A. J. STUDNICKA & C. W. CAMPBELL.

COMBINED MAGNETO AND BATTERY SWITCH FOR ELECTRIC IGNITERS.

APPLICATION FILED NOV. 18, 1908.

957,270. Patented May 10, 1910.

2 SHEETS—SHEET 1.

Fig 2.

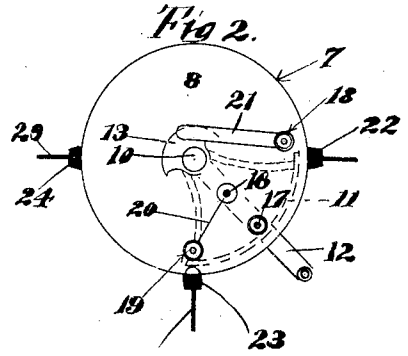


Fig 3.

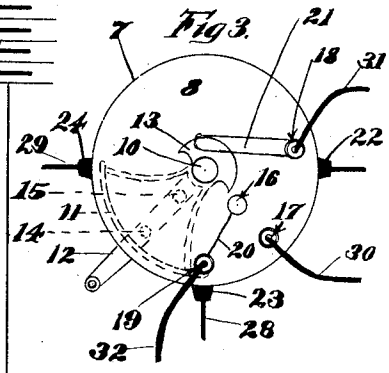
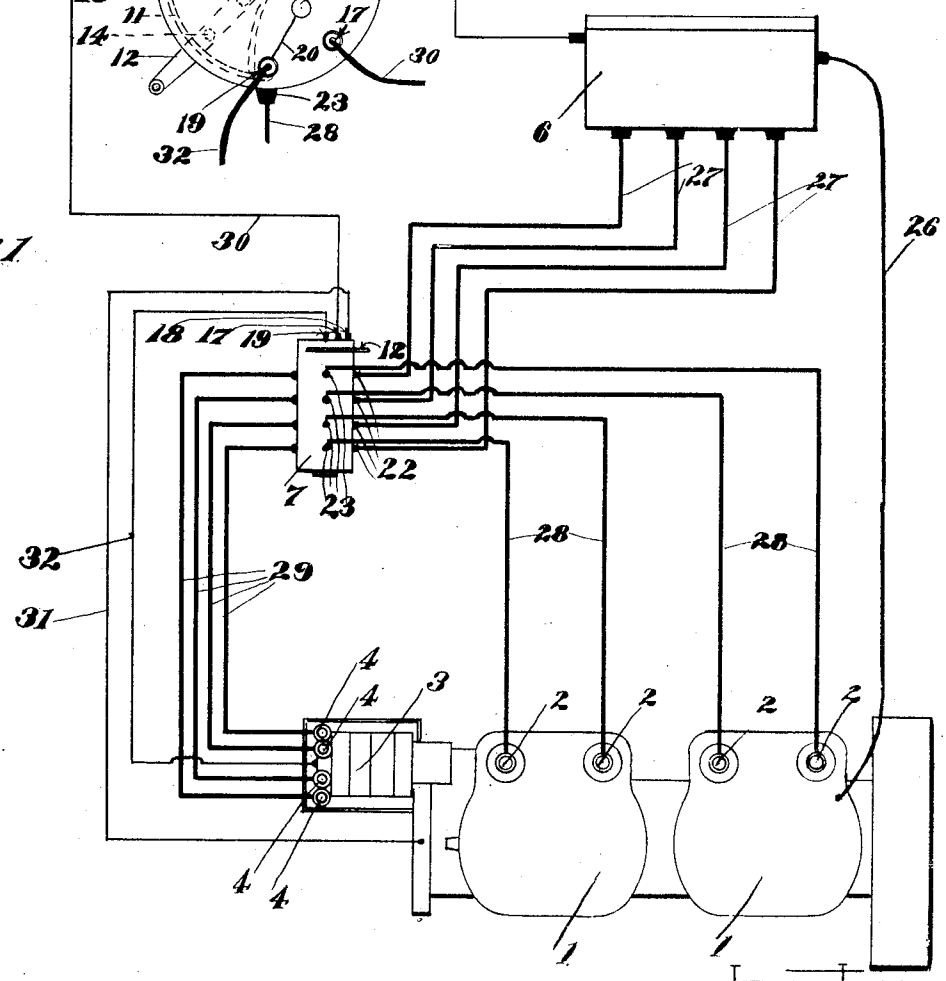


Fig 1.



Witnesses

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Fig 4

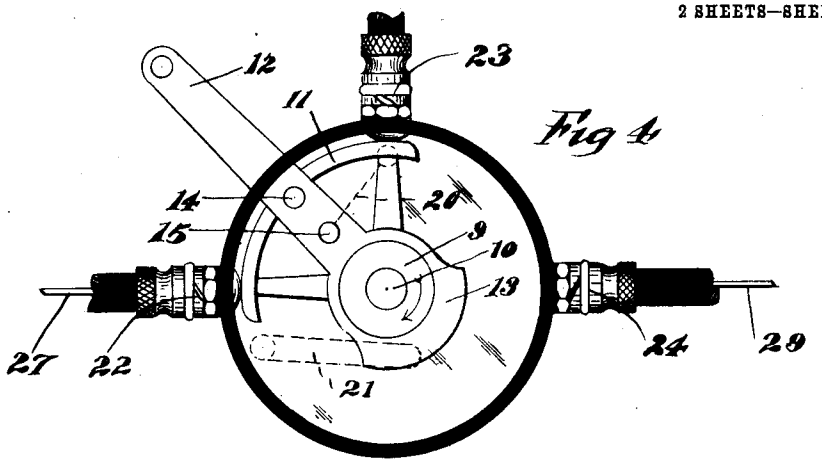
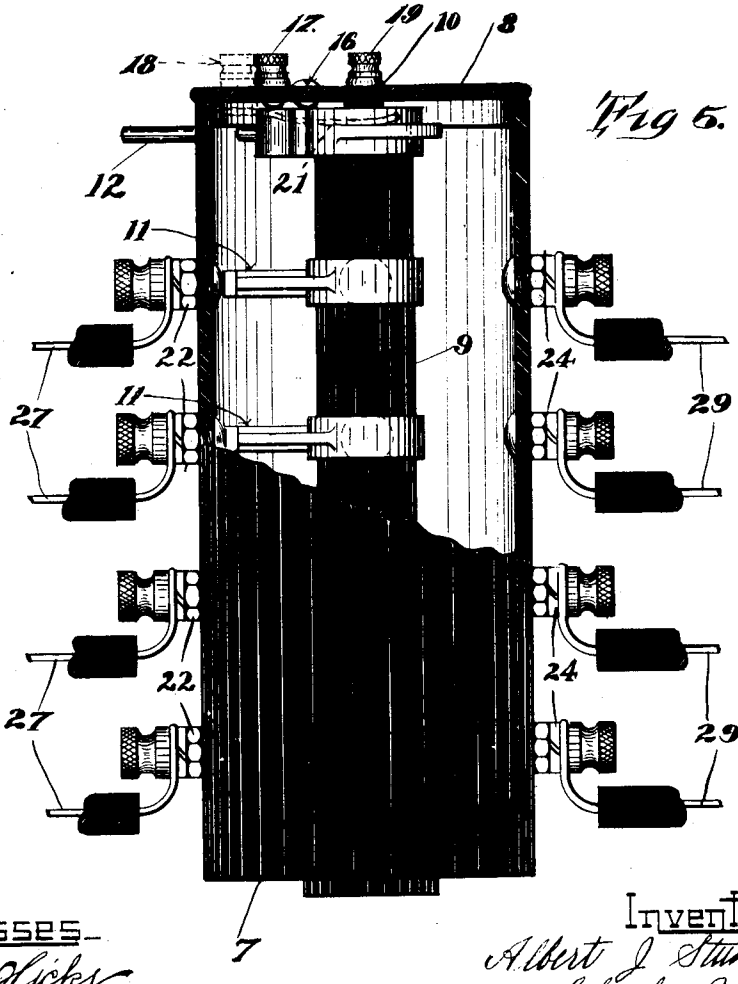


Fig 5.



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UNITED STATES PATENT OFFICE.

ALBERT J. STUDNICKA AND CHARLES W. CAMPBELL, OF MINNEAPOLIS, MINNESOTA.

COMBINED MAGNETO AND BATTERY SWITCH FOR ELECTRIC IGNITERS.

957,270. Specification of Letters Patent. Patented May 10, 1910.

Application filed November 18, 1908. Serial No. 463,167.

To all whom it may concern:

Be it known that we, ALBERT J. STUDNICKA and CHARLES W. CAMPBELL, citizens of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Combined Magneto and Battery Switches for Electric Igniters; and we 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.

Our invention relates to ignition mechanism for explosive engines and has for its especial object the provision of improved switch mechanism for rendering either a battery or a magneto operative at will through the same sparking plugs.

To the above ends the invention consists of the novel devices and combination of devices hereinafter described and defined in the claims.

As is well known, it has become the practice to use both battery and magneto to supply the sparking current to explosive engines, but it has been considered necessary to employ different sets of sparking plugs because it is impossible to connect two circuits to a sparking plug at the same time.

Our invention provides an improved switch, which is adapted for use either in connection with a single cylinder or a multi-cylinder explosive engine and by means of which, when the battery is thrown into action, the magneto is thrown out of action, preferably by opening the sparking circuit of said magneto and short-circuiting the armature circuit thereof through a portion of the battery circuit. The dynamo, when its sparking circuit is thus opened and its armature short-circuited, will not, of course, generate current.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a digrammatic view illustrating our invention connected to a multi-cylinder engine. Figs. 2 and 3 are plan views of the improved switch. Fig. 4 is a plan view of the improved switch with the upper head thereof removed, and Fig. 5 shows the improved switch partly in elevation and partly in vertical section.

The numeral 1 indicates a multi-cylinder explosive engine, equipped with four sparking plugs 2, one for each cylinder.

The numeral 3 indicates the magneto, the field of which is grounded on the engine and is provided with four secondary contacts.

The numeral 5 indicates a battery and the numeral 6 indicates a sparking coil inclosing case as an entirety.

The parts so far described may be treated as of standard, well-known construction and arrangement, the said sparking coil being, as indicated by the wiring thereof, what is known as a separate unit vibratory coil.

Our improved switch preferably has a cylindrical case or body 7 of vulcanized rubber, wood fiber or other suitable insulating material and it is provided at its upper end with a detachable head 8 of similar insulating material.

Rotatively mounted within and extended axially through the case 7 is a shaft 9 of the insulating material, preferably such as above indicated. This shaft has reduced ends 10. It constitutes trunnions, generally one in the upper and one in the lower head of said case. This shaft 9, for the four cylinder engine shown, is provided with four metal contact segments 11, the hubs of which are readily secured to said shaft. These segmental contacts are completely insulated from each other and they are preferably located vertically one over the other. At its upper end, said shaft 9 is provided with a radially projecting lever 12 that works through a suitable slot in the case 7 and the hub of which is formed with a segmental compact flange 13.

The lever 12 on its upper surface carries a pair of contacts 14 and 15, which, when said lever is positioned, as shown in Figs. 2 and 4, engages the impending ends of contacts 16 and 17 applied to the top 8 of the case. A pair of binding posts 18 and 19 are also applied to the said case top 8. The said binding post 19 is primarily connected by wire 20 to the contact 16 and the binding post 18 is connected to one end of a spring contact arm 21, the free end of which always

maintains contact with the segmental flange 13 or said lever 12. For coöperation with each contact segment 11, the case 7 is provided in its sides with three contacts, 22, 23 and 24, which contacts are afforded by binding posts with inwardly projecting extremities.

In the construction illustrated, the contact segments 11 extend through approximately ninety degrees and hence the contacts 22 and 24 are located diagrammatically opposite to each other and the contact 23 is located midway between the two. With this construction, the contact segments 11 may be moved, as shown in Fig. 2, so as to connect the contacts 22 and 23, or they may be moved as shown in Fig. 3, so as to connect the contacts 23 and 24. One terminal of the battery 5 is connected by wire 25 to the primary of the sparking coil 6, the other terminal of which, as shown, is connected by wire 26 to the frame of the engine. The secondaries of the sparking coil are connected by wires 27 to the contacts 22. The contacts 23 are connected by wires 28, one to each of the sparking plugs 2. The secondary contacts 4 of the magneto 3 are connected by wires 29, one to each of the contacts 24. A wire 30 connects the contact 17 to the other terminal of the battery 5. The binding post 18 is connected by wire 31 to the engine frame; and the armature of the magneto 3 is connected by wire 32 to the binding post 19.

In practice, a suitable timer or distributer will, of course, be used to regulate the amount of lead which will be given to the sparks produced in the several cylinders in respect to several pistons.

The operation of the ignition mechanism above described, briefly stated, is as follows: When the battery is to be used to supply the spark producing current, the lever 12 will be set in the position indicated in Figs. 2, 4 and 5. When thus set, the current will flow from the battery as follows: through the wire 25, the primary or sparking coil 6 and the wire 26 to the frame of the engine 1, from thence through wire 31, binding post 18, contact arm 21, segmental flange 13 and lever 12 to contact 14 of said lever, and from thence through contact 17 and wire 30 back to the said battery 5. The current induced in the secondary of the sparking coil will flow through wires 27 to contacts 22, thence through segmental switch contacts 11 to contacts 23 and from thence through wires 28 to the respective sparking plugs usually under control of timer not shown. One of the electrodes of each sparking plug will, of course, be connected to the engine frame and hence this induced current, as well as the primary of the battery current will finally return to the battery through the wire 31, binding post 18, spring contact 21, lever 11, contacts 14 and 17 and wire 30. When the said parts are adjusted as above stated, the armature of the magneto 3 will be short-circuited through the wire 32, binding post 19, wire 20, contacts 16 and 15, lever 12, its flange 13, spring contact 21, binding post 18, wire 31 and the frame of the engine, it being understood, of course, that one side of the armature of the magneto 3 is customarily grounded through the said engine frame. At this time, it will also be noted the sparking circuit of the magneto armature is broken because there is no connection between the contacts 23 and 24, to which the wires 28 and 29, respectively, are connected. Hence, when the battery is in action, the magneto is cut out of action. When the magneto is to be thrown into action and the battery cut out of action, the contact segments 11, by means of the lever 12, are moved into the position indicated at Fig. 3. When the parts are thus adjusted, the battery circuit is broken because there is no electrical connection between the contacts 22 and 23 to which the wires 27 and 28, respectively, are connected, and at this time the magneto circuits are closed as follows: from the secondary contacts 4 through wires 29 to contacts 24, thence through the segmental switch contacts 24, thence through the segmental switch contacts 11 to contacts 23 and from thence through the wires 28 to the respective sparking plugs 2.

What we claim is—

1. In an ignition mechanism for multi-cylinder explosive engines, a single sparking plug for each cylinder, a battery, a magneto, a common switch, a sparking coil having a multiplicity of secondary wires extending to said common switch, magneto secondary wires also extending to said common switch, secondary plug wires extending from said switch to the several sparking plugs, a primary sparking circuit including said battery and said common switch, and a primary magneto circuit including said common switch, substantially as described.

2. In an ignition mechanism for multi-cylinder explosive engines, a single sparking plug for each cylinder, a battery, a magneto, a common switch having a multiplicity of fixed and a multiplicity of movable contacts, a sparking coil having a multiplicity of secondary wires extending to fixed contacts of said switch, magneto secondary wires connecting said magneto to other fixed contacts of said common switch, secondary plug wires connecting the several sparking plugs to still other fixed contacts of said common switch, a primary sparking circuit including said battery and said common switch, and a primary magneto circuit including said

common switch, the fixed and movable contacts of said common switch being so related that, in one position, they will close the secondary magneto circuits to said sparking plugs and break the primary magneto circuit and the primary and secondary sparking coil circuits, and in another position will close the primary and secondary sparking coil circuits and the primary magneto circuit and break the secondary magneto circuits.

In testimony whereof we affix our signatures in presence of two witnesses.

ALBERT J. STUDNICKA.
CHARLES W. CAMPBELL.

Witnesses:
HARRY D. KILGORE,
F. D. MERCHANT.