

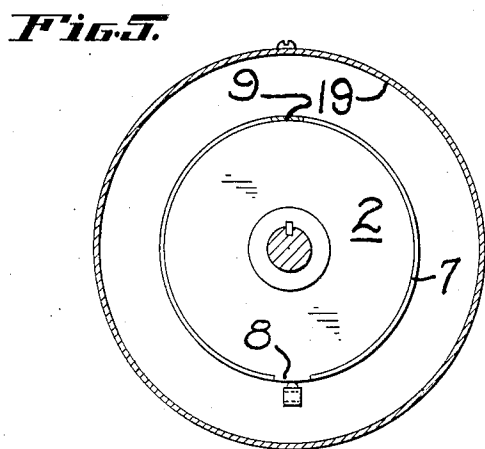
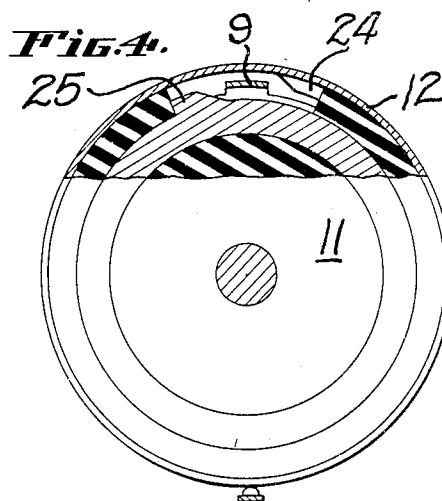
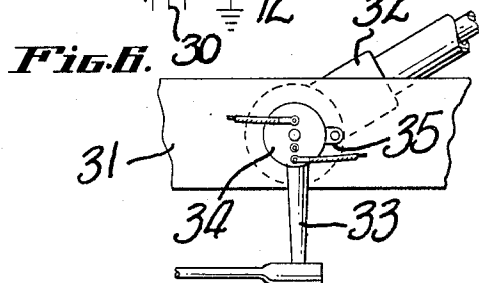
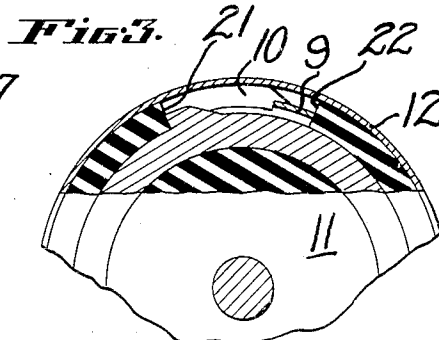
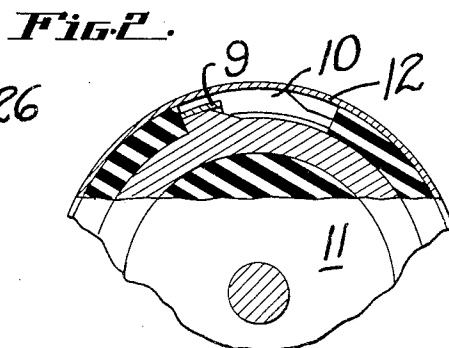
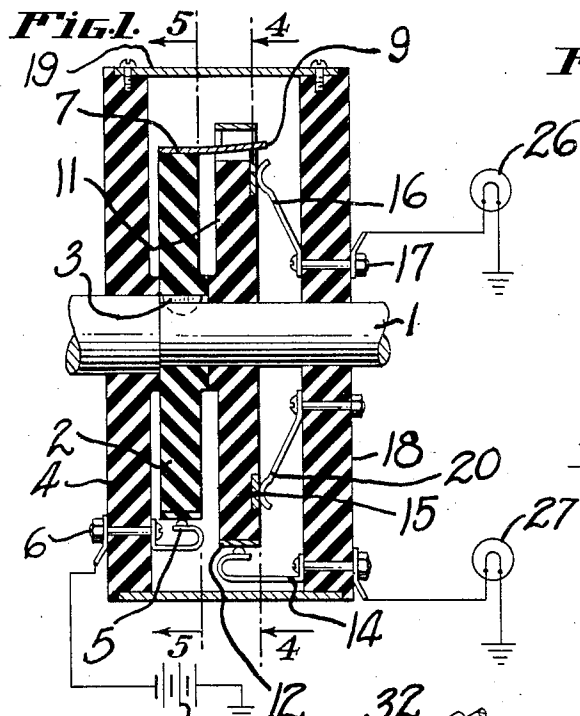
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DOUBLE CIRCUIT FRICTIONALLY RESTRAINED SWITCH

Filed Feb. 2, 1938



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UNITED STATES PATENT OFFICE

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DOUBLE CIRCUIT FRICTIONALLY
RESTRAINED SWITCHHerbert E. Metcalf, Walnut Creek, Calif., assign-
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Application February 2, 1938. Serial No. 188,329

5 Claims. (Cl. 200—59)

My invention relates to double circuit rotary switches, and more particularly to such switches that perform their cycle of operation by virtue of a frictional restraint, to the end that selective energization of a pair of circuits may be obtained in accordance with the direction of rotation of a shaft, irrespective of the number of revolutions of such shaft.

My invention is of the same general character and performs the same results, although in a different manner and with a different structure, as the switch described and claimed by Clarence B. Howard in his United States Patent No. 2,103,287, issued December 28, 1937.

Among the objects of my invention are: to provide a switch selectively energizing one of a pair of circuits in accordance with the direction of rotation of a shaft; to provide such a switch having means thereon for interrupting any circuit through said switch at a predetermined point in the cycle of operation thereof; to provide a switch ideally suited for use in an automotive directional signalling system; to provide a simple rotary switch selectively energizing separate signalling devices upon rotation of a shaft; and to provide a selective rotary switch operable upon change in rotation of a shaft, irrespective of the amount of rotation thereof, which operates without the use of a friction driving clutch.

Other objects of my invention will be apparent or will be specifically pointed out in the description forming a part of this specification, but I do not limit myself to the embodiment of the invention herein described, as various forms may be adopted within the scope of the claims.

In the Howard patent cited above, the inventor has described and claimed a double circuit rotary switch wherein an oscillating member is frictionally driven by a clutch from a shaft over a predetermined arc only, irrespective of the amount of rotation of the shaft, the friction clutch allowing for continued rotation of the shaft after the oscillating member has stopped. At each end of the allowed arc of rotation of the oscillating member, contacts are made or broken so that circuits may be energized in accordance with the direction of rotation of the shaft. The device has a major use in conjunction with the steering mechanism of automobiles or like vehicles to signal turning thereof, and the inventor Howard also provided, solidly rotating with the shaft, an interrupting mechanism whereby at a certain particular portion of the cycle of rotation of the main shaft, all current through the switch was cut off, thus preventing signals in conjunction with

an automotive vehicle when the vehicle was proceeding in a straight-ahead path. While the present switch utilizes such interrupting means as previously described by Howard, the make and break means for selectively opening and closing the pair of circuits is wholly different.

My invention may be more fully understood by direct reference to the drawing, wherein

Fig. 1 is a longitudinal sectional view, with the shaft in elevation, of one preferred embodiment of my invention, together with a diagram showing a signalling circuit.

Figs. 2, 3 and 4 are views partly in section and partly in plan, taken as indicated by the line 4—4 in Fig. 1, and showing three different operating positions of the switch.

Fig. 5 is a view partly in section and partly in elevation, taken as indicated by the line 5—5 in Fig. 1.

Fig. 6 is a diagram showing how the switch of my invention may be attached to a vehicle steering gear.

The shaft 1 to be rotated has solidly mounted thereon an interrupter or driving disc 2, which is prevented from rotating with respect to the shaft by key 3. End plate 4, of insulating material, is positioned on shaft 1 adjacent interrupter disc 2, and carries a common brush 5 attached to connector bolt 6 extending through the end plate 4. Common brush 5 bears against a peripheral conductive ring 7 on the interrupter disc, and this conductive ring is continuous except for a gap 8 of predetermined angle. I prefer to fill gap 8 with insulating material so that as the interrupter disc 2 is rotated by shaft 1, common brush 5 will have a continuous bearing against the disc, part of the time on the conductive ring and part of the time on the insulating material in gap 8.

At one position around the periphery of conductive ring 7 I prefer to form thereon a moving contact projection 9, extending away from end plate 4 and entering a segmental opening 10 in a contact carrying or driven member 11, mounted adjacent and abutting interrupter disc 2. This contact carrying member 11 is free on shaft 1 and is provided with a continuous peripheral circuit ring 12 which may cross over the top of opening 10, so that if the contact carrying member 11 is continuously rotated a circuit brush 14 may make continuous contact with circuit ring 12. Contact carrying member 11 is also provided with a lateral circuit ring 15 against which a second circuit brush 16 bears, fastened to a circuit bolt 17 passing through a second end plate 18. The

enclosure of the switch is completed by cylindrical case 19 connecting the two end plates.

In order to equalize pressure against contact carrying disc 11 and to provide a greater friction, I prefer to utilize an additional friction brush 20, also bearing against lateral ring 15. Inasmuch as electrical connection has already been made to lateral ring 15, no electrical connection need be made to friction brush 20. It will be understood, however, that other means for applying a restraining friction between the contact carrying disc 11 and the casing are fully equivalent.

The friction between brushes 16 and 20 or their equivalents and contact carrying disc 11 should be made sufficiently high to prevent contact carrying disc 11 from rotating until positively rotated by engagement of contact projection 9 with either end of opening 10. Thus, when the shaft is turned in one direction, let us say to the left, contact projection 9 will move relative to contact carrying disc 11 until end wall 21 of opening 10 is reached, whereupon contact disc 11 will rotate with interrupter disc 2 against the frictional restraint of brushes 16 and 20. When the direction of rotation of shaft 1 is reversed, the frictional restraint of brushes 16 and 20 will prevent contact carrying disc 11 from rotating until contact projection 9 rotates to engage the opposite end wall 22 of opening 10, whereupon the contact carrying disc will be rotated with interrupter disc 2 in that direction.

The left position of the contact projection 9 is shown in Fig. 2, the right position is shown in Fig. 3, and a central and intermediate position is shown in Fig. 4. Thus, during every reversal of the shaft 1 there is a change in the relative position of the interrupter disc and the contact carrying disc, and I utilize this relative change in position to selectively open and close a pair of circuits, and to that end I drop down, on one side of opening 10, a peripheral contact 24 from peripheral circuit ring 12, adjacent end wall 22, and I erect from lateral ring 15 a second contact 25 adjacent the opposite end wall 21. Thus, when the contact projection 9 moves to the left it engages contact 25, and when it moves to the right it engages contact 24. The connection is preferably made before the contact carrying disc moves, thus providing a sliding contact.

If, then, signal lamps or similar devices 26 and 27 are attached to brushes 16 and 14 respectively, these circuits will be selectively connected to peripheral ring 7, in accordance with the rotation of shaft 1, and peripheral ring 7 in turn will be connected to common brush 5 at all times except when common brush 5 is bearing on the insulation in gap 8. Thus, for a given portion of the cycle of rotation of shaft 1 no circuit can be made at all through the switch. When, however, shaft 1 is rotated sufficiently so that common brush 5 bears on conductive ring 7, thereafter all changes in rotation of shaft 1 connect either signal lamp 26 or 27 to a source of energy 30 through common brush 5.

It will be seen, therefore, that the switch of my invention differs wholly from the Howard switch in that the contact carrying disc 11 is positively driven by the rotation of interrupter disc 2, but is frictionally restrained in such a manner that relative movement of the two discs is allowed only over a predetermined arc, and due to this allowable relative movement selective energization of two circuits is obtained. I wish it understood, however, that I do not wish

to be limited to the particular contacts shown, as equivalent modifications thereof will be obvious. Furthermore, it is obvious that while I have shown contact projection 9 as having a dual function of driving contact carrying member 11 and making circuit contact, the driving can be done by separate means thus relieving the projection 9 of driving force.

The switch of my invention may be applied in any desired manner to the steering gear of an automobile, for example, and one such manner is shown in Fig. 6, where a frame 31 is provided with the usual steering gear 32 operating a quadrant arm 33. The entire switch assembly 34 may be positioned so that the shaft 1 rotates with the quadrant arm nut (not shown), the case being stabilized by case bracket 35. Under these circumstances the switch is adjusted, with relation to the quadrant arm axle, so that common brush 5 is on gap 8 when the vehicle is proceeding in a straight-away position, but contacts conductive ring 7 when the vehicle is moved away from a predetermined angle including the straight-away path.

It will be obvious to those skilled in the art that the illustration of the switch given herein, as applied in conjunction with automotive vehicles, is purely illustrative of only one use of such a switch, and that I do not wish to be limited to the exact construction herein shown, as modifications, within the scope of the claims, will be immediately apparent to those skilled in the art.

It will also be obvious that I do not desire to be limited to a switch of this type wherein gap 8 is always utilized, inasmuch as gap 8 may be eliminated, conductive ring 7 made continuous, and the device used in conjunction with rotational members wherein a large number of rotations are made before any reversal occurs. Under such conditions the shaft will at all times indicate reversal of rotation and in what direction the shaft is rotating.

I claim:

1. A rotary switch comprising a shaft, a driving member keyed to said shaft, a driven member mounted on and free to rotate on said shaft, means for positively driving said driven member by said driving member after relative movement of said members over a predetermined arc only has occurred, means for restraining said driven member to cause said relative movement over said arc upon reversal of rotation of said shaft, a peripheral common ring on said driving member, a common brush bearing against said peripheral ring, a pair of circuit rings on said driven member, a brush bearing against each of said circuit rings, a common contact extension from said common ring, and a circuit contact extension from each of said circuit rings positioned in the path of said common contact extension at different points in said path.

2. Apparatus in accordance with claim 1 wherein the common contact extension is the means for positively driving the driven member.

3. A rotary switch comprising a shaft, a driving member keyed to said shaft, a driven member mounted on and free to rotate on said shaft, means for positively driving said driven member by said driving member after relative movement of said members over a predetermined arc only has occurred, means for restraining said driven member to cause said relative movement over said arc upon reversal of rotation of said shaft, a peripheral common ring on said driving member, a common brush bearing against said peripheral

ring, a pair of circuit rings on said driven member at different radial distances from said shaft, said driven member having an aperture therein between said rings, a brush bearing against each of said circuit rings, a common contact extension from said common ring and entering said aperture and forming means for driving said driven member upon contact with the edges of said aperture, and a circuit contact extension from each of said circuit rings positioned in the path of said common contact extension at opposite ends of said aperture.

4. Apparatus in accordance with claim 3, wherein the said common contact extension is radially resilient to create a sliding contact with said circuit contact extensions.

5. Apparatus in accordance with claim 3, wherein the said common contact extension is radially resilient to create a sliding contact with said circuit contact extensions, and said common contact extension is resistant to deformation by forces applied in the direction of drive.

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