Dec. 1, 1936. F. BEAL 2,062,440

COMBINED IGNITION AND STARTER SWITCH

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Fig. 1.

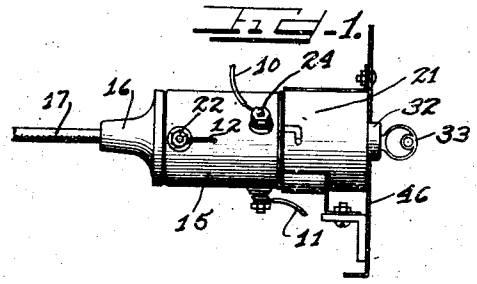


Fig. 4.

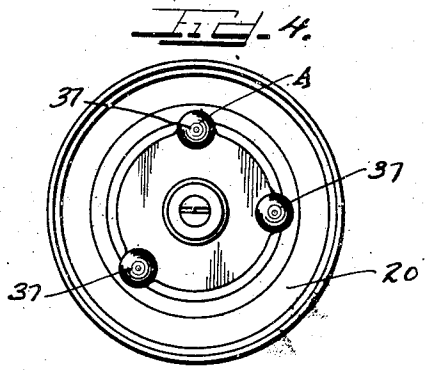


Fig. 2

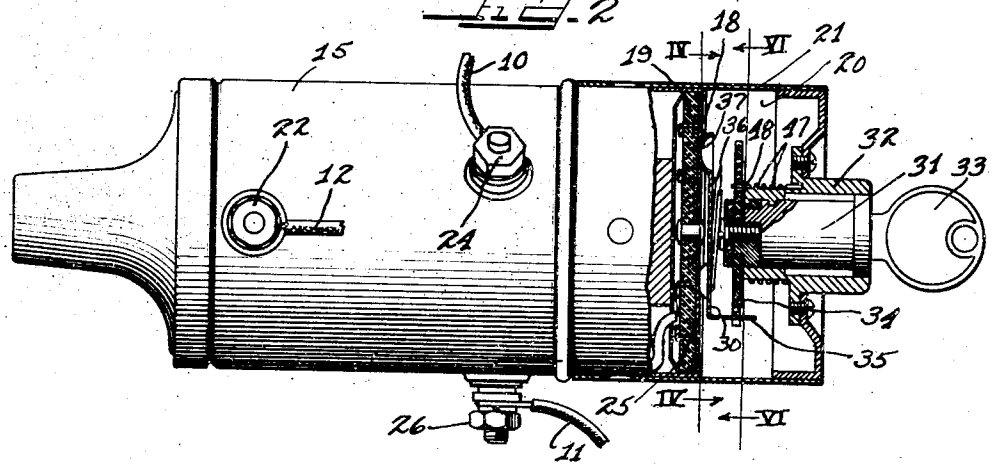


Fig. 5.

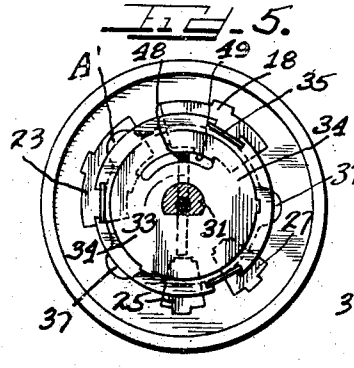


Fig. 6.

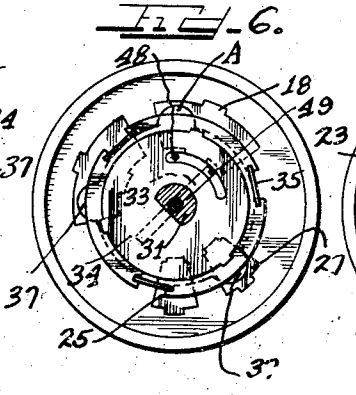
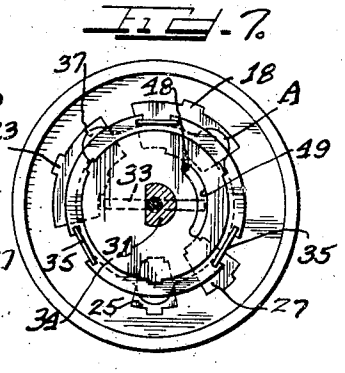


Fig. 7.



Inventor

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Fig. 8.

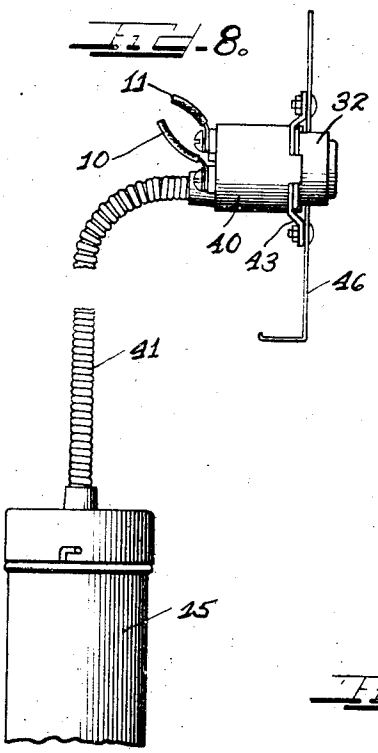


Fig. 3.

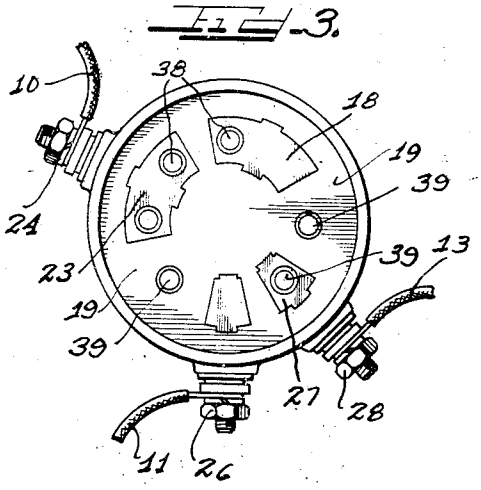


Fig. 9.

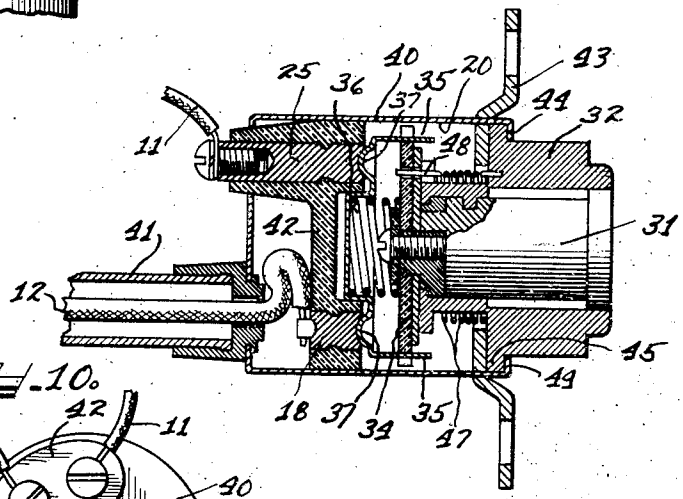
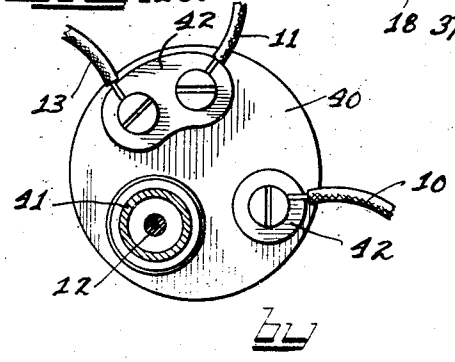


Fig. 10.



Inventor
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Atty.

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UNITED STATES PATENT OFFICE

2,062,440

COMBINED IGNITION AND STARTER SWITCH

Fay Beal, Kokomo, Ind., assignor to Kingston Products Corporation, Kokomo, Ind., a corporation of Indiana

Application July 26, 1934, Serial No. 736,975

1 Claim. (Cl. 200—44)

This invention relates to an improved locking switch for controlling the ignition and starter circuits of an internal combustion engine, such as is used in automotive vehicles.

It is an object of this invention to combine the ignition and starter switches under a single key operated control in such a way that one movement of the key closes both circuits and upon release of the key the starter circuit is opened, while the ignition switch remains closed until such time as the key is manually returned to its locked position. With such an arrangement the operator can hold the key in the starting position until the engine begins to fire and upon releasing the key, the starter circuit is deenergized for normal operation of the engine. By operating both circuits from a single key operated switch, the effectiveness of the lock is greatly increased, as it becomes much more difficult to wire around the locked switch, the difficulty being greatly increased by providing a multiple contact switch in a single casing wherein a single contact member selectively or simultaneously closes circuits to two or more instrumentalities.

It is a further object of this invention to provide an improved switch of the class described wherein the more essential circuits are housed in such a way that wiring across the various exposed terminals will not energize the ignition circuit. I have accomplished this result in different ways in the disclosed embodiments of this invention, in one form by building the high tension coil of the ignition system into a housing secured to the switch housing, and in the other form by armouring the lead from the switch to the primary terminal on a separate ignition coil, so that in either case the circuit to the breaker cannot be completed through the ignition primary coil except by key operation of the switch.

It is another object of this invention to provide a multiple contact key operated switch of the class described wherein a series of circuits can be automatically and sequentially controlled by a single operation of the key.

It is also an object of this invention to provide an improved switch controlling both the ignition and starting circuits of an internal combustion engine in such a way that both circuits will be locked against energization by the removal of a single key the insertion of which permits the closing of the ignition circuit alone or the simultaneous closing of both the ignition and starting circuits.

It is a further object of this invention to provide a lock controlled multiple switch of the class described wherein not only the ignition and starting circuits, but also auxiliary circuits for other control or indicating devices can also be controlled or energized by the movement of the lock mechanism.

It is another object of this invention to provide an improved and simplified multiple switch of the class described which can be economically manufactured either as a unit with the ignition coil or separately therefrom should it be desired to mount the latter adjacent the engine with the switch at a control point.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

This invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is an elevation of a combined ignition coil and switch embodying the features of this invention, the unit being shown as mounted behind a dash or control panel with the lock cylinder projecting therethrough.

Figure 2 is an enlarged view corresponding to Figure 1, partly broken away to show a section of the switch of this invention in its running position.

Figure 3 is a plan view of the stationary switch contacts carried by the coil element, the cover, lock, and switch mechanism having been removed.

Figure 4 is a section on the line IV—IV of Figure 2 showing the moving switch contact member in elevation.

Figures 5, 6, and 7 are sections corresponding to the line VI—VI in Figure 2 showing the different switch positions corresponding to "off", "running", and "start" respectively.

Figure 8 is an elevation of another form of this invention wherein the ignition coil is separate from the switch housing.

Figure 9 is a central vertical section in a plane parallel to Figure 8.

Figure 10 is a view of the back of the switch housing of Figures 8 and 9.

As shown on the drawings:

The switch of this invention is shown in both views as having a battery connection 10 which is connected through the switch to a starter connection 11, ignition coil primary connection 12, and gas gage or auxiliary control connection 13. While it is believed to be unnecessary to trace such connections, it may facilitate matters to mention that in the usual automotive circuits one bat-

tery pole is grounded so that the various connections from the switch extend to the items mentioned and are grounded after performing their functions. In the case of the coil primary, the circuit includes a circuit breaker or timer operated by the engine; and the starter circuit energizes a starter relay to avoid carrying the heavy starting current through the switch. The gas gage connection 13 is made only while the engine is running and therefore automatically conserves the battery. This connection may also be used for other services if desired, with an additional switch in series if the particular service is not always required while the engine is running, as in the case of windshield wipers, head, side, tail, and dash lights and other electrically controlled devices, including electrically controlled door locks such as are disclosed in my prior Patents Nos. 1,901,548 and 1,901,721, where if desired the secondary locks could be unlocked only while the engine was running.

In the first disclosed form of this invention, an ignition coil 14 is enclosed in a case 15, a high tension push type terminal 16 being provided for a high tension cable 17 leading to the distributor on the engine. Such a coil has primary and secondary windings, one end of the primary winding being connected to a stationary terminal 18 on an insulated base 19 separating the coil from the switch compartment 20 formed in a cover 21 for the open end of the case 15. The other end of the primary coil is connected to a binding post 22 from which the connection 12 leads to the engine circuit breaker. One end of the secondary or high tension coil is grounded, and the other end connected to the terminal 16 previously mentioned. Other stationary terminals are provided on the insulated base 19, one terminal 23 being connected to a binding post 24 to which the battery connection 10 is made, another terminal 25 being connected to a post 26 with the starter connection 11 applied thereto to energize a starting relay, and a fourth terminal 27 connected to a post 28 on which the connection 13 is made for an electric gas gage and/or other electrical devices to be controlled. The various stationary terminals are best shown in Figure 3, being arranged in a circle in such a way that a three point moving switch armature 30 will selectively engage the terminals as will be later described in connection with Figures 5, 6, and 7.

The switch mechanism comprises a cylinder type of lock 31 released from its inclosing barrel 32 by the insertion of a proper key 33. The lock cylinder 31 has an insulating disc 34 secured to its inner end which disc engages upstanding lugs 35 carried by the switch armature disc 30, which latter is yieldingly urged against the stationary terminals by a spring 36. The moving armature disc is provided with three cup like projections 37 which make actual contact with the stationary terminals, and complementary cups 38 are formed in certain of the terminals into which one or more of the projections 37 drop to give a slight catch or snap action at the three positions of the switch. Additional cups 39 may also be provided in the insulating base 19. The cups 38 and 39 are so arranged as to engage all of the projections 37 in each of the off and running positions, and one of the projections in the starting position in order to prevent vibrations or jars from affecting the switch. For convenience in what follows, the topmost projection 37 on the moving armature, in Figure 4, will be indicated by the letter A in Figures 5, 6, and 7 in order to more clearly indicate the position of the moving contact member. The head of the key is shown in dotted lines in these figures for the same reason.

In the second form of the invention as shown in Figures 8 to 10, the coil case 15 is separate from a switch housing 40, the primary connection 12 leading from the primary contact 18 to the coil through an armoured flexible conduit 41. The switch mechanism is substantially identical with that already described, the differences arising from the construction of the stationary contacts as inserts in a molded plastic base 42 which can be inserted into the housing 40 from the right in Figure 9, a mounting bracket 43 being assembled between the lock barrel 32 and the insulating disc 34, and the switch assembly then slipped into the housing with ears 44 on the housing projecting through slots in the bracket 43 and being turned over the edge of a collar 45 on the lock barrel.

When mounted, only the lock barrel projects through the dash or control board 46, as shown in Figures 1 and 8.

The operation of both switches is identical and best shown by a comparison of Figures 5, 6, and 7, where the lock mechanism has been omitted, although the key head is shown superimposed thereon. In these figures the insulating disc 34 appears above and partially obscures the armature 30 which in Figure 5, with the key vertical, has that projection 37 which is marked A lying on the battery contact 23, the other two projections resting in the cups 39 on the insulating base 19 between the other contacts thereon so that all circuits are open. When the key is turned 45 degrees to the position of Figure 6, the projection A moves over to the primary contact 18, one of the other projections 37 rests in the cup 38 on the gas gage contact 27 and the third projection drops into the lower cup 39 on the battery contact 23. In this position the switch is positioned for normal running of the engine, and it will be noted that the starter circuit is open.

When the key is turned a further 45 degrees to the position of Figure 7, the second mentioned projection 37 on the armature shifts from the gas gage contact 27 to the starter contact 25, the other two projections remaining on the elongated primary and battery contacts.

In this position, only one of the projections 37 on the armature drops into a cup 38, the upper one on the battery contact in Figure 3. This makes the starter contact less rigid in order to enable a torsion spring 47 to return the switch and armature to the mid position of Figure 6, when the key is released. In order to prevent this torsion spring from returning the key mechanism to the off position, the working end 48 of the spring engages a slot 49 in the insulated disc 34, the slot being so arranged that the key movement from Figure 5 to Figure 6 does not bring the spring into action. Further movement to the position of Figure 7 picks up the torsion spring, so that in the operation of the switch to start an engine the operator turns the key 90 degrees from the position of Figure 5 to that of Figure 7, thus energizing both the ignition and the starter circuits. The key is held in this position until the engine begins to fire, whereupon the operator merely releases the key, allowing the spring 47 to return the switch mechanism to the running position of Figure 6, which automatically cuts out the starter circuit and engages the supplementary contact 27.

It will thus be seen that I have invented an

improved safety switch for the purposes described, wherein a key released lock serves to control both the ignition and starter circuits and cuts out the starter circuit upon release of the key, the operation of starting the engine being analogous to the operation of the usual type of foot switch in that the operator releases the key when the engine begins to fire.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention and I, therefore, do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

I claim as my invention:

An electric switch having a rotatable member movable between "off", "running" and "starting" positions, an operating key attachable to and detachable from the member only in the "off" position, an insulating member providing a smooth working surface and carrying a plurality of spaced-apart conducting members having ends recessed adjacent said working surface, a spring-pressed conducting armature having a plurality of cup-shaped projections adapted to slide on said working surface and to enter the recessed ends of said conducting members and movable with said rotatable member, a spring arranged opposing movement of said rotatable member only when said rotatable member is being turned from the "running" to the "starting" position, only one of said cup-shaped projections being in engagement with a recessed conducting member when the switch is in the "starting" position to facilitate return of the switch to the "running" position by said spring when the key is released, and a plurality of said cup-shaped projections being in engagement with a plurality of said recessed conducting members in the "running" position.

FAY BEAL.