

Sept. 4, 1923.

1,466,940

W. W. HAWKINS

IGNITION SYSTEM

Filed Feb. 20, 1922

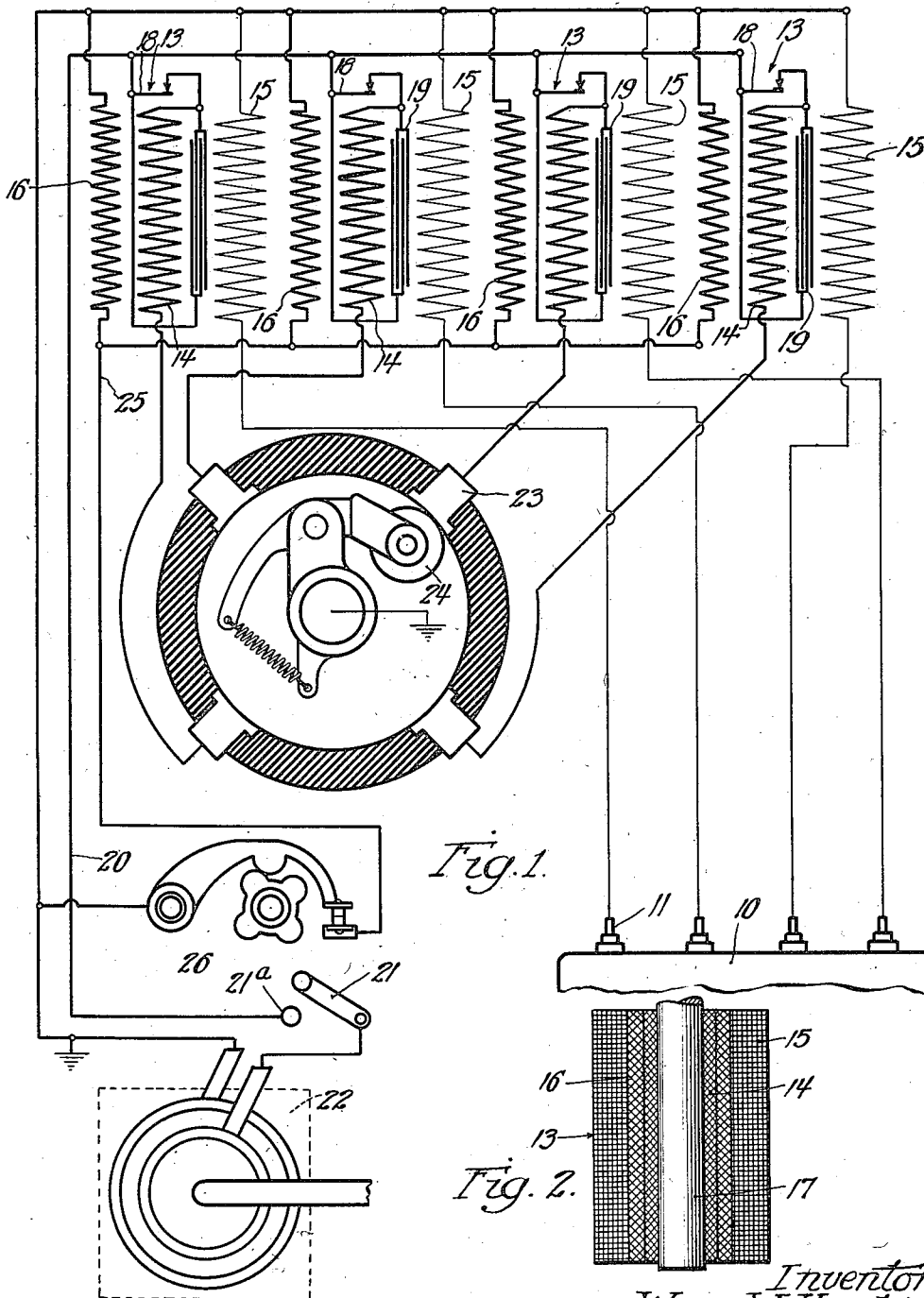


Fig. 1.

Fig. 2.

Inventor.
Wm. W. Hawkins.
William Bradbury
McCobb & Pierce Attys.

UNITED STATES PATENT OFFICE.

WILLIAM W. HAWKINS, OF BROOKLYN, NEW YORK, ASSIGNOR TO WEBSTER ELECTRIC COMPANY, OF RACINE, WISCONSIN, A CORPORATION OF WISCONSIN.

IGNITION SYSTEM.

Application filed February 20, 1922. Serial No. 537,987.

To all whom it may concern:

Be it known that I, WILLIAM W. HAWKINS, a citizen of the United States, and resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Ignition Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an ignition system wherein each spark plug of an engine is connected with the secondary or high tension winding of one of a plurality of induction coils of the vibrator type, which are excited successively and in proper sequence from a source of current common to all of the induction coils. My invention provides a generally improved system of this type.

As the characteristics, principal objects and advantages of my improved ignition system will best be understood from a description read in connection with illustrative drawings, I shall proceed at once to a description of the accompanying drawings, in which—

Figure 1 is a diagrammatic representation of an ignition circuit embodying my invention, and

Figure 2 illustrates how the several windings of each induction coil are mounted upon a single core, being the core, the polarization of which affects the operation of the vibrator.

Referring to the drawings, reference numeral 10 indicates an internal combustion engine provided with spark plugs 11, each of which is connected with, and, at the proper times in the engine cycle, is supplied with high tension current from one of a plurality of induction coil units 13—13 which are of the vibrator type. Each induction coil unit comprises a primary winding 14, a secondary winding 15, and a tertiary winding 16. The secondary winding, as is usual, is formed of finer wire than the primary and comprises a greater number of turns than the primary. The tertiary winding is preferably identical with the primary with respect to the number of turns and the size of wire employed. The three windings are mounted upon a

suitable magnetic core 17 (not shown in Figure 1) as illustrated in Figure 2.

Each induction coil unit is provided with a vibrator 18 which is adapted to rapidly open and close the circuit of the primary winding when the latter is connected with the source of current. Also associated with each induction coil unit is a condenser 19 which is connected across the vibrator contacts.

Each of the secondary windings 15 has one end thereof connected with the insulated terminal of one of the spark plugs 11, the other ends of said secondary windings being grounded.

One end of each of the several primary windings 14 is normally connected through its associated vibrator with the conductor 20, which in turn connects with the button 21^a, which is adapted to be connected by switch 21 with one terminal of a suitable source of current such, for instance, as the engine driven, alternating current magneto 22. The other terminal of the magneto is grounded. The other ends of the primary windings are connected with the segments 23—23 of a timer mechanism 24, the timer mechanism also comprising an engine driven roller which is adapted successively and in proper sequence to ground the segments 23.

One end of each of the tertiary windings 16 is grounded, the other ends of said tertiary windings being connected through a common lead 25 with the stationary or insulated contact of an interrupter mechanism indicated as a whole at 26. The movable interrupter contact is permanently grounded; hence, each tertiary winding is connected in a closed circuit through ground when the interrupter contacts are closed.

It will be understood that the timer roller and interrupter cam are driven in timed relation to each other and to the cycle of the engine. Prior to the occurrence of a spark at any spark plug, the roller 24 grounds the segment 23 which is connected with the primary of the induction coil unit assigned to such plug, the interrupter contacts opening while this condition exists.

The switch 21 is closed when the engine is running. Each time the timer roller 24

grounds one of the segments 23, the primary winding connected with such segment is excited but no high tension current is created in the secondary associated with such primary until the interrupter contacts open. This is true because the tertiary coil associated with such primary and secondary coils, being in a closed circuit, tends to neutralize any inductive effect which the primary would otherwise have upon the secondary. However, as soon as the interrupter contacts separate, the circuit of the tertiary is opened and the tertiary has no neutralizing effect upon the primary. Consequently, a high tension ignition current is now induced in the secondary due to the rapid variation in the primary coil flux, which is attributable to the operation of the vibrator and the discharge of the condenser.

The operation just described is repeated each time the roller 24 grounds one of the segments 23.

Having thus illustrated and described an ignition system embodying my invention, I wish to have it understood that I do not limit myself to the particular construction and arrangement of parts herein shown, but wish to cover all equivalent embodiments of the invention set forth in the appended claims.

What I claim is new and desire to secure by Letters Patent of the United States is:

1. An ignition system including an ignition coil comprising a core, a primary winding, secondary winding and a tertiary winding inductively related to said core, a vibrator influenced by said core and controlling the circuit of said primary winding, means for exciting said primary winding, and means for short circuiting the tertiary winding and for interrupting such short circuit.

2. An ignition system including an ignition coil comprising a core, primary, secondary and tertiary windings inductively related to said core, the primary and tertiary windings being substantially equal, a vibrator influenced by said core and controlling the circuit of the primary, means for exciting the primary winding, and means for short circuiting and interrupting the short circuit of the tertiary winding.

3. An ignition system including an ignition coil comprising a magnetic core, primary, secondary and tertiary windings carried by said core, means for exciting the primary winding, a vibrator influenced by said core adapted to make and break the circuit of the primary winding, and means for short circuiting the tertiary winding and for interrupting the short circuit of the tertiary winding.

4. An ignition system including an ignition coil comprising primary, secondary and

tertiary windings, a magnetic core whereon said windings are carried, a vibrator influenced by said core and adapted when operated to make and break the circuit of the primary winding, a condenser bridged across the vibrator contacts, means for exciting the primary winding, and means for short circuiting and interrupting the short circuit of the tertiary winding.

5. An ignition system including an ignition coil comprising a core and primary, secondary and tertiary windings, a vibrator influenced by said core and controlling the circuit of the primary, and means for short circuiting the tertiary winding, exciting the primary winding, and interrupting the short circuit of the tertiary winding, seriatim.

6. An ignition system including an ignition coil comprising primary, secondary and tertiary windings, a magnetic core whereon said windings are carried, a vibrator influenced by said core and adapted when operated to make and break the circuit of the primary winding, a condenser bridged across the vibrator contacts, and means for short circuiting the tertiary winding, exciting the primary winding, and interrupting the short circuit of the tertiary winding, seriatim.

7. An ignition system including a plurality of ignition coils, each comprising a core, primary, secondary and tertiary windings, and a vibrator influenced by said core and controlling the circuit of the primary, and means for successively operating said coils by short circuiting each tertiary winding, exciting the primary winding associated with such tertiary winding, and then interrupting the short circuit of the tertiary winding, seriatim.

8. An ignition system including a plurality of ignition coils, each comprising primary, secondary and tertiary windings, each ignition coil also comprising a vibrator adapted when actuated to make and break the circuit of the primary winding of such ignition coil, timer mechanism adapted successively to excite the several primary windings, interrupter mechanism adapted to short circuit each tertiary winding prior to the excitation of its associated primary winding, and to interrupt the short circuit of such tertiary winding during the excitation of its associated primary winding.

9. An ignition system including a plurality of ignition coils, each comprising a magnetic core, primary, secondary and tertiary windings, and a vibrator adapted when operated to make and break the circuit of its associated primary winding, a condenser bridged across the contacts of each vibrator, timer mechanism adapted to excite the several primary windings in succession, and interrupter mechanism adapted to short cir-

5 cuit all of the tertiary windings prior to the excitation of any primary winding, and to open the circuits of the tertiary windings during the excitation of each primary winding.

10 10. An ignition system including a plurality of ignition coils, each comprising a magnetic core, primary, secondary and tertiary windings, and a vibrator adapted when
10 operated to make and break the circuit of its associated primary winding, timer mechanism adapted to excite the several primary

windings in succession, and interrupter mechanism adapted to short circuit all of the tertiary windings prior to the excitation 15 of any primary winding, and to open the circuits of the tertiary windings during the excitation of each primary winding.

In witness whereof, I hereunto subscribe my name this 27th day of January, 1922.

WILLIAM W. HAWKINS.

Witnesses:

EDNA V. GUSTAFSON,
EMILE J. BOURGEOIS.