June 12, 1923. 1,458,484

F. P. HABICHT

ELECTRIC ROTARY SWITCH

Filed Aug. 25, 1921

Fig. 1.

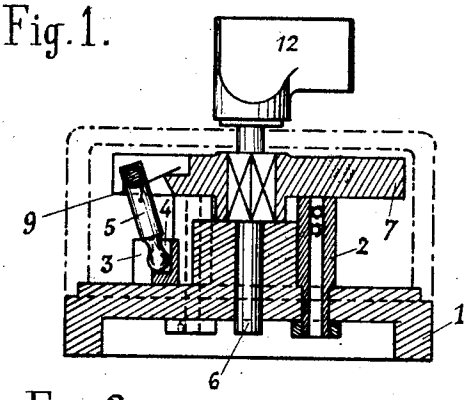


Fig. 2.

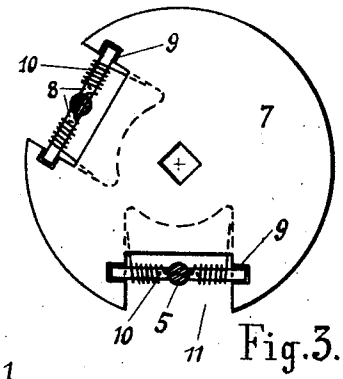


Fig. 3.

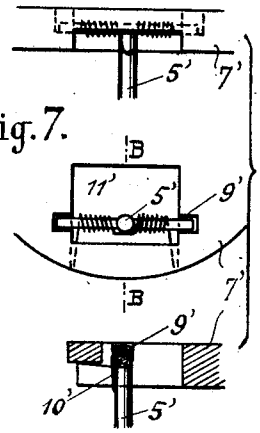


Fig. 7.

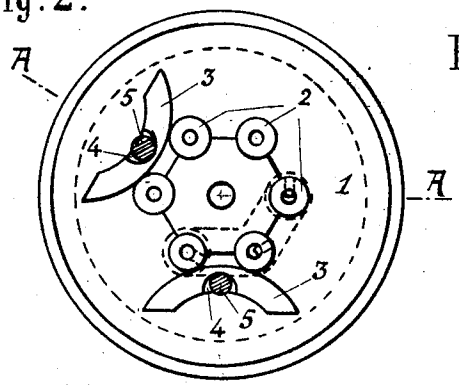


Fig. 9.

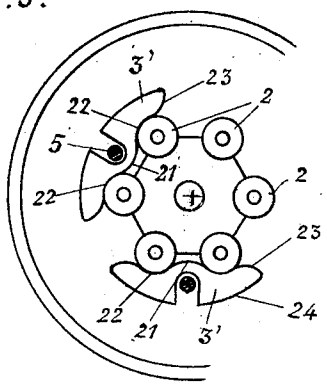
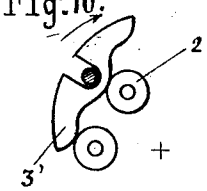


Fig. 10.



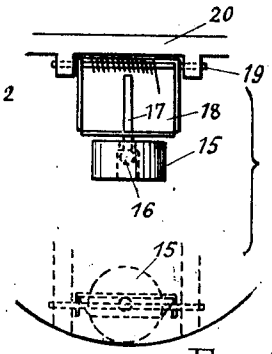
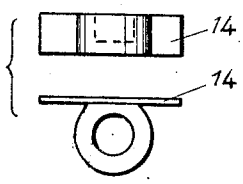
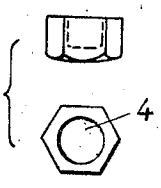


Fig. 8.

Fig. 4.

Fig. 6.





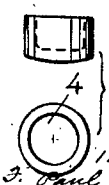


Fig. 5.

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By Wm. Wallace White, ATT'Y

Patented June 12, 1923. 1,458,484

UNITED STATES PATENT OFFICE.

FRANZ PAUL HABICHT, OF SCHWANDEN, SWITZERLAND, ASSIGNOR TO THE FIRM "THERMA," FABRIK FÜR ELEKTRISCHE HEIZUNG A.-G., OF SCHWANDEN, CANTON OF GLARUS, SWITZERLAND.

ELECTRIC ROTARY SWITCH.

Application filed August 25, 1921. Serial No. 495,328.

To all whom it may concern:

Be it known that I, FRANZ PAUL HABICHT, a citizen of the Republic of Switzerland, residing at Schwanden, in the Canton of Glarus, Republic of Switzerland, have invented an Improvement in Electric Rotary Switches, for which he has obtained a patent in Switzerland, #85,638, dated March 31, 1920, application filed March 27, 1919, and of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention has for its object electric rotary switches of the type, in which at least one movable contact member constitutes the contact, said contact member being adapted to be swung round the axis of rotation and elastically resting against two fixed contact members, the distance between the latter being bridged over by the movable contact member. According to the invention, the movable contact member rotates during the switching movement on a geometrical axis, by rolling on one of the two fixed contact members, said geometrical axis being situated between the contact points of the movable contact member and parallel or approximately parallel with the axis of rotation of the rotary switch. In consequence thereof, the switching spark is drawn off in an increased measure and thus sure to break.

One embodiment of the invention and several modifications of details thereof are illustrated by way of example in the accompanying drawing wherein:—

Fig. 1 is an axial section through the switch on the line A—A in Fig. 2;

Fig. 2 is the plan view of the contact members;

Fig. 3 is the inside view of the movable portion without the contact members, partly shown in section;

Figs. 4 to 6 and also 9 and 10 show modifications of the movable contact members;

Figs. 7 and 8 show modifications of the holders of the latter.

The switch shown is arranged for six switching positions, as it may be used for instance for the consecutive series, single and parallel connection of two resistances; however a switch for more or fewer switching positions could also be chosen as an example. In the base 1 of the switch six perforated pins 2, two of them parallel with the axis of the switch, are rigidly secured at equal distances one from another in the form of a wreath around said axis, said pins being adapted to be used as terminals. These pins themselves constitute the fixed contact members. The movable contact members are formed in the switch as shown in Figs. 1 and 2, by two loose cylinder segments 3 arranged so as to electrically connect the first and second, and also the third and fourth of four consecutive contact pins 2. The number of contact segments depends of course on the type and object of the switch; there could also for instance be only one provided. In the same way, one or several pins 2 could also serve or be constructed as rests for the contact segments, instead of serving as terminals. Each of the contact segments 3 is provided with a cavity 4, the foot of a T-shaped driver 5 gearing therewith, said driver being carried by a disc 7 owing to its cross-arms 8 being loosely inserted from below in slots 9 of said disc 7 made of insulating material and rotating with the axis 6 of the switch. The cross-arms 8 are wrapped around with a helical spring 10, consisting of two halves wound in opposite directions. The ends of said spring embrace one edge of the notches 11 of the disc 7, while the central portion traverses the web (middle part) of the driver, the latter and thus the contact segments 3 being pressed thereby against the contact pins 2. The disc 7 may be made in a simple way by presswork, as all notches start from the flat sides. The switch is operated by the handle 12. The revolving disc is closed by a cover (shown in dot and dash line).

By rotating the switch, which may be done without any harm to the switch either to the right or to the left, the contact segment 3 slides at first a little along the pin 2 owing to its shape, the outer curvature of which corresponds by preference approximately to the curvature of the outer circle of contact; owing to this sliding the contacts are kept bright. Thereupon the segment leaves the rear contact pin, rolling in the meantime on the other pin; the departure from the rear pin (with reference to the direction of the movement) takes place rapidly, thus, the

spark produced is rapidly drawn away outwardly and, consequently, it is sure to break. Besides this, the relatively great masses of the contact members ensure a good abstraction of the heat. Owing to these features, the switch is capable of supporting relatively great electric powers with a small volume of the switch, which is also partly due to the thorough contact produced by the highly elastic cooperation of the various parts of the switch. Owing to the great masses of the contact members, the fire-particles produced on the latter are squashed on the meeting of the contact members. Stopping in the various switching positions is brought about, without providing any further arrangement for this purpose, in the well-known manner, simply by two neighbouring contact pins. The type of drivers permits the application of strong and solid helical springs ensuring, as already mentioned, a thorough contact between the contact members. (Even in its end position the middle part of the driver is still a little oblique to the axis of the switch.) Owing to its simplicity and robust construction, the switch is very durable. The mounting up of the various parts thereof is very simple.

The contact members may also have another form instead of that shown. The movable contact members for instance may have the form of hexagonal cups (modification Fig. 4) or cylindrical ones (Fig. 5), the cavity 4 thereof serving to gear with the foot of the driver. Cylindrical contact members are, as shown for instance in Fig. 6, preferably provided with a slide plate 14, sliding along the contact pin during a certain part of the switching movement and thus causing the contact members (pins and plate) to be kept bright by their sliding one on another.

A most appropriate construction of the movable contact members (which may be designated as "contact shuttles") is shown in Figs 9 and 10. In this construction, the movable contact members are formed by portions of a cylinder 3′, having the inside (contact side) corrugated in such a manner that on both sides of its convex central portion 21, projecting into the interval between two contact pins, a concave portion 22 joins said central portion and rests upon a portion however small of the periphery of the adjacent pin 2, while an end portion 23 laterally joins said concave portion, this end portion being outlined by a convex arc directed towards the opposite side 24 of the contact piece 3′ and forming an obtuse angle with said opposite side.

In switching, the last contact between the movable contact member 3′ and the rear contact pin (with reference to the direction of the switching movement) takes place on the end portion 23; thus, the rupture of the break spark takes place on this portion whereas the contact takes place on the concave portion. Thus, the points of rupture and contact of the contact member 3′ not being identical, the latter is not damaged by the spark. But even on the contact pin itself, these two points do not coincide, the point of rupture being situated a little further outwards than the point of contact proper (cf. Fig. 10). This point of rupture of the pin as well as the point of contact are cleaned, during switching, by the sliding of the contact member and are thus kept bright. Besides this, a very large surface of contact between the contact member 3′ and the pins results from the clinging of the former to the latter, due to the unidirectional curvature.

Fig. 7 illustrates another type of the elastic driver and its holder. This driver 5′ is inserted by its cross-arms from above in slots 9′ of the disc 7′; the central portion of the helical spring 10′ does not traverse the central shaft of the driver, but passes above the same, and the ends seize the disc 7′ in an outward direction from below. However, in this case too, the disc may be made by presswork, all cavities being accessible in an axial direction.

In the modification Fig. 8, the movable contact member 15, having the form of a roll, is loosely mounted on a ball journal 16 secured by the bolt 17 to the sheet-metal holder 18. The latter is carried by an axis 19 wrapped round with a helical spring and supported by the ribs of a disc 20, which project downwards.

Having described the nature of my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. An electric rotary switch, in which the contact is formed by at least one movable contact member, adapted to be swung round the axis of rotation and elastically resting against two fixed contact members, the distance between the latter being bridged over by the movable contact member, characterized by the fact that the movable contact member itself is rotatable on a geometrical axis, situated between its points of contact and parallel or approximately parallel with the axis of rotation of the switch, in such a manner that said movable contact member rolls on one of the two fixed contact members, for the purpose of ensuring the rupture of the spark.

2. An electric rotary switch, in which the contact is formed by at least one movable contact member, adapted to be swung round the axis of rotation and elastically resting against two fixed contact members, the distance between the latter being bridged over by the movable contact member, characterized by a driver for the movable contact

member, rotatable on an axis which vertically crosses the axis of the switch, and taking along the contact member during the switching movement whilst putting an elastic pressure on the fixed contact members.

3. An electric rotary switch, in which the contact is formed by at least one movable contact member, adapted to be swung round the axis of rotation and elastically resting against two fixed contact members, the distance between the latter being bridged over by the movable contact member, characterized by a driver for the movable contact member, rotatable on an axis which vertically crosses the axis of the switch, and taking along the contact member during the switching movement whilst putting an elastic pressure on the fixed contact members, said driver forming an axis of rotation situated between the points of contact of the movable contact member and parallel or approximately parallel with the axis of rotation of the switch, and on which the movable contact member rotates during the switching movement.

4. An electric rotary switch, in which the contact is formed by at least one movable contact member, adapted to be swung round the axis of rotation and elastically resting against two fixed contact members, the distance between the latter being bridged over by the movable contact member, characterized firstly by a driver for the movable contact member, rotatable on an axis which vertically crosses the axis of the switch, secondly by a cavity in the movable contact member, situated between the points of contact thereof, the driver loosely gearing with said cavity and forming thereby a geometrical axis, parallel or approximately parallel with the axis of rotation of the switch, and on which the movable contact member rotates during the switching movement, and finally by one or several springs pressing the movable contact member against the fixed contact members by the intermediary of the driver.

5. An electric rotary switch, in which the contact is formed by at least one movable contact member, adapted to be swung round the axis of rotation and elastically resting against two fixed contact members, the distance between the latter being bridged over by the movable contact member, characterized firstly by a T-shaped driver for the movable contact member, the middle part of which engages the movable contact member between the points of contact thereof and forms a geometrical axis, parallel or approximately parallel with the axis of rotation of the switch, and on which the movable contact member rotates during the switching movement, secondly by a holder supporting the cross-arms of the driver in such a manner that they vertically cross the axis of the switch and form an axis of rotation, on which the driver can rotate, and finally by one helical spring at least, wrapped round the cross-arms of the driver and pressing, on one side, against the holder of the driver, and on the other, against the middle part thereof, the movable contact member being pressed thereby against the fixed contact members.

6. An electric rotary switch, in which the contact is formed by at least one movable contact member, adapted to be swung round the axis of rotation and elastically resting against two fixed contact members, the distance between the latter being bridged over by the movable contact member, characterized by the fact that the fixed contact members are formed by pins whereas the movable contact member is formed by a portion of a cylinder, rotatable on a geometrical axis which is situated between the points of contact thereof and is parallel or approximately parallel with the axis of rotation of the switch.

7. An electric rotary switch, in which the contact is formed by at least one movable contact member, adapted to be swung round the axis of rotation and elastically resting against two fixed contact members, the distance between the latter being bridged over by the movable contact member, characterized by the fact that the fixed contact members are formed by pins whereas the movable contact member is formed by a portion of a cylinder, rotatable on a geometrical axis which is situated between the points of contact thereof and is parallel or approximately parallel with the axis of rotation of the switch, and sliding, during the switching movement, at first a little along the pins and thereupon leaving the rear pin, with reference to the direction of the movement, whilst rolling on the other pin.

8. An electric rotary switch, in which the contact is formed by at least one movable contact member, adapted to be swung round the axis of rotation and elastically resting against two fixed contact members, the distance between the latter being bridged over by the movable contact member, characterized by the fact that the fixed contact members are formed by pins whereas the movable contact member is formed by a portion of a cylinder, rotatable on a geometrical axis which is situated between the points of contact thereof and is parallel or approximately parallel with the axis of rotation of the switch, the contact side of the cylindrical piece being corrugated in such a manner that on both sides of its convex central portion, which projects into the interval between two contact pins, a concave portion joins said central portion and clings to a portion of the periphery of the pin, whilst an end portion, outlined by a convex arc directed towards

the opposite side of the contact member, laterally joins said concave portion.

9. An electric rotary switch, in which the contact is formed by at least one movable contact member, adapted to be swung around the axis of rotation and elastically resting against two fixed contact members, the distance between the latter being bridged over by the movable contact member, characterized by a T-shaped driver for the movable contact member and a holder for the driver, said holder being formed by a disc rotatable with the axis of the switch and provided with cavities, which are adapted to be made from the flat sides by presswork, the driver being loosely inserted in said cavities.

In witness whereof I have hereunto set my hand.

F. PAUL HABICHT.