G. H. BOYNTON.

SWITCH FOR IGNITION SYSTEMS.

APPLICATION FILED JULY 13, 1908.

1,017,948.

Patented Feb. 20, 1912.

2 SHEETS—SHEET 1.

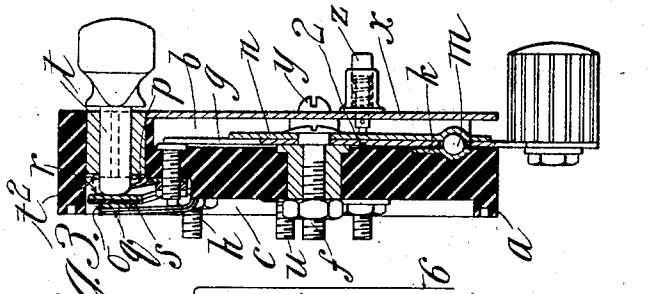

Fig. 3.

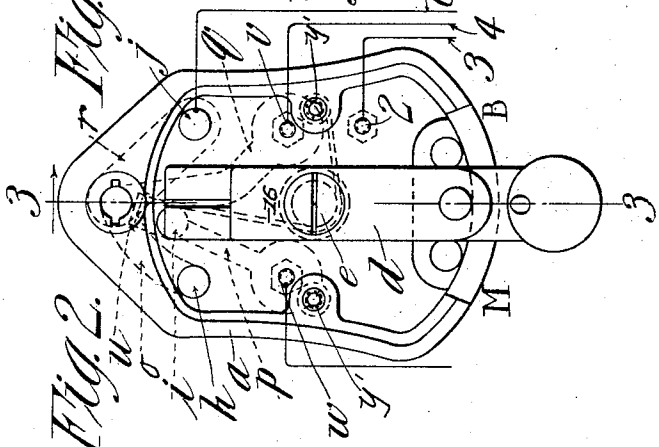

Fig. 2.

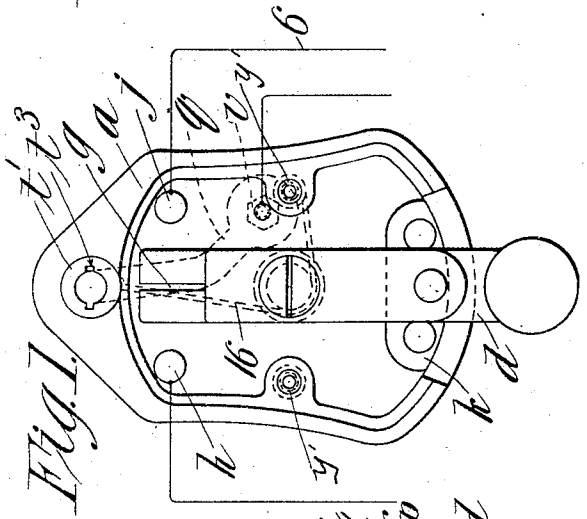

Fig. 1.

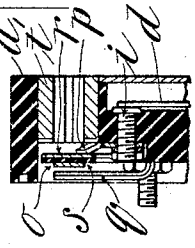

Fig. 4.

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Fig. 5.

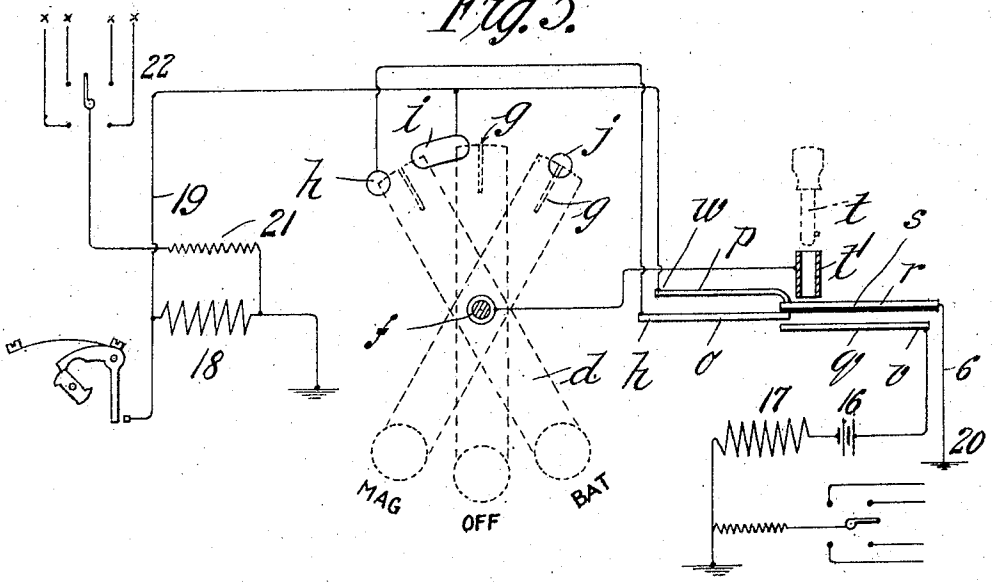
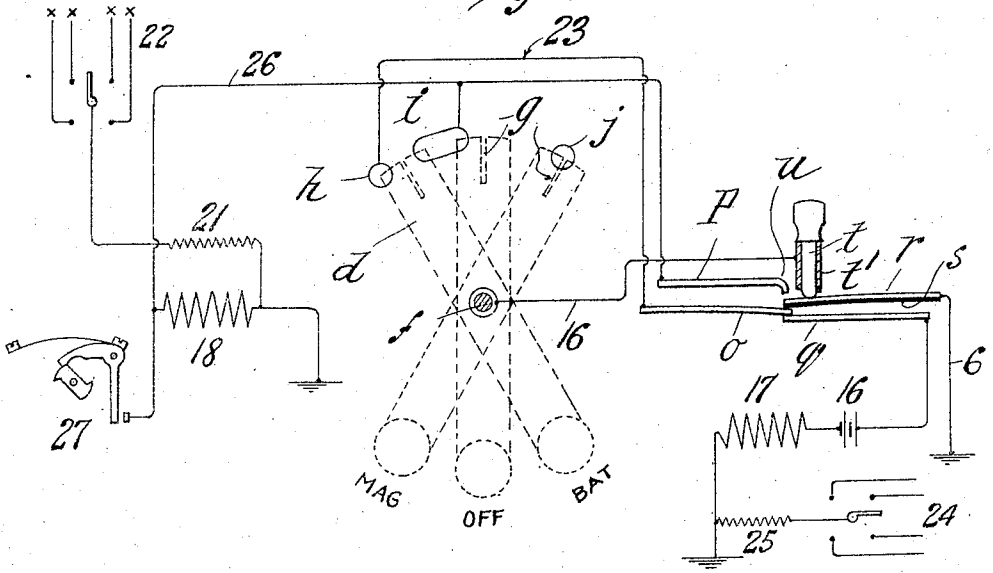


Fig. 6.



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SWITCH FOR IGNITION SYSTEMS.

1,017,948. Specification of Letters Patent. Patented Feb. 20, 1912.

Application filed July 13, 1908. Serial No. 443,265.

To all whom it may concern:

Be it known that I, GEORGE H. BOYNTON, a citizen of the United States of America, residing at Dalton, in the county of Berkshire and State of Massachusetts, have invented new and useful Improvements in Switches for Ignition Systems, of which the following is a specification.

This invention relates to improvements in switches and is particularly adapted for use in connection with the ignition systems for closing and opening the circuit of said systems as used for starting and stopping vapor or internal combustion engines.

The particular object of the invention is in arranging the contacts so that the battery terminals will be in open position while the magneto primary circuit will be in a closed position, thereby preventing the battery from being depleted or run down when the safety plug is removed from the switch, as some of the switches now in use do not overcome this objection. In this switch both a battery and magneto are employed for furnishing electrical energy to the ignition system, or my switch may be employed with two sets of batteries.

Details of the construction and operation of the switch will be fully described in the body of the specification and clearly pointed out in the claims forming a part thereof.

Referring to the drawings,—Figure 1 is a plan view of a switch having its cover removed for the purpose of clearly showing the interior construction thereof. Fig. 2 is a plan view of a modification for use preferably with a magneto and battery, whereby either source of electrical energy may be used for igniting the charge. Fig. 3 is a vertical longitudinal section on line 3—3 of Fig. 2 showing the switch lever and the means for securing the same to the base, also showing the plug in position for causing the opening of the magneto circuit, and closing the battery circuit. Fig. 4 is a detail sectional view showing the position of the battery contacts open and taken on the same sectional line as Fig. 3. Fig. 5 is a diagrammatic view of the various elements of the switch, and the circuits for the magneto and battery associated therewith and which are shown connected to the spring contact strips, and to the contacts of the switch-lever, showing the plug or key withdrawn. Fig. 6 is a view similar to Fig. 5 showing the plug inserted, and in dotted lines the different positions of the switch-levers.

Referring to the drawings in detail, *a* designates the base portion of the switch, preferably constructed of hard rubber or some other suitable insulating material of very high resistance. The upper and lower portion of the base is provided with recesses, as shown at *b* and *c*. Within the recess *b* is pivotally mounted a switch lever *d* at the point *e* by means of a pin *f*, the inner end of this lever being preferably bifurcated, as shown, by means of the slit *g* for the purpose of producing a flexible or resilient contact with the terminals *h*, *i*, and *j*. In order to adjustably lock the switch-lever *d* in contact with the points *h*, *i*, and *j*, a plate *k* is secured to the base-piece *a* and within the upper surface of this plate are hollows or indentations for receiving the ball *m* that is retained on the lever *d* by means of the plate *n*, as clearly shown in sectional view in Fig. 3.

On the underside of the base-piece *a* and in the recess *c* are suitably secured conducting strips *o*, *p*, *q*, and *r*. The conducting strips *o* and *r* are separated or insulated from each other by means of a flexible strip of insulation, designated at *s*. The conducting strips *q* and *o* have their outer ends overlying each other, as shown in Figs. 2, 3, 4, 5 and 6, but are so bent or formed at their inner ends that when the safety plug *t* is removed from the socket t^1 these ends will be separated, thus opening the battery circuit and closing the magneto circuit. The inner end of the strip *p* is bent, as designated at *u*, Fig. 2, and shown in side elevation in Figs. 3 and 4 so that the conducting strips *r* and *p* (which are in the magneto circuit), are in contact, that is when the plug *t* is removed from the socket t^1, but are separated when the plug *t* is inserted, as shown in Fig. 3 and also in Figs. 5 and 6.

The battery terminals are designated at *v* and *h* while the magneto terminals are designated at *w* and *j*.

The cover plate of the switch is designated at *x* and is secured to the upper portion of the base-piece *a* by means of the screws *y*, which engage the threaded openings y^1 in the base portion *a*. Mounted in the cover-plate *x* is a spring-pressed pin *z* that is adapted to engage a contact point 2 in the base-piece *a*, as shown in Fig. 2, which con-

tact point is connected to the interrupter of a suitable coil. This pin *z* is for the purpose of starting the engine from the battery by merely pushing the pin inward into contact with the point 2, whereby the wire 3, which leads to the interrupter, will close the circuit to the coil and ignite the charge in the engine cylinder. The wire 6 is a common ground connection.

The plug *t*, it will be noticed, is provided with a transversely located pin t^2 for the purpose of locking the same in the socket t^1, the projecting ends of this pin engaging the grooves t^3 of the socket when it is inserted in the socket, and after the insertion of the plug it is rotated so as to bring the pin t^2 under the inner end of the socket. The inner end of the plug engages the conducting strip *r*, as shown in Fig. 3. By giving the plug one-half turn a slight pressure on the strip bends the same sufficiently to lock the plug in the socket when in use.

The positions of the switch-lever *d* are indicated by means of the letters "B", "O", and "M", meaning respectively the "battery", "off" and "magneto" positions of the lever.

The strip of conducting material 16 (which is shown in dotted lines in Fig. 1 and embedded in the base of insulation material) electrically connects the socket t^1 with the lever *d* and the internally threaded socket y^1 and is for the purpose of starting the engine from the seat by means of the button *z* engaging the contact point 2.

Referring now to the operation or use of my switch, and first considering the lever *d* in the "B" or battery position, which means that the vaporous charge of the engine is to be ignited by electricity derived from a suitable battery: The lever *d* would then be swung to the right causing its inner end to engage the contact *h*. The plug *t* is inserted in the socket t^1, and locked by means of the pin elements t^2 engaging the lower side of the socket. The inserted plug holds the battery contact strips *o* and *q* in contact and at the same time separates the magneto contact strips *r* and *p* (see Fig. 3). The current from the battery may now be considered to flow from the terminal *v*, contact-strip *q*, to the strip *o*, contact *h*, lever *d*, pin *f*, insert strip 16 (which is soldered or in contact with the bushing in which the pin *f* is located) screw socket y^1, cover plate *x*, starting-pin *z*, contact 2, (when the pin *z* is depressed,) and wire 3, to the spark coil, when it is desired to start the engine from the seat of the vehicle, that is by depressing the pin *z*. After the engine has been started by means of the pin *z*, the current is as follows: battery terminal *v*, contact strip *q*, contact strip *o*, terminal *h* to the spark-coil, the plug *t* remaining in place, as before. After the battery has become depleted, or the motor has acquired its normal or full speed, the lever *d* is moved to the "off" position and from there to the "M" or magneto position. When the lever is in the "off" position all circuits are then broken. The lever has then left the battery contact *h* and is also not in contact with the magneto terminal shown at *j*.

Consider the lever *d* in contact with the magneto contact *j*: The circuit may then be traced as follows with the plug *t* inserted, which causes the magneto contact strips *r* and *p*, to close (see Fig. 4): The current passes from the primary of the magneto to the terminal *w*, strip *p*, strip *r*, terminal *j*, to the wire 6 completing the circuit through the primary of the magneto, or in practice to the ground of the machine. If it is desired to cut out the magneto, the plug is inserted and the lever *d* moved to the "O" or off position; the circuit is then as follows: terminal *w*, contact *i*, lever *d*, insert wire 16 through the pin *f*, socket t^1, starting plug *t*, conducting strip *r*, to the magneto terminal *j*, and wire 6 to the ground. This position opens the magneto contact-strips *p* and *r* which includes the primary circuit and allows the current to flow to the ground, therefore rendering the magneto inoperative.

Consider the starting plug *t* as removed from the socket t^1 and the switch-lever *d* in the "B" or battery position, in which position the battery will be in open circuit since the contact strips *o* and *q* are separated: The circuit from the magneto (which is shown in outline at the left of Fig. 5) will then be from the primary coil 18, wire 19, contact-strip *p*, strip *r*, wire 6, to the ground at 20. This current, through the primary with the plug removed, allows the current to flow without any break in this circuit to the ground, whereby the lines of force about the secondary winding of the magneto are unchanged. Therefore no induction occurs in the secondary windings 21 which lead to a set of spark-plugs and timer construction shown at 22.

Consider now the switch-lever *d* in the "O" or off position: No current will flow to the spark-plugs from either the battery or magneto source of energy. The primary current from the magneto flows from the primary 18 to the closed contact strips *p* and *r* to the ground 20. No current can flow from the battery as the contact strips *o* and *q* are open. The same results occur when the lever *d* is in the "M" or magneto position. In a word, therefore, the removal of the starting plug *t* opens all the circuits.

Referring to the position of the parts shown in Fig. 6 in which the plug *t* is inserted in the socket t^1 forcing the battery contact strips *o* and *q* together and separating the magneto contact strips *p* and *r*: With the switch lever *d* in the "B" or battery posi-

tion, the current will flow from the battery 17 to the strip *q*, strip *o*, wire 23, battery terminal *h*, lever *d*, insert wire 16, pin *f*, to the socket member t^1, plug *t*, and strip *r* to the ground, whereby the current through the primary of the coil is complete. The spark-plugs and timer which are indicated diagrammatically at 24 will then receive current from the secondary 25 of the coil. The current from the primary of the magneto will then flow as follows: from the primary winding 18, wire 26, terminal *i*, through the lever *d*, to the pin *f*, insert wire 16, plug *t*, socket t^1, plug *t*, strip *r* to the ground. No current will therefore appear in the spark circuit which is connected with the secondary of the magneto, the current of the primary flowing uninterruptedly to the ground 24 by the wire 6.

Consider now the switch lever *d* in the "off" position of the switch: the circuit from the battery 17 will be broken between the lever *d* and contact point *h*, and the primary circuit from the magneto will be from the winding 18, wire 26, terminal *i*, lever *d*, insert wire 16, and strip *r* to the earth, as before. When the lever *d* is thrown over to the "M" or magneto position, the battery is still cut out and the magneto primary current will be made and broken at the interrupter 27, whereby an alternating current will be induced in the secondary winding 21, which will supply current to the spark-plug 22. In this position the primary winding is opened at the point *u*.

What I claim is:—

1. In a switch of the class described, in combination, a base-piece, a switch-lever pivoted thereto, contact-points engaged by the switch-lever, two sets of conducting bars, means for insulating the sets of conducting bars from each other, a plug, the insertion of which closes one set of conducting bars and opens the other set, and upon the withdrawal of which allows the first set to open and allows the second set of conducting bars to close, and connecting means between the plug, switch-lever and the conducting bars.

2. In a switch, in combination, a pivoted switch-bar, contact points, means for locking the switch-bar in adjusted positions and in engagement with the contact-points, two pairs of elastic conducting bars connected to the contacts, the bars of each pair being arranged for contacting relation with each other, a plug for operating the said bars, a strip of insulation for electrically insulating the pairs of bars from each other, and connecting means between the plug and contact-lever whereby upon the operation of the plug and switch-bar independent sources of electrical energy may be connected and disconnected, as described.

3. A switch having in combination with a base-piece, a metallic cover therefor, a terminal mounted in the base-piece, a spring push-button mounted in the plate and adapted to engage the terminal, a pair of normally separated conducting contact bars, a plug, a socket therefor, an electrical connection between the terminal and the socket, means for locking the plug to the socket and retaining said bars in contact, whereby a circuit may be closed through the plate when the button is operated.

4. In a switch construction, an insulating base-piece, a lever pivotally attached thereto, a series of contact-points adapted to be engaged by the lever, two sets of elastic contact strips, means for insulating one set from the other, means for simultaneously opening one set and permitting the other set to close, and vice versa, and connecting means between the strip-operating means and the lever, substantially as described.

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Witnesses:
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J. E. HOOD.