Aug. 17, 1965 H. G. GRUNDIG 3,201,532

ROTARY SWITCH WITH INTERCHANGEABLE CONTACT STRUCTURE FOR SHORTING AND NON-SHORTING POSITIONS

Filed Oct. 9, 1962 2 Sheets-Sheet 1

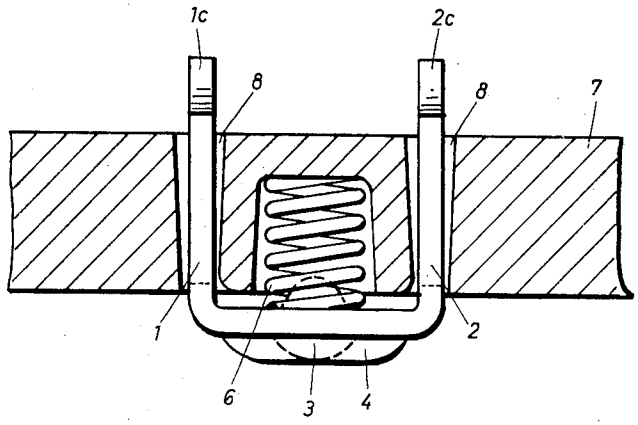

Fig. 2

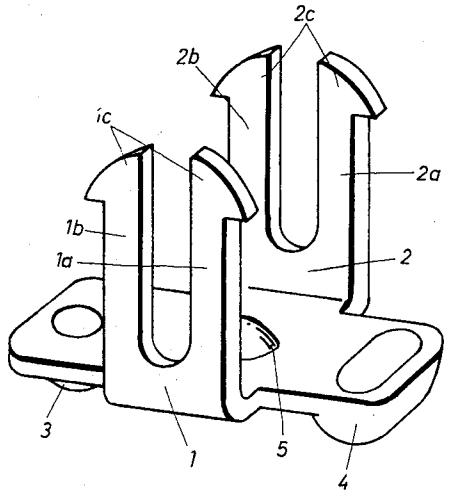

Fig. 1

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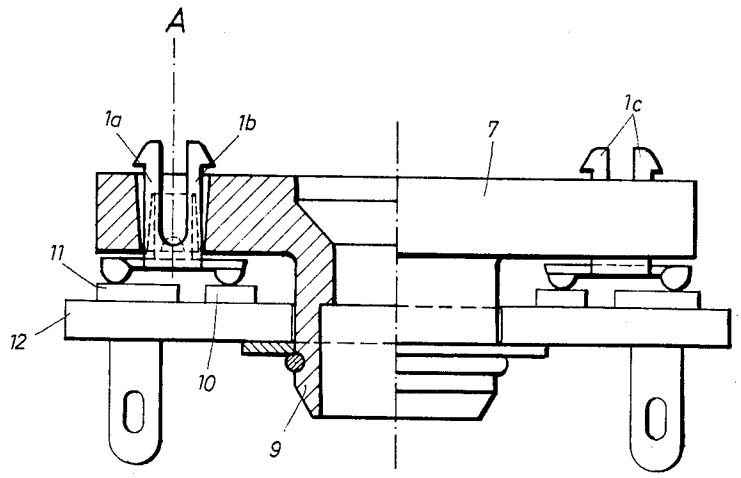

Fig. 3

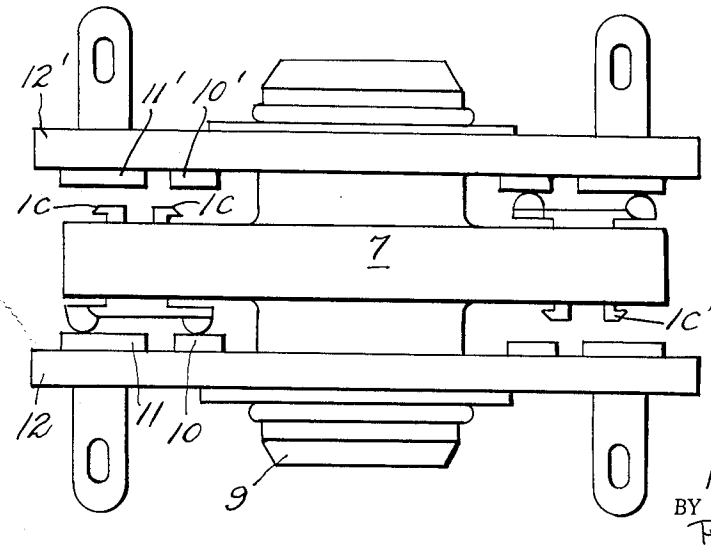

Fig. 4

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ROTARY SWITCH WITH INTERCHANGEABLE CONTACT STRUCTURE FOR SHORTING AND NON-SHORTING POSITIONS

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5 Claims. (Cl. 200—11)

The invention relates to improvements in the wipers or brushes of rotary switches, particularly multicontact switches as they are used, for example, in telecommunication systems.

A multicontact rotary switch essentially consists of a stator equipped with a contact ring and a contact bank and a rotor bearing the wipers arranged adjacent to the stator. Stator and rotor must be associated to facilitate proper contact between contact ring and contact lamina through the wipers.

In prior art rotary switches, particularly multicontact switches, the wiper is mounted on an intermediate piece as an independent element on the rotor. The wipers, for example, have consisted of a movable roller or of a conductive strip mounted to move into contiguous relationship with a wiper of the rotary switch.

An object of this invention is to provide a new and simplified wiper for use in rotary switches.

Another object of invention is to provide wiper contacts connected directly to the rotor.

Still another object of this invention is to provide a on-piece wiper that can readily be converted for performing either shorting or non-shorting functions.

A still further object of the invention is to provide a rotor-wiper arrangement that automatically compensates for misalignments between the wiper and the contacts of the contact bank.

In accordance with this invention the wiper of the rotary switch is designed in such a way that it performs the functions of an intermediate piece, i.e. it anchors itself to the rotor, and does the contact-making. The wipers, according to the invention, consist of U-shaped elements, the legs of which are elastic tongues provided at their ends with barbs or barbed hooks. The center piece of the U-shaped element provides protruding contact surfaces. The wiper, according to the invention, can be easily mounted by pressing it into the slots of the rotor of the multicontact switch. The elastic tongues of the legs of the contact bank spread after plugging through and are prevented by means of their barbs from falling off the rotor. A helical spring inserted into the rotor serves to properly seat the wiper in the rotor and to provide the correct contact pressure. The barbs at the tongues are mounted in such a way that a limited axial motion is possible because of the resilience of the helical spring of the rotor. By this means any unevenness between the contact elements of the stator and the rotor is cancelled.

It is also within the scope of the invention to provide the rotor bearing the contact bank, with cone-shaped slots, e.g. with slots which expand to the side of the rotor opposite the contact elements. This design of the guide slots permits a slight swinging of the contact bank in the slot ensuring proper contact-making even at inexactly made contact elements.

A further embodiment of the invention is to design the front side of the contact bank in such a way that it can be alternately used for a bridging or interruptive switching, depending on its arrangement within the rotor. To this end the center piece of the U-shaped wiper piece will be extended at the sides without legs and provided at one

end with a narrow spherical shaped contact surface, i.e. a contact surface not to be bridged, and at the other end with a wide cylindrical shaped contact, that is, a contact surface bridging two contacts of the contact bank.

The above mentioned and other objects of this invention together with the manner of obtaining them will become more apparent and the invention itself will be best understood when taken in conjunction with the accompanying drawings, in which:

FIG. 1 shows a contact bank according to the invention,

FIG. 2 shows the installation of this contact bank into the rotor of the multicontact switch,

FIG. 3 shows a side view, partially in cross-section of a part of a multicontact switch consisting of stator and rotor; and

FIG. 4 shows a side view of a part of a multicontact switch consisting of a rotor and two stators.

The wiper, preferably made of bimetal according to the invention, is U-shaped as is illustrated in FIG. 1. The legs **1** and **2** of this wiper are slotted into elastic tongues or blades **1***a* and **1***b* and **2***a* and **2***b* respectively. The end of the tongues are barb-shaped, **1***c* and **2***c*. The center piece of the U-shaped contact bank is extended at their leg-free ends and provided on one side with a relatively narrow spherical shaped contact surface **3** and at the other side with a relatively wide cylindrical shaped contact surface **4**. The center piece further shows a point-shaped knob **5** facing the surface of the rotor and serving to guide the helical spring **6** in the rotor, as is illustrated in FIG. 2. This helical spring **6** is inserted into a recess of the rotor **7** and presses the contact bank inserted in the cone-shaped slots **8** towards the contact ring **10** and the contact laminae **11** of the contact bank which are fastened on the adjacent stator **12** (see FIG. 3). The barbs **1***c* and **2***c* not only prevent the contact bank from falling out of the rotor but also serve to limit the axial motion with the aid of the helical spring **6**.

FIG. 3 shows the relationship of the rotor and the stator according to the invention. The reference symbols are the same as those of FIGS. 1 and 2. It may be pointed out, however, that the rotor including the socket **9** for its axle is made of one piece according to the invention. The figure shows that, according to the invention, due to a simple turning of the U-shaped contact bank by 180° around the axis A, either a bridging or an interruptive mode of switching can be selected.

FIG. 4 shows the rotor switch of FIG. 3 with an additional stator. The component reference symbols used in FIG. 4 are the same as those used in FIG. 3 in order to expedite the explanation of the drawings. As shown in FIG. 4, one of the wipers **1'** is mounted to be capable of making contact with the contacts **10'**, **11'** of the wiper stator **12'**. In this way, the wiper of one rotor can serve two stators as may be understood from the drawings. Either one or both of the wipers could be mounted so that either one or both of the stator elements in conjunction with the rotor element act as a shorting or a non-shorting rotor switch.

The stator with its ring contact and laminae could be a printed circuit board within the scope of this invention.

While the principles of the invention have been described above in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of the invention.

What is claimed is:

1. A multi-contact rotary switch for switching between different circuits, comprising a stator, a plurality of individual contacts mounted on said stator at a fixed distance

from each other, each of said individual contacts permanently connected to different ones of said circuits, at least one contact ring on said stator permanently connected to one of said circuits that is to be selectively connected to the other ones of said circuits, rotor means in juxtaposition to said stator, slots in said rotor means, said slots shaped to be smallest at the stator side of said rotor and gradually expanding as said slots extend away from the stator side of said rotor, wiper means mounted in each of said slots so as to be simultaneously contiguous to said ring and said contacts, said wiper means consisting of U-shaped conductive metallic strips having legs and a center part, said legs being bifurcated, said bifurcated portion terminating in barbed hooks for holding said wipers in said slots, and said center parts having contact surfaces integral thereto, at least one of said contact surfaces being at least as long as said fixed distance thereby being capable of simultaneously bridging at least two of said individual contacts for said stator and at least another of said contact surfaces being shorter than said fixed distance thereby being capable of touching only one of said individual contacts on said stator at any one position of said rotor.

2. The rotor switch of claim 1, and resilient means in said slots for forcing said wipers against said contacts but allowing axial motion by said wipers.

3. The rotor switch of claim 1 wherein said rotor slots extend through said rotor, a second stator on the other side of said rotor, contact means mounted on said second stator connected to individual circuits, contact ring means

mounted on said second stator connected to a circuit to be selectively commoned to said individual circuits, and said wiper means mounted on both sides of said rotor so as to simultaneously be contiguous to said rings and selective ones of said contacts whereby the rotor can be used for switching on either side.

4. The rotor switch of claim 1, means for rotatably supporting said wiper in either a first or a second position, means on said wiper including said contact surfaces for bridging at least two of said individual contacts on said stator when said wiper is rotatably supported in said first position, and means on said wiper including said contact surfaces for forming a contiguous relationship between said wiper and only one of said contact surfaces at any given time when said wiper is rotatably supported in said second position.

5. In the rotor switch of claim 1 wherein said rotor is a unitary piece.

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