April 8, 1930. H. E. NORVIEL ET AL 1,753,621

ELECTRIC SWITCH

Filed Feb. 20, 1928

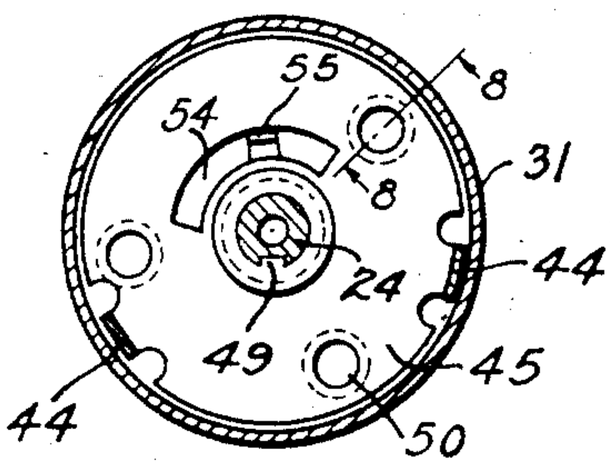


Fig. 7.

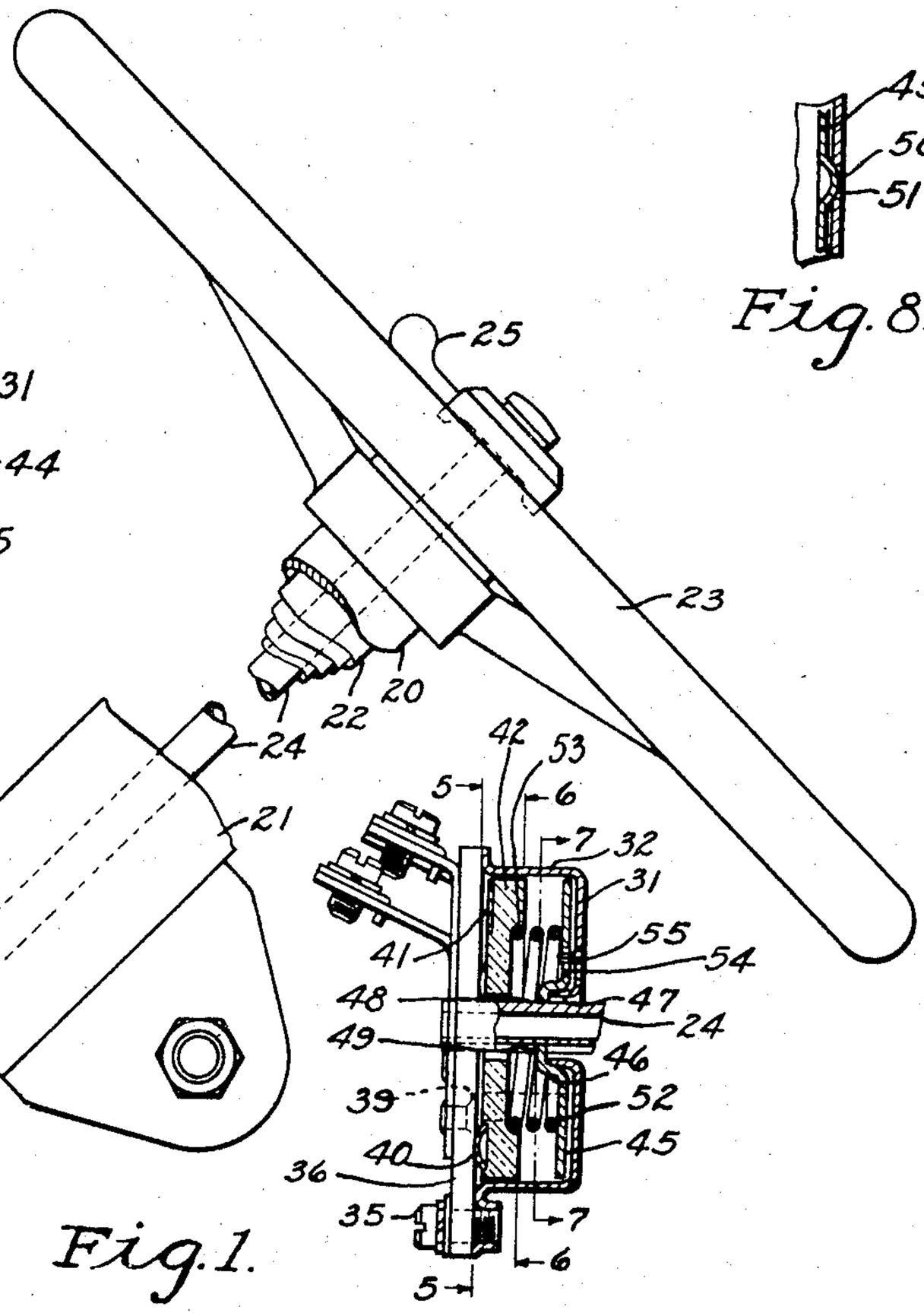


Fig. 1.

Fig. 8.

Fig. 4.

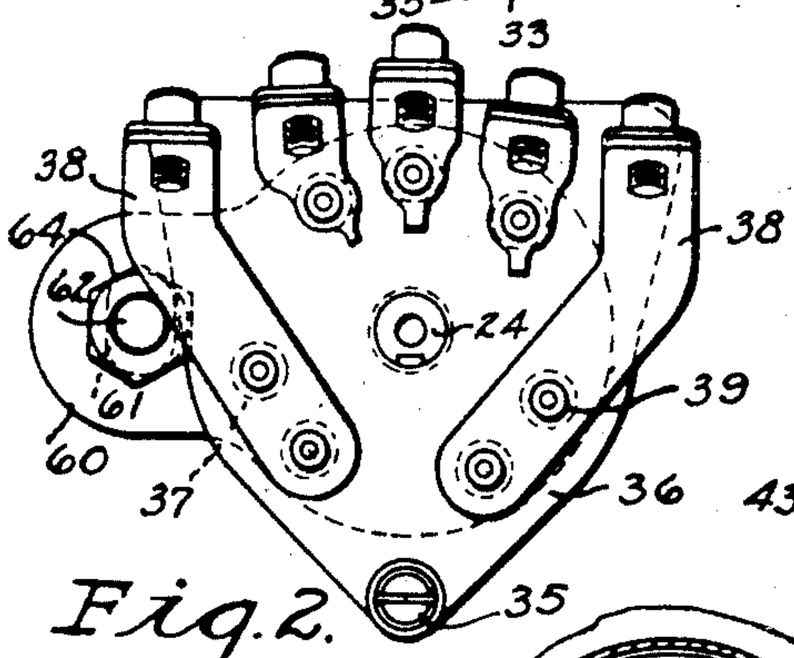


Fig. 2.

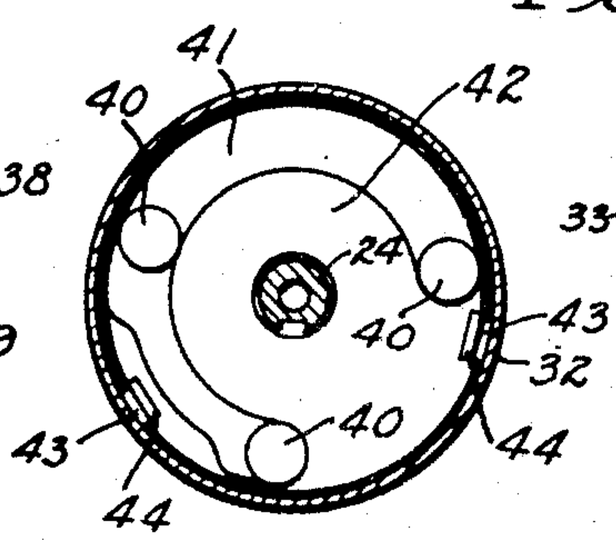


Fig. 5

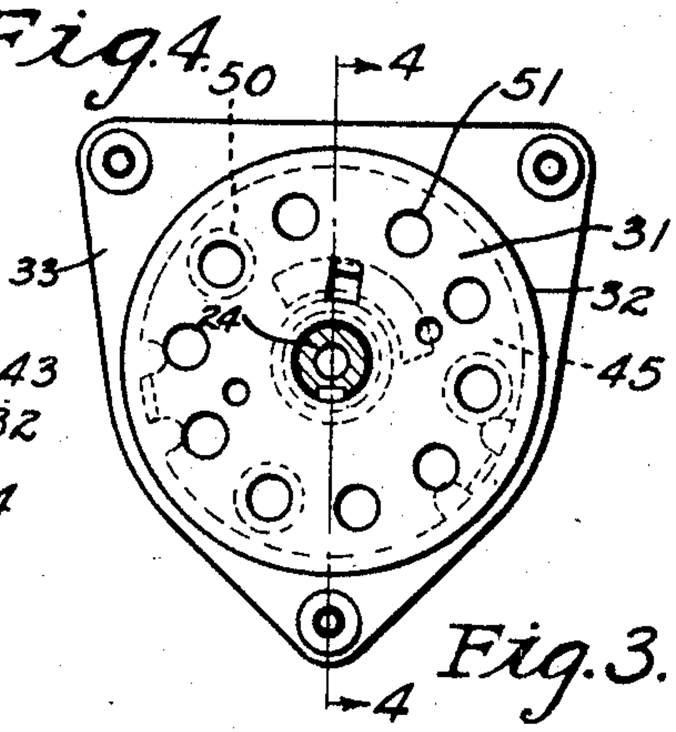


Fig. 3.

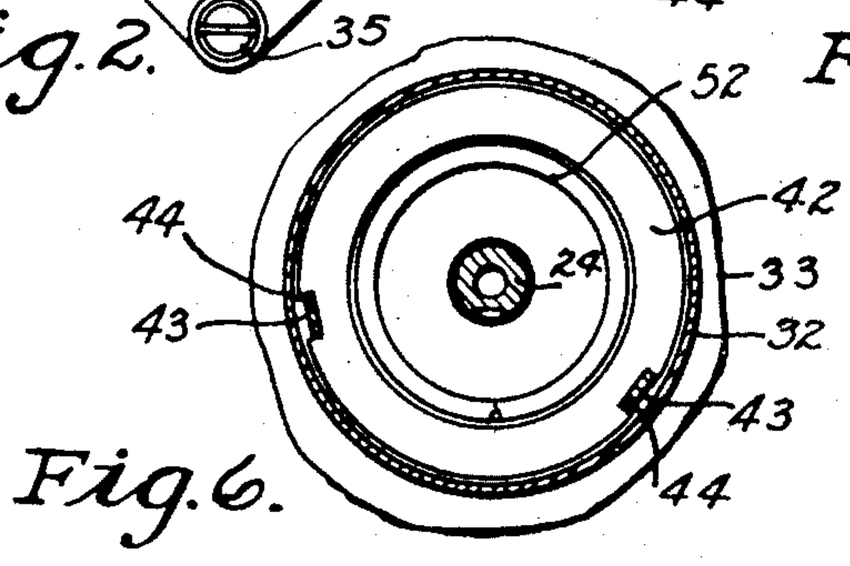


Fig. 6.

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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

Application filed February 20, 1928. Serial No. 255,543.

This invention relates to electric switches for automobiles and particularly to switches which are adapted to be mounted adjacent the lower end of the steering column of the automobile and to be operated by a shaft extending through the column and connected with a handle adjacent the hub of the steering wheel.

The present invention has been developed with the aim of simplifying the construction and reducing the cost of manufacture of switches of this type.

Other aims and objects of the present invention will be apparent, from the following description, reference being had to the accompanying drawings, wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a fragmentary side elevation of a steering column assembly to which a switch embodying the present invention is attached.

Fig. 2 is a view of the switch looking in the direction of the arrow 2 of Fig. 1.

Fig. 3 is a view of the switch taken on the plane of the line 3—3 of Fig. 1.

Fig. 4 is a sectional view on the line 4—4 of Fig. 3.

Figs. 5, 6 and 7 are sectional views, respectively, on the lines 5—5, 6—6 and 7—7 of Fig. 4.

Fig. 8 is a fragmentary sectional view on the line 8—8 of Fig. 7.

Referring to the drawings, 20 designates the mast of the steering column which is supported by the steering gear housing 21 and which provides a bearing for a steering tube 22 attached to a steering wheel 23. The tube 22 encloses a plurality of concentric tubes, the innermost of which is designated by numeral 24. The tube 24 is connected with a lever 25 located adjacent the hub of the steering wheel 23, extends through the steering column and is connected at its lower end with a switch 26 which forms the subject matter of the present invention.

The switch 26 comprises a cup-shaped case 30 having a flat end wall 31 and a cylindrical side wall 32 and having a flange 33. The flange 33 is provided with tapped holes 34 for receiving screws 35 by which a non-conducting cover plate 36 is attached to the case 30. The plate 36 carries stationary switch contacts 37 which are arranged in a circular row and are electrically connected with various terminal brackets 38 respectively.

The stationary contacts 37 are formed by the heads of rivets 39 which secure the terminal brackets 38 to the plate 36. These contacts are adapted to be engaged by certain of a plurality of movable contacts formed by providing a somewhat C-shaped plate 41 with spherical bosses 40. The plate 41 is supported by and is driven by a non-conducting disc 42 or contact carrier which is provided with a central opening for receiving the lower end of the tube 24 which passes through the switch case 30. The contact carrier 42 is provided with notches 43 each receiving a tang 44 extending parallel to the shaft 24 and integral with a driving plate 45. The plate 45 is provided centrally with a cup-shaped recess 46 for receiving an annular flange 47 provided by the case wall 31 for the purpose of rotatably supporting the plate 45. The driving plate 45 is provided with a central opening 48 for receiving tubular shaft 24 which is provided with a longitudinal groove for receiving a tank 49 integral with the plate 45 and having a key which is drivingly connected with the shaft and also is slidable relative thereto in order to permit the driving plate 45 to operate as a part of the means for yieldingly maintaining the switch contact 41 in various positions.

The driving plate 45 is provided with spherical projections 50 which are adapted to be received by certain holes 51 which are arranged in a circular row in the back 31 of the switch case 30. A spring 52 located between the contact carrier 42 and the driving plate 45 serves to yieldingly maintain the contact bosses 40 in engagement with certain of the stationary contacts 37 or the inner face of the contact supporting plate 36, and also serves to urge the driving plate 45 toward the back wall 31 of the switch case. Whenever the lever 25 is operated to move the switch from one of its positions to another, the plate 45 will be moved axially due to the engage-

ment of the spherical bosses 50 with the metal of the plates 31 which surrounds the holes 51. When the movable contact of the switch is located in another operating position, the bosses 50 will be located in substantial alignment with certain of the holes 51 whereupon the spring 52 will cause the driving plate 41 to approach the switch case end wall 31 and the bosses 50 to enter certain of the holes 51. In this way the movable contact member 41 of the switch will be yieldingly maintained in its various operating positions. One end of the spring 52 is received by a recess 53 in the contact carrier 42 in order to maintain the spring 52 in proper position. Rotation of the driving plate 45 is limited by providing it with an arcuate opening 54 for receiving a stop lug 55 provided by bending inwardly a partially sheared portion of the switch case end wall 31 as shown particularly in Fig. 4.

The switch case is fixed to the lower end of the steering gear case 31 by a mounting plate 60 attached to the switch case 30 and having a slot 61 for receiving the threaded end 62 of a stud 63 attached to the steering gear case 21. A nut 64 cooperates with stud end 62 to clamp the plate 60 to the stud 63. The slot 61 permits adjusting the case 30 angularly relative to the shaft 24 so that the switch may be located properly with respect to the switch operating handle 25.

The present invention provides for constructing a switch without requiring a fine degree of accuracy, for example, the switch case wall 31 need not be exactly parallel to the cover plate 36. The connections between the carrier 42 and the driving plate 45 will allow these parts to accommodate themselves to adjacent surfaces of the plate 36 and switch case wall 31 respectively. When the switch is mounted on the steering column, the switch case 30 need not be exactly concentric with the shaft 24. The relation of the movable parts of the switch to the switch case will be determined somewhat by the connection of a shaft 24 with a disc 45. If, after this connection is made, the disc 45 should be slightly eccentric to the cylindrical wall 32 of the switch case, the switch may be successfully operated since there is sufficient clearance between the case wall 32 and the carrier 42 and the driving plate 45, to permit lateral movement of these parts relative to the switch case.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An electric switch comprising, in combination, a case having an end wall provided with stationary contacts, a movable contact rotatable within the case adjacent the stationary contacts, a plate rotatable adjacent the other end wall of the case, a spring located between the movable contact and plate and tending to urge the movable contact toward the stationary contacts and the plate against the case wall adjacent thereto, cooperating provisions provided by the plate and adjacent the end wall and cooperating with said spring to yieldingly maintain the plate in various positions of rotation, means drivingly connecting the contact and plate, and means for operating the plate.

2. An electric switch comprising, in combination, a case having an end wall provided with stationary contacts, a movable contact rotatable within the case adjacent the stationary contacts, a plate carrying the movable contact, a plate rotatable adjacent the other end wall of the case, a spring located between the plates and tending to urge the plates apart, cooperating provisions provided by one of the plates and its adjacent end wall of the case and cooperating with said spring to yieldingly maintain the movable contact in various positions, and means for driving the movable contact.

3. An electric switch comprising, in combination, a case having an end wall provided with stationary contacts, a movable contact rotatable within the case adjacent the stationary contacts, a plate carrying the movable contact, a detent plate rotatable adjacent the other end wall of the case, a spring located between the plates and tending to urge the plates apart, cooperating provisions provided by the detent plate and adjacent the end wall and cooperating with the spring to yieldingly maintain the detent plate in various positions of adjustment, means drivingly connecting the plates, and means for operating the plates.

4. An electric switch comprising, in combination, a case having an end wall provided with stationary contacts, a movable contact rotatable within the case adjacent the stationary contacts, a plate carrying the movable contact, a detent plate rotatable adjacent the other end wall of the case, a spring located between the plates and tending to urge the plates apart, cooperating provisions provided by the detent plate and adjacent the end wall and cooperating with the spring to yieldingly maintain the detent plate in various positions of adjustment, tangs extending from one plate and received by notches in the other in order to drivingly connect them, and means for operating the plates.

5. An electric switch comprising, in combination, a case having an end wall provided with stationary contacts, a movable contact rotatable within the case adjacent the stationary contacts, a plate carrying the movable contact, a detent plate rotatable adjacent the other end wall of the case, a spring located between the plates and tending to urge the plates apart, cooperating provisions provided

by the detent plate and adjacent the end wall and cooperating with the spring to yieldingly maintain the detent plate in various positions of adjustment, means drivingly connecting the plates, and a hub provided by the detent plate and having a central opening for receiving an operating shaft having a slot which receives a tang integral with said hub.

6. A switch according to claim 5 in which the hub of the detent plate including a cylindrical portion and the adjacent end wall has an annular flange providing a journal for the cylindrical portion of the hub.

7. An electric switch comprising, in combination, a case having an end wall provided with stationary contacts, a movable contact rotatable within the case adjacent the stationary contacts, a non-conducting plate carrying the movable contact and provided with notches, a detent plate rotatable adjacent the other end wall of the case and having tangs engageable with the notches of the non-conducting plate and having projections received by recesses in the adjacent end wall of the case, a spring urging the plates apart, and means for driving the plates.

8. An electric switch comprising, in combination, a cup shaped case having a non-conducting end wall closing the same, and provided with stationary contacts, a movable contact rotatable within the case adjacent the stationary contacts, a plate carrying the movable contact, a plate rotatable adjacent the other end wall of the case, means located between the plates and tending to urge the plates apart, cooperating provisions provided by one of the plates and its adjacent end wall of the case and cooperating to yieldingly maintain the movable contact in various positions, and means for driving the movable contact.

9. An electric switch comprising, in combination, a cup shaped case having a nonconducting closure provided with stationary contacts, a movable contact rotatable within the case adjacent the stationary contacts, a plate carrying the movable contact, a plate rotatable adjacent the other end wall of the case, a spring located between the plates and tending to urge the plates apart, cooperating provisions provided by one of the plates and its adjacent end wall of the case and cooperating to yieldingly maintain the movable contact in various positions, and means for driving the movable contact.

10. An electric switch comprising, in combination, a movable contact rotatable within the case adjacent the stationary contacts, a plate rotatable adjacent the bottom wall of the cup, means located between the contact and plate and tending to urge them apart, cooperating provisions provided by one of the plates and its adjacent end wall of the case and cooperating to yieldingly maintain the movable contact in various positions, and means for driving the movable contact.

In testimony whereof we hereto affix our signatures.

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