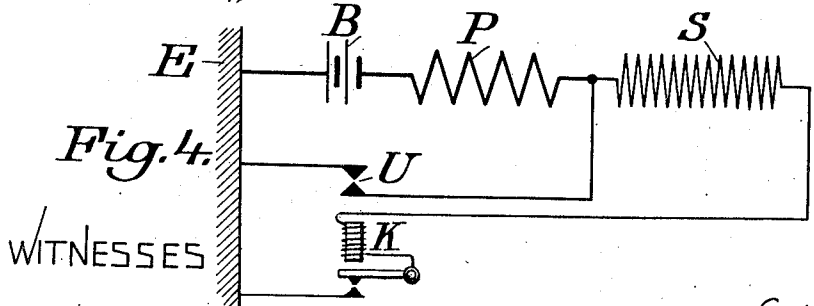
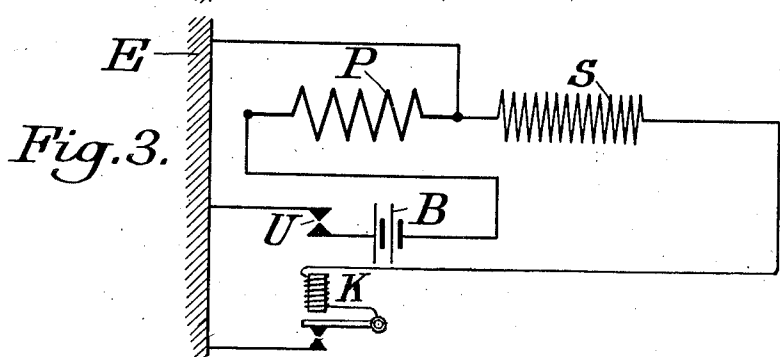
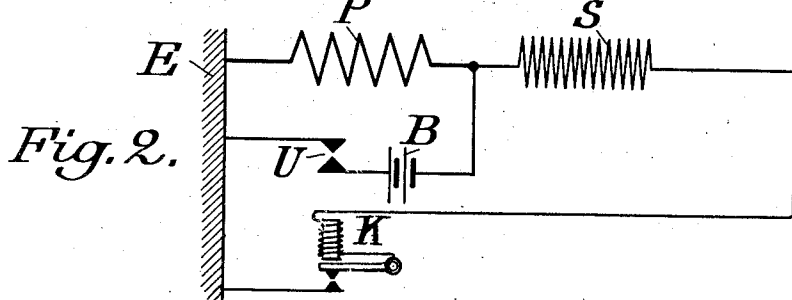
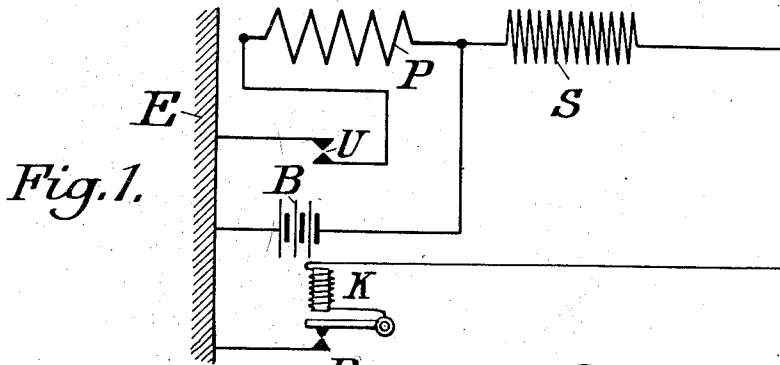


G. HONOLD.
ELECTRICAL IGNITION SYSTEM FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED OCT. 27, 1910.

1,063,542.

Patented June 3, 1913.



WITNESSES

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GOTTLÖB HONOLD, OF STUTTGART, GERMANY, ASSIGNOR TO THE FIRM OF ROBERT BOSCH, OF STUTTGART, GERMANY.

ELECTRICAL IGNITION SYSTEM FOR INTERNAL-COMBUSTION ENGINES.

1,063,542.

Specification of Letters Patent.

Patented June 3, 1913.

Application filed October 27, 1910. Serial No. 559,309.

To all whom it may concern:

Be it known that I, GOTTLÖB HONOLD, a subject of the Emperor of Germany, residing at Nos. 11-13 Hoppenlaustasse, Stuttgart, Germany, have invented certain new and useful Improvements in Electrical Ignition Systems for Internal-Combustion Engines; 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.

The invention relates to ignition in internal combustion engines by means of a battery, a transformer, a mechanical interrupter, and an electromagnetic spark plug.

It has heretofore been proposed in such systems to produce an ignition spark by connecting an induction coil in electrical series with a battery and a mechanical interrupter, and connecting an electromagnetic spark plug in parallel with the interrupter. At the desired moment of ignition, the interrupter is opened and the battery current added to the induced current from the induction coil flows through the electromagnetic spark plug, whose contact points are drawn apart in consequence thereof and produce a spark. This system has been used because of its simplicity and reliability. However, it requires a relatively high battery voltage, and furthermore, in order that the induction coil shall have sufficient self induction to generate a high voltage, its winding must have many turns, in consequence of which a relatively high resistance is introduced in the battery circuit. This system is not very well adapted for automobile engines, for the reason that in order to keep the weight as low as possible it is customary to employ a battery of no more than four to six volts, and, at this low voltage, it is difficult to obtain an induction coil of sufficient magnetism within the desired dimensions, because in order to bring about satisfactory ignition a sufficient number of magnetizing ampere turns is required in the induction coil, and at the low voltage specified this necessitates a number of turns of wire of comparatively large cross section.

The invention consists in substituting a transformer for the induction coil and connecting the battery in the primary circuit of the transformer and the electromagnetic spark plug in the secondary circuit.

In the accompanying drawings forming a part of this specification, Figures 1 to 4 show diagrammatically four different exemplifications of the system, in its application, for instance, to single cylinder engines.

It will, of course, be understood that by using a distributor, any desired number of spark plugs may be supplied from the system. In all of the figures, B is the battery, E the engine body, U the mechanical interrupter actuated from the engine shaft, P the primary winding of the transformer, S the secondary winding of the transformer, and K the electromagnetic spark plug including the winding and the sparking electrodes thereof.

The systems illustrated differ from each other in the arrangement of the primary winding, the battery and the mechanical interrupter, which are in all cases connected in series in the primary circuit. In the several modifications shown in the figures, one terminal of the secondary winding is electrically connected to one terminal of the primary winding. However this connection is not necessary as the ignition is equally well obtained with the secondary winding disconnected from the primary winding.

During the period of ignition the mechanical interrupter U is open. In Fig. 1 the secondary winding is then in series with the battery and the spark plug. In Fig. 2 the secondary winding is then in series with the primary winding and the spark plug. In Fig. 3 the secondary winding is then in series with the spark plug alone. In Fig. 4 the secondary winding is then in series with the primary winding, the battery and the spark plug.

The operation of the system will now be described.

Upon closing of the interrupter the battery current flows to the primary winding P and the magnetization of the transformer produced thereby increases rapidly to a high value, because the resistance of the primary winding is relatively low on account of its few turns of large wire. Therefore, when the interruption occurs, the full output of the battery is available for producing the ignition spark and its voltage is raised to a sufficiently high value as a result of the ratio of transformation of the primary and secondary windings. The winding of the electromagnetic spark plug is energized and

the spark points, on separating, produce the ignition spark. In this way a battery of comparatively low voltage produces a sparking voltage of sufficient intensity to generate the ignition spark.

Having thus described my invention, what I claim is:

1. In an ignition system for internal combustion engines, a transformer, a battery and a mechanical interrupter in electrical series in the primary circuit of the transformer, and the winding of an electromagnetic spark plug in the secondary circuit of the transformer; substantially as described.
2. In an ignition system for internal combustion engines, a transformer having one terminal of its primary winding electrically connected to one terminal of its secondary winding, a battery and a mechanical interrupter in electrical series in the circuit of the primary winding, and the winding of an electromagnetic spark plug in the circuit of the secondary winding; substantially as described.
3. In an ignition system for internal combustion engines, a battery common to two electrical circuits, the primary winding of a transformer and a mechanical interrupter in one of said circuits, and the secondary

winding of the transformer and the winding of an electromagnetic spark plug in the other of said circuits; substantially as described.

4. In an ignition system for internal combustion engines, a battery and the primary winding of a transformer common to two electrical circuits, a mechanical interrupter in one of said circuits, and the secondary winding of the transformer and the winding of an electromagnetic spark plug in the other of said circuits; substantially as described.

5. In an ignition system for internal combustion engines, a transformer having a primary and a secondary winding, the primary winding being common to two electrical circuits, a battery and an interrupter in one of said circuits, and the secondary winding and the winding of an electromagnetic spark plug in the other of said circuits; substantially as described.

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

GOTTLOB HONOLD.

Witnesses:

MAX ANSCHUTZ,
REINHOLD ELWERT.