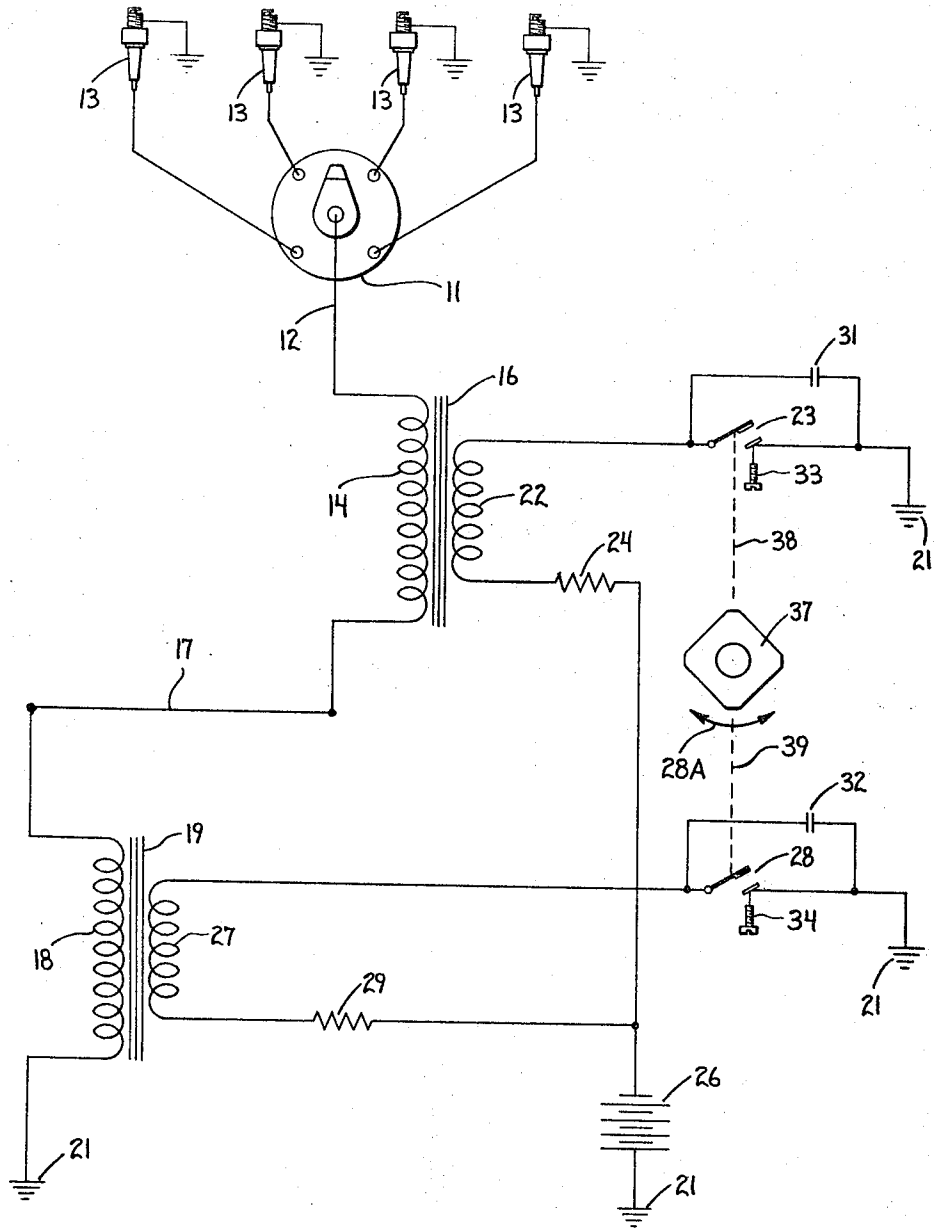
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IGNITION SYSTEM

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INVENTOR.
FRANK B. ECKERT

BY
Woodard, Weikart, Emhardt & Naughton
Attorneys

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IGNITION SYSTEM

Frank B. Eckert, 7319 Highland Road, Indianapolis, Ind. 46268

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ABSTRACT OF THE DISCLOSURE

A spark ignition secondary circuit having two ignition coil secondary windings in series with a distribuor and thereby with various spark plugs in sequence. Two primary circuits, each having a primary winding inductively coupled with one of the secondary windings and in series with a battery, resistor, and pair of breaker points. A distributor cam disposed to operate the breaker points for opening them in slight sequence and maintaining both primary circuits open simultaneously for a short period before closure.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates generally to ignition systems and more particularly to an ignition system employing two primary circuits firing each spark plug.

Description of the prior art

Various ignition systems are known in the prior art. In view of the continuous efforts to improve engine performance, increase fuel economy, and decrease obnoxious combustion products it has been desirable to provide better ways and means of assuring adequate spark energy in combustion chambers in spite of high engine speeds and adverse operating conditions. One approach has been the transistor ignition system. Several problems have confronted its adoption including expense, but more importantly, the inability of many service stations to deal with such systems. The present invention is directed to the provision of adequate spark energy with components in a system which can be serviced by garages and service stations if necessary.

SUMMARY OF THE INVENTION

Described briefly, in a typical embodiment of the present invention, the secondary circuit is provided with two secondary windings connected in series. Energy for the first of these windings is provided by a primary winding coupled thereto and in circuit with a first breaker point switch. Energy for the other secondary winding is provided by another primary winding in a primary circuit distinct from the first and including a second breaker point switch. Both switches are operated by the usual distributor cam and can be adjusted to provide a period of concurrent open condition of both primary circuits with a slightly staggered initial opening between the one and the other, if desired, for better acceleration performance. When the first and second breaker point switches are synchronized to operate at practically the same instant, the watt second electrical energy level delivered to the spark plug is doubled over the conventional coil system in use today.

BRIEF DESCRIPTION OF THE DRAWING

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

The single figure of drawing is a schematic diagram of a preferred embodiment, with the two primary windings offset to emphasize absence of magnetic coupling.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail, a conventional distributor **11** is provided to supply energy from the secondary lead **12** in the desired sequence to each of the four spark plugs **13**. More or less plugs can be supplied by this system, four being used for example. Secondary lead **12** is connected to a secondary winding **14** on core **16**, and this winding is connected through a lead **17** at its opposite end to another secondary winding **18** wound on core **19**, the other end of winding **18** being returned to ground at **21**. Energy for winding **14** is derived from a primary circuit including primary winding **22**, breaker point switch **23**, resistor **24**, and battery **26**, all in series.

Energy for secondary winding **18** is derived from a second primary circuit including primary winding **27**, breaker point switch **28**, resistor **29** and battery **26**. Condensers **31** and **32** are connected respectively across breaker points **23** and **28** for the usual purpose of minimizing point deterioration. An adjustment **33** is provided on breaker point **23** and adjustment **34** on breaker point **28**, these points being operable by a timing cam **37** which is shown with only four lobes, corresponding to the four spark plugs to be fired. A cam follower block designated schematically by the dotted outline **38** serves to open the normally closed points **23**, and cam follower block **39** is moved by the cam **37** to open the points of switch **28**. Additional adjustment means for the breaker point switches **23** and **28** is provided by making the switch **28** rotatable relative to the switch **23** with the switch **23** being fixed in position, all as indicated by the arrow **28A**.

From the foregoing description it will be recognized that there are, in effect, two primary circuits and two ignition coils. These coils are separated a sufficient distance to provide isolation between the magnetic fields of one and those of the other. In other words they are spaced sufficiently apart as to effect shielding of the magnetic fields of one with respect to the other. If desired, the system of the present invention can be constructed by taking two standard ignition coils, and removing half the secondary windings of one and half the secondary windings of the other and connecting what remains of the two secondary windings together in series. The reason for such an arrangement is to prevent too high a secondary voltage which may cause shortage or misfiring of the plugs. In colder climates, however, it may be desirable to leave the complete secondaries in the circuit.

In addition to providing the extra energy assuring a high energy spark even during the comparatively short dwell periods occurring at high engine speeds providing better fuel economy, it has been found that if one set of breaker points is adjusted to open slightly ahead of the other set, acceleration performance can be improved. This can be done, for example, by adjusting the adjustable point or contactor of one set so that the gap, when open, is slightly greater than the other. Accordingly, in operation, this circuit is open slightly ahead of the other. The total dwell of both is sufficient that the open condition of both circuits is concurrent for a certain period of time after the initial opening of each and before closure for the next dwell period.

While the invention has been disclosed and described in some detail in the drawings and foregoing description, they are to be considered as illustrative and not restrictive in character, as other modifications may readily suggest themselves to persons skilled in this art and within the broad scope of the invention, reference being made to the appended claims.

The invention claimed is:

1. An ignition system comprising:

a spark plug;

first and second secondary coil windings connected in series circuit with said spark plug to establish a voltage across the gap of said spark plug and produce a spark thereacross;

a first primary circuit including in series a source of electrical energy, a first primary coil winding, and a first switch;

a second primary circuit including in series said energy source, a second primary coil winding, and a second switch;

said first primary and secondary coil windings being inductively coupled together for energy transfer from said first primary winding to said first secondary winding; and

said second primary and secondary coil windings being inductively coupled together for energy transfer from said second primary winding to said second secondary winding, the magnetic fields of said second primary and secondary windings being isolated from the magnetic fields of said first primary and secondary windings, said switches being adjusted for opening at generally the same time and for a period of concurrent open condition of both switches by said engine operated means.

2. The ignition system of claim 1 and further comprising:

engine operated means coupled to said switches for operation of said switches in synchronism with engine events.

3. The system of claim 2 wherein:

said engine operated means include a breaker point operating cam, each of said switches including a cam follower engageable by said cam for opening the contacts of the switch.

4. The system of claim 3 wherein said switches are adjusted for sequential opening and a period of concurrent open condition effected by said cam.

5. The combination of claim 4 and further comprising:

a first resistor in series in said first primary circuit, and a second resistor in series in said second primary circuit.

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LAURENCE M. GOODRIDGE, *Primary Examiner.*

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