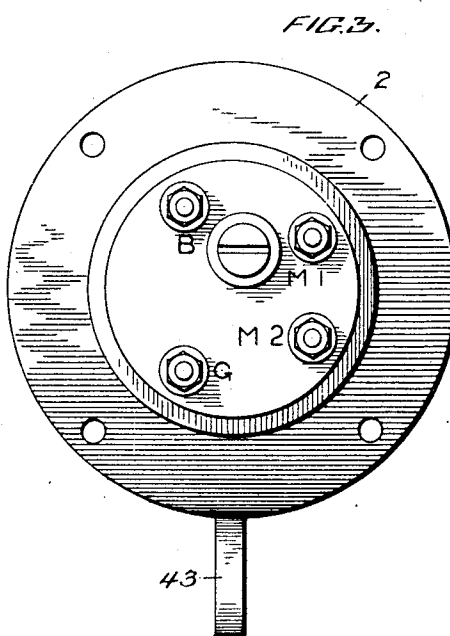
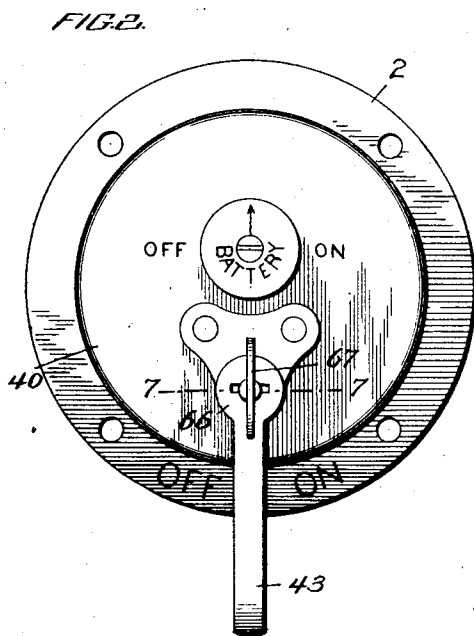
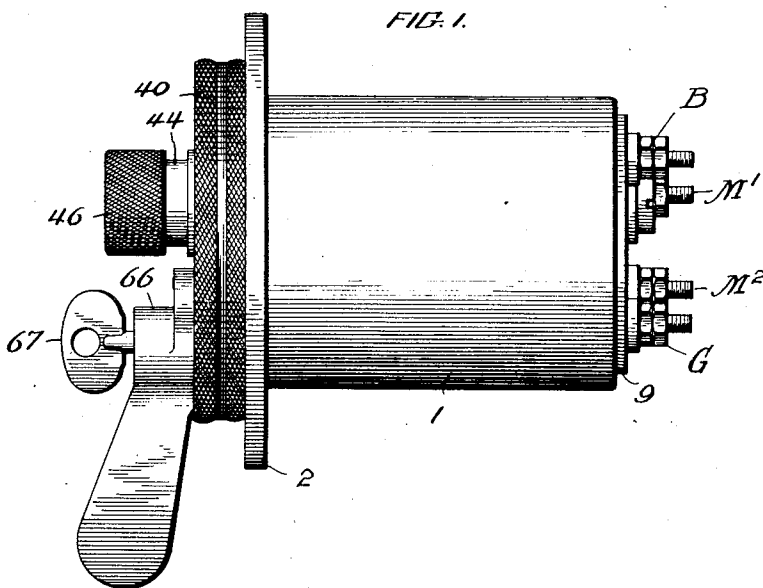


G. W. WACKER.
STARTER SWITCH FOR DUAL IGNITION SYSTEMS.
APPLICATION FILED DEC. 20, 1912.

1,089,167.

Patented Mar. 3, 1914.

4 SHEETS—SHEET 1.



WITNESSES
H. F. Kyle
R. H. Barry

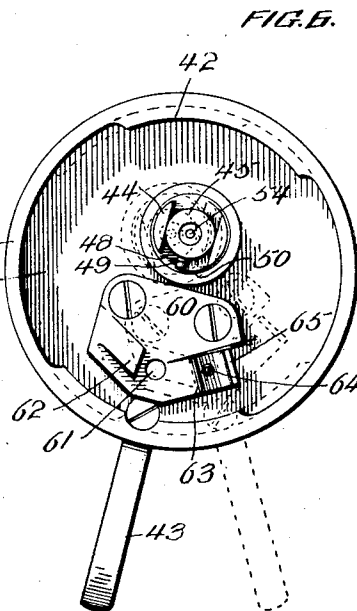
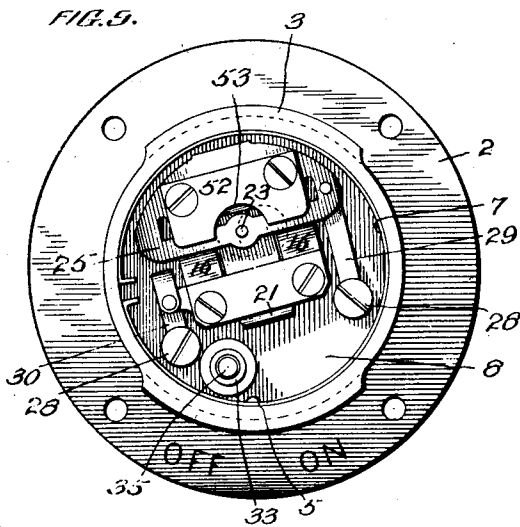
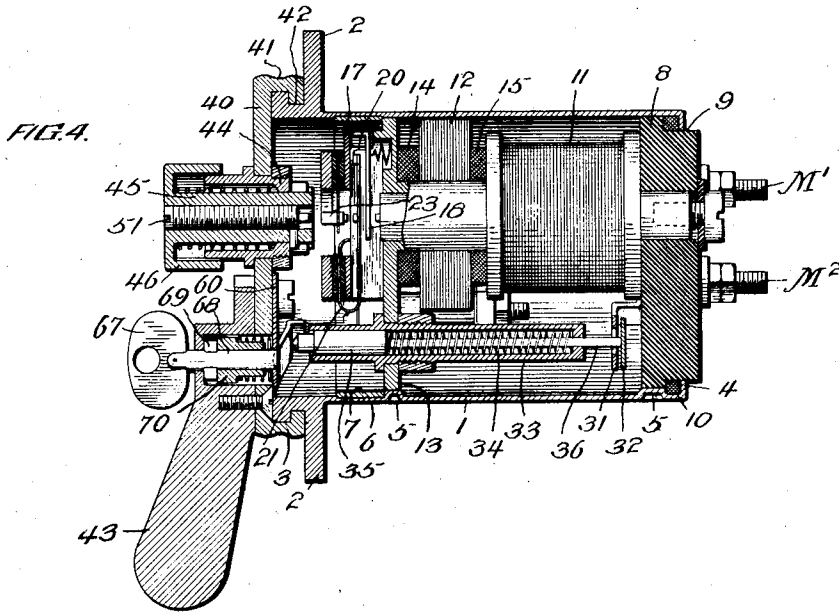
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By Whitaker & Prevor Attorneys

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4 SHEETS—SHEET 2.



WITNESSES
W. F. Doyle
Robt. E. Barry

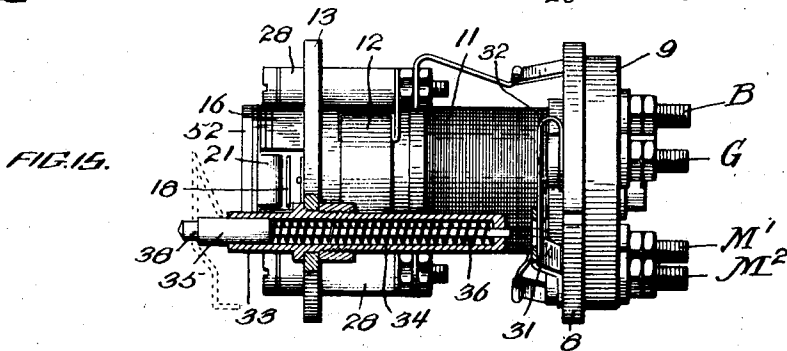
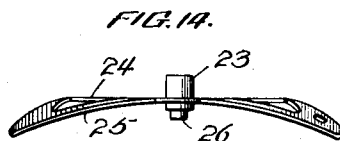
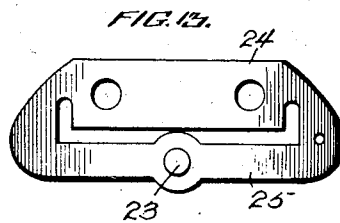
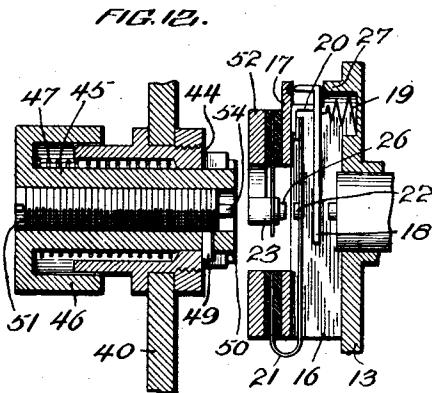
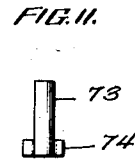
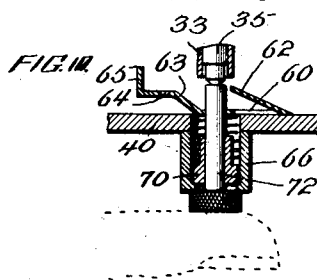
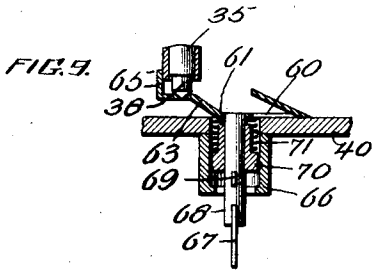
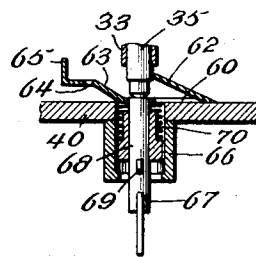
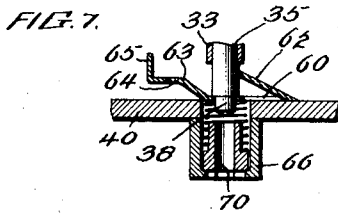
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4 SHEETS—SHEET 3.



WITNESSES

H. F. Kaye
Robt. E. Barry

INVENTOR

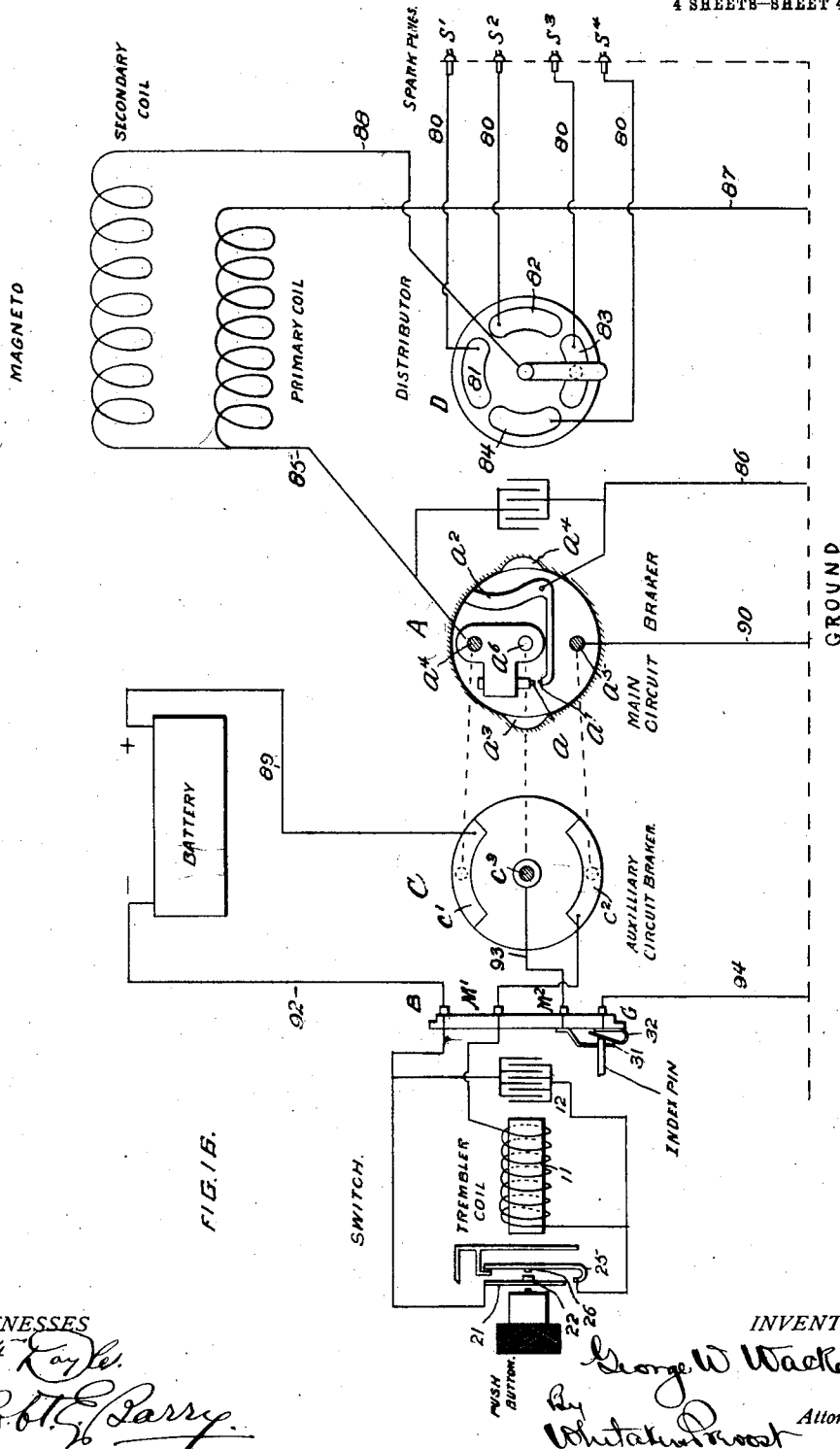
George W. Wacker
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G. W. WACKER.
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 APPLICATION FILED DEC. 20, 1912.

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Patented Mar. 3, 1914.

4 SHEETS—SHEET 4.



UNITED STATES PATENT OFFICE.

GEORGE W. WACKER, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO THE SIMMS MAGNETO COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

STARTER-SWITCH FOR DUAL IGNITION SYSTEMS.

1,089,167.

Specification of Letters Patent.

Patented Mar. 3, 1914.

Application filed December 20, 1912. Serial No. 737,888.

To all whom it may concern:

Be it known that I, GEORGE W. WACKER, citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Starter-Switches for Dual Ignition Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the novel features hereinafter described, reference being had to the accompanying drawings, which show an embodiment of the invention selected by me for purposes of illustration, and the said invention is fully disclosed in the following description and claims.

Referring to the said drawings:—Figure 1 represents a side elevation of a starter switch embodying my invention and selected by me for the purpose of illustrating the same. Fig. 2 is a front end elevation of the switch. Fig. 3 is a rear end elevation of the same. Fig. 4 is a vertical longitudinal sectional view of the switch. Fig. 5 is a front end elevation with the cover removed showing in dotted lines the position of the push button on the cover in the "on" and "off" positions. Fig. 6 is a view of the cover taken from the inside showing in dotted lines the position of the locking pin on push button stem when in locked position and also showing in dotted lines the location of the index pin when the cover is in locked position. Fig. 7 is a partial section on line 7—7 of Fig. 2 showing the switch locked in "off" position by the index pin. Fig. 8 is a similar view showing key in position to release the index pin. Fig. 9 is a similar view showing the switch in the "on" position. Fig. 10 is a view similar to Fig. 7 showing the ejector pin in position to permit the cover to be rotated so as to release the interlocking devices which secure it to the shell or casing. Fig. 11 is a detail of a part which may be permanently inserted in the key aperture to prevent the locking of the switch and obviate the necessity of using a key in order to throw the switch into the "on" position. Fig. 12 is a detail sectional view of the push button, the movable contact piece with its supporting spring, and the trembler.

Fig. 13 is a plan view of the movable contact piece and its supporting spring detached. Fig. 14 is an edge view of the same. Fig. 15 is a sectional detail showing the switch mechanism removed from the shell and cover and illustrating the relation of the index pin to the circuit breaker for the ground connection of the magneto circuit. Fig. 16 is a diagram of the circuits including the magneto, battery or accumulator, switch and spark plugs.

The object of my invention is to provide a starter switch for use especially in connection with explosive engines in automobiles and other motor propelled vehicles, in which a battery or accumulator is employed for starting the motor, and it comprises the novel features of construction and operation hereinafter more fully set forth.

In the embodiment of the invention selected by me for the purpose of illustrating the invention, and which is shown in the accompanying drawings, the mechanism advantageously comprises three parts, to wit; a shell or casing adapted to be secured to an appropriate part of the vehicle and usually in a horizontal position; a compact interior unit carrying an electric coil, a condenser, a circuit breaker, binding posts for the electrical connections, an electric trembler, a movable contact cooperating therewith and an index pin, a cap or cover rotatably mounted upon the casing and provided with a push button and with devices cooperating with the index pin, an operating handle for rotating the cover and a key receiving aperture.

In the drawings, 1 represents the shell or casing which is of cylindrical form open at both ends. At the front end the casing is provided with an exterior flange, 2, which is provided with suitable screw holes for enabling it to be secured to a part of the vehicle, as the dash of an automobile. The front end of the casing projects beyond the said flange and is provided with lateral projecting portions 3 segmental in form which interlock with inwardly extending projections on the rim of the cover in a well-known way to secure the cover in position on the front end of the casing while permitting it to be rotated a short distance in either direction without disengaging said interlocking projections. At its rear end

the casing is provided with an inwardly extending flange, 4, for retaining the internal unit hereinafter described in the casing. Said casing is also provided on the interior of its cylindrical wall with inwardly projecting lugs, 5, in this instance formed conveniently by indenting the wall of the casing, the said projections being adapted to register with certain recesses in the frame portions of the internal unit hereinafter described, for the purpose of positioning the said unit in the casing, in assembling the parts of the device. The casing is also provided adjacent to its front end with an internal annular groove, 6, to receive a spring locking ring, 7, said ring being cut at one point so that its ends, which are bent inwardly to facilitate its insertion, may be drawn together and held until the ring is in line with said groove, when the expansion of the ring will seat it in the groove. The said ring is adapted to engage the outer frame part of the internal unit as hereinafter described and hold the same firmly in place in the casing.

The interior mechanism of the switch, which, for convenience, I have termed the internal unit is so constructed that all the parts are firmly united and held from jar or vibration and the interior parts of the switch can, therefore, be assembled entirely independently of, and afterward inserted in the casing. The said unit is shown in elevation detached in Fig. 15, and in section within the casing in Fig. 4. The said unit comprises the following parts:—8 represents the rear supporting plate formed of insulating material, such as fiber or vulcanite, of such size as to fit the casing, and is provided with a positioning notch to engage one of the lateral projections, 5, on the inside of the casing before referred to. The insulating plate, 8, is provided with four binding posts lettered B, M¹, M², G. The said plate is also provided with an annular cutaway portion, 9, to receive a felt washer, 10, which lies between the shoulder so formed and the end flange, 4, of the casing. Secured to the plate 8 is an electromagnet, 11, upon the pole of which is mounted a condenser, 12, surrounding the same and the pole piece also carries a circular metallic guide plate, 13, adapted to fit the casing and provided with a positioning notch to engage the other internal projection, 5, of the casing, the whole structure being firmly connected. The felt washers, 14 and 15, being inserted above and below the condenser to prevent any possible vibration thereof which would tend to impair the electric connections. The circular plate, 13, which I term the front plate of the switch unit is provided with a pair of parallel bosses, 16, see Fig. 12, upon which is mounted a cross plate, 17, having a notch in its lower face to receive a vertically dis-

posed part of the armature lever, 18, said lever being held in raised position by a spring, 19, and being provided with a hook portion, 20, to engage the upper face of a spring contact strip, 21, mounted upon but insulated from the bosses, 16, and carrying a platinum contact point, 22. Above the contact, 22, is a vertically movable stud, 23, carried by and extending through a spring plate of peculiar form illustrated in detail in Figs. 13 and 14. This spring plate is divided longitudinally by a slot as shown in Fig. 13, the outer portion, 24, being adapted to be clamped rigidly between plates secured to the bosses, 16, and insulated from said plates and the inner portion, 25, carrying the stud, 23. The end portions of the spring plate are bent down as shown in Fig. 14 so that the portion 25 of the spring assumes a curved position and a downward movement of the stud causes a slight expansive or lateral strain on the plate at each end; thus forming a very quick acting spring and also guiding the stud so that it moves vertically without twisting. The lower end of the stud, 23, carries a platinum point, 26, normally separated from the contact point, 22. When the push button is pushed in as hereinafter described it engages the stud, 23, and forces the contact, 26, against the contact, 22, closing the circuit through the trembler, and the circuit will then be caused to make and break rapidly by the oscillations of the vibrating armature, 18. The plate, 13, is also provided with a projection, 27, beneath the heel of the armature lever, 18, but not normally in contact therewith, the function of said projection being to prevent the angular portion of the lever 18 from being accidentally disengaged from the notch in the plate 17 in case of unusual jar to the apparatus. The plate 13 also carries binding posts, 28, insulated therefrom, one of said binding posts being connected at its outer end by a strip, 29, with the spring plate 25 and at the other end with the binding post B, the other binding post, 28, being connected by a strip 30 to the spring arm, 21, at its outer end and to the coil, 11, at its inner end, and both of said binding posts are connected with the condenser. The binding post M¹ is connected to the other end of the coil and the binding posts M² and G are connected to contacts, 31 and 32, for grounding or short circuiting the primary coil of the magneto. Contact 31 which is a fixed contact is provided with an aperture therein and the spring contact 32 engages the lower face of the fixed contact 31, see Fig. 15. The front frame plate is provided with a sleeve rigidly secured thereto in line with the aperture in the contact 31, the said sleeve, 33, having a reduced guiding aperture in its lower end, and in said sleeve is mounted the spring actuated index pin, 35,

which fits the upper end of said sleeve and is provided with an elongated stem, 36, extending through the reduced aperture at the lower end of the sleeve, which stem is adapted to extend through the aperture in contact 31 and engage the spring contact 32 to separate said contacts as indicated in dotted lines in Fig. 15 when the switch is in the "on" position as hereinafter more fully described. The index pin is normally pressed in a direction toward the cap or cover by means of a spring, 34, within the sleeve surrounding the stem 36 thereof. In placing the switch unit just described in the casing it will be forced inward so as to compress the felt washer, 10, when the spring retaining ring 7 is slipped into its recess, 6, in the casing, thus firmly holding the unit in position therein.

40 represents the cap or cover which is provided with an annular flange, 41, the inner face of which is provided with inwardly extending segmental locking flanges, 42, to interlock with the flanges 3 on the casing as before described. The peripheral edge of the cap is preferably provided with milled portions to facilitate handling the same. The cap plate is also provided with a depending lever, 43, for oscillating the plate so as to throw the switch mechanism into the "off" or "on" position. The cap plate, 40, also carries a push button which is disposed eccentrically with reference to the plate and is normally held outward or in inoperative position by a spring. In this instance the cap plate is provided with a sleeve, 44, extending through an aperture in the plate, 40, and having its interior diameter enlarged on the outer side of the plate. The push button comprises a stem, 45, mounted in said sleeve and provided with a milled head, 46, which is internally recessed to fit over the exterior portion of the sleeve, 44, a retracting spring 47 being inserted in the recessed end of the sleeve between it and the head 46 and surrounding the stem 45. The inner end of the sleeve is provided with a notch or recess, 48, to receive a laterally projecting stud, 49, secured to the stem of the push button and said sleeve is also provided with a locking shoulder, 50, at such a distance from the bottom of the recess, 49, that when the push button is pressed inwardly to its full extent it may be slightly rotated to bring the locking pin, 49, into engagement with the locking shoulder, 50, as shown in dotted lines in Fig. 6 so as to hold the push button in its rearmost position for obviating the necessity of retaining the finger in engagement therewith. This is of advantage in case it becomes necessary to crank the engine in starting. I prefer to provide the stem of the push button with a central longitudinal aperture in which is located a screw, 51, carrying at its

inner end a fiber tip, 54, which is in position to engage the stud, 23, but is located just inside of the central bore so as to protect it from possible injury. By reference to Fig. 5 it will be seen that the metal plate, 52, which holds the spring plate 24, 25, carrying the stud 23, in position is provided with a curved or semi-circular recess, 53, surrounding the stud 23, and this recess is of substantially the same size as the stem of the push button, so that the plate 52 will offer no resistance to the inward movement of the push button when the cover plate has been moved to the "on" position. When the cover plate is moved to the "off" position, the push button being eccentrically mounted in the plate will be carried slightly to one side of the position which it occupied in the "on" position, hence it is impossible to operate the push button as the stem thereof will strike the plate, 52, if it should be moved inward. Moreover, if the operator should have pressed in the push button when the switch was in the "on" position and slightly rotating it has locked it in that position, it will be impossible to throw the switch into the "off" position without first releasing the push button from its locked position for the reason that the stem of the push button will engage the recess, 53, in the plate, 52, and prevent the cover plate from being turned until the push button is released. This prevents the possibility of the operator forgetting to release the push button when throwing his switch off and the exhaustion of the battery which would otherwise ensue. The switch mechanism is also provided with means co-operating with the index pin for definitely locating the "on" or "off" positions of the cover and switch, and with means for locking the cover in the "off" position and also for normally preventing the rotation of the cover to such an extent as to disengage the interlocking projections, 42 and 3 of the cover and casing.

In the embodiment of my invention herein shown I have provided on the inner face of the cover a stamping, 60, which is secured thereto by screws passing through the cover plate and engaging the shift lever, 43, said stamping comprising a plate provided with an aperture, 61, on one side of which is located an inclined struck-up locking projection 62, and on the other side of which is an inclined arm, 63, provided with a shallow recess, 64, and with an upturned end 65, constituting a stop. The cover plate is provided with an aperture in line with the aperture 61 and I prefer to form this aperture in a boss, 66, in the casting forming the shifting lever, 43, the said boss having a key aperture extending longitudinally there-through to receive a key, 67, provided with a cylindrical stem, 68, and lateral retaining

wings, 69. The boss is also provided internally with a longitudinally movable sleeve 70 pressed outwardly by a spring, 71, so that the key may be forced inwardly against said sleeve and turned to bring its lateral projections, 69, in rear of solid portions of the boss so as to retain the key in its inner position as shown in Fig. 4. When the key is in its inner position, the inner end thereof will fill the aperture, 61, in the plate 60 and the inner end of the key is preferably provided with a slight recess to engage the end of the index pin, 35, which is pointed as shown. When the parts are in normal position and the switch is in "off" position the reduced portion 38 at the end of the index pin will enter the aperture 61 as shown in Fig. 7 and positively lock the cover plate in the "off" position, in which position the reduced stem of the index pin will have released the movable contact, 32, and permitted it to resume its engagement with the fixed contact, 31, thus short circuiting the primary coil of the magneto. When the key, 67, is inserted the end of the key will force the index pin 35 inwardly, see Fig. 8, and hold it in that position, the recess in the end of the pin serving as an index recess in conjunction therewith. The cap plate may now be rotated by moving the shifting lever to the right until the index pin engages the index recess, 64, in the arm 63, the inclined portion of the arm 63 up which the index pin is forced to travel serving to force the index pin farther inwardly against its spring and causing the stem, 36, of the index pin to engage the movable contact 32 and separate it from contact 31 thus breaking the short circuit of the primary winding of the magneto and placing the ignition system in condition to be operated either by the battery or the magneto as hereafter described. It will be noted that when the parts are in the position just described, the forward end of the sleeve, 33, in which the index pin is mounted will come in contact with the projection 65 of the plate 60, which acts as a stop to prevent any further movement of the cap plate in that direction. It will be noted by reference to Figs. 7 and 8 that when the index pin is in locking position or in engagement with the end of the key, the shoulder of the pin in rear of the index point will be in position to engage the struck-up locking projection, 62, or stop, and prevent the movement of the cap plate in the opposite direction, hence the cap plate cannot be moved under ordinary circumstances far enough in either direction to disengage its interlocking projections 3 and 42. When it is desired to remove the cap plate I employ what I term an ejecting pin for engaging the key receiving aperture in the boss, 66, as shown in Fig. 10. This ejecting pin, 72, has a stem similar to the stem of the

key but longer so that it will press the index pin inwardly to a position from which it will readily pass over the inclined locking projection 62. By inserting this pin, which may be held in place by the finger, the cap plate may be rotated past the index pin which will then travel down the inner face of the locking projection, 62, and the cap plate can then be turned far enough to enable the interlocking projections 42 and 3 to be disengaged and the cover to be removed from the casing. It will further be seen that by simply removing the spring ring or band, 7, the entire switch unit within the casing can be readily removed for examination or repair.

From the foregoing description it will be seen that assuming the switch to be in the "off" position and the key removed it will be firmly locked in such position by the index pin, Fig. 7, which in this position permits the contacts 31 and 32 to come together and short circuit the primary coil of the magneto. To start the engine the operator will insert his key and give it a half turn to secure it in position, the key forcing back the index pin, see Fig. 8, and releasing or unlocking the movable cap plate. The shifting lever of the switch will then be moved to the right into the "on" position, thereby causing the index pin to travel up the inclined plate 63 and be further pressed inwardly to separate the contacts 31 and 32 and break the short circuit of the primary coil of the magneto. The operator will then press in the push button thereby causing the trembler to operate as heretofore described and causing a series of sparks at the spark plug of the cylinder in which the next explosion should occur according to the position of the engine. This will ordinarily cause the engine to start without cranking. Should it be necessary to crank the engine, the operator can by giving the push button a slight twist catch the locking pin 49 on the shoulder 50 as before described and lock the push button in its inner position while he cranks the engine. After the engine is started the push button is released and the engine will continue to run on the magneto, the circuit through the battery being broken by the separation of the contacts 22 and 26. It will be noted by reference to Fig. 9 that after the key has been inserted and the switch thrown into "on" position, the key can be removed as the index pin is then in engagement with the inclined arm 63. This permits of the key being carried on a key ring, which is desirable, as a momentary use of the key to unlock the switch is all that is required. Some users of devices of this kind may, however, prefer to dispense with the use of a key altogether, and, in such cases, we provide a device for eliminating the locking feature without in any way al-

tering the mechanism. To this end we provide a dummy key which is illustrated in detail in Fig. 11, comprising a stem, 73, provided with wings, 74, and being in effect a facsimile of the key 67 without the handle. This dummy key is inserted in the boss, 66, between the outer end of the boss and the spring actuated sleeve, 70, before the shifting lever is applied to the cap plate so that it remains at all times in that position, and, therefore, holds the index pin from ever passing through the aperture, 61, in the plate 60 thus dispensing with the locking feature. Obviously this dummy key can be removed at any time by detaching the shifting lever and replacing it, in case it was afterward desired to use the locking feature and the key in connection with the device.

It will be noted in connection with the index pin that it serves a number of functions, to wit, as an index pin in connection with the recess 64 and the recess in the end of the key, as a lock for the cap or cover plate in conjunction with the aperture 61 and also through its reduced stem at the rear end to separate the contacts 31 and 32, thus greatly simplifying the construction, insuring its accurate operation and reducing the cost of manufacture.

In Fig. 16 I have illustrated diagrammatically the wiring system in which this improved switch is employed including the battery, the magneto and the spark plugs. The magneto is preferably a high tension magneto of the well known Simms type, although other forms of magneto may be employed with this switch. In connection with this switch the magneto is provided with what I term an auxiliary circuit breaker which performs the double function of maintaining the correct polarity of the armature core of the magneto when energized by the external source of electricity, as the battery, and also being so timed with respect to the main circuit breaker for the primary circuit of the magneto as to maintain the circuit through the battery open when the main circuit breaker contacts are closed and vice versa.

In Fig. 16 S^1 , S^2 , S^3 and S^4 indicate the spark plugs which are connected by separate wires, 80, with segments 81, 82, 83 and 84 on the distributor D which is provided with the usual rotating brush, d , connected with the secondary coil of the magneto and adapted to pass over the segments of the distributor. A represents the main circuit breaker provided with a fixed contact, a , and provided with a movable contact a' , carried by a pivoted lever, a^2 , having a heel portion in engagement with the interior annular surface of the casing connected with the oscillating timing lever, said ring or casing having recesses a^3 , a^4 , usually at diametrically opposite points for permitting

the contacts a and a' to come together. The particular construction of this main circuit breaker is not material to my present invention. The auxiliary circuit breaker or commutator, C, comprises a stationary plate provided with segments, c^1 and c^2 and a central brush, c^3 , which are engaged by rotating brushes, a^4 , a^5 , and a contact a^6 respectively, and for convenience in timing the auxiliary circuit breaker with the main circuit breaker these brushes and contact may be carried by the revolving part of the main circuit breaker as indicated in the drawing. The brushes a^4 and a^5 and the contact a^6 are connected to the part carrying the fixed contact a , and the two brushes a^4 and a^5 are insulated from each other, the relation of the brushes, a^4 a^5 to the recesses a^3 and a^4 being such that when the brushes a^4 a^5 are in engagement with the segments c^1 c^2 , the contacts of the main circuit breaker will be separated and vice versa. The brush a^6 being centrally located will always be in contact with the contact c^3 of the auxiliary circuit breaker. When the magneto is in operation the primary circuit thereof will be from the primary coil through a wire, 85, to the fixed contact of the main circuit breaker, thence through the movable contact to ground through wire 86, thence by wire 87 to the primary coil. The secondary current will pass from the secondary coil by wire 88 to the brush of the distributor, D, and from thence be transmitted to the spark plugs in succession in the usual manner. When the magneto is not in operation and it is desired to start the engine, the switch is placed in the "on" position as previously described and the push button is pressed in, when the battery circuit will be indicated as follows on the diagram, Fig. 16, to wit, from the battery by wire 89 to the segment c^1 of the auxiliary circuit breaker C, thence to the brush a^4 , thence by wire, 85, to the primary coil of the armature of the magneto which acts as an induction coil for the purpose of starting, thence by wire, 87, to ground. From ground by wire, 90, to the brush a^5 , thence to segment c^2 of the auxiliary circuit breaker, thence to binding post M' of the switch, thence to the trembler coil, 11, thence to spring plate 25 and contact 26, thence to contact 22 and spring 21, thence to binding post, b , and thence by wire, 92, to battery. The trembler will make and break the battery circuit through the primary coil of the magneto and cause a succession of sparks in the secondary or high tension circuit, which will be distributed by the distributor to the proper spark plug and cause an explosion which will start the engine. As soon as the engine is started the push button is released thus separating contacts 22 and 26 when the magneto will supply current to the distributor and spark plugs in the usual manner.

When the shifting lever is turned to the "off" position, as before stated, the index pin will pass forward into the locking aperture and permit contacts 31 and 32 to come together thus short circuiting the primary coil of the magneto through wire 93 to the brush c^3 , contact a^6 and wire 85, the binding post, G, being connected by wire, 94, to ground, and preventing the operation of the magneto for ignition purposes.

It will be noted in connection with this switch that it has but two positions, to wit, the "off" position in which neither the magneto or battery circuit can be operated and the "on" position in which either the magneto circuit or the battery circuit may be operated as desired. This eliminates the necessity for a third position and simplifies the general construction and operation of the switch.

The dual system herein shown and described in which my improved switch mechanism is employed is not specifically claimed herein, but is reserved in order that it may be covered by a subsequent application for patent.

What I claim and desire to secure by Letters Patent is:—

1. In a switch mechanism for ignition systems the combination with an electric trembler provided with a vibrating contact of a movable contact normally out of contact with the vibrating contact and a push button independent of the movable contact, provided with a part adapted to engage said movable contact and move it into engagement with said vibrating contact.

2. In a switch mechanism for ignition systems the combination with an electric trembler provided with a vibrating contact of a spring actuated contact normally held out of contact with the said vibrating contact, and a push button independent of the spring actuated contact, in line with said spring actuated contact for moving it into contact with the vibrating contact.

3. In a switch mechanism for ignition systems, the combination with an electric trembler provided with a vibrating contact, of a spring actuated contact normally separated from said vibrating contact, a shifting part movable transversely with respect to said spring actuated contact, a push button carried by said shifting part, and adapted to be moved therewith into and out of alinement with said spring actuated contact, and a stop for said push button located adjacent to said spring actuated contact for preventing the operation of said push button, when the shifting part is moved to carry the push button out of alinement with said spring actuated contact.

4. In a switch mechanism for ignition systems, the combination with an electric trembler provided with a vibrating contact, of

a spring actuated contact normally separated from said vibrating contact, a shifting part movable transversely with respect to said spring actuated contact, a push button carried by said shifting part, and adapted to be moved therewith into and out of alinement with said spring actuated contact, and means for preventing the operation of said spring actuated contact when said shifting part is moved to carry said push button out of alinement therewith.

5. In a switch mechanism for ignition systems, the combination with an electric trembler provided with a vibrating contact, of a spring actuated contact normally separated from said vibrating contact, a shifting part movable transversely with respect to said spring actuated contact, a push button carried by said shifting part, and adapted to be moved therewith into and out of alinement with said spring actuated contact, a plate adjacent to said spring actuated contact, provided with a recess registering with the stem of said push button when the latter is in operative position whereby said plate will engage the stem of the push button and prevent its operation when the shifting part is moved to carry the push button out of alinement with the spring actuated contact.

6. In a switch mechanism for ignition systems, the combination with an electric trembler provided with a vibrating contact, of a spring actuated contact normally separated from said vibrating contact, a shifting part movable transversely with respect to said spring actuated contact, a push button carried by said shifting part, and adapted to be moved therewith into and out of alinement with said spring actuated contact, a plate adjacent to said spring actuated contact, provided with a recess registering the stem of the push button, when in operative position, and means for locking said push button in its inner position, whereby the engagement of the push button stem and said recess will prevent the movement of said shifting part, until said locking means is released.

7. In a switch mechanism for ignition systems the combination with an electric trembler provided with a vibrating contact of a spring actuated contact normally held out of contact with the said vibrating contact, and a push button in line with said spring actuated contact for moving it into contact with the vibrating contact and means for locking said push button in its inner position.

8. In a switch mechanism for ignition systems, the combination with a casing, an electric trembler located within the same, and a part adapted to be engaged by a push button for closing the circuit through the trembler, a cap plate, mounted on said cas-

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ing and movable with respect thereto in a rotary direction, and a push button mounted in said cap, eccentrically thereto, and adapted to be moved into and out of operative relation with said part by the oscillation of said cap plate.

9. In a switch mechanism for ignition systems, the combination with a casing, an electric trembler located within the same, and provided with means for closing the circuit therethrough, of a cap plate mounted on said casing and movable with respect thereto in a rotary direction, a push button mounted in said cap plate, eccentrically to the axis of movement of said plate, and adapted to be brought into alinement with a part connected with said circuit closing means, and a stop for preventing the operation of said circuit closing means when said cap plate is moved to carry said push button out of alinement with said part.

10. In a switch mechanism for ignition systems, the combination with a casing, an electric trembler located within the same, and provided with means for closing the circuit therethrough, of a cap plate mounted on said casing and movable with respect thereto in a rotary direction, a push button mounted in said cap plate, eccentrically to the axis of movement of said plate and adapted to be brought into alinement with a part connected with said circuit closing means, a stop plate for said push button located adjacent to said circuit closing means, and provided with a recess to permit the passage of a part connected with said push button.

11. In a switch mechanism for ignition systems, the combination with a cylindrical casing of an electric trembler located therein and provided with a vibrating contact, a movable spring actuated contact normally held out of contact with the vibrating contact, a cap plate mounted to oscillate on said casing, a push button carried thereby and located eccentrically to said cap plate, a stop plate for said push button within said casing, provided with a recess adjacent to said movable spring actuated contact, to accommodate the stem of the push button, a locking pin on the push button, and a locking shoulder carried by said plate, adapted to be engaged by said pin to hold said push button in its inner position.

12. In a switch mechanism for ignition systems, the combination with a casing having a cylindrical portion and a cap plate engaging the same, said parts being provided with interlocking projections for connecting them while permitting relative rotary movement of the same, and locking means for normally preventing said parts from being disengaged, comprising a spring actuated pin carried by one of said parts and separated stops carried by the other

part for engaging lateral portions of said pin, circuit controlling devices in said casing and devices carried by said cap plate for operating the same.

13. In a switch mechanism for ignition systems, the combination with a casing having a cylindrical portion and a cap plate engaging the same, said parts being provided with interlocking projections for connecting them while permitting relative rotary movement of the same, and locking means for normally preventing said parts from being disengaged, comprising a spring actuated pin carried by one of said parts and separated stops carried by the other part for engaging lateral portions of said pin, one of said parts being provided with an aperture adjacent to said pin, to enable said pin to be retracted so as to pass one of said stops to permit disengagement of said interlocking projections, circuit controlling devices located within said casing and devices carried by said cap plate for operating the same.

14. In a switch mechanism for ignition systems, the combination with a casing having a cylindrical cap engaging portion, and a cap plate engaging the same, said parts being provided with interlocking projections, for connecting them while permitting relative rotary movement of the same, locking means for preventing the relative movement of said parts to such an extent as to disengage said interlocking projections, and means for automatically locking said cap plate rigidly with respect to the casing, and circuit controlling devices within said casing, and devices carried by said cap plate for operating the same.

15. In a switch mechanism for ignition systems, the combination with a casing having a cylindrical cap engaging portion, and a cap plate engaging the same, said parts being provided with interlocking projections, for connecting them while permitting relative rotary movement of the same, one of said parts being provided with a longitudinally movable spring actuated pin, and the other part being provided with stops located on opposite sides of said pin for limiting the relative movement of the said parts, one of said parts being provided with an aperture in line with said pin to permit the insertion of a tool for moving said pin out of operative relation with said stops.

16. In a switch mechanism for ignition systems, the combination with a casing having a cylindrical cap engaging portion, and a cap plate engaging the same, said parts being provided with interlocking projections, for connecting them while permitting relative rotary movement of the same, one of said parts being provided with a spring actuated, longitudinally movable pin, and the other of said parts being provided with

a locking aperture to receive said pin and positively lock said parts against relative movement, circuit controlling devices in said casing, and means for operating the same carried by said cap plate.

17. In a switch mechanism for ignition systems, the combination with a casing having a cylindrical cap engaging portion, and a cap plate engaging the same, said parts being provided with interlocking projections, for connecting them while permitting relative rotary movement of the same, one of said parts being provided with a spring actuated, longitudinally movable pin, and the other of said parts being provided with a locking aperture to receive said pin and positively lock said parts against relative movement, one of said parts being provided with an aperture in line with said pin to permit the insertion of a tool for withdrawing the pin from engagement with said locking aperture; circuit controlling devices within said casing and means for operating the same carried by said cover.

18. In a switch mechanism for ignition systems the combination with a casing having a cylindrical cap engaging portion, and a cap plate engaging the same, said parts being provided with interlocking projections, for connecting them while permitting relative rotary movement of the same, one of said parts being provided with a spring actuated, longitudinally movable pin, and the other of said parts being provided with a locking aperture to receive said pin to lock the parts from relative movement, and with stops located on opposite sides of said pin to limit the relative movement of said parts, when the pin is disengaged from said locking aperture, circuit controlling devices in said casing and means carried by said cap plate for operating the same.

19. In a switch mechanism for ignition systems, the combination with a casing having a cylindrical cap engaging portion, and a cap plate engaging the same, said parts being provided with interlocking projections, for connecting them while permitting relative rotary movement of the same, a circuit controlling device in said casing, a longitudinally movable spring actuated pin, located in said casing and having a part in operative relation with said circuit controlling device, and a part adjacent to said cap plate, said cap plate being provided with a locking aperture for engaging said pin, an external aperture communicating therewith to permit the insertion of a tool to release said pin, and an inclined operating part for engaging said pin when the cap plate is partially rotated, to effect the operation of said circuit controlling device.

20. In a switch mechanism for ignition systems, the combination with a casing having a cylindrical cap engaging portion, and

a cap plate engaging the same, said parts being provided with interlocking projections, for connecting them while permitting relative rotary movement of the same, a circuit controlling device in said casing, a longitudinally movable spring actuated pin, located in said casing and having a part in operative relation with said circuit controlling device, and a part adjacent to said cap plate, said cap plate being provided with a locking aperture for engaging said pin, an external aperture communicating therewith to permit the insertion of a tool to release said pin, and an inclined operating part for engaging said pin when the cap plate is partially rotated, to effect the operation of said circuit controlling device, and stops carried by said cover plate and located on opposite sides of said pin, for limiting the amount of relative movement between the cap plate and casing.

21. In a switch mechanism for ignition systems, the combination with a casing, a circuit controlling device in said casing, a spring actuated pin having a part in operative relation with said circuit controlling device, an electric trembler in said casing, and a circuit controlling device therefor located adjacent thereto, of a cap plate engaging said casing and movable with respect thereto in a rotary direction, a push button mounted in said plate eccentrically thereto and movable with said plate into and out of operative relation with the circuit controlling device for said trembler, said cap plate being provided with a locking aperture to receive said pin, said aperture extending to the exterior of the cover, and an inclined operating part carried by said cap plate for engaging said pin and moving it to operate its associated circuit controller, when the push button is brought into operative position.

22. In a switch mechanism for ignition systems the combination with a casing, of a cap plate engaging the same, and rotatable thereon, means for locking said parts against relative movement, including a spring actuated longitudinally movable pin, one of said parts having an aperture located in alignment with said pin, and extending to the exterior of said part, a removable part located in said aperture, for engaging said pin and preventing it from entering said aperture, circuit controlling devices in said casing and means carried by said cap plate for operating the same.

23. In a switch mechanism for ignition systems, the combination with a casing having a cylindrical portion, a cap plate fitting said cylindrical portion, said parts being provided with interlocking projections for holding them in engagement but permitting a limited relative movement of said parts without disengaging said projections, an

electric trembler located in said casing, a circuit closing device therefor, a separate circuit controlling device in said casing, a longitudinally movable spring actuated pin in said casing having a cap engaging portion, and a portion in operative relation with said circuit controlling device, said cap being provided with a locking aperture to receive said pin, stops on opposite sides of said pin for limiting the relative movement of the cap plate and casing when the pin is released from said locking aperture, a push button carried by said cap plate and located eccentrically thereto, for operating the said circuit closing device for the trembler and an inclined part on the cap plate for engaging said pin to effect the operation of the said circuit controlling device associated therewith.

24. In a switch mechanism for ignition systems the combination with an electric trembler provided with a vibrating contact, a spring plate provided with a longitudinally disposed slot, means for rigidly clamping portions of said plate on one side of said slot, a contact carried by the movable portion of said spring plate on the other side of said slot and a push button for depressing the movable portion of said spring plate to bring said contacts together.

25. In a switch mechanism for ignition systems the combination with an electric trembler provided with a vibrating contact,

a spring plate provided with a longitudinally disposed slot, means for rigidly clamping portions of said plate on one side of said slot, a contact carried by the movable portion of said spring plate on the other side of said slot, the end portions of said plate being bent out of alinement with their control portions, and a push button for depressing the central portion of the movable part of said spring plate to bring said contacts together.

26. In a switch mechanism for ignition systems the combination with an electric trembler provided with a vibrating contact, a spring plate provided with a longitudinally disposed slot, means for rigidly clamping portions of said plate on one side of said slot, a contact carried by the movable portion of said spring plate on the other side of said slot, a casing inclosing said trembler, a cap plate mounted on said casing and having a limited movement in a rotary direction with respect thereto and a push button carried by said cap plate and adapted to be moved into position to operate said movable portion of said spring plate.

In testimony whereof I affix my signature, in the presence of two witnesses.

GEORGE W. WACKER.

Witnesses:

R. C. ANDERSON,
GEO. REA.