Oct. 7, 1947. H. C. BOLLEY 2,428,447

SIGNAL SWITCH

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Fig. 1

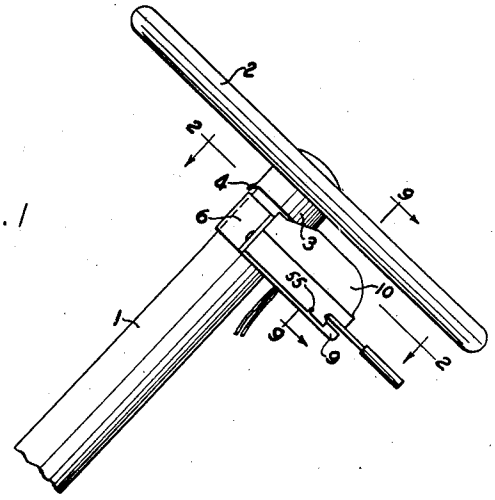


Fig. 2

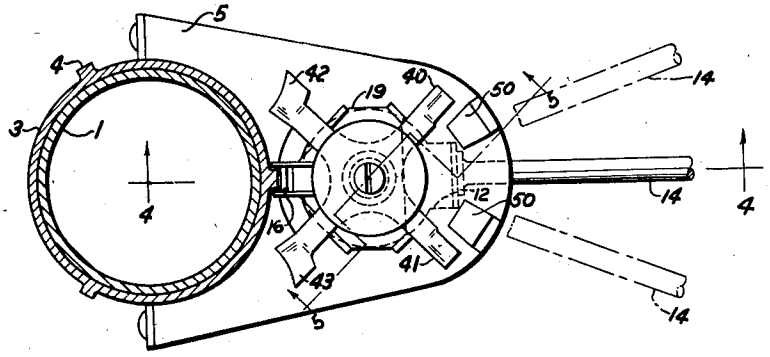
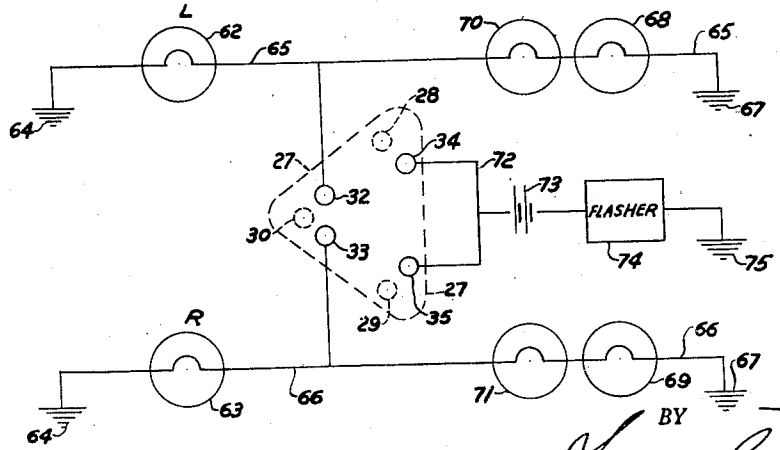


Fig. 3



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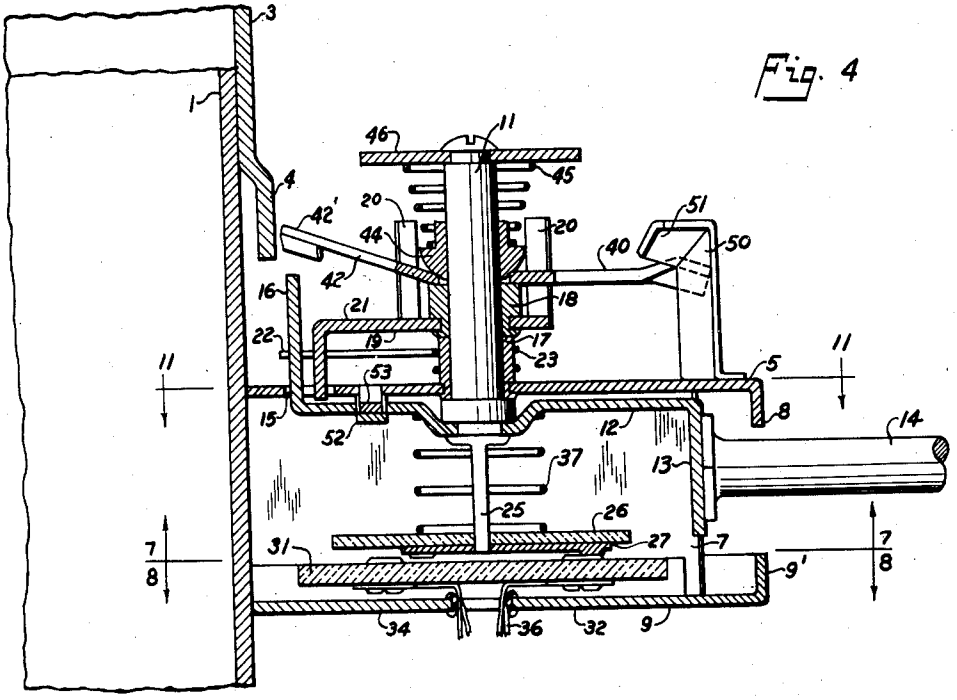
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Fig. 4



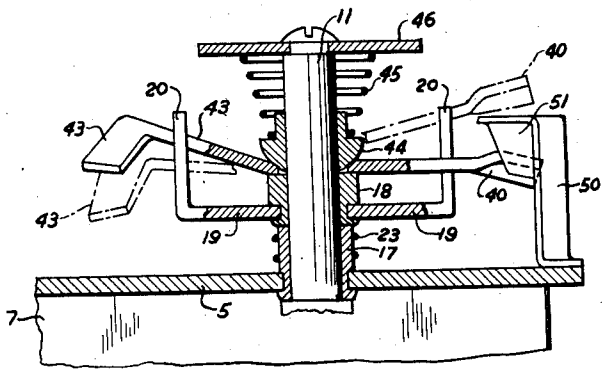


Fig. 5

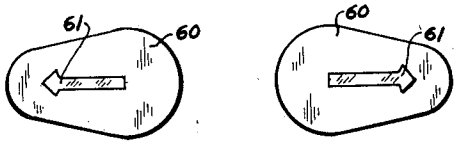


Fig. 6

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Fig. 12

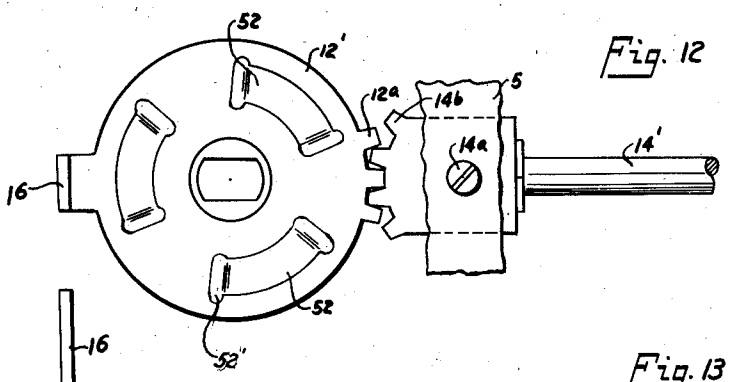


Fig. 13

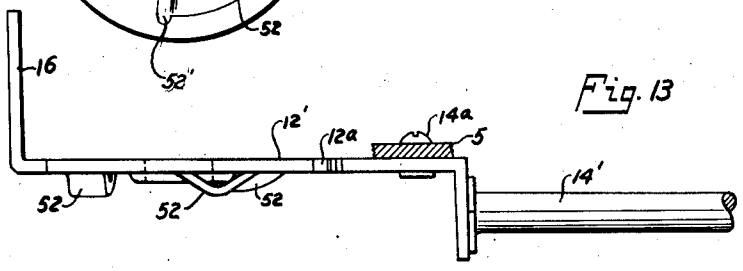


Fig. 14



Fig. 7

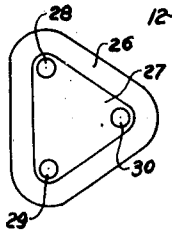
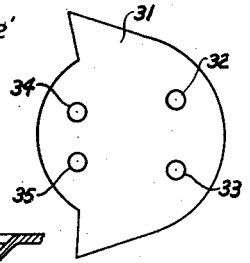


Fig. 8



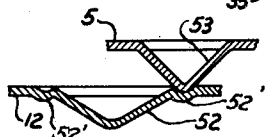


Fig. 15

Fig. 10

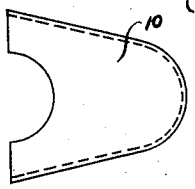


Fig. 9

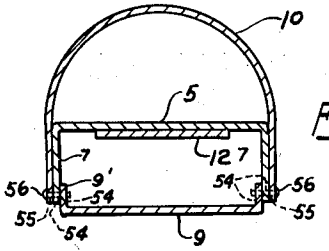
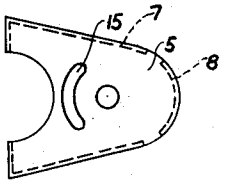


Fig. 11



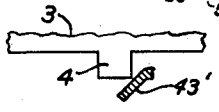


Fig. 16

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Patented Oct. 7, 1947

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2,428,447

SIGNAL SWITCH

Herschel C. Bolley, Royal Oak, Mich.

Application December 22, 1945, Serial No. 636,886

12 Claims. (Cl. 200—59)

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The present invention pertains to a self-restoring two-way switch designed especially, but not exclusively, for indicating the direction in which a motor vehicle is about to turn.

A device of this general character, as already known in the art for motor vehicles, is operated from a manual lever for closing a circuit illuminating a signal corresponding to the direction in which the turn is to be made, and a restoring means operable by the return of the steering wheel to forward position for returning the switch to neutral or circuit-open position. The principal object of this invention is to simplify existing mechanisms for this purpose. This object is accomplished, generally, by the provision of lugs rotatable with the steering for actuating a spider which in turn restores the switch to the open position.

In such a construction, however, the lugs would often be in the path of the spider arms on the circuit-closing movement. In this connection, another object of the invention is to provide means for moving the spider arms out of the path of the lugs on the circuit-closing movement, while enabling the lugs to strike and move the spider arms on the restoring movement.

In the accomplishment of this object, the movable contacts of the switch are carried by a rotatably mounted shaft which is actuated by the operating lever and the shaft carries the aforementioned spider which is tiltably mounted thereon but not directly fixed thereto. Rotary motion is imparted from the shaft to the spider by a driving means that permits tilting of the spider. When the spider is thus rotated in either direction to close the signal circuit, certain of its arms come into engagement with means, such as cams, which tilt the spider and thereby cause the opposite arms to move out of the path of the lugs so that the latter offer no obstruction. When the circuit has closed, the arms disengage the tilting means, and the spider returns to its normal position under the action of the spring provided for that purpose. Thus, some of the spider arms reenter the path of the lugs to be engaged thereby and return the movable switch contacts to the neutral position when the steering wheel is righted.

The mechanism described herein is applicable in a broader sense to a timed circuit in which the restoring lugs are rotated at a selected speed. Also, the operation of the device may be reversed in the sense that the restored position of the switch may be a closed position, while the manual adjusted position may correspond to an open position of the switch.

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The invention is fully disclosed by way of example in the following description and in the accompanying drawings in which:

Figure 1 is a side elevation of the device;

Figure 2 is a plan section;

Figure 3 is a wiring diagram;

Figure 4 is a section on the line 4—4 of Figure 2;

Figure 5 is a section on the line 5—5 of Figure 2;

Figure 6 is an elevation of a pair of signal indicators;

Figures 7 and 8 are elevations of the contact plates, taken on the lines 7—7 and 8—8 respectively of Figure 4;

Figure 9 is a section on the line 9—9 of Figure 1;

Figure 10 is a plan view of the housing;

Figure 11 is a plan view on the line 11—11 of Figure 4;

Figure 12 is a plan view of a modification;

Figure 13 is a side elevation thereof;

Figure 14 is a detail section of one of the detents in neutral position;

Figure 15 is a similar section of the detents in a direction indicating position, and

Figure 16 is a detail vertical section of the apparatus showing one of the striking lugs in elevation.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

In Figure 1 is shown a conventional steering column of a motor vehicle surmounted by a rotatable steering wheel 2 in the usual manner. The wheel rotates the usual steering shaft within the column 1, and inasmuch as this structure is conventional and forms no material part in the present invention, it is not illustrated. On the lower surface of the wheel and concentric therewith is attached a suitably shaped body 3 which preferably encloses the upper end of column 1 and is formed with a suitable number of downwardly projecting lugs or fingers 4 for a purpose that will be presently described.

Beneath the lugs 4 a mounting plate or body 5 is fastened to the column 1 by suitable means such as a conventional clamp 6. The member 5 has a depending flange 7 which is interrupted at the outer extremity of the member 5, and in the opening thus formed there is provided a narrow downwardly extending lip 8. A bottom closure member or supporting plate 9 is fitted into the flange 7, and a hood 10 is fitted over the flange 7, the parts being assembled in a manner presently to be described. It will be understood however that the parts 9 and 10 are applied only after the internal assembly has been completed.

In the body plate 5 is rotatably mounted a shaft 11, passing therethrough as shown in Figure 4 and carrying a driving plate 12 fixed thereto below the plate 5. The plate 12 has a depending lip 13 to which is attached an operating lever 14 extending through the slot in the flange 7 beneath the lip 8. The member 5 has an arcuate slot 15 into which extends an operating finger 16 for a purpose that will presently appear.

The shaft 11 is surrounded by a boss 17 above the member 5, and on the boss is mounted a spacer 18 also surrounding the shaft. The lower end of the spacer, in turn, is surrounded by a slider guide plate 19 having a number of spaced upstanding fingers 20 and another finger 21 projecting downwardly into the slot 15. The fingers 16 and 21 are straddled by a horseshoe spring 22 which has its center coiled at 23 around the member 17. It is now apparent that rotation of the driving plate 12 and operating finger 16 by the lever 14 also rotates the finger 21 with the plate 19 and its fingers 20 through the spring 22.

The lower end of the shaft 11 is keyed at 25 to receive an insulating plate 26 having an electrically conductive plate 27 fastened to its lower surface. The member 27 is formed with a series of three downward dents 28, 29 and 30.

In the bottom closure member 9 is fastened another insulating plate 31 carrying a series of four contact buttons 32, 33, 34 and 35 exposed at both surfaces. The buttons 32, 33 are connected to the battery side of the circuit, and the buttons 34, 35 respectively to direction signal lamps suitably mounted on the vehicle, for example, as signal indicators on the rear of the vehicle and also on the front if desired and pilot lights on the instrument panel.

The dent 30 normally lies between the contacts 32 and 33 when no signal is to be indicated, thereby rendering the circuit open. When the shaft 11 is turned to the right or left by the lever 14 to indicate a turn, the dent 30 engages the corresponding contact 32 or 33, and one of the dents 28, 29 engages one of the contacts 34, 35 to complete the corresponding signal circuit. The leads or conductors from the lower ends of the buttons 32—35 are indicated generally by the numeral 36. The contact members of the plates 27 and 31 are maintained in firm engagement by a compressed coil spring 37 surrounding the shaft 11 between the members 12 and 26.

Upon the spacer 18 is loosely mounted a spider comprising four arms 40, 41, 42 and 43 projected through the spaces between the fingers 20. The arms 40 and 41 are forwardly disposed or at the end of the housing nearer the lever 14 while the arms 42 and 43 are disposed nearer the column 1.

A ball member 44 having a convex lower surface is mounted on the shaft 11 directly over the spider and is surmounted by a compressed coil spring 45 bearing against a disk 46 secured to the upper end of the shaft 11. The member 44 is thereby maintained firmly and resiliently against the spider, and the latter is permitted to rock on the ball member by means that will now be described.

Cam members 50 are mounted on the body member 5 at opposite sides of the neutral axis of the lever 14 and are formed with cam surfaces 51 that converge in the upward direction. When the lever 14 is swung to either side, one of the arms 40, 41 engages and rides upward on the adjacent surface 51, thereby depressing the opposite arm 42 or 43. In turning the wheel 2

for steering the lugs 4 approach the sloped ends 42', 43' of the arms 42, 43 in the upgrade direction. The lugs thus ride over the ends 42', 43' without rotating the spider arms, although depressing them slightly as shown in dotted lines in Figure 16. When the turn of the vehicle has been completed and the steering wheel 2 returns to forward position, one of the lugs 4 strikes and propels an arm 42 or 43 which rotates the plate 19 through one of its fingers 20. The downwardly extending finger 21 of the plate 19 turns the finger 16 and driving plate 12 through the spring 22, thus rotating the shaft and returning the contact assembly 26—30 and the lever 14 to neutral or idle position.

The foregoing kick-back or return movement of the spider requires that one of the lugs 4 lie in the path of the arms 42 and 43. However, in the signalling operation, the arms 42 and 43 must not strike the lug 4 that lies between them. This obstruction is avoided by the tilting of the spider on one or the other of the cam surfaces 51, whereby the opposite arm 42 or 43 is lowered sufficiently to pass beneath the intervening lug 4.

Suitable detents are provided for holding the mechanism in either of the signalling positions and in neutral position. For example, the driving plate 12 is formed with three appropriately spaced dents 52, and the body member 5 also has three downward dents 53 located so that the dents 52 interlock with the dents 53 in the neutral position of the lever 14.

The driving plate 12 is formed with a shallower dent 52' on each side of each dent 52 and capable of receiving the point of a dent 53. When the driving plate 12 is turned to indicate either direction, the points of the dents 53 are received in the corresponding dents 52'. On returning to neutral position, the driving plate need be turned only until the dents 53 commence to enter the dents 52. Thereafter the pressure of the spring 37 cams the dents 53 into full register with the dents 52. Thus, the lug 4 must move the spider arms 42, 43 only a short distance to bring the dents 53 into mere entering relation to the dents 52, whereupon the spring 37 initiates a cam action that completes the return to neutral position, as already set forth.

For the purpose of assembling, the bottom plate 9 which carries the insulating plate 31 is formed with a flange 9' that seats within the flange 7 of the body 5. Both flanges are formed with apertures 54 which register when the assembly is made. The sides of the hood 10 are formed with keyhole slots 55 adapted to register with the apertures 54. Before applying the hood, screws 56 are passed through the apertures 54 sufficiently to hold the member 9 but not fully seated. After the hood is applied, with the screws seated in the slots 55, the screws are tightened.

In the previously described embodiment of the invention, the lever 14 in its idle position lies parallel to the axis of the vehicle. When the driver is about to turn the steering wheel 2 to the right, it is more natural and convenient for him to swing the lever 14 to the right, and the contacts in the circuits are adjusted accordingly. However, it may be desirable to swing the lever 14 in the direction opposite to the turn, and this is especially true when the lever is located at the right-hand side of the steering column and substantially perpendicular to the axis of the vehicle.

In such case the reversal is effected by introducing gear teeth between the operating lever and the driving plate as shown in Figure 12. The

lever 14' is mounted on an independent pivot 14a and is formed with a gear segment 14b. The driving plate 12' is also formed with a segment 12a meshing with the segment 14b. Thus, the plate 12' is turned in the reverse direction of the lever 14'.

The principal indicators are in the form of a pair of housings 60 suitably mounted on the rear end of the vehicle, for example, on the fenders. Each housing has inserted therein a lens 61 which may be colored and in the shape of a pointer such as an arrow. The arrows point in opposite directions, and behind each is a lamp as will presently be described. The wiring diagram shown in Figure 3 illustrates the lamps 62 and 63 positioned respectively behind the left-hand and right-hand lenses 61. These lamps are grounded at one end as indicated by the numeral 64. The opposite terminals of the lamps are joined by conductors 65 and 66 to the fixed contacts 32, 33 which are engageable selectively by the movable contact 30 as previously set forth. The conductors 65, 66 are grounded at 67 and each conductor preferably carries in series a lamp 68 or 69 mounted at the front of the vehicle and a smaller lamp 70 or 71 mounted on the instrument panel.

The fixed contacts 34, 35 are joined by a branched conductor 72 to a battery 73 carrying a flasher 74 and finally grounded at 75.

In adjusting the plate 27 to either side of the neutral position illustrated, the contact 30 engages one of the contacts 34, 35. A circuit is thereby closed from the battery through the several lamps corresponding to a turn in the selected direction. The flasher 74 automatically interrupts the circuit at short intervals so that the signals are rendered more conspicuous.

The described mechanical structure is also useful in a timed system, in apparatus other than a steering mechanism. For example, after a circuit has been closed by manual operation of a member similar to the lever 14, it may be desirable that the circuit be automatically open after a given interval of time. In such case the member 3 carrying the striking lugs 4 is mechanically regulated at a given rate to open the circuit in the manner previously described. Such a construction involves the aforementioned problem of one of the lugs 4 being in the path of the spider arms 42, 43 in setting the switch, and this problem is solved by tilting the arms 42, 43 to pass beneath the obstructing lug 4 by the mechanism already described.

Although specific embodiments of the invention have been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention as indicated by the appended claims.

What I claim is:

1. In an operating mechanism for oppositely indicating signals, a two-way switch for selectively actuating said signals and including a movable member, a restoring member for returning said movable member to a given position and including a series of lugs, a tiltably mounted multi-armed spider movable with said movable member, certain of the arms of said spider lying in the path of said lugs to be struck by the latter in the restoring movement, fixed cams engageable by the spider arms opposite the last named arms on actuation of said movable member and adapted to tilt said certain arms, said certain arms having inclined upper surfaces facing and engageable by said lugs.

2. In an operating mechanism for oppositely indicating signals, a two-way switch for selectively actuating said signals and including a movable member, a restoring member for returning said movable member to a given position and including a series of lugs, a tiltably mounted multi-armed spider movable with said movable member, certain of the arms of said spider lying in the path of said lugs to be struck by the latter in the restoring movement, fixed cams engageable by the spider arms opposite the last named arms on actuation of said movable member and adapted to elevate the engaged arms, whereby to depress said certain spider arms and pass them beneath said lugs.

3. In an operating mechanism for oppositely indicating signals, a two-way switch for selectively actuating said signals and including a series of fixed contacts, a rotatably mounted shaft, a series of movable contacts carried by said shaft and adapted for selective engagement with the fixed contacts, a multi-armed spider tiltably mounted on said shaft, and means for driving said spider from said shaft, a restoring member having lugs adapted to strike certain of the arms of said spider to return said movable contacts to a given relation to the fixed contacts, means engageable by the remaining spider arms on rotation of said spider for tilting the spider, whereby to pass said certain arms across said lugs.

4. In an operating mechanism for oppositely indicating signals, a two-way switch for selectively actuating said signals and including a series of fixed contacts, a rotatably mounted shaft, a series of movable contacts carried by said shaft and adapted for selective engagement with the fixed contacts, a multi-armed spider tiltably mounted on said shaft, a series of fingers rotatable with said shaft and extending between said spider arms to drive the spider, a restoring member having lugs adapted to strike certain of the arms of said spider to return said movable contacts to a given relation to the fixed contacts, means engageable by the remaining spider arms on rotation of said spider for tilting the spider, whereby to pass said certain arms across said lugs.

5. In an operating mechanism for oppositely indicating signals, a two-way switch for selectively actuating said signals and including a series of fixed contacts, a rotatably mounted shaft, a series of movable contacts carried by said shaft and adapted for selective engagement with the fixed contacts, a multi-armed spider tiltably mounted on said shaft, and means for driving said spider from said shaft, a restoring member having lugs adapted to strike certain of the arms of said spider to return said movable contacts to a given relation to the fixed contacts, fixed cams engageable by the spider arms opposite the last named arms on actuation of said movable member and adapted to tilt said certain arms, whereby to pass said certain arms across said lugs.

6. In combination with a two-way switch including fixed contacts, a movable member, a series of contacts carried by said member and engageable selectively with the fixed contacts; a restoring member for returning said movable member to a given position and including a series of lugs, a tiltably mounted multi-armed spider movable with said movable member, certain of the arms of said spider lying in the path of said lugs to be struck by the latter in the restoring movement, fixed cams engageable by the spider

arms opposite the last named arms on actuation of said movable member and adapted to tilt said certain arms, whereby to pass said certain arms across said lugs.

7. In a combination, with a two-way switch including fixed contacts, a rotatably mounted shaft, a series of movable contacts carried by said shaft and adapted for selective engagement with the fixed contacts; a multi-armed spider tiltably mounted on said shaft, and means for driving said spider from said shaft, a restoring member having lugs adapted to strike certain of the arms of said spider to return said movable contacts to a given relation to the fixed contacts, means engageable by the remaining spider arms on rotation of said spider for tilting the spider, whereby to pass said certain arms across said lugs.

8. In combination, a pair of fixed and spaced body members, a shaft rotatably mounted in one of said members, a series of fixed contacts carried by the other member, a contact plate carried by said shaft and having contacts selectively engageable with the fixed contacts, a driving plate fixed to said shaft between said body members, a multi-armed spider tiltably mounted on said shaft, means for driving said spider from said driving plate, a restoring member having lugs adapted to strike certain of the arms of said spider to return said movable contacts to a given relation to the fixed contacts, means engageable by the remaining spider arms on rotation of said spider for tilting the spider, whereby to pass said certain arms across said lugs.

9. In combination, a pair of fixed and spaced body members, a shaft rotatably mounted in one of said members, a series of fixed contacts carried by the other member, a contact plate carried by said shaft and having contacts selectively engageable with the fixed contacts, a driving plate fixed to said shaft between said body members, a compressed spring between said contact plate and said driving plate, and inter-engageable detents formed on said driving plate and on the first designated body member and held in mutual engagement by the tension of said spring, a multi-armed spider tiltably mounted on said shaft, means for driving said spider from said driving plate, a restoring member having lugs adapted to strike certain of the arms of said spider to return said movable contacts to a given relation to the fixed contacts, means engageable by the remaining spider arms on rotation of said spider for tilting the spider, whereby to pass said certain arms across said lugs.

10. In combination, a pair of fixed and spaced body members, a shaft rotatably mounted in one of said members, a series of fixed contacts carried by the other member, a contact plate carried by said shaft and having contacts selectively engageable with the fixed contacts, a driving plate fixed to said shaft between said body members, a multi-armed spider tiltably mounted on said shaft, means for driving said spider from said driving plate, a restoring member having lugs adapted to strike certain of the arms of said spider to return said movable contacts to a given relation to the fixed contacts, fixed cams engageable by the spider arms opposite the last named arms on actuation of said movable member and adapted to tilt said certain arms, whereby to pass said certain arms across said lugs, said cams being dimensioned so that the engaging arms slip off them in the actuating movement, and a spring tending to maintain said spider in the untilted position.

11. The device as set forth in claim 1, further characterized by said cams being dimensioned so that the engaging arms slip off them in the actuating movement, and a spring tending to maintain said spider in the untilted position.

12. In a combination with a two-way switch including fixed contacts, a rotatably mounted shaft, a series of movable contacts carried by said shaft and adapted for selective engagement with the fixed contacts; a multi-armed spider tiltably mounted on said shaft, and means for driving said spider from said shaft, a restoring member having lugs adapted to strike certain of the arms of said spider to return said movable contacts to a given relation to the fixed contacts, means engageable by the remaining spider arms on rotation of said spider for tilting the spider and moving said certain arms out of the path of said lugs, said certain arms having sloped ends engageable by said lugs, whereby said lugs ride over said ends in one direction and abut said ends in the opposite direction.

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