FIGURE 2, the rotor arm has been pivoted into operative position wherein the nose of the lug 10 is displaced from its normal position wherein it rests in the recess 10a, and now bears on a portion of the plate 12 between the recess 10a and the pivot 13 so as to pivot the plate downwardly against the action of the spring 15 whereby the contacts 17a, 17b and 18a, 18b make electrical engagement with the appropriate fixed contacts on the printed panel 3. When the rotor arm is pivoted into this position, the projection 8a on the free end of the arm enters one of the depressions 7 which are located at positions corresponding to the pairs of fixed contacts a^1 , b^1 . The spring 15 in tending to pivot the plate 12 upwardly maintains the plate in abutting relation to the nose of the lug 10 so that the plate 12 is retained in its lower pivoted position as shown in FIGURE 2.

So long as the rotor arm is in the position indicated in FIGURE 2, a circuit is closed through the contacts on the rotor through rings c , d , to a pair of selected fixed contacts a^1 , b^1 . To open the circuit, the end of the rotor arm opposite to the projection 8a is pressed downwardly to pivot the rotor arm to withdraw the projection 8a from the depression 7. The lug 10 is accordingly caused to move over the plate 12 away from the pivoted end and enter the recess 10a, and the plate is thereby permitted to pivot upwardly under the action of the spring 15 so that the contacts 17a, 17b, 18a, 18b on the plate 12 are disposed in spaced superposed relation to the printed panel 3. As the rotor assembly including the plate 12 is rotated to select another pair of fixed contacts, the contacts on the plate 12 will be in superposed spaced relation to the fixed contacts on the panel 3, and in consequence there will be no rubbing action between the contacts liable to cause wear or damage. When the rotor assembly has been rotated into another selected position,

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the projection 8a on the rotor arm will be aligned with a corresponding depression 7, and the rotor arm is then pivoted as previously described to effect the engagement of the selected contacts.

Preferably a click stop device is provided on the rotor plate 6 comprising spring urged balls 20 engageable in the notches 5a which, as previously described, are located at positions corresponding to recesses 7 and the pairs of fixed contacts on the printed panel 3.

The important advantage of the switch according to the present invention is that the various contacts are maintained out of engagement during the rotation of the rotor assembly, thereby preventing wear or damage, the contacts being brought into positive engagement only when the rotor plate is stationary and the contacts on the plate 12 are in correct superposed relation over the fixed contacts on the panel 3. It will be noted that when the plate 12 is pivoted downwardly by the rotor arm 8, the resilient contacts on the plate 12 will be given a small radial wiping movement over the fixed contacts on the panel 3 which serves as a cleaning action.

Other means than the spring 15 may be provided for normally urging the plate 12 into its upper pivoted position.

The particular arrangement described and illustrated has the advantage of simplifying manufacture and assembly of the switch, as the spring 15 serves to hold the pintles 13 in the channel-shaped recesses 14, and it is accordingly not necessary to provide the plate with a separate hinge pin insertable into pin receiving apertures in the plates 6 and 12.

The construction and mounting of the rotor plate 6, arm 8 and top 6a may take other forms than that described and illustrated, but the particular arrangement shown has the advantage of simplifying manufacture and assembly. As shown more particularly in FIGURE 7, the top 6a which is moulded from synthetic plastics is formed with a transverse slot 6b, and portions 6c formed with downwardly facing channel-shaped recesses 11. The rotor arm 8 is assembled with the rotor plate 6 by inserting the lateral pins 9 through the offset slot portions 6d and engaging the pins in the channel-shaped recesses 11. When this assembly is positioned on the cover 2, and the rotor plate 6 is offered up and fixed to the top 6a from the underside of the cover 2, the upwardly open channel-shaped recesses 11a on the rotor plate 6 mate with the recesses 11 to form a bearing for the pins 9.

In use, when the rotor assembly is rotated, the click stop device will indicate each step-like movement which serves to position the contacts on the rotor plate 6 over one of the pairs of fixed contacts on the panel 3, and the arm 8 is then pivoted downwardly if it is desired to engage the rotor plate contacts with a selected pair of fixed contacts to close a particular circuit. If it is desired to open the circuit without selecting another pair of contacts, it is merely necessary to pivot the rotor arm 8 upwardly to permit the plate 11 to be pivoted upwardly by the spring 15. This provides an advantage over previously known forms of rotary selector switches wherein it was necessary to rotate the rotor to an "off" position if none of the circuits controlled by the switch were required to be used.

The particular form of switch described and illustrated is particularly applicable as a programme selector switch for a line supply to radio or television receivers. It is

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not, however, limited to such use. Further, it will be understood that the invention is not limited to switches having a series of pairs of fixed contacts engageable by pairs of contacts on a rotor, as the rotor may be provided with a single or multiple bridging contact engageable with corresponding fixed contact or contacts.

We claim:

1. A rotary switch comprising a base provided with a plurality of spaced contacts, a cover having an upper surface and being mounted on said base, said cover having a recess formed therein providing a shoulder and having a bottom portion, said bottom portion having an aperture formed therethrough, a movable rotor plate mounted in superposed relation with said bottom portion and having a rotor arm pivotally mounted in relation to said rotor plate, said rotor arm having a finger extending through said aperture and having a projection adjacent an end extending therefrom, said finger having a free terminal end, said rotor plate having a series of lugs in spaced relation to each other and extending therefrom, a member pivotally mounted on said rotor plate, rotatable therewith, below said bottom portion of said cover and having a depression formed therein adapted to receive said free terminal end of said finger and said member having a contact means associated therewith, a series of cavities formed in said cover adjacent to and opening into said recess, each of said cavities adapted to receive said projection of said rotor arm, and a spring means connecting said rotor plate and said member, said member maintained during rotation of said rotor plate in a position wherein the contact means are in spaced superposed relation to the contacts on said base and being pivotal into a position wherein the said contact means engage the contacts on said base only when the rotor plate is stationary in a selected rotational position.

2. A rotary selector switch comprising a housing, a support having a plurality of circumferentially spaced fixed contacts mounted in the housing, a rotor rotatably mounted in the housing and having a plate pivotally connected thereto in superposed relation to the support and provided with resilient contacts for co-operative engagement with the fixed contacts, a manually operable actuating arm mounted on the rotor for rocking movement transversely of a portion of the rotor projecting from the housing, a spring normally urging said plate into abutment with a projection on the arm so as to maintain the resilient contacts in spaced relation to the fixed contacts when the rotor is rotated, the arm being rockable when the rotor as "at rest" between rotational movements to cause the projection to pivot the plate to effect the engagement of the resilient contacts with underlying fixed contacts and maintain them in engagement, and means on the housing preventing rotation of the rotor until the arm has been rocked into a position which permits the plate to be pivoted by the spring to again dispose the resilient contacts in spaced relation to the fixed contacts.

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