J. H. FRIEDENWALD.

IGNITING SYSTEM FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED JUNE 4, 1909.

953,603.

Patented Mar. 29, 1910.

2 SHEETS—SHEET 1.

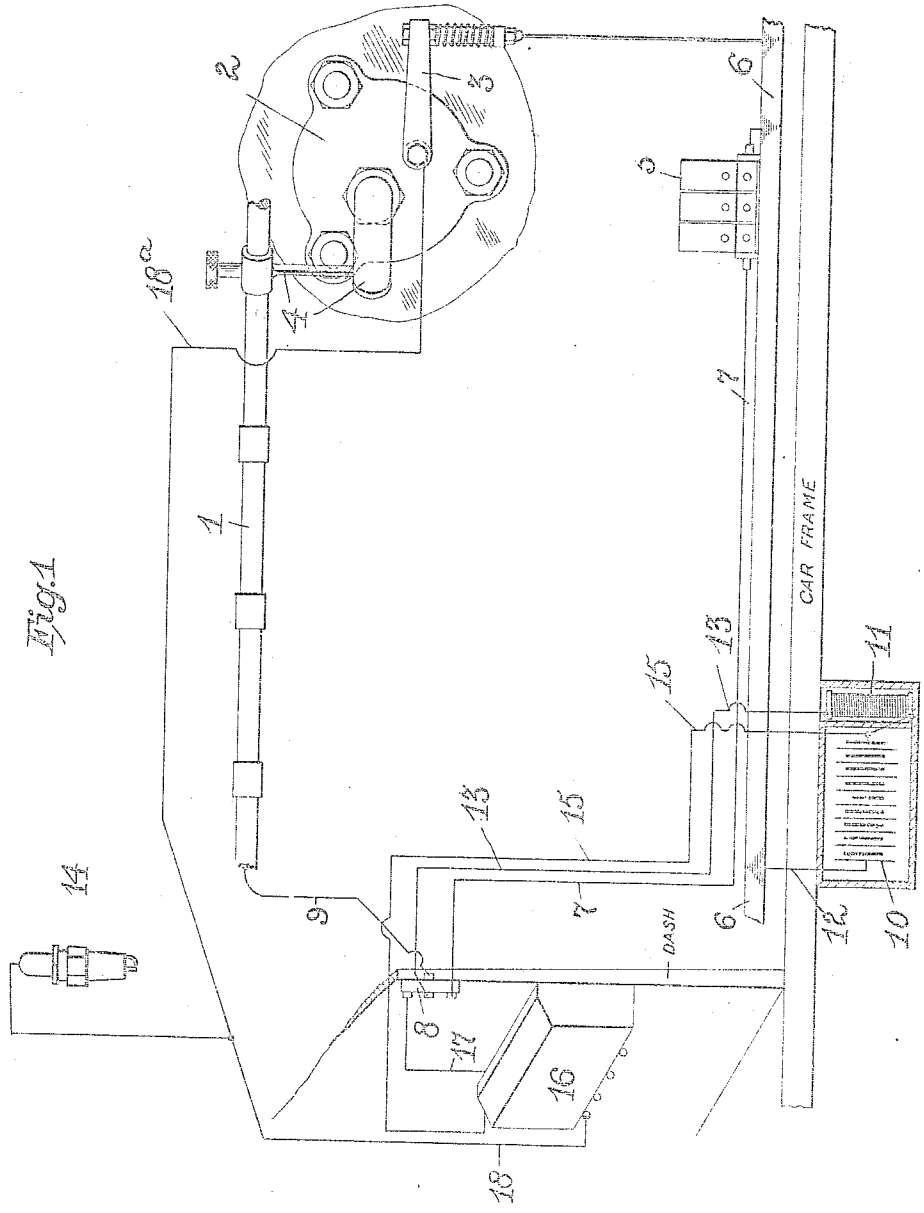

Fig. 1

Attest:

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2 SHEETS—SHEET 2.

Fig. 2.

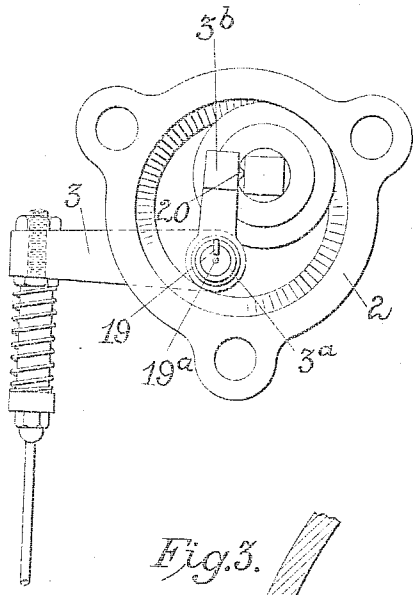


Fig. 3.

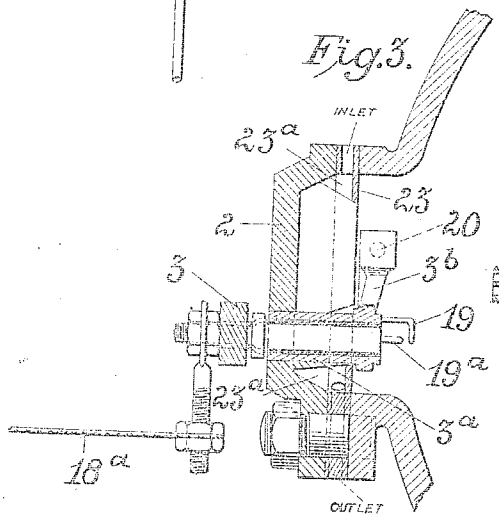


Fig. 5.

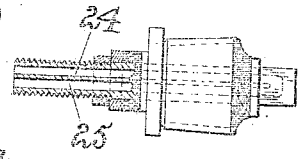
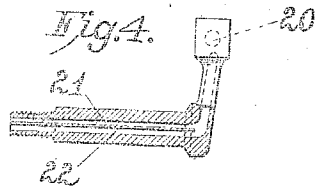


Fig. 4.



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UNITED STATES PATENT OFFICE.

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IGNITING SYSTEM FOR INTERNAL-COMBUSTION ENGINES.

953,603. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed June 4, 1909. Serial No. 500,108.

To all whom it may concern:

Be it known that I, JACOB H. FRIEDENWALD, a citizen of the United States, residing at Baltimore, Maryland, have invented certain new and useful Improvements in Igniting Systems for Internal-Combustion Engines, of which the following is a specification.

My present invention relates to improvements in electrical igniting systems for internal combustion engines, and the object of the invention is to provide in the same engine a combined make and break, and jump spark system, so that, in case of trouble with the make and break system, a jump spark circuit may be switched in, the make and break operating, however, as the circuit closer for the primary circuit of the jump spark system, thus avoiding the necessity of providing the ordinary timing devices.

The invention includes the novel features of construction and combination and arrangement of parts hereinafter described and particularly pointed out in the appended claims.

The invention is illustrated in the accompanying drawing, in which—

Figure 1 is a diagrammatic view, and Figs. 2 and 3 are details, and Fig. 4 a detail of a modification. Fig. 5 is a detail of the anvil.

Referring by reference characters to this drawing, the numeral 1 designates the bus bar by which the current is carried to the make and break devices of a multiple cylinder engine, only one of such devices being represented at 2 for convenience in the drawing, as it is, of course, obvious that the system may apply to a single cylinder engine. The hammer handle for the make and break is indicated at 3, and the knife switch at 4, and as these parts are of the ordinary construction, further description thereof herein is deemed unnecessary. At 5 I have indicated a low tension magneto grounded to the engine frame which is designated at 6, and having a wire 7 which leads to the switch 8. From this point the magneto current is led, when the switch is in the proper position, by wire 9 to the bus bar, thus causing ignition from the magneto by the make and break system in the usual manner. Where magneto ignition is used, it is always desirable to provide battery for starting purposes. The battery is indicated at 10, and a low tension coil at 11. The battery is grounded by the wire 12, and from the low tension coil a wire 13 leads to the switch plate from which the current may be conducted to the bus bar by the wire 9 as before described. For the purpose of providing for jump spark ignition, I may provide the ordinary jump spark plugs 14 located in the usual position at the tops of the cylinders, and when the jump spark is to be used, the primary current passes from the battery by the wire 15 through the primary of the induction coil indicated at 16, thence by wire 17 to the switch plate, and thence by wire 9 to the make and break device 2 which, in this instance, operates as the timer, each cylinder acting as its own timing device. From the secondary winding of the induction coil, a secondary wire 18 leads to the jump spark plug 14, the secondary coil, not specifically shown, being grounded in the ordinary manner.

While, as above described, it may be desirable to use a jump spark plug in the top of the cylinder, as a matter of fact I prefer to use a combined make and break and jump spark device, though this may be used if desired with the jump spark plug 14, in which event I will secure three ignition points, thus making proper ignition absolutely certain. For this purpose I make the shaft 3^a which carries the hammer 3^b hollow, and put through the center thereof an insulated plug similar to the ordinary spark plug to which I connect the branch 18^a of the secondary wire, as indicated in Fig. 1. The insulated plug carries the ordinary spaced wires 19 and 19^a, the one being connected with the wire 18^a, while the other is, of course, in electrical connection with the engine. I prefer to provide the hammer with an iridium point, as indicated at 20.

Where it is not desired to combine the jump spark and make and break in a single plug, I have found it of very great advantage to make the hammer hollow, and have it communicate with the outside air, as shown in Fig. 4, as thereby liability of overheating is reduced and premature firing prevented. The hammer is shown with such a hollow space indicated at 21, and, if desired, a partition 22 may be put in this space, terminating short of the inside of the plug so as to provide a channel for the circulation of air or any other cooling medium. I also prefer to provide a plate or wall 23 on the inside of the block or part which carries the

make and break devices, which provides a water space 23ª for further keeping the parts cool, this space being provided with an inlet and outlet, as shown, for a cooling medium. I also preferably provide means for keeping the anvil cool and for this purpose make it hollow for the circulation of a cooling medium, as shown at 24 in Fig. 5, also providing in this hollow space a partition 25.

It will be understood that the hammer and anvil shown are representative of any form of make and break igniter, and my invention is not confined to the specific type shown.

Having thus described my invention what I claim is:—

1. In an internal combustion engine, a make and break igniting device, a magneto connected to supply current thereto, a battery also connected to supply current to said make and break device, a jump spark device, an induction coil having its primary winding in circuit with said battery and make and break device, and its secondary coil in circuit with the jump spark device, and switch mechanism for controlling the respective circuits, the make and break device acting as a circuit closer for the primary circuit when the jump spark system is switched in, substantially as described.

2. In an internal combustion engine, a make and break igniting device, a magneto connected to supply current thereto, a battery also connected to supply current to said make and break device, a jump spark device incorporated in said make and break device, an induction coil having its primary winding in circuit with said battery and make and break device, and its secondary coil in circuit with the jump spark device, and switch mechanism for controlling the respective circuits, the make and break device acting as a circuit closer for the primary circuit when the jump spark system is switched in, substantially as described.

3. In an internal combustion engine, a make and break igniting device having a hollow hammer shaft, a jump spark plug inserted in said hollow shaft, a magneto connected to supply current to the make and break igniting device, a battery having circuit connections for also supplying current to said make and break igniting device, an induction coil having its primary winding adapted to be included in said battery circuit, and its secondary winding in circuit with said jump spark plug, substantially as described.

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

JACOB H. FRIEDENWALD.

Witnesses:
ETHEL KING,
ERNEST J. F. BULL.