Sept. 1, 1953 E. N. JACOBI 2,650,958

ELECTRIC SWITCH

Filed Oct. 26, 1949 4 Sheets-Sheet 1

Fig. 1.

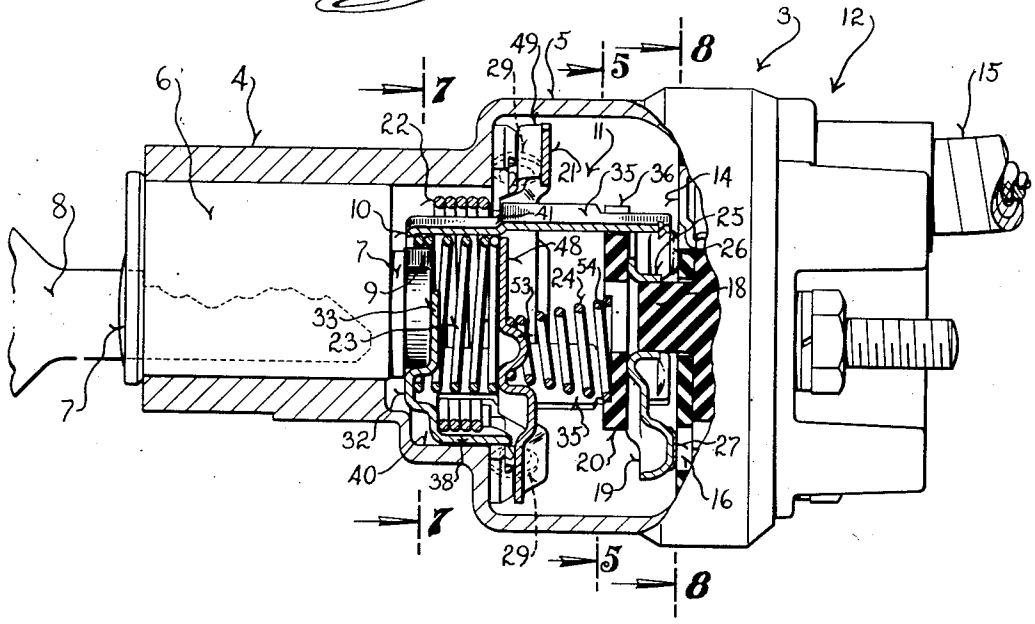
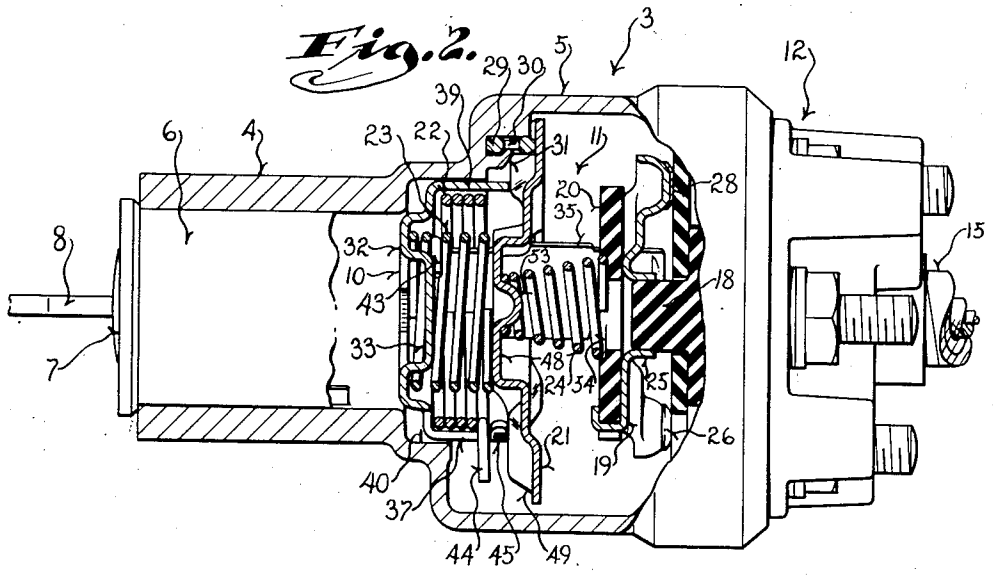


Fig. 2.



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ELECTRIC SWITCH

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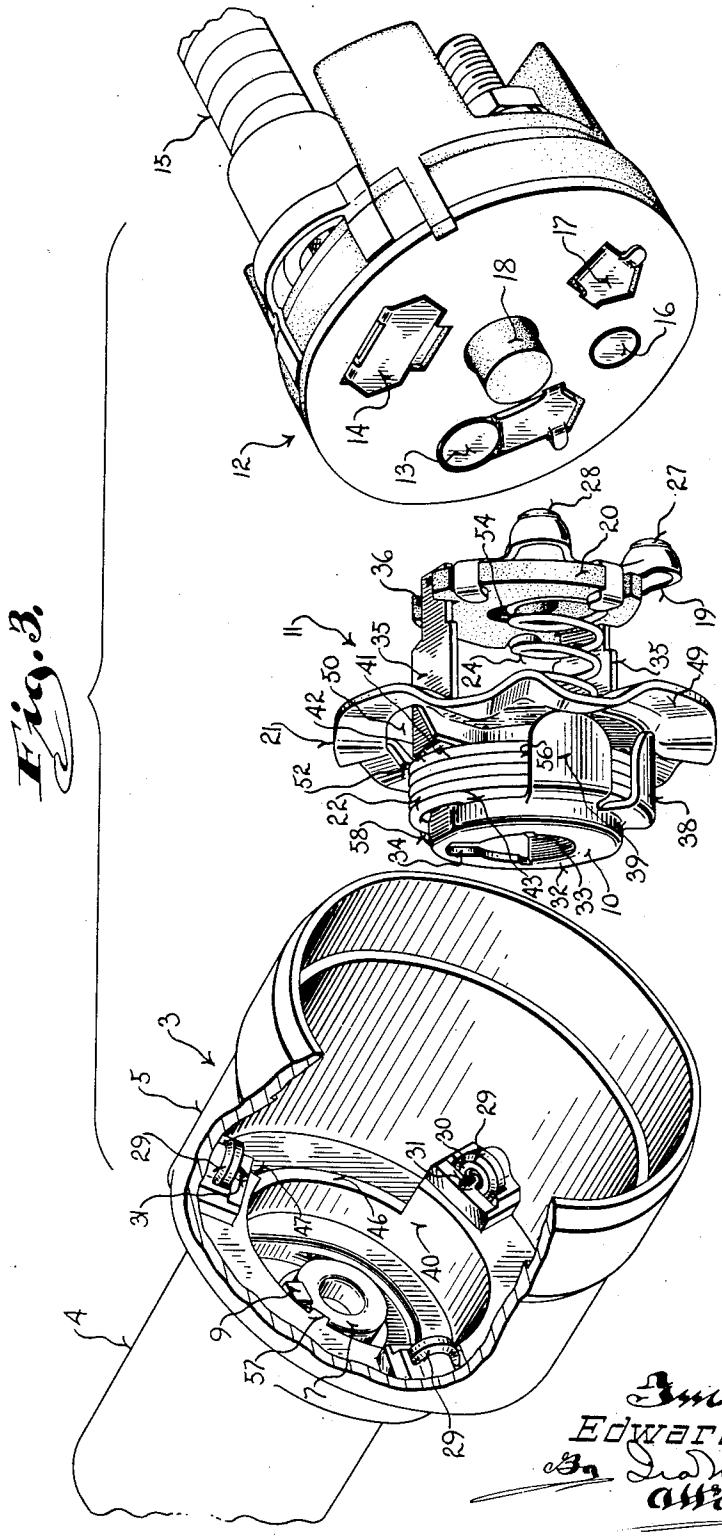


Fig. 3.

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ELECTRIC SWITCH

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Fig. 5.

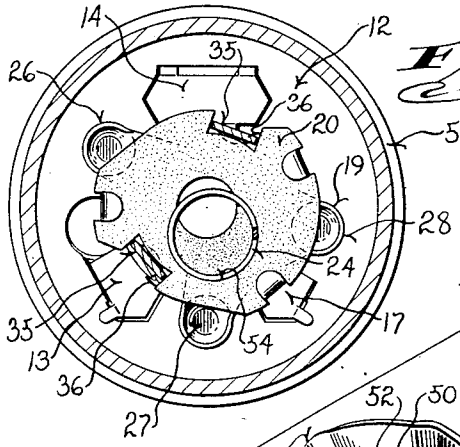
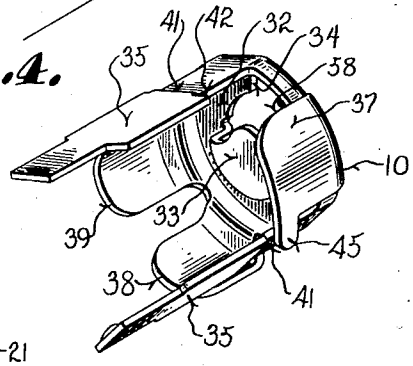
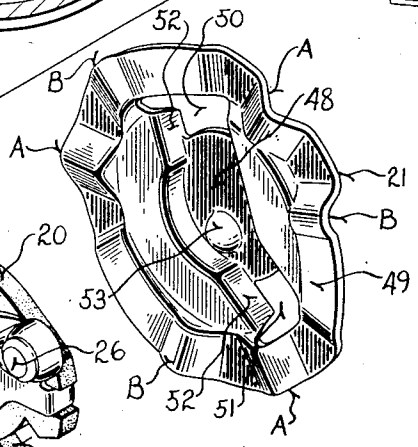


Fig. 4.





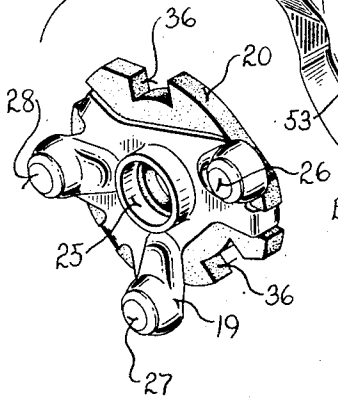
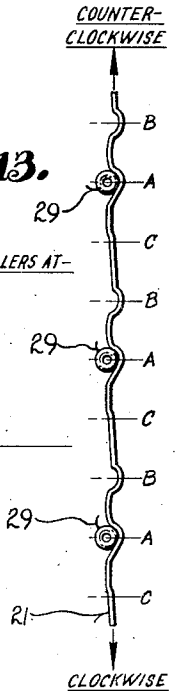
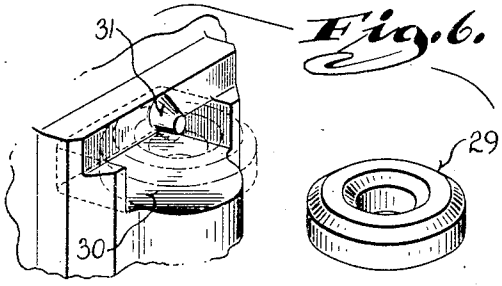


Fig. 13.



SWITCH POSITION	DETENT ROLLERS AT-
OFF	A
CLOCKWISE ROTATION FROM OFF	
START (IGN. & STARTER ON)	C
RUNNING (IGN. & ACC. ON)	B
COUNTERCLOCKWISE ROTATION FROM OFF	
ACCESSORY	C

Fig. 6.



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ELECTRIC SWITCH

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Fig. 7.

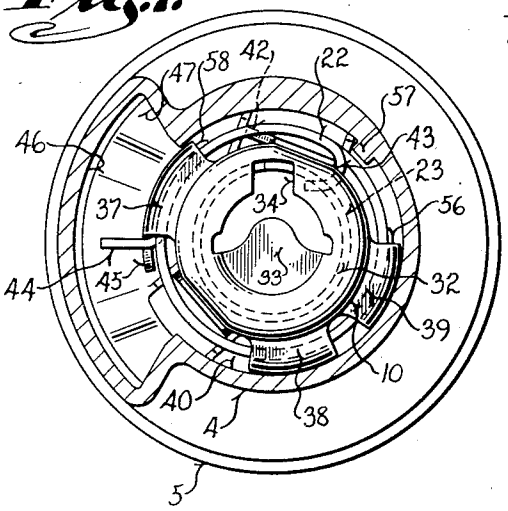


Fig. 8.

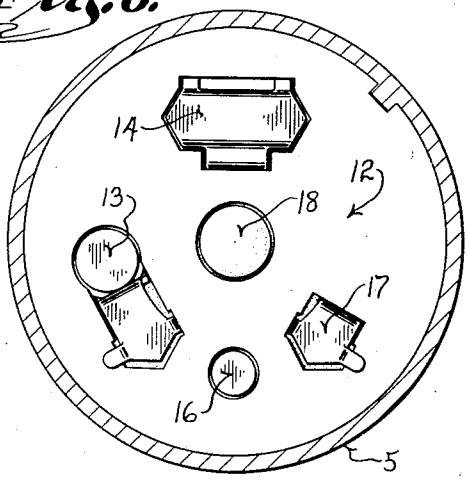


Fig. 9.

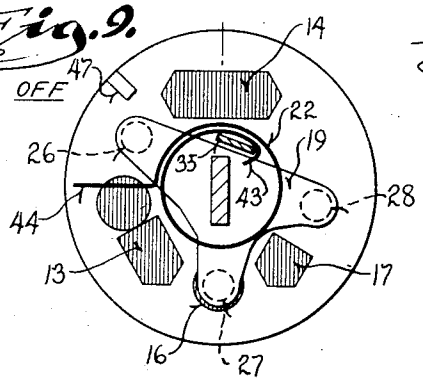


Fig. 10.

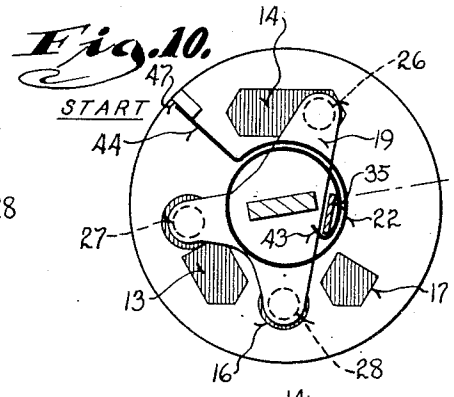


Fig. 11.

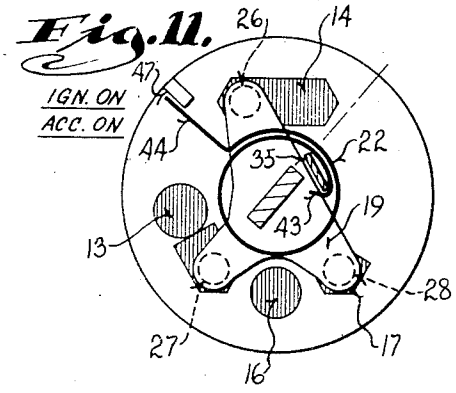
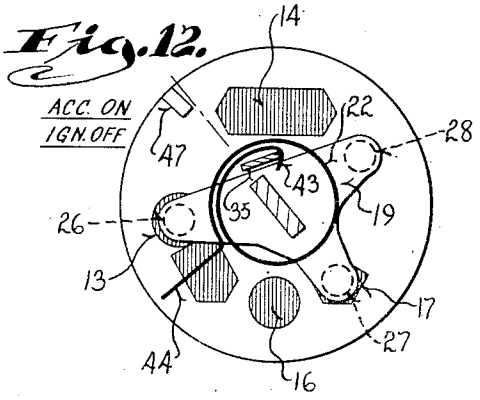


Fig. 12.



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Patented Sept. 1, 1953

2,650,958

UNITED STATES PATENT OFFICE

2,650,958

ELECTRIC SWITCH

Edward N. Jacobi, Milwaukee, Wis., assignor to Briggs & Stratton Corporation, Milwaukee, Wis., a corporation of Delaware

Application October 26, 1949, Serial No. 123,709

12 Claims. (Cl. 200—6)

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This invention relates to electric switches and refers more particularly to an ignition switch for automobiles.

In a general way the switch of this invention is of the type disclosed in Patent No. 2,440,690, issued May 4, 1948, in that the contactor is rotatable across the face of a terminal head and means are provided to at all times assure adequate contact pressure and also give the switch a strongly marked detent action comparable to that of conventional quick break snap switches.

Also, as in the aforesaid patent, the contactor of the present switch is actuated by rotation of a key controlled lock cylinder and the detent action is obtained by rollers riding on an annular cam track, but the manner in which this detent arrangement is employed in the instant invention and the drive established between the rotatable lock cylinder and the rotatable contactor achieves advantages not present in the switch of the aforesaid patent.

The use of an annular cam track and rollers coacting therewith to effect the detent action entails relative axial movement between these parts. If this axial movement also entails relative axial movement between the insulated carrier for the movable contactor and the drive arms therefor, as is the case in the patented construction, there is always the possibility of lifting the contactor away from the terminal head and thus weakening the contact pressure.

The present invention, therefore, has as one of its objects to provide a switch of the character described wherein the parts which are axially movable in consequence to the detent action move with respect to the driving arms that carry the torque from the lock cylinder to the contactor so that such endwise or axial motion cannot interfere with proper contact pressure.

While the present invention is concerned chiefly with an automobile ignition switch, it also incorporates a starter switch and an accessory switch. The latter affords assurance that all the accessories, such as the radio and heater, are automatically switched off as an incident to turning off the ignition and removing the ignition key. During closure of the starter switch it is, of course, essential that the ignition switch be also closed, but after the engine starts the starter circuit should be open. Thus, it is necessary that the switch provide both a starting position in which the ignition circuit and the starting circuit are closed and a running position in which only the ignition circuit is closed; and means should be provided to automatically bring

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the switch from its starting position to its running position.

Since it is, of course, desirable that the accessories be operable whether the engine is running or not, the accessory switch contacts must be closed in the running position and also in another non-running position of the switch. However, it is also desirable to have the full battery current available for starting without the drain of the accessories. Hence, in the starting position of the switch the accessory contacts should be open.

The applicant's copending application, Serial No. 123,279, filed October 24, 1949, now U. S. Patent 2,604,554, granted July 22, 1952, discloses a switch wherein these objectives are attained and wherein this concept is broadly covered. The present invention also achieves these objectives, but does so with purely rotary motion and without recourse to axial depression of the lock cylinder which, in the said copending application, is utilized to secure the starting position. To this end the present invention employs a torsion spring which is loaded by manual rotation of the lock cylinder to its starter position and automatically retracts the switch to its running position as soon as the operator releases the key, the running position being defined by a detent.

Another advantageous feature of this invention resides in the specific construction of the driver or coupling through which rotation is transmitted from the lock cylinder to the contactor and which also provides a mounting for the torsion spring and the detent plate.

Still another novel feature of the invention resides in the specific manner in which this driver transmits rotation to the detent plate.

Still another feature of novelty resides in the manner in which the rotatable contactor is guided for rotation by a boss projecting from the contact face of the terminal head to provide a pilot for the rotatable contactor.

With a view toward achieving these various advantages it is particularly an object of this invention to provide a driver for the rotatable contactor of the switch which may be formed from a lobed stamping, in which certain of the lobes provide a journal bearing to rotatably mount the driver in the switch case and wherein the lobes coact to retain the torsion spring and cooperate with a stationary stop on the switch case to define the extent of rotation of the contactor.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction,

combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a side view of a switch constructed in accordance with this invention, said view having parts thereof broken away and in section to illustrate structural details;

Figure 2 is a view similar to Figure 1 but viewing the switch from the bottom;

Figure 3 is a perspective view of the switch case, terminal head and rotatable contactor assembly shown disassembled but in their proper order of assembly;

Figure 4 is a perspective view of the major portions of the rotatable contactor assembly, that is, the driver, the detent plate and the contactor unit, shown disassembled but in their proper order of assembly;

Figure 5 is a cross sectional view through Figure 1 on the plane of the line 5—5 showing the off-center application of spring pressure on the movable contactor;

Figure 6 is a perspective view showing one of the detent rollers and a portion of the switch case to illustrate the manner in which the rollers are mounted;

Figure 7 is a cross sectional view through Figure 1 on the plane of the line 7—7;

Figure 8 is a cross sectional view through Figure 1 on the plane of the line 8—8;

Figures 9 to 12, inclusive, are diagrammatic views illustrating the different positions of the contactor; and

Figure 13 is a view showing a development of the detent plate to more clearly illustrate the detent action of the switch.

Referring now particularly to the accompanying drawings in which like numerals indicate like parts throughout the several views, the numeral 3 designates the case or housing for the switch. This housing is preferably a die casting with a small diameter cylindrical front end portion 4 and a larger hollow rear end portion 5. The front end 4 has a tumbler lock 6 mounted therein and which, as is customary, includes a cylinder 7, rotatable upon insertion of a proper key 8. The rear or innermost end of the cylinder 7 projects from the lock and has a driving connection 9 with a cup-like driver or coupling 10 which forms part of a rotary contactor assembly indicated generally by the numeral 11.

The rotary contactor assembly 11 operates in the enlarged rear end portion 5 of the switch case between the rear end of the cylinder 7 and a terminal head indicated generally by the numeral 12. The terminal head closes the back of the switch case and has the stationary contacts of the switch and their terminals mounted therein. One of these stationary contacts 13 is connectible with the battery and is, therefore, live; another contact 14 is connectible through a cable 15 with the ignition coil; another contact 16 is connectible with the starter coil, and the last contact 17 is connectible with the accessory circuit.

The specific construction of the contacts and the manner in which they are mounted upon the terminal head, constitutes the subject matter of related applications. Serial Nos. 126,468, now U. S. Patent 2,606,264, granted August 5, 1952, 126,356, now U. S. Patent 2,612,577, granted September 30, 1952, and 125,867, filed November 10, 1949, November 9, 1949, and November 7, 1949, respectively.

The contact surfaces of all of the stationary contacts are flush with the inner face of the terminal head upon which the contacts of the rotary contactor ride, and projecting from the center of the terminal head is a boss 18 to pilot the rotary motion of the contactor assembly.

The contactor assembly 11 comprises, in addition to the driver or coupling 10, a stamped metal contactor 19 which is clinched to a carrier disc 20 of insulating material, a detent plate 21, a torsion spring 22, a light coil spring 23 confined between the bottom of the driver or coupling cup and the detent plate, and a heavier coil spring 24 compressed between the detent plate and the contactor carrier disc 20. The contactor 19 has a bearing portion 25 at its hub to receive the boss 18 and thus pilot the rotary motion of the contactor so that its three contacts 26, 27 and 28 will seat squarely upon the stationary contacts as the contactor moves from one position to the other. The contact surfaces of these three contacts are preferably silver plated or otherwise equipped for long contact wear.

As shown in the diagrammatic views, Figures 9 to 12, inclusive, the arrangement of the stationary and movable contacts is such that in the "off" position of the switch, shown in Figure 9, the live battery contact 13 is not engaged by any of the movable contacts so that even though the movable contact 27 is on the stationary starter contact 16 this is of no consequence.

In the start position shown in Figure 10, the rotary contactor is in a position electrically connecting the battery contact 13 with the ignition contact 14 and the starter contact 16. Placement of the switch in this start position requires clockwise rotation of the ignition key to the full limit of rotation in this direction, and as the key is so turned the torsion spring 22 is wound up. Hence, with the release of the ignition key the contactor snaps back in a counterclockwise direction to a running position shown in Figure 11 and in which the contactor bridges the battery contact 13, the ignition contact 14 and the accessory contact 17.

These various positions of the contactor are defined by a novel detent mechanism which comprises the detent plate 21 and three annular rollers 29, the rollers being mounted in the switch case in a manner most clearly illustrated in Figure 6. As here shown each roller sits in a loose fitting pocket or cavity 30 formed in the switch case, where it is held by a tit 31 formed on the casing struck inwardly into the central aperture of the roller. The relative proportions of the rollers and the pockets or cavities 30 are such that the periphery of the roller, when tangent to the bottom of the cavity, just touches the adjacent sides of the cavity. This leaves the rollers relatively free for a combination of revolving and sliding motion in their loose fitting pockets as the detent plate 21 turns with the rest of the rotary contactor assembly 11.

The driver or coupling 10 of the rotary contactor assembly is formed up from a lobed stamping and is substantially cup-shaped. The central portion of its bottom wall 32 is indented to

provide a socket 33 into which the rear end of the lock cylinder is received with its driving lug entering a notch 34. This provides the driving connection 9 by which rotary motion of the cylinder is imparted to the cup-shaped driver or coupling and holds these parts in coaxial alignment. The light coil spring 23 seats on the bottom wall 32 of the driver or coupling and since the driver or coupling bears against the end of the lock cylinder, the lock cylinder carries the reaction of this spring which thus serves to hold the cylinder against rattling.

The two long lobes of the stamping which forms the driver or coupling 10 provide driving arms 35. The outer ends of these arms embrace the contactor carrier disc 20 and engage in appropriately shaped notches 36 therein. The lock cylinder and the contactor carrier disc are thus directly coupled together as distinguished from past constructions wherein other intermediate elements were involved in the torque transmitting chain.

This construction also obviates the possibility of having endwise motion imparted to the drive arms 35, and as a result the operation of the switch cannot engender any tendency to lift the contactor disc away from the terminal head.

Besides the two long lobes which provide the driving arms 35 the stamped driver or coupling has three shorter lobes 37, 38 and 39. All of these shorter lobes are arcaute in cross section and coact to form a journal of a diameter to be rotatably received in a bearing portion 40 concentric to the pilot lug 18 and formed in the case or housing medially of the ends thereof.

The torsion spring 22 is held in place by being received within the shorter lobes 37, 38 and 39 and disposed over the adjacent base portions of the long lobes which provide the driving arms 35. Preferably these long lobes have their portions which are embraced by the torsion spring set inwardly slightly from the plane of their outer portions to provide shoulders 41 which coact with a shoulder 42 defined by abrupt widening of one of the drive arms to hold the torsion spring in place.

One end 43 of the torsion spring is hooked over an edge of one of the long lobes. Its other end has a straight outwardly directed hook 44 which engages behind one side edge of the lobe 37 where it is held by a lug or projection 45. In applying the torsion spring it is placed under tension, and as best shown in Figure 7 its outwardly projecting end 44 is accommodated by an arcuate cavity 46 in the medial portion of the switch case.

The arcuate length of this cavity is sufficient to permit unrestrained movement of the projecting spring end 44 as the contactor is turned from its "off" position to either its running position or its accessory "on" position; but upon clockwise rotation of the contactor beyond its running position, which is required to reach the start position, the spring end 44 collides with the end 47 of the arcuate cavity. Hence, as the switch is turned to its start position the torsion spring is loaded so that upon release of the ignition key after the engine starts the spring snaps the switch back to its running position.

The location of the torsion spring at the driven end of the driver or coupling 10 directly adjacent to its connection with the lock cylinder not only assures compactness but applies the torque of the spring at the most effective point.

The lateral reaction of the torsion spring as it is additionally tensioned by rotation of the switch to its start position forces the lobes 38 and 39 against the bearing surface 40, and to assure smooth rotation notwithstanding this lateral deflection of the driver or coupling the opposite side edges of the lobes 38 and 39 are directed slightly inwardly to preclude their digging into the surface 40.

The arms 35 of the driver or coupling in addition to carrying the torque from the lock cylinder to the contactor carrier disc also mount the detent plate 21 and turn it with respect to its cooperating rollers 29. The detent plate is a dished stamping having a flat bottom wall 48 and a generally undulating rim 49 which rides on the three rollers and by its shape provides the detents to hold the switch in its different positions.

Openings 50 and 51 in the bottom wall of the detent plate receive the drive arms 35 to establish the torque transmitting connection between the arms and the detent plate. To preclude an objectionable edge-to-edge contact between the drive arms 35 and the detent plate the sides of the openings 50 and 51 are flanged as at 52, and to preclude incorrect positioning of the detent plate during assembly the opening 50 and the medial portion of the drive arm 35 received therein are wider than the opening 51 and the medial portion of the other drive arm. This difference in the widths of the drive arms and openings in the detent plate coacts with the non-diametrically opposite disposition of these elements to assure proper positional relationship between the various parts.

The detent plate 21 is urged against the rollers 29 by the conical spring 24 which also provides the necessary contact pressure. The small end of this spring is centered by a nub 53 pressed from the flat bottom wall 48 of the detent plate and its large diameter end is received in a spring seat 54 in the contactor carrier disc 20. To assure uniform contact pressure at all three contacts despite their non-uniform angular spacing around the axis of rotation, the axis of the spring 24 is near the two closest contacts 27 and 28, which brings the spring off center with respect to the axis of rotation.

As brought out hereinbefore the switch has four positions, namely, the "off" position shown in Figure 9, the "start" position shown in Figure 10, the "running" position shown in Figure 11 and the "accessory-on, ignition-off" position shown in Figure 12. All but the "start" position are defined by the detent action of the detent plate coacting with its rollers 29. Thus, the generally undulating rim 49 of the detent plate has three equi-spaced indentations A in which the rollers 29 are seated when the switch is in its "off" position; three indentations B in which the rollers are seated when the switch is in its "running" position; and a shoulder C with which the rollers are engaged in the "accessory-on, ignition-off" position of the switch. No indentation is needed in this latter position for the reason that it is reached by counter-clockwise rotation of the switch to its limit of rotation in this direction, this limit being defined by the side edge 56 of the lobe 39 colliding with one side of a stationary stop 57 formed on the bearing surface 40 of the lock case.

This same stationary stop lug 57 also coacts with the side edge 58 of the lobe 37 to define the clockwise limit of rotation.

In the "start" position of the switch, which is

at the limit of its clockwise rotation, the three rollers 29 are directly adjacent to the shoulders C but in this position of the switch these shoulders have no function since the contactor must be manually held in this position.

Attention is directed to the fact that those portions of the rim 49 lying between the indentations B and the shoulders C are sloped to provide a declivity leading to the indentations B. Thus, upon release of the ignition key after the engine starts the strong coil spring 24 reacting through this declivity assists the torsion spring in snapping the contactor from its starting to its running position.

The shape of the rim 49 is best illustrated in the development thereof shown in Figure 13, but since this figure also includes a chart showing the different positions of the switch no description thereof is necessary.

From the foregoing description taken in connection with the accompanying drawings it will be readily apparent to those skilled in this art that the switch of this invention is admirably adapted for use in modern automobiles in which the battery carries a heavy accessory load, since within one compact unit it provides a control for the ignition, start and accessory circuits and automatically assures cutting out the accessory load during starting of the engine, and in addition affords a positive safeguard against leaving the car parked with one or more of the accessories on, it being assumed of course, that anyone so parking the car removes the ignition key from the lock.

What I claim as my invention is:

1. A combination ignition, starting and accessory switch for automobiles, comprising: a terminal head having battery, ignition, start and accessory contacts mounted thereon; a movable contactor cooperable with said stationary contacts; means constraining the movable contactor to rotary motion across thhe face of the terminal head to bring its contacts into bridging engagement with different groups of said stationary contacts, said contactor having an "off" position in which it does not engage the battery contact, a "running" position in which it bridges the battery, ignition and accessory contacts reached by rotation of the contactor in one direction from its "off" position, and a "start" position reached by further rotation of the contactor in said direction and in which it bridges the battery, start and ignition contacts; a manually operable actuator for turning the contactor to its different positions; a torsion spring connected with the actuator to rotate bodily therewith between the "off" and "running" positions of the switch; stationary means on the switch cooperable with said torsion spring to effect loading of the same in consequence to rotation of the contactor from its "running" to its "start" position, so that the spring is operable to automatically turn the contactor in the opposite direction upon release of the actuator; and detent means for arresting such spring propelled motion of the contactor in the "running" position thereof.

2. In an electric switch: a plurality of stationary contacts having contact surfaces lying in a common plane; a movable contactor rotatable across said plane from a switch "off" position and adapted in different positions thereof to electrically bridge different groups of said stationary contacts; a manually operable actuator for rotating the contactor from its "off" position through a first switch "on" position and to a second switch "on" position; rotatable coupling means connecting the contactor with the actuator for rotation therewith; a preloaded torsion spring mounted on said coupling means to rotate bodily therewith between positions thereof corresponding to the "off" and first switch "on" positions of the contactor, and for resisting rotation of the coupling means in the direction to carry the contactor beyond its first switch "on" position, whereby the spring is operable upon release of the actuator to automatically move the contactor from its second toward its first switch "on" position; and detent means for arresting spring propelled motion of the contactor in its first switch "on" position.

3. In an electric switch of the character described: a movable contactor constrained to rotation and having an "off" position, a first switch "on" position and a second switch "on" position; a manually operable actuator for turning the contactor to its different positions; a driver coupling the actuator to the contactor; a torsion spring carried by the driver and having one end thereof hooked onto the driver and its other end normally engaged with a part on the driver to hold the spring under initial tension, said other end of the spring projecting from the driver; a fixed stop in position to have said projecting end of the torsion spring collide therewith upon rotation of the spring with the driver to the first switch "on" position of the contactor and to effect loading of the spring during further rotation of the driver to carry the contactor from its first toward its second switch "on" position so that during such further rotation of the contactor the torsion spring is loaded and rendered operative to automatically turn the driver and contactor from its second to its first switch "on" position upon release of the actuator; and detent means for arresting such spring propelled rotation of the driver and contactor with the contactor in its first switch "on" position.

4. In a switch of the character described, a rotatable contactor assembly, comprising: a rigid metal contactor member; a carrier disc of insulating material to which the contactor member is secured; a driver comprising a stamping having a disc-like end wall and arms extending axially outwardly thereform, said arms having an interengaging axially slidable driving connection with the carrier disc; stop means on said arms for limiting outward movement of the carrier disc off of said arms; a detent plate having an undulating rim portion and having holes in which said arms are received to slidably spline the detent plate to the arms, the rear side of said undulating rim of the detent plate being engageable with detent rollers; and a compression spring engaged between the detent plate and the carrier disc to urge the latter outwardly of said arms and the former inwardly toward the disc-like end wall of the driver, whereby said compression spring provides contact pressure for the switch and spring action for the detent when said assembly is incorporated in the switch.

5. In a switch of the character described, a rotatable contactor assembly, comprising: a rigid metal contactor member; a carrier disc of insulating material to which the contactor member is secured; a driver for the contactor member comprising a stamping having a disc-like end wall and opposite arms extending therefrom, said arms having an interengaging axially slidable driving connection with the carrier disc; a detent plate having an undulating rim portion and hav-

ing holes in which said arms are received to slidably spline the detent plate to the arms, the side of the undulating rim of the detent plate remote from the carrier disc being engageable with detent rollers; a compression spring engaging between the detent plate and the carrier disc to provide contact pressure for the switch and spring action for the detent; a plurality of lobes projecting from the disc-like end wall of the driver, said lobes forming an interrupted cylinder bearing journal of a diameter larger than the distance across said arms; a torsion spring encircling the arms and disposed within said lobes, one end of said torsion spring being hooked about an adjacent edge of one of said lobes; a substantially radially projecting hook on the other end of the torsion spring engaging behind an adjacent edge of another lobe to hold the torsion spring under a degree of initial tension, the projecting hook on the torsion spring providing means whereby the tension on the torsion spring may be increased by rotation of the contactor assembly.

6. In an electric switch, the rotatable contactor assembly set forth in claim 5 further characterized by the provision of a second lighter compression spring within the torsion spring and confined between the detent plate and the disc-like end wall of the driver.

7. In an electric switch of the character described: a rotary contactor; a driver for the contactor including a socket-like hub, and spaced substantially parallel arms projecting axially from said hub and having an insulated driving connection with the contactor remote from said hub; and a detent plate mounted on said arms to rotate with the driver and in spaced relation to both the hub of the driver and the contactor, said detent plate comprising a disc-like stamping having holes to receive the arms and having an undulating rim portion encircling said arms adapted for coaction with a plurality of rollers, the undulating formation of the rim portion providing detents spaced around a circle about said arms to coact with the rollers in holding the driver and consequently the contactor in different positions of adjustment.

8. In an electric switch, the rotary contactor assembly set forth in claim 7 further characterized by the provision of an insulated carrier disc for the contactor and by which the contactor is drivingly connected with the arms; and a compression spring reacting between said carrier disc and the detent plate to yieldingly urge the same apart.

9. The switch set forth in claim 3 further characterized by the fact that said detent means comprises cooperating stationary and movable elements, one of said cooperating elements having elevations and depressions, and the movable element being mounted on the driver, between the contactor and the stationary element of the detent means, to turn with the driver; a compression spring engaged between the movable element of the detent means and the contactor, said spring providing contact pressure for the switch and serving to hold the elements of the detent means in cooperative relation, and said detent means providing a declivity leading from an elevation in the second switch "on" position to a depression in the first switch "on" position and sloped in the direction to partly relieve the force of the compression spring during movement of the contactor from its second to its first switch "on" position so that said compression spring coacts with the torsion spring to rotate the contactor from its second to its first switch "on" position.

10. The switch set forth in claim 9 further characterized by the fact that the stationary element of the detent means comprises a plurality of rollers, and the movable element of the detent means comprises a stamped disc having a generally undulating rim shaped to provide the detents, said disc riding upon the rollers and having holes in which parts of the driver are received to provide a slidably splined driving connection between the disc and said driver.

11. In an electric switch having a substantially cup-shaped housing, a contactor rotatable on the axis of the housing into and out of engagement with stationary contacts on the housing, and a driver connected with the contactor and projecting through the bottom wall of the cup-shaped housing to provide for actuation of the contactor, detent means for defining a plurality of positions of the contactor, said detent means comprising: a detent plate splined to the driver to rotate therewith while being free to slide axially therealong toward and from the bottom wall of the cup-shaped housing; a series of circumferentially spaced rollers partially edgewise received in loose fitting cavities in the bottom wall of the cup-shaped housing so that their peripheries have sliding engagement with the bottoms of said cavities, said cavities positioning the rollers for rotation on axes substantially radial to the housing axis; spring means acting on the detent plate to urge the same toward the bottom wall of the housing; and an undulating rim on said detent plate held pressed against the exposed peripheries of the rollers by said spring means.

12. The electric switch set forth in claim 11 wherein said rollers are annular; and further characterized by the fact that each of the rollers is loosely held in its cavity by a tit on the housing struck inwardly into the central aperture of the roller.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,641,352	Norviel	Sept. 6, 1927
1,746,887	Douglas	Feb. 11, 1930
1,922,449	Norviel	Aug. 15, 1933
2,062,440	Beal	Dec. 1, 1936
2,170,154	Moore	Aug. 22, 1939
2,441,808	Fry	May 18, 1948