

[54] CAPACITOR CHARGE-DISCHARGE TYPE
IGNITION SYSTEM FOR USE IN A
TWO-CYCLE INTERNAL COMBUSTION
ENGINE

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[51] Int. Cl. F02p 1/00

[58] Field of Search 123/148 E, 149 R, 149 D,
123/149 C

[56] References Cited

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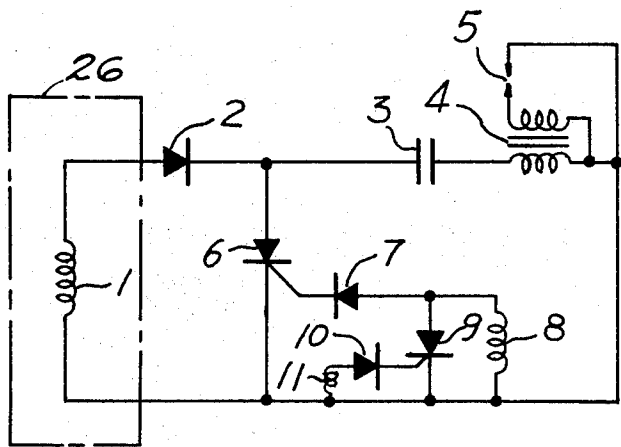
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[57] ABSTRACT

A capacitor charge - discharge type ignition system for use in a two-cycle internal combustion engine comprising a capacitor to be charged by a suitable power source; ignition coil means through the primary coil of which discharge current from said capacitor flows; a signal source for developing a signal output at the time of ignition; and a gate controlled rectifier for determining said time of ignition under the control of said signal output, said ignition system including means for preventing said engine from rotating in the reverse direction and said means being adapted to short-circuit the charging power source thereby to prevent the charging current from the source from flowing through the capacitor or the signal source thereby to prevent the igniting current from the signal source from flowing through the gate controlled rectifier when the engine rotates in the reverse direction.

13 Claims, 9 Drawing Figures



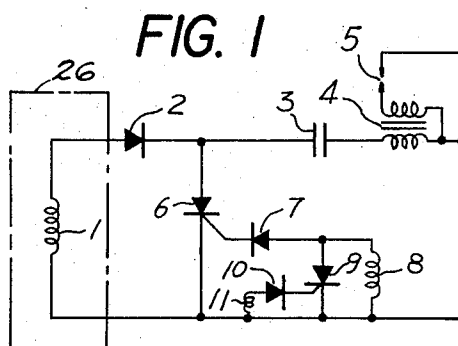
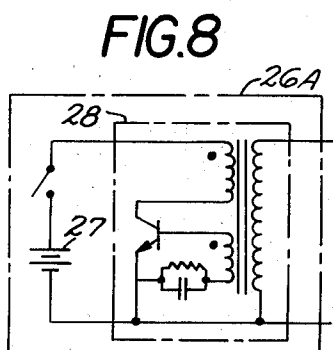


FIG. 2.

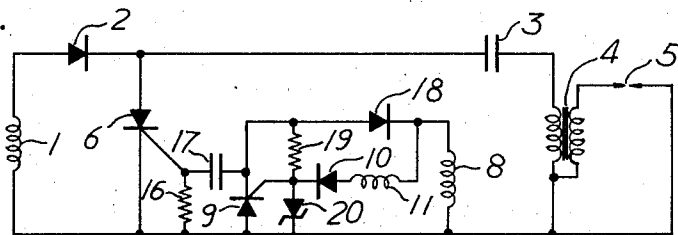


FIG. 3.

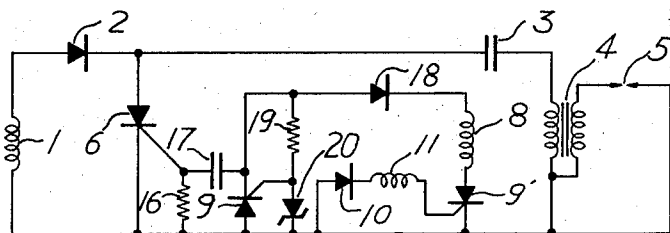


FIG. 4.

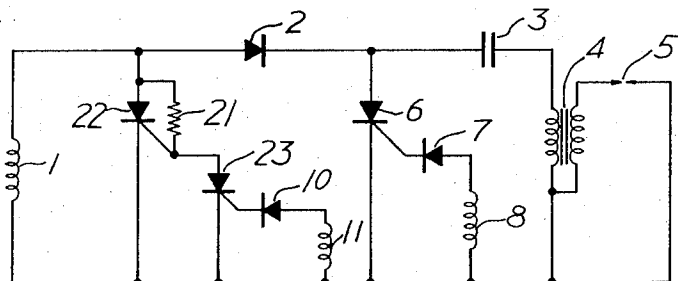


FIG. 5.

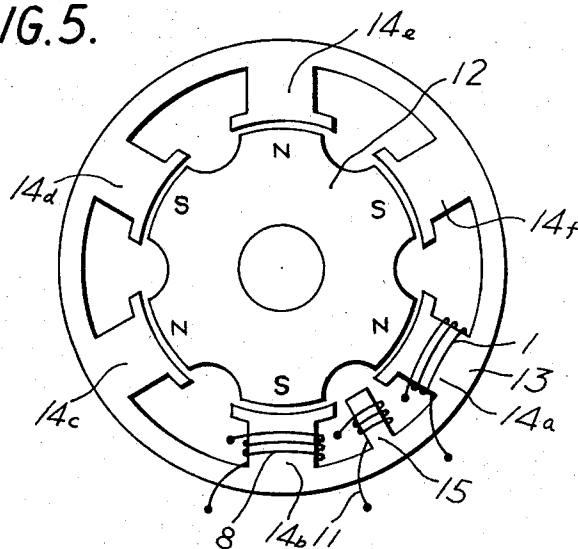


FIG. 6.

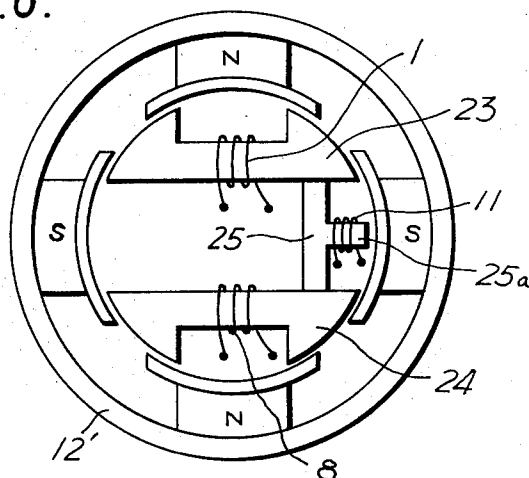


FIG. 7A.

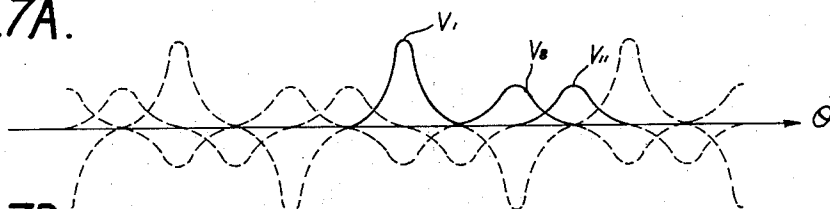
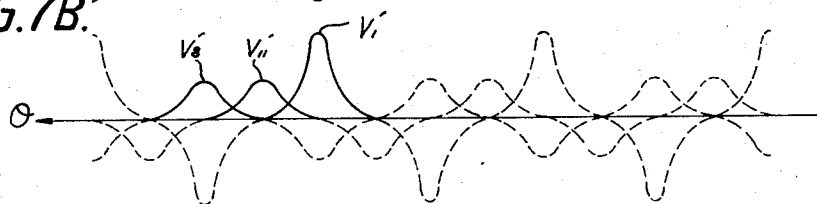


FIG. 7B.



CAPACITOR CHARGE-DISCHARGE TYPE IGNITION SYSTEM FOR USE IN A TWO-CYCLE INTERNAL COMBUSTION ENGINE

BACKGROUND OF THE INVENTION

This invention relates to a breakerless type ignition system for a two-cycle engine and more particularly, to a capacitor charge - discharge type breakerless ignition system for preventing the engine from rotating in the reverse direction.

Of late, a two-cycle internal combustion engine has been designed to have a breakerless type ignition system incorporated therein. As a typical ignition system to be incorporated in such an engine, the so-called capacitor charge - discharge type breakerless ignition system has been known.

The capacitor charge - discharge type breakerless ignition system generally comprises a capacitor connected to the primary side of an ignition coil, a power source for charging said capacitor and a gate controlled rectifier such as thyristor for discharging the charged capacitor through the primary winding of the ignition coil. As the power source for charging the capacitor, an AC generator connected through the rectifier to the capacitor to be driven from an internal combustion engine or a battery has been employed. At the time of ignition, an output from a signal source is applied at the gate terminal of the gate controlled rectifier to turn the gate controlled rectifier on and the charged capacitor discharges through the primary winding of the ignition coil. As the charged capacitor discharges, a high voltage is induced on the secondary side of the ignition coil to strike sparks across the ignition plug connected to the secondary side of the ignition coil. As the power source for the ignition signal, an armature coil of a generator which is driven from an engine, for example, can be employed.

In the afore-mentioned ignition system, the charging of the capacitor by the capacitor charging power source and the supply of an ignition signal to the gate controlled rectifier are alternately repeated and the repeating alternate sequence remains unchanged regardless of the direction in which the crank-shaft of the engine rotates. Therefore, even if the engine rotates in the reverse direction, the ignition system can operate to allow a high voltage to develop on the secondary side of the ignition coil. Thus, if this type of ignition system is employed in a two-cycle engine, there will be the possibility for the engine to rotate in the reverse direction resulting in hazard.

SUMMARY OF THE INVENTION

According to the present invention, the ignition system is provided with a second signal source for developing an output having a phase different from that of an output from the afore-mentioned signal source and a gate controlled rectifier controlled by an output from the second signal source for prevention of rotation in the reverse direction of the engine. The gate controlled rectifier cooperates with the ignition system to nullify the signal output or the power source output when the engine tends to rotate in the reverse direction thereby to prevent the engine from being ignited when the engine rotates in the reverse direction.

According to one aspect of the present invention, in a breakerless type ignition system comprising a capacitor connected to the primary side of an ignition coil; a

power source for charging the capacitor; a gate controlled rectifier such as a thyristor for discharging the charged capacitor through the primary winding of the ignition coil, said thyristor acting for determining an ignition time for an engine; and a first signal source for applying an ignition signal at the gate of the gate controlled rectifier, there are provided a second signal source for developing an output having a phase different from that of an output of the first signal source and a gate controlled rectifier for preventing an engine from rotating in the reverse direction when the rectifier turns on with an output of the second signal source in such a reverse direction rotation of the engine whereby the turning-on of the rectifier nullified the output of the first signal source. Therefore, when the engine tends to rotate in the reverse direction the gate controlled rectifier for determining an ignition time point will not be turned on thereby to prevent the engine from rotating in the reverse direction.

According to another aspect of the present invention, the gate controlled rectifier for prevention of the rotation in the reverse direction is in series connected to the first signal source in such a manner that the rectifier turns on only when the engine rotates in the forward direction to allow the first signal source to cooperate with the gate controlled rectifier for determining an ignition time point.

According to a further aspect of the present invention, when the engine tends to rotate in the reverse direction, the gate controlled rectifier for prevention of rotation in the reverse direction turns on to nullify an output of the capacitor charging power source whereby the capacitor will not be charged and in consequence, the engine is prevented from rotating in the reverse direction.

According to a further aspect of the present invention, the ignition system includes a wave-form arranging circuit having a capacitor charged from a signal source, an auxiliary thyristor arranged to control the discharge of the capacitor so that the capacitor is discharged through the gate and cathode of a main thyristor connected in series to the primary side of an ignition coil, and a Zener diode arranged to control the auxiliary thyristor so that the capacitor is discharged through the gate and cathode of the thyristor thereby to turn the thyristor on, said auxiliary thyristor acting as a gate control rectifier for nullifying an output from the signal source so as to prevent the engine from rotating in the reverse direction.

In a preferred embodiment of the invention, as the afore-mentioned power source for charging the capacitor and first and second signal sources, respectively, armature coils disposed within a common AC generator are employed and the AC generator is drivingly connected to the crank-shaft of an engine for synchronous rotation therewith.

Therefore, the principal object of the present invention is to provide a capacitor charge - discharge type breakerless ignition system which can effectively prevent an engine from rotating in the reverse direction when the engine tends to rotate in the direction.

The above and other objects and attendant advantages of the present invention will be more readily apparent to those skilled in the art from a reading of the following detailed description in conjunction with the accompanying drawings which show preferable embodiments of the invention for illustration purpose

only, but not for limiting the scope of the same in any way.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a circuit diagram of a first embodiment of ignition system according to the present invention;

FIG. 2 is a circuit diagram of a second embodiment of ignition system according to the present invention which represents a modification of the system shown in FIG. 1;

FIG. 3 is a circuit diagram of a third embodiment of ignition system according to the present invention;

FIG. 4 is a circuit diagram of a fourth embodiment of ignition system according to the present invention;

FIG. 5 is a schematic and elevational view on an enlarged scale of an AC generator suitably employed in any one of the embodiments shown in the preceding figures;

FIG. 6 is a schematic and elevational view on an enlarged scale of another type of AC generator suitably employed in any one of the embodiments shown in FIGS. 1 through 4 inclusive;

FIG. 7A is a diagram showing an output voltage of the AC generator shown in FIG. 5 or 6 when the internal combustion engine associated with any one of the ignition systems shown in FIGS. 1 through 4 inclusive is rotating in the forward direction; and

FIG. 7B is a diagram showing an output voltage of the AC generator shown in FIG. 5 or 6 when the internal combustion engine associated with any one of the ignition systems shown in FIGS. 1 through 4 inclusive is rotating in the reverse direction.

FIG. 8 is a diagram showing an alternate power source for charging the capacitor.

PREFERRED EMBODIMENTS OF THE INVENTION

The present invention will be now described referring to the accompanying drawings and more particularly, to FIG. 1 thereof in which the first embodiment of ignition system of the invention is diagrammatically shown. The ignition system of this figure is adapted to nullify an output of a first signal source which controls a gate controlled rectifier which in turn determines an ignition time point of an internal combustion engine, when the engine tends to change its rotational direction from the forward direction to the reverse direction. In FIG. 1, a power source for charging a capacitor is shown in the form of an armature coil or capacitor charging coil 1 disposed in an AC generator which is driven from the engine. Connected in series to the opposite ends of the armature or capacitor charging coil 1 are a diode 2, a capacitor 3 and the primary winding of an ignition coil 4. The capacitor charging coil 1 induces an AC voltage in synchronism with the rotation of the engine and the capacitor 3 is charged during one half cycle of an output of the charging coil 1 in the forward direction with respect to the diode 2. Connected to the secondary side of the ignition coil 4 is an ignition plug 5 which strikes sparks in the cylinder of the engine. Connected to the opposite ends of the series circuit which includes the capacitor 3 and primary coil 4 is a gate controlled rectifier for determining an ignition time point such as a thyristor 6 and a diode 7 and a first signal source are connected between the gate and cathode of the thyristor 6. In the illustrated embodiment, the first signal source

comprises a first signal armature coil 8 disposed in the AC generator which is driven from the engine.

After the capacitor 3 has been charged with an output from the capacitor charging coil 1, an output from the first signal armature coil 8 is applied across the gate and cathode of the thyristor 6 and at this time, since a voltage which makes the anode of the thyristor positive with respect to the cathode thereof is applied across the anode and cathode of the thyristor 6 by the charged capacitor, the thyristor 6 is turned on whereby the charged capacitor discharges through the primary winding of the ignition coil 4. Therefore, an abrupt variation occurs in the flux across the ignition coil to induce in the secondary winding of the ignition coil a high voltage sufficient to strike sparks in the plug. Thus, if the arrangement is so designed that the time point at which an output develops in the first signal armature coil 8 which output turns the thyristor on coincides with an ignition time point for the engine, the engine can rotate in the forward direction.

In order to attain the purpose of the present invention, a gate controlled rectifier such as a thyristor 9 is in parallel connected to the first signal armature coil 8 so as to prevent the engine from rotating in the reverse direction. A diode 10 and a second signal source are in series connected across the gate and cathode of the thyristor 9. In the illustrated embodiment, the second signal source comprises a second signal armature coil 11 disposed within the AC generator which is driven from the engine. The second signal armature coil 11 is so set that when the engine is rotating in the forward direction, the second signal armature coil develops an output in a time lag relationship to the output developed by the first signal armature coil.

According to the present invention, the charging coil and first and second armature coils are preferably disposed within a magnet-type generator having its rotor drivingly connected to the crank-shaft of the engine as shown in FIG. 5. In FIG. 5, numeral 12 denotes a magnet rotor which is driven by the crank-shaft of the engine. The magnet rotor 12 generally has $2n$ poles (n is an integer greater than 2) and in the illustrated embodiment, the rotor is shown as having six poles. Although the magnet rotor is shown as comprising one magnet provided with $2n$ poles in FIG. 5, it is also possible to alternately arrange $2n$ magnets and $2n$ iron pieces along the outer periphery of the rotor 12 so as to provide $2n$ poles without departing from the scope of the invention. A stator 13 is coaxially disposed about the rotor 12 in a surrounding relationship to the latter. The stator 13 has $2n$ salient poles 14a, 14b, . . . 14f corresponding to the poles of the rotor. Two adjacent salient poles of the stator (the salient poles 14a and 14b in the illustrated embodiment) have the capacitor charging coil 1 and first signal armature coil 8 wound thereabout, respectively and the remaining salient poles (the salient poles 14c . . . 14f in the illustrated embodiment) have armature coils wound thereabout which supply power to loads such as the battery and head light. In the illustrated embodiment, the stator 13 also has an auxiliary pole 15 between the adjacent two salient poles 14a and 14b and the auxiliary pole 15 has the second signal armature coil 11 wound thereabout.

Although FIG. 5 illustrates the generator as being an inner rotor type AC generator, the armature coils 1, 8 and 11 may also be disposed within an outer-rotor type

or fly-wheel type generator shown in FIG. 6. In FIG. 6, the fly-wheel type rotor 12' is shown as having four poles. The capacitor charging coil 1 and first signal coil 8 are respectively wound about I-shaped iron cores 23 and 24 which are disposed 180° of mechanical angle from each other in the space defined by the poles of the rotor 12'. The second signal armature coil 11 is wound about the leg 25a of a T-shaped iron core 25 disposed between the iron cores 23 and 24. The leg 25a of the iron core 25 is parallel to the iron cores 23 and 24.

When the capacitor charging coil 1, first signal armature coil 8 and second signal armature coil 11 are arranged in a signal AC generator as shown in FIG. 5 or 6, output voltages as shown in FIG. 7A are induced in these coils as the engine rotates in the forward direction. In FIG. 7A, V_1 , V_8 and V_{11} shown by the solid lines represent voltages induced in the capacitor charging coil 1, first signal armature coil 8 and second signal armature coil 11, respectively as a two-cycle engine makes one complete rotation.

It should be noted that the generator employed in the present ignition system may comprise a $2n$ pole magnet field and a $3n$ pole armature. It will be understood that the arrangement causes the generator to generate the three or more phase output therefrom.

When the coils 1, 8 and 11 of the ignition system as shown in FIG. 1 are disposed within the common generator as shown in FIG. 5 or 6, as the engine rotates in the forward direction, the capacitor 3 is first charged with the voltage V_1 from the capacitor charging coil 1. By the voltage across the charged capacitor 3, a voltage is applied across the anode and cathode of the thyristor 6 which makes the anode positive with respect to the cathode. Therefore, as the engine rotates at a further degree, the first signal armature coil 8 develops the voltage V_8 which is then applied across the gate and cathode of the thyristor 6 through the diode 7 to turn the thyristor 6 on. Thus, the charged capacitor 3 rapidly discharges the thyristor 6 and the primary winding 4 of the ignition coil thereby to develop a high voltage sufficient to strike sparks across the gap in the ignition plug 5 on the secondary side of the ignition coil. As the engine further rotates, the second signal armature coil 11 develops the voltage V_{11} . By the time the second signal armature coil 11 has developed the output voltage V_{11} , the output voltage V_8 of the first signal armature coil 8 has not yet reduced to zero and therefore, the thyristor 9 turns on. Since the thyristor 9 turns on only after the engine has been ignited, the operation of the engine will not be adversely affected in any way.

On the other hand, if the engine tends to rotate in the reverse direction, the rotor 12 or 12' of the generator also rotates in the reverse direction and in consequence, the capacitor charging coil 1, the second signal armature coil 11 and first signal armature 8 develop the voltages V'_1 , V'_{11} and V'_8 as shown in FIG. 7B, respectively. Also in this case, the capacitor 3 is charged with the output voltage V'_1 of the capacitor charging coil 1. Thereafter, the second signal armature coil 11 develops the voltage V'_{11} which is applied across the gate and cathode of the thyristor 9 through the diode 10. Lastly, the first signal armature coil 8 develops the voltage V'_8 which is applied across the anode and cathode of the thyristor 9 whereby the thyristor 9 is biased in the forward direction. By the time the first signal armature coil 8 has developed the voltage V'_8 , the output of the second signal armature coil 11 which applies a turn-on

gate voltage across the gate and cathode of the thyristor 9 has not been reduced to zero and thus, the thyristor 9 turns on. Since this thyristor 9 continues to be on during the development of the output in the first signal armature coil 8, the whole of the current supplied from the first signal armature coil 8 flows through the thyristor 9 and no turn-on signal is applied across the gate and cathode of the thyristor 6. Thus, the thyristor 6 will not be turned on at the ignition time and there is no possibility for development of a high voltage on the secondary side of the ignition coil. In this way, since no spark is struck across the ignition plug when the engine tends to rotate in the reverse direction, the engine is positively prevented from rotating in the reverse direction.

FIG. 2 shows a second embodiment of ignition system of the invention which is substantially similar to the embodiment of FIG. 1 except for the arrangement of the circuit extending from the first signal armature coil 8 to the gate of the thyristor 6. In the embodiment of FIG. 2, a resistor 16, a capacitor 17 and a diode 18 are in series connected between the opposite ends of the first signal armature coil 8 and the opposite ends of the resistor 16 are connected across the gate and cathode of the thyristor 6. Connected in parallel between the opposite ends of a circuit in which the diode 18 and first signal armature coil 8 are in series connected are a circuit in which a resistor 19 and a Zener diode 20 are in series connected and a thyristor 9. The gate of the thyristor 9 is connected to the juncture between the resistor 19 and Zener diode 20 and a second signal armature coil 11 and a diode 10 are in series connected between the gate of the thyristor 9 and the juncture between the diode 18 and first signal armature coil 8.

In the embodiment shown in FIG. 2, when the engine rotates in the forward direction after the capacitor 3 has been charged with the output voltage V_1 of the capacitor charging coil 1, the capacitor 17 is charged with the output voltage V_8 of the first signal armature coil 8 through the resistor 16 and diode 18. When a voltage across the opposite ends of the capacitor 17 reaches the Zener voltage of the Zener diode 20, the thyristor 9 turns on. Therefore, the charged capacitor 17 discharges through the gate and cathode of the thyristor 6 and the now turned on thyristor 9. This discharge current turns the thyristor 6 on thereby to discharge the capacitor 3 through the thyristor 6 to develop a high voltage on the secondary side of the ignition coil. It will be understood that the capacitor 17, thyristor 9 and Zener diode 20 constitute the circuit for arranging the signal output from the signal armature coil 8. The signal arranging circuit serves to convert the signal output from the signal armature coil into a pulse having a quite narrow band wave form which is supplied to the gate of the thyristor 6, resulting in that the engine can be ignited at a proper time point even when the engine is rotating at a high rate.

On the other hand, when the engine tends to rotate in the reverse direction, the voltage V'_{11} develops in the second signal armature coil 11 before the output voltage V'_8 will develop in the first signal armature coil 8 and this voltage V'_{11} is applied across the gate and cathode of the thyristor 9 to turn the thyristor 9 on, so that the capacitor 17 will not be charged. Therefore, even if the output voltage V'_8 develops in the first signal armature coil 8 at the ignition time, the thyristor 6 will not be turned on and in consequence, the engine will

not be ignited. It will be further understood that the signal wave form arranging thyristor also serves as a thyristor for nullifying the signal output from the signal source when the engine tends to rotate in the reverse direction.

FIG. 3 shows a third embodiment of ignition system of the present invention. In this embodiment, the capacitor 17, Zener diode 20 and thyristor 9 are employed in the ignition circuit for the thyristor 6 as in the case of the embodiment of FIG. 2. Connected in series to the first signal armature coil 8 is a thyristor 9' which acts as a gate controlled rectifier for preventing the engine from rotating in the reverse direction. A diode 10 and a second signal armature coil 11 are in series connected between the gate and cathode of the thyristor 9'. In this embodiment, different from the embodiments of FIGS. 1 and 2, when the engine is rotating in the forward direction, the second signal armature coil 11 develops an output before the first signal armature coil 8 develops an output as shown in FIG. 7B.

In the system shown in FIG. 3, when the engine is rotating in the forward direction, the thyristor 9' is turned on with an output from the second signal armature coil 11. When the thyristor 9' is turned on, the capacitor 17 is charged with an output from the first signal armature coil 8 and when the voltage across the opposite ends of the capacitor 17 reaches the Zener voltage of the Zener diode 20, the thyristor 9 is turned on and then, the thyristor 6 is turned on to ignite the engine as in the case of the embodiment of FIG. 2. On the other hand, when the engine tends to rotate in the reverse direction, since the first signal armature coil 8 develops an output before the second signal armature coil 11 develops an output, when the first signal armature coil 8 develops the output, the thyristor 9' will not be turned on and in consequence, the first signal armature coil 8 cannot charge the capacitor 17. Therefore, the thyristor 6 cannot turn on and the engine is prevented from being ignited.

Although description has been made of the use of the capacitor charging coil 1 as the power source 26 for charging the capacitor 3 in the embodiments of FIGS. 1, 2 and 3, it will be understood, as in FIG. 8 that a DC power source 26A such as a battery 27 and a DC-AC converter 28 in combination can be equally employed as the capacitor charging power source in these embodiments.

FIG. 4 shows a fourth embodiment of the invention and in this embodiment, the capacitor 3 is prevented from being charged when the engine tends to rotate in the reverse direction. In this embodiment, the operative arrangement of the capacitor charging coil 1, diode 2, capacitor 3, ignition coil 4, ignition plug 5, thyristor 6, diode 7 and first signal armature coil 8 is quite identical with that of the corresponding elements of the embodiment of FIG. 1. Connected between the opposite ends of the capacitor charging coil 1 is a thyristor 22 which serves as a gate controlled rectifier for preventing the engine from rotating in the reverse direction. A resistor 21 is connected between the gate and anode of the thyristor 22 for applying an ignition signal to the thyristor. A diode 10 and a second signal armature coil 11 are connected between the gate and cathode of a thyristor 23 the anode and cathode of which are connected to the gate and cathode of the thyristor 22, respectively. In the embodiment of FIG. 4, the coils are so arranged that when the engine rotates in the forward

direction, the second signal armature coil 11 first develops an output, the capacitor charging coil 1 then develops an output and thereafter, at the time of ignition, the first signal armature coil 8 develops an output.

When the engine rotates in the forward direction, the thyristor 23 is turned on with an output from the second signal armature coil 11 to short-circuit the gate and cathode of the thyristor 22 to prevent the thyristor from turning on. Therefore, an output from the charging coil 1 charges the capacitor 3 and the first thyristor 6 is turned on with an output from the first signal armature coil 8 thereby to ignite the engine. On the other hand, when the engine tends to rotate in the reverse direction, the capacitor charging coil 1 first develops an output before the second signal armature coil 11 develops an output and the output voltage from the capacitor charging coil 1 is applied through the resistor 21 to the gate of the thyristor 22 whereby current flows through the thyristor 22 to turn the thyristor on. In this way, the charging coil 1 is short-circuited by the thyristor 22 and in consequence, the capacitor 3 is prevented from being charged and the engine will not be ignited.

The present disclosure includes that contained in the appended claims, as well as that of the foregoing description. Although this invention has been described in its preferred forms with a certain degree of particularity, it is understood that the present disclosure of the preferred forms has been made only by way of example and that numerous changes in the details of the systems and the combination and arrangement of circuit elements may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. A breakerless type ignition system for a two-cycle engine comprising a capacitor; a power source for charging said capacitor; ignition coil means having the primary coil through which discharge current from said capacitor flows at a predetermined time and the secondary coil connected to an ignition plug; a first signal source for developing a signal output at said predetermined time; and a first gate controlled rectifier for turning on at said predetermined time under the control of an output of said first signal source to permit discharge current coming from said capacitor to flow through the primary coil of said ignition coil means, said first gate controlled rectifier acting to determine an ignition time point for said engine, characterized in that a second signal source for developing an output having a phase different from that of an output of said first signal source and a second gate controlled rectifier for prevention of rotation in the reverse direction, said first and second signal sources developing signal outputs in one type of sequence when said engine rotates in the forward direction and signal outputs in another type of sequence when said engine rotates in the reverse direction and said second gate controlled rectifier being adapted to turn on when said engine rotates in the reverse direction to nullify said output of the first signal source in cooperation with said second source.

2. The breakerless type ignition system for a two-cycle engine as set forth in claim 1, in which said second gate controlled rectifier is disposed in a parallel connection relationship with respect to said first signal source, said first and second signal sources are so ar-

ranged that when said engine rotates in the forward direction the phase of an output of said first signal source is in advance of that of an output of said second signal source and when the engine tends to rotate in the reverse direction the phase of an output of said first signal source lags behind that of an output of said second signal source and said second gate controlled rectifier is turned on with an output signal of said second signal source thereby to short-circuit the output of said first signal source.

3. The breakerless type ignition system for a two-cycle engine as set forth in claim 1, in which said first and second signal sources are first and second signal armature coils disposed within a common magnet type AC generator which rotates in synchronism with said engine and cooperate with a common magnetic field.

4. The breakerless type ignition system for a two-cycle engine as set forth in claim 1, in which said power source for charging said capacitor is an armature coil of a magnet type AC generator which rotates in synchronism with said engine.

5. The breakerless type ignition system for a two-cycle engine as set forth in claim 4, in which said first and second signal sources are first and second signal armature coils disposed within said magnet type AC generator together with said charging armature coil and said three armature coils cooperate with a common magnetic field.

6. The breakerless type ignition system for a two-cycle engine as set forth in claim 1, in which said power source for charging said capacitor comprises a combination of a battery and a DC-AC converter.

7. A breakerless type ignition system for a two-cycle engine comprising a capacitor; a power source for charging said capacitor; ignition coil means having the primary coil through which discharge current from said capacitor flows at a predetermined time and the secondary coil connected to an ignition plug; a first signal source for developing a signal output at said predetermined time; and a first gate controlled rectifier for turning on at said predetermined time under the control of an output of said first signal source thereby to permit discharge current coming from said capacitor to flow through said primary coil of the ignition coil means, said first gate controlled rectifier acting for determining an ignition time point for said engine, characterized in that a second signal source for developing a signal output the phase of which leads that of an output of said first signal source when said engine rotates in the forward direction and lags the phase of an output of the first signal source when the engine tends to rotate in the reverse direction and a second gate controlled rectifier connected in series with said first signal source to be controlled by an output of said second signal source, said second gate controlled rectifier acting for preventing said engine from rotating in the reverse direction, said second gate controlled rectifier being adapted to turn on with an output of said second signal source when said engine rotates in the forward direction whereby said first signal source effectively acts on the ignition circuit for said first gate controlled rectifier and the first gate controlled rectifier will not turn on when the engine tends to rotate in the reverse direction.

8. The breakerless ignition system for a two-cycle engine as set forth in claim 7, in which said first and sec-

ond signal sources are first and second signal armature coils disposed within a common magnet type AC generator which rotates in synchronism with said engine and said first and second signal armature coils cooperate with a common magnetic field.

9. The breakerless type ignition system for a two-cycle engine as set forth in claim 7, in which said power source for charging said capacitor is an armature coil of said magnet type AC generator which rotates in synchronism with said engine.

10. The breakerless type ignition system for a two-cycle engine as set forth in claim 9, in which said first and second signal sources are first and second signal armature coils disposed within said magnet type AC generator together with said charging armature coil and cooperating with a common magnetic field.

11. The breakerless type ignition system for a two-cycle engine as set forth in claim 7, in which said power source for charging said capacitor comprises a combination of a battery and a DC-AC converter.

12. The breakerless type ignition system for a two-cycle engine comprising a capacitor; a power source for charging said capacitor; ignition coil means having the primary winding through which discharge current from said capacitor flows at a predetermined time and the secondary winding connected to an ignition plug; a first signal source for developing a signal output at said predetermined time; and a gate controlled rectifier for turning on at said predetermined time under the control of an output of said first signal source thereby to permit discharge current coming from said capacitor to flow through said primary coil of the ignition coil means, said gate controlled rectifier acting for determining an ignition time point for said engine, characterized in that a first auxiliary gate controlled rectifier connected in parallel to the output of said capacitor charging power source; a second auxiliary gate controlled rectifier connected between the gate and cathode of said first auxiliary gate controlled rectifier; means for supplying ignition current from said power source to said first auxiliary gate controlled rectifier to ignite said first auxiliary gate controlled rectifier; and a second signal source for developing an output the phase of which leads that of an output of said power source when said engine rotates in the forward direction and for developing an output the phase of which lags that of an output of the power source when the engine tends to rotate in the reverse direction and in which an output of said second signal source is applied across the gate and cathode of said second auxiliary gate controlled rectifier and when said engine rotates in the forward direction said second auxiliary gate controlled rectifier is turned on with an output of said second signal source whereby said first auxiliary gate controlled rectifier is prevented from turning on whereas when said engine tends to rotate in the reverse direction said second auxiliary gate controlled rectifier is prevented from turning on whereby said first auxiliary gate controlled rectifier is turned on with an output of said first signal source so that charging of said capacitor by said power source is prevented.

13. The breakerless type ignition system for a two-cycle engine as set forth in claim 12, in which said power source is an armature coil of a magnet type AC generator which rotates in synchronism with said engine and said first and second signal sources are first and second signal armature coils disposed within said AC generator which three armature coils cooperate with a common magnetic field.

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