

Dec. 22, 1953

R. W. HEPT ET AL

2,663,780

COMBINED STARTER AND IGNITION SWITCH

Filed Feb. 15, 1951

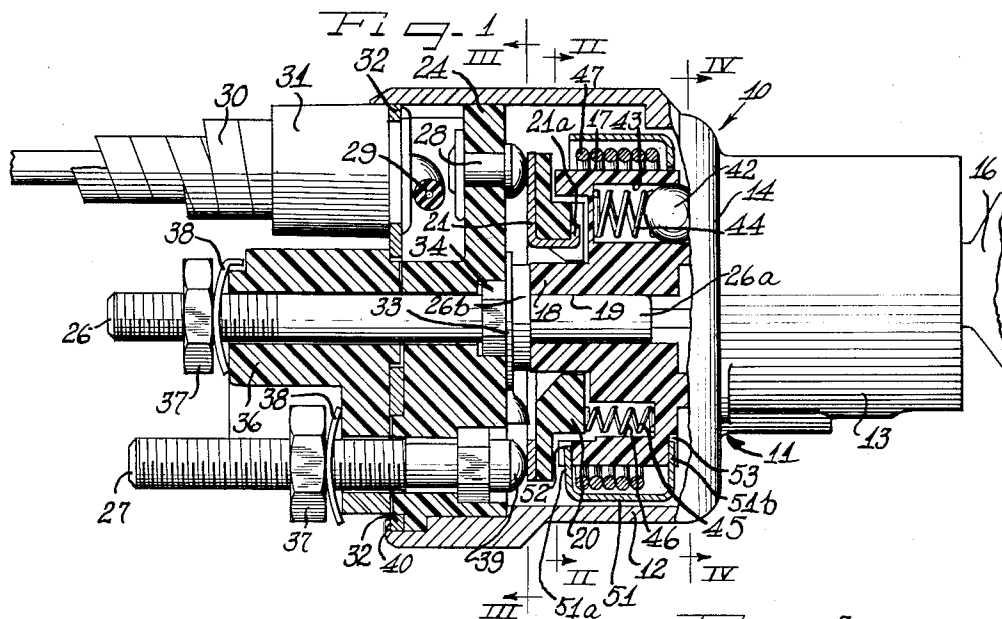
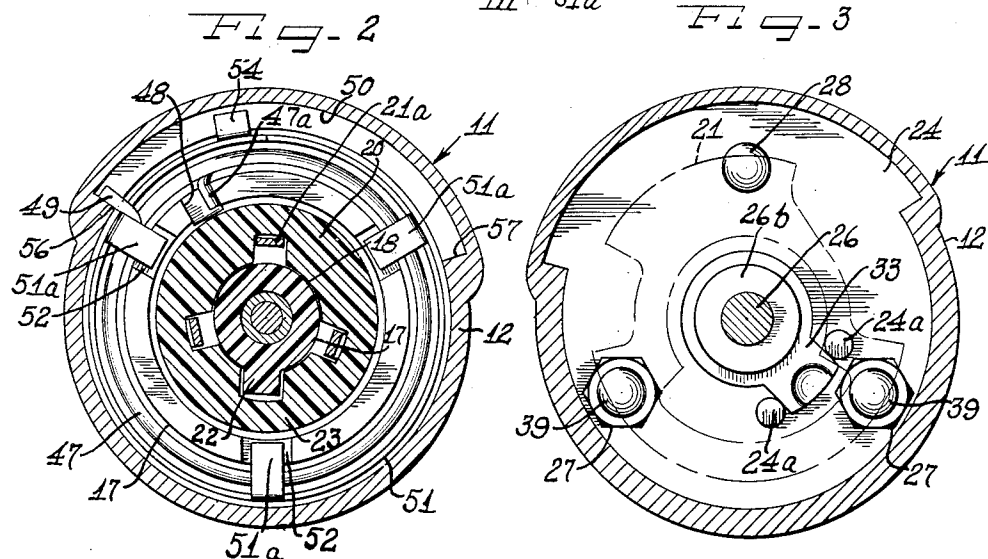
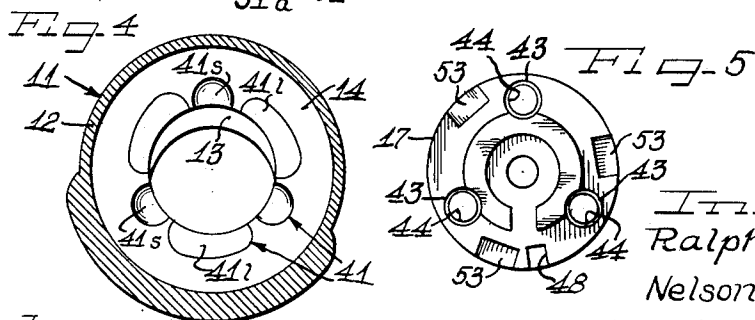
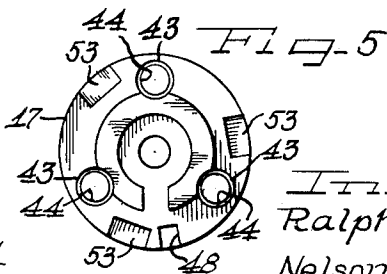


FIG. 4



Inventors
Ralph W. Hept
Nelson H. Weber

By *Bill, Sherman, Meroni, Gross & Simpson* Attorneys

UNITED STATES PATENT OFFICE

2,663,780

COMBINED STARTER AND IGNITION SWITCH

Ralph W. Hept, Dayton, Ohio, and Nelson H. Weber, Bronson, Mich., assignors to Kingston Products Corporation, Indianapolis, Ind., a corporation of Indiana

Application February 15, 1951, Serial No. 211,064

3 Claims. (Cl. 200—166)

1

This invention relates generally to a composite switch mechanism and more particularly to a combined starter-ignition switch for the electrical system of an automotive vehicle or the like.

According to the principles of the present invention, a composite starter and ignition switch is provided including a rotatable carrier having means adapted to complete an ignition circuit upon predetermined rotation thereof. Improved motion controlling means are provided whereby further rotation of the carrier will be resisted by a torsion spring, however, having completed a starter circuit upon rotating the carrier against the tension of the torsion spring, the carrier will be returned to an intermediate position upon release.

The motion controlling means provided according to the principles of the present invention permits free movement of the carrier in opposite angular directions whereby an accessory circuit may also be selectively completed.

It is an object of the present invention to provide an improved switching structure which is composite in character so as to efficiently control the combined ignition, accessory and starter electrical circuits of an automotive vehicle.

Another object of the present invention is to provide an improved composite ignition-starter switch having a key actuated lock rotatably actuable in a turning sequence to sequentially close the ignition circuit and thereafter selectively control a starter motor circuit.

A further object of the present invention is to provide a novel and improved composite switch structure which is made from a reduced number of simplified elements and which is easy to operate and economical to produce.

Many other features, advantages and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description which follows and the accompanying sheets of drawings upon which a preferred form of one structural embodiment incorporating the principles of our invention is shown.

On the drawings:

Figure 1 is a side elevational view with parts broken away and with parts shown in cross-section and in elevation of a composite switch mechanism provided in accordance with the principles of the present invention;

Figure 2 is a cross-sectional view taken on line II—II of Figure 1;

Figure 3 is a cross-sectional view taken on line III—III of Figure 1;

2

Figure 4 is a reduced cross-sectional view taken substantially on line IV—IV of Figure 1; and

Figure 5 is an end elevational view of the rotatable carrier provided in accordance with the principles of the present invention.

As shown on the drawings:

The composite switching mechanism of the present invention is indicated generally by the reference numeral 10 and includes a housing 11 having an enlarged generally cylindrical portion 12 and a reduced diameter neck 13 separated from one another by a radially extending wall portion 14.

The neck 13 is provided with a hollow bore and is adapted to receive the barrel of a conventional ignition lock or the like, for example, a lock of the type having a rotatable cylinder operated by a key 16.

A carrier 17 comprising a generally circular member made of an electrically non-conductive material is situated in the cylindrical portion 12 of the housing 11 adjacent the wall 14 and is provided with a hub 18 having a bore 19 extending therethrough. A contact plate 20 having an irregularly shaped contact member 21 of irregular configuration firmly connected thereto by a plurality of bent over finger portions 21a is seated on the carrier 17. The contact plate 20 and the carrier 17 are locked for co-rotation by a rib 22 and groove 23 connection.

An internal base member 24 closes the open end of the cylindrical portion 12 of the housing 11 and is suitably apertured to receive a central terminal portion 26 together with a pair of spaced apart terminal posts 27. The internal base member 24 also carries a contact member 28 which may be electrically connected to the end of a cable 29 suitably sheathed as at 30 and supported by a ferrule 31 in a cable support plate 32.

The internal end of the terminal post 26 is provided with a smooth stud portion 26a receivable in the bore 19 of the carrier 17 and is further provided with a shoulder 26b against which a contact member 33 may be retained by a nut 34. A pair of spaced nubbins 24a are provided on the base member 24 to position and retain the contact member 33.

The cable support plate 32 is interposed between the internal base member 24 and an external base member 36 which is also apertured to receive the terminal posts 26 and 27. These elements may be held in firm assembly with the internal base member 24 by means of nuts 37 threadable on each of the terminal posts 26 and

3

27, respectively, against the tension of spring elements 38 associated therewith.

It may be further noted that the end of each of the terminal posts 27 is provided with a spherical contact surface 39.

The various components of the switching mechanism are held in firm assembly with one another by staking over the ends of the cylindrical portion 12 of the housing 11 at a plurality of radially spaced apart locations as at 40.

Referring now to Figure 4, it will be noted that the wall 14 of the housing 11 is provided with a plurality of detent recesses 41 which are adapted to cooperate with detent balls 42 resiliently stressed between the carrier 17 and the walls 14. To seat the balls 42, the carrier 17 is provided with a plurality of radially spaced recesses 43 each of which seating a coil spring 44 which in turn seats one of the balls 42. By virtue of the spring pressed detent means, the carrier 17 may be selectively angularly positioned and yieldingly retained in the housing 11.

The opposite face of the carrier 17 is provided with a plurality of radially spaced recesses 46 each seating a coil spring 45 adapted to resiliently urge the contact plate 20 toward the internal base member 24.

Around the outside of the carrier 17 is situated a torsion spring 47 having an end portion 47a extending radially inwardly into a slot 48 formed in the carrier 17, the other end of the torsion spring 47 indicated at 49 extending radially outwardly into an arcuate recess 50 formed in the cylindrical portion 12 of the housing 11.

A cup-shaped torsion spring retainer 51 is provided and substantially embraces the carrier 17. A plurality of tongues 51a are bent to extend radially inwardly and engage in slots 52 formed in the carrier 17 thereby to lock the torsion spring retainer 51 for corotation with the carrier 17. It will be noted that the torsion spring 47 may be placed under slight tension and the end 49 of the torsion spring 47 may be hooked behind one of the fingers 51a of the retainer 51.

It may be noted that the carrier 17 is also provided with a plurality of recesses 53 to receive a corresponding plurality of bent over fingers 51b formed on the retainer 51.

The torsion spring retainer 51 is further provided with a struck-out portion bent outwardly to form a stop member 54 and arranged to extend into the arcuate recess 50. The stop member 54 is preferably spaced away from the finger 51a behind which the end 49 of the torsion spring 47 is hooked so that the end 49 of the torsion spring 47 and the stop member 54 will be spaced apart radially by a predetermined angular distance.

The housing 11 is also constructed to provide a pair of radially spaced apart shoulders 56 and 57, respectively, which lie on opposite ends of the arcuate recess 50 and are spaced apart a greater distance angularly than is the end 49 of the torsion spring 47 and the stop member 54.

It will be apparent from referring to Figure 2 of the drawings that the limits of angular movement of the carrier 17 are prescribed by the arcuate recess 50, the stop 54 being engageable with each of the shoulders 56 and 57 at the limiting points of travel. Moreover, it will be further apparent that the end 49 of the torsion spring 47 is also engageable with the shoulder 56 so that movement of the carrier 17 in one direction will be resiliently restricted by the torsion spring 17 for a distance equal to the spacing dimension be-

4

tween the end 49 of the torsion spring 47 and the stop member 54. Movement in an opposite direction, however, will be unrestricted since both the end 49 of the torsion spring 47, as well as the stop member 54 are free to move in the arcuate recess 50 within the limits prescribed by the shoulders 56 and 57.

It will be appreciated that there is thus provided an improved motion controlling arrangement which affords a highly efficient operation of the composite ignition-starter switch assembly.

It will be noted that some of the detent recesses 41 provided in the wall 14 are longer than the others, for example, the longer detent recesses being indicated by 41L and the smaller detent recesses being indicated by 41S. Assuming the orientation of a typical ignition switch arrangement in an automotive vehicle, the carrier 17 can be rotated counterclockwise to bridge the contact terminals carried by the inner base member 24 connected to an accessory circuit. Such movement would correspond to a free unrestricted movement of the end 49 of the torsion spring 47 together with the stop member 54 through the arcuate recess 50.

Upon returning the carrier 17 to a neutral position, the carrier could be angularly displaced clockwise to bridge contact terminals on the inner base member 24 to complete an ignition circuit of the electrical system of an automotive vehicle. This movement would also result in a free unrestricted movement of the stop member 54 and the end 49 in the arcuate recess 50. In completing the ignition circuit, the end 49 of the torsion spring would be positioned against the shoulder 56 as illustrated in Figure 2. The detent balls 42 would then be positioned in the detent recesses 41L and any further movement of the carrier 17 tending to move the detent balls 42 in the detent recesses 41L would be restricted by the tension of the torsion spring 47.

Further movement of the carrier 17 in a clockwise direction would result in the bridging of the contact terminals on the internal base member 24 to complete the circuit to the starter motor. Upon release of the carrier 17, however, the torsion spring 47 would again return the carrier and the other switching components to the position shown in Figure 2, the detent balls 42 again moving to the end of the detent recesses 41L.

Although minor structural modifications might be suggested by those versed in the art to the preferred embodiment herein described in great detail for the sake of clarity only, it should be understood that we wish to embody within the scope of this patent all such modifications as reasonably and properly come within the scope of our contribution to the art.

We claim as our invention:

1. In a combined starter and ignition switch apparatus, a housing having an arcuate recess providing a pair of circumferentially spaced shoulders, a retainer ring in said housing having a radially outwardly extending tongue received in said recess and engageable with said shoulders, a coiled torsion spring in said ring, a carrier member in said torsion spring, said torsion spring having one end extending radially inwardly and locking to said carrier member, the other end of said spring extending radially outwardly into said recess and being engaged by said retainer ring to preload said spring, said other end of said torsion spring being spaced from said tongue by a predetermined distance less than the arcuate distance between said shoulder, whereby

5

angular movement of said carrier member in one direction will be resiliently resisted for a distance equal to the distance between said other end of said torsion spring and said tongue to normally return said carrier member to an intermediate stop position in said housing, and means for imparting rotation to the carrier member in opposite directions.

2. In a combined starter and ignition switch apparatus having a housing, a carrier sub-assembly in said housing, comprising, a generally cylindrical carrier member having bridging contact means on one end, a coiled torsion spring around said carrier member, and a retainer ring embracing said spring and including spaced apart tongues engaging opposite ends of said carrier member in firm assembly therewith, said spring having one end extending radially inwardly for engagement with said carrier member and having its other end locked behind one of said tongues to preload said spring, said housing having an arcuate recess providing a pair of circumferentially spaced shoulders adjacent said carrier sub-assembly, said other end of said spring extending radially outwardly into said recess and said retainer ring having a tongue extending radially outwardly into said recess in spaced relation to said other end of said spring, whereby rotation of said carrier member in one direction in said housing will be resiliently resisted upon engagement of said spring with one of said shoulders.

6

3. In a switch mechanism, a generally cylindrical hollow housing, a generally cylindrical rotatable carrier member in said housing adapted to be rotatably driven by lock actuated means, a bridging contact member mounted on one end of said carrier member, an arcuate recess in said housing adjacent said carrier member, a shoulder at each end of said recess spaced apart from one another a first predetermined distance, a stop member on said carrier member projecting into said recess and engageable with said shoulders, and a torsion spring connected on the outside of said carrier member and having one end thereof projecting into said recess, said end of said torsion spring spaced from said stop member by a second predetermined distance less than said first distance between said two shoulders, whereby angular movement of said carrier member in one direction will be resiliently resisted for a distance equal to said second distance and said carrier member will be normally returned to an intermediate position.

RALPH W. HEPT.
NELSON H. WEBER.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,033,252	Parker	Mar. 10, 1934
2,062,440	Beal	Dec. 1, 1934
2,121,671	Schwarze	June 21, 1934