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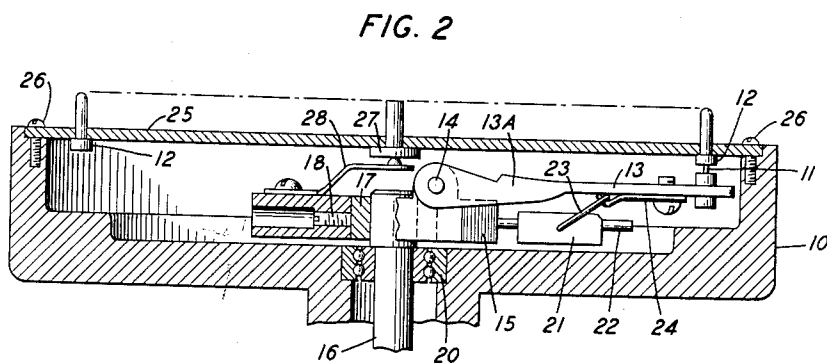
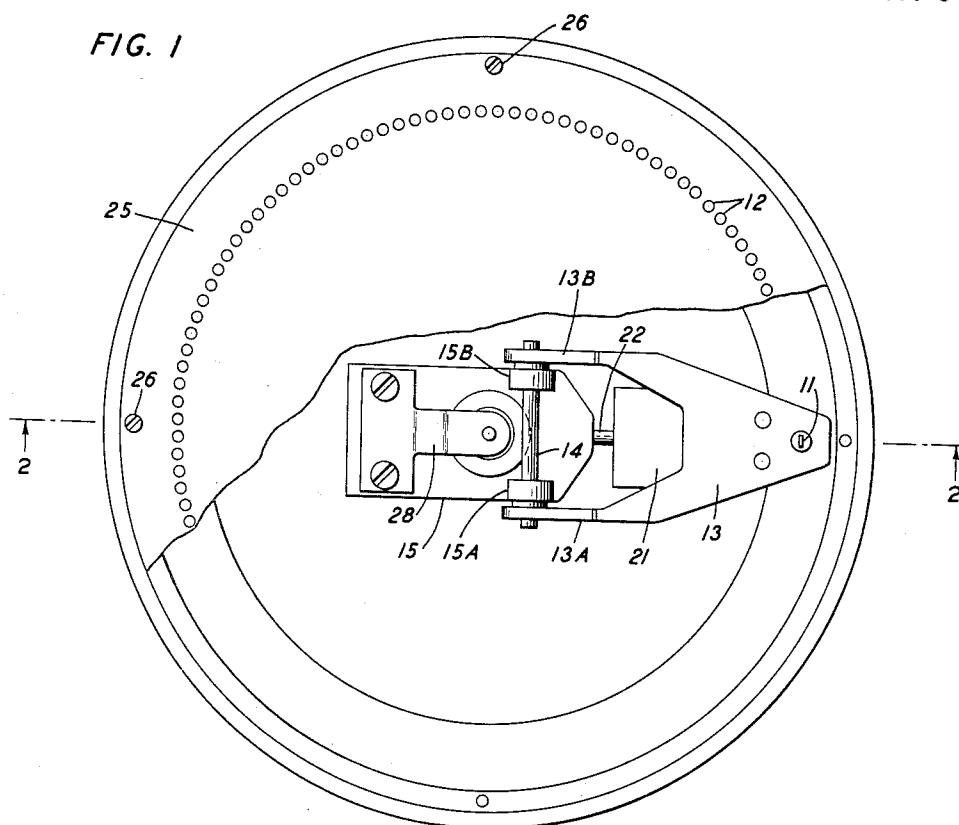
W. T. DRUGAN

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ROTARY SWITCH WITH CENTRIFUGAL CONTACTOR

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INVENTOR
W. T. DRUGAN
BY *John C. Morris*
ATTORNEY

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ROTARY SWITCH WITH CENTRIFUGAL CONTACTOR

Walter T. Drugan, Millington, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

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This invention relates to switches and more particularly to multiple contact rotary switches adapted for successively and momentarily closing a plurality of circuits.

In rotary switches comprising a circular array of fixed contacts having their faces lying in a plane and a rotary contactor or brush for successively wiping across each fixed contact, difficulty has been encountered due to excessive contact wear after relatively short periods of continuous operation. The required contact pressure is usually obtained by spring means. Since contact wear ordinarily decreases the spring deflection, the contact pressure tends to decrease with wear. Moreover, wear is usually at a high rate in the early stages of use because the spring pressure is made initially higher than necessary to assure a sufficient pressure after a period of wear. The foregoing practices make for noisy switches that wear quickly and soon lose their ability to make good contact.

An object of this invention is to increase the life of multiple contact rotary switches. More specifically, this object is to decrease contact wear without sacrificing adequate contact pressure.

A feature of this invention resides in centrifugally operated means for maintaining a constant contact pressure of a rotatable contactor under a relatively constant speed of rotation.

Other and further objects and features of this invention will appear more fully and clearly from the following detailed description of illustrative embodiments thereof taken with the appended drawings in which:

Fig. 1 is a plan view with parts broken away of one embodiment of this invention;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a plan view of modified rotatable means suitable for use in the embodiment of Figs. 1 and 2;

Fig. 4 is a partially sectioned side view of the means of Fig. 3; and

Fig. 5 is a sectional view of another modification of this invention.

As illustrated in Figs. 1 and 2, one embodiment of this invention comprises a circular housing 10, for example a metal casting, in which is mounted a rotatable contactor or brush 11 and a circular array of stationary contacts 12. The brush 11 is secured to the end of a deflectable wiper arm 13 pivoted at 14 to a rotor 15.

The rotor 15 is secured to an axle or drive shaft 16, a portion only of which is shown, by any suitable means such as the bushing 17 and the set screw 18. The drive shaft 16 may be mounted in the housing 10 by any suitable means such as the antifriction bearing 20.

The wiper arm 13 is bifurcated having two portions 13A and 13B orificed adjacent their respective inner ends to receive the pivot pin 14 which is journaled in the upstanding ears 15A and 15B of the rotor 15.

A slidable weight 21 is mounted on a guide rod 22 extending radially from the rotor 15 in generally parallel relation to the wiper arm 13.

A toggle link 23 is connected between the weight 21

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and the wiper arm 13. The link 23 may be C-shaped with its ends pivoted in orifices in opposite sides of the weight 21 and its opposite side pivotally secured to the arm 13 by the clamp 24.

The contacts 12 are secured in circular array in a cover 25 which is fastened to the housing by screws 26. The cover 25 is advantageously made of insulating material but may be of conductive material with each contact 12 insulated therefrom. A contact 27 mounted in the center of the cover 25 is connected to the rotor 15 by means of a spring contactor 28 and serves as a common connection for all of the circuits to be switched.

When the shaft 16 is rotated and with it the rotor 15, the weight 21 tends to slide radially outward due to centrifugal force and urges the wiper arm 13 toward the cover 25, increasing the pressure between the contactor 11 and the contacts 12. The arm 13 is so mounted that the face of the contact 11 is substantially in the plane of the faces of the contacts 12. Thus, the movement of the weight and wiper arm is very slight. Due to the centrifugal effect, the pressure tends to increase with rotational speed and thus afford higher pressure when it is most needed, i. e., at high speeds.

In Figs. 3 and 4 are shown two views of a modified rotatable means with different means for urging the movable contactor or brush toward the fixed contacts. The brush 111 is mounted on a wiper arm 113 having a bifurcated portion comprising the members 113A and 113B. The arm 113 is secured by the pivot pin 114 to the rotor 115. The spring-mounted contactor 128 is for making a continuous connection to a center contact, such as 27 of Fig. 2.

A weight 121 is slidably mounted in guide ways 122 on the arm 113. Extending radially from the rotor 115 in the same direction as the arm 113, is a projection 123 having a sloping surface or ramp 123A on which rides a bearing 124 housed in the weight 121. When the rotor 115 is revolving, the tendency of the weight 121 to move radially outward causes it to "climb" the ramp and urge the arm 113 and thus the contactor 111 toward the fixed contacts.

In the modification disclosed in Fig. 5 the arrangement of the parts is similar to that in Figs. 1 and 2 but differs therefrom in that the sliding weight with its support and connecting means is on the opposite side of the rotor to the rotatable contactor. The wiper arm 213 is connected to the rotor 215 by the pivot 214 at a point somewhat offset from the center of rotation and carries the contactor or brush 211 at its end. A portion of the wiper arm designated as 213A extends across the center of the rotor and beyond the opposite side thereof.

The weight 221 is slidably mounted on the guide rod 222, which extends radially from the rotor in a direction diametrically opposite to that of the wiper arm 213. The link 223 is connected between the end of the wiper arm extension 213A and the weight 221, so that the tendency of the weight to move outward due to centrifugal force causes the wiper arm 213 to urge the brush 211 toward the fixed contacts 212.

In this embodiment, the cover 225 comprises a center portion 225A surrounded by successive annular portions 225B, 225C, and 225D. The cover is secured to the housing 210 by screws 226 passing through the outer cover portion 225D.

The common stationary contact 227 is mounted in the center of the cover 225. The common contactor 228 on the rotor is secured to the extension 213A at a point such that it will be in continuous contact with the fixed contact 227. In order to assure good contact at all times between the contact 227 and the contactor 228, the former is backed by a spring (not shown). Thus, any tendency

to decrease the contact pressure, due to deflection of the extension 213A by the sliding weight, is overcome.

The rotor is secured to the shaft 216 by means of a set screw 218. The shaft 216 is rotatably mounted in the housing 210 by the bearings 220 and 220A.

What is claimed is:

1. A multiple contact rotary switch comprising a housing, a circular array of fixed contacts mounted on the housing with their faces in the same plane, a rotatable contactor for successively wiping across each fixed contact, means for rotating the contactor comprising a rotor, a wiper arm pivoted to the rotor and having the contactor secured to its free end, a radially slidable weight mounted for rotation with the rotor and for centrifugally impelled radial movement with respect to said rotor, means connected with the weight and reacting on the wiper arm for urging the rotatable contactor toward the fixed contacts during rotation of the rotor, and means journaled in the housing for driving the rotor.

2. A switch as in claim 1 in which the centrifugally operated weight is slidably mounted on the wiper arm and reacts with an inclined plane surface of a projection on the rotor to urge the contactor and its brush toward the fixed contacts.

3. A switch as in claim 1 in which the centrifugally operated weight is slidably mounted on a projection extending radially from the rotor on the same side thereof as the wiper arm and is connected to said arm by a link.

4. A switch as in claim 1 in which the centrifugally operated weight is slidably mounted on a projection extending radially from the rotor on the opposite side thereof to the wiper arm.

5. A multiple contact rotary switch comprising a housing, a circular array of fixed contacts, a rotatable contactor for successively wiping across each fixed contact, means for rotating the contactor comprising a rotor, a wiper arm pivoted to the rotor and having the contactor secured to its free end, a radially movable weight mounted for rotation with the rotor and for centrifugally impelled radial movement with respect to the rotor, means connected with the weight and reacting on the wiper arm for urging the rotatable contactor toward the fixed contacts during rotation of the rotor, and means journaled in the housing for driving the rotor.

6. A rotary switch comprising a circular array of fixed contacts having their faces in the same plane, a rotatable contactor for successively wiping across each fixed contact, means for rotating the contactor comprising a rotor, a wiper arm pivoted to the rotor and having the contactor secured to its free end, a weight mounted for rotation with the rotor and for centrifugally impelled radial movement with respect to the rotor, means connected with the weight and reacting on the wiper arm for urging the rotatable contactor toward the fixed contacts during rotation of the rotor.

7. A multiple contact rotary switch comprising a circular array of fixed contacts mounted on a housing with their faces in the same plane, a rotatable contactor for successively wiping across each fixed contact, means for rotating the contactor comprising a rotor, a wiper arm pivoted to the rotor and having the contactor secured to its free end, a radially slidable weight mounted for rotation with the rotor and for centrifugally impelled radial movement with respect to the rotor, means interconnecting the rotor, the wiper arm, and the weight for slightly moving the wiper arm around its pivot in a radial plane through the rotor axis for urging the rotatable contactor into firm contact with the fixed contacts during rotation of the rotor, and means for rotating the rotor.

8. A multiple contact rotary switch comprising a circular array of fixed contacts having their faces in the same plane, a rotatable contactor for successively contacting each fixed contact, means for rotating the contactor comprising a rotor, a wiper arm pivoted to the rotor and having the contactor secured to a free end thereof,

a weight mounted for rotation with the rotor and for centrifugally impelled radial movement with respect to the rotor, means interconnecting the rotor, the wiper arm, and the weight for moving the wiper arm around its pivot in a radial plane through the rotor axis for urging the rotatable contactor into contact with the fixed contacts during rotation of the rotor, and means for rotating the rotor.

9. A switch as in claim 8 in which the centrifugally operated weight is slidably mounted on a projection extending radially from the rotor on the opposite side thereof to the wiper arm, and in which the weight and arm are connected by a link pivotally connected to each of them.

10. A switch as in claim 8 in which the centrifugally operated weight is slidably mounted on a projection extending radially from the rotor on the same side thereof as the wiper arm.

11. A multiple contact rotary switch comprising a circular array of fixed contacts mounted on a housing with their faces in the same plane, a rotatable contactor for successively wiping across each fixed contact, means for rotating the contactor comprising a rotor, a wiper arm pivoted to the rotor and having the contactor secured to its free end, a weight mounted for rotation with the rotor and for centrifugally impelled radial movement with respect to the rotor, means interconnecting the rotor, the wiper arm, and the weight for moving the wiper arm around its pivot for urging the rotatable contactor into contact with the fixed contacts during rotation of the rotor, and means for rotating the rotor.

12. A switch as in claim 11 in which the centrifugally operated weight is slidably mounted on the wiper arm and reacts with an inclined plane surface of a projection on the rotor to urge the contactor and its brush toward the fixed contacts.

13. A switch comprising a housing, an arcuate array of fixed contacts mounted on said housing with their contact faces in one plane, a movable contactor secured to a wiper arm pivotally mounted on a rotor, said rotor being journaled in the housing at the center of the arc of said fixed contacts to wipe the movable contactor thereover, a weight mounted on the rotor for radial movement with respect to said center, and means connecting the weight to the arm for pivotally moving said arm in a radial plane through said center for urging the movable contactor toward the fixed contacts when the rotor is revolving.

14. A switch as in claim 13 in which the centrifugally operated weight is slidably mounted on a projection extending radially from the rotor on the same side thereof as the wiper arm.

15. A switch as in claim 13 in which the centrifugally operated weight is slidably mounted on a projection extending radially from the rotor on the opposite side thereof to the wiper arm.

16. A switch comprising a housing, an arcuate array of fixed contacts mounted on said housing with their contact faces in one plane, a movable contactor secured to a wiper arm pivotally mounted on a rotor, said rotor being rotatably mounted on the housing to wipe the movable contactor over the fixed contacts, a weight mounted for radial movement on the rotor, and means connecting the weight to the arm for pivoting said arm in a radial plane through the rotor axis thereby urging the movable contactor toward the fixed contacts when the rotor is revolving.

17. A switch comprising a housing, an arcuate array of fixed contacts mounted on said housing with their contact faces in one plane, a movable contactor, rotatable means for wiping the movable contactor over the fixed contacts, said rotatable means including a wiper arm, a shaft, a rotor, and a radially movable, centrifugally operated weight, means to interconnect the wiper arm and the weight to move said arm in a plane through the axis of the rotatable means to urge the movable contactor toward the fixed contactor when the rotatable means is revolving.

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18. A switch as in claim 17 in which the centrifugally operated weight is slidably mounted on the wiper arm and reacts with an inclined plane surface of a projection on the rotor to urge the contactor and its brush toward the fixed contacts.

19. A switch comprising an arcuate array of fixed contacts having their contact faces in one plane, a movable contactor, rotatable means for moving the contactor over the fixed contacts, said rotatable means including a shaft,

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a rotor, a wiper arm pivoted on the rotor, and a radially movable, centrifugally operated weight, means interconnecting the wiper arm and the weight for moving said arm in a plane through the axis of the rotatable means thereby urging the movable contactor toward the fixed contactor when the rotatable means is revolving.

No references cited.