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IGNITION SYSTEM FOR INTERNAL COMBUSTION ENGINES

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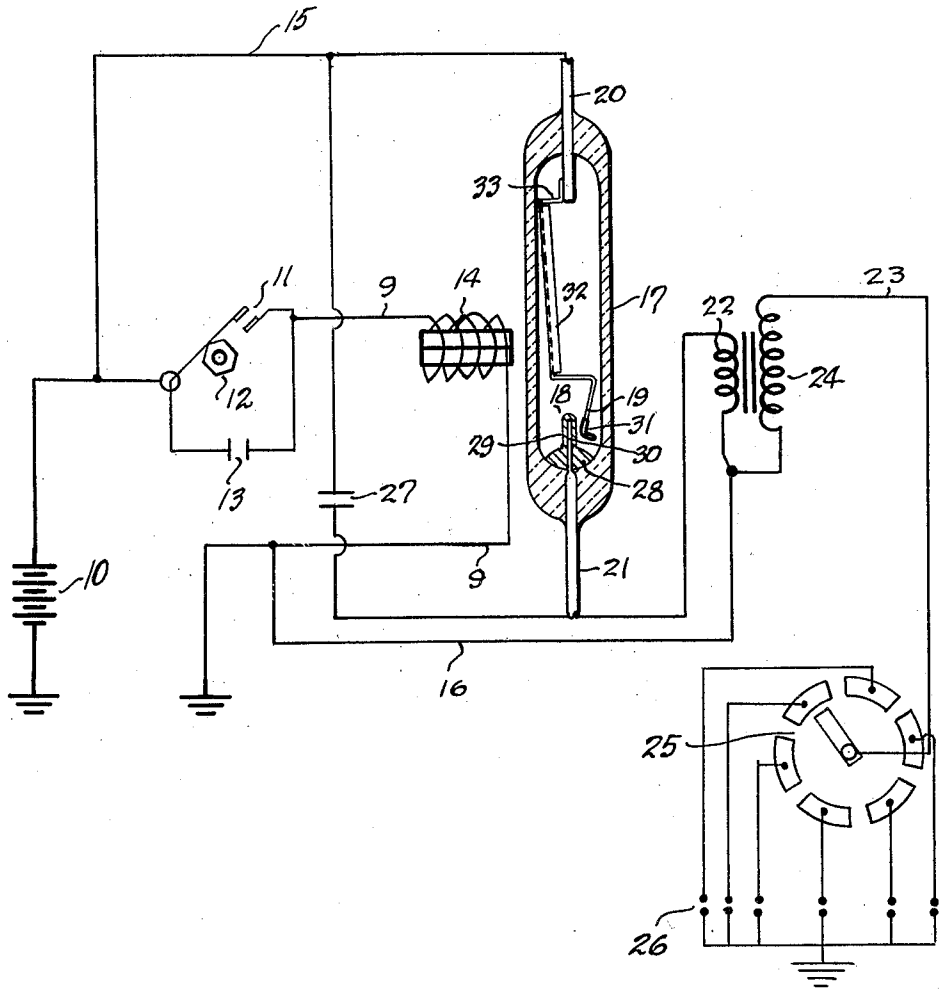

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IGNITION SYSTEM FOR INTERNAL COMBUSTION ENGINES

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This invention relates to an ignition system for internal combustion engines, and has for an object to materially increase the efficiency and reliability of the ignition system, and also to increase the life of the cam-operated breaker points and the whole ignition system.

Another object is to provide a system including the normal cam-operated breaker points for interrupting a first or control circuit in which the normal current through the circuit and these points is materially reduced, to thus greatly increase the normal life and efficiency of these points, and to provide a primary ignition circuit including a make-and-break switch having liquid, such as mercury make-and-break contacts carrying the normal primary ignition current, which switch is controlled by the first circuit, and a secondary circuit inductively coupled to the second or primary circuit and including the ignition plugs for the engine.

With the foregoing and other objects in view, I have devised the construction illustrated in the accompanying drawing forming a part of this specification. It is, however, to be understood the invention is not limited to the specific details of construction and arrangement shown, but may embody various changes and modifications within the scope of the invention.

In this drawing:

The single figure is a diagrammatical view showing this improved ignition circuit.

The usual ignition systems which utilize a pair of cam-operated breaker points of solid material to make and break the circuit through the primary coil of an induction coil, begin to operate inefficiently and unreliably after these breaker points become deteriorated, burned and pitted. This condition will exist in a relatively short operating time using breaker points of solid material to make and break the inductive loads in an induction coil type of ignition system, as the entire current of the primary ignition circuit from the battery or generator passes through these points. In the present invention these disadvantages are overcome by materially reducing the current through these breaker points, while all the advantages of a primary breaker point induction coil are retained. This is accomplished by providing a circuit for the breaker points in which the normal current through these points is materially reduced, and providing a primary circuit for the primary of the ignition coil in which the full primary ignition current from the battery or generator is controlled by a conducting liquid contact, gas-filled make-and-break switch, preferably of a mercury contact type, operated by the first circuit in which the cam-operated contacts are located.

Referring to the accompanying drawing, the usual source of current, such as a battery or generator, is indicated at 10, and this source is included in the first or control circuit comprising the breaker contacts 11 operated by the cam 12, across which contacts may be connected a condenser 13 in the usual manner to reduce arcing at the contacts, and in series with these breaker points and the source of current is a magnetic coil 14. The source of

current 10 also is included in the primary circuit for the primary of the ignition coil, this circuit including the leads 15 and 16 and a make-and-break switch 17 comprising relatively movable liquid make-and-break contacts, preferably mercury, 18 and 19, in a sealed gas-filled tube, these contacts being connected at 20 and 21 in this primary circuit. Also in series in this circuit is the primary coil 22 of the ignition induction coil, and inductively related or coupled to this circuit and coil 22 is a secondary circuit 23 including a secondary induction coil 24, and in this circuit is the distributor 25 distributing current from the secondary coil successively to the ignition devices comprising the spark plugs 26 in the engine. A condenser 27 may be connected across the liquid contacts 18 and 19 to reduce arcing therein. This switch comprises a mercury reservoir or pool 28 at the bottom of the sealed tube, including an upwardly extending conductor 29 which maintains a film of mercury 30 over a surface from the pool by capillary action. The contact 19 is a movable contact shaped at its lower end 31 to move to and from the stationary contact, and during this action some mercury is transferred from the stationary contact to the movable contact so that the make-and-break contacts are liquid or mercury contacts. The movable contact is mounted on the lower end of armature 32 connected by a flexible resilient element 33 with the inner end of the conductor 20, and the coil 14 is located closely adjacent one side of the tube so as to operate the armature 32. Thus, when a coil 14 is energized it attracts the armature 32 to shift the movable contact 19 into engagement with the stationary contact 18 to close the primary circuit 15 including the source of current 10 and the primary 22 of the induction coil. When the circuit through the coil 14 is broken the resilient element 33 will swing the armature in the opposite direction and shift the movable contact 19 away from the stationary contact 18 to open the primary circuit.

In this arrangement the primary circuit 15, including the liquid make-and-break contacts, carries the full normal primary ignition current from the current source 10, which in the normal system is about 5 amperes. However, the coil 14 in the first or control circuit 9 has sufficient resistance to materially reduce the current in this circuit below that of the normal primary ignition circuit and materially below that of the primary circuit 15. It may reduce the current in the control circuit 9 to about $\frac{1}{15}$ of the normal current in the primary circuit 15, or that is, about .3 amperes, and if the coil 14 does not have sufficient resistance to reduce the current in the control circuit to the desired amount a further resistance (not shown) may be introduced into this circuit if desired. This, however, is ordinarily not necessary. Therefore, this coil 14 not only greatly reduces the normal current in the first or control circuit 9, but it is also the electromagnetic operating means for the mercury contact make-and-break switch 17 in the primary circuit carrying the full normal primary ignition current. It has been found that this liquid mercury switch will operate with these currents with full efficiency indefinitely and the indications are it will so operate for the full life of the car. Due to the greatly reduced current through the usual cam-operated breaker points 11 of solid material these points will operate very much longer without being burned, pitted or otherwise having their efficiency reduced. Indications are they will operate with full efficiency for around 50,000 miles. It will be understood that any reduction of the current through the control circuit 9 and therefore through the points 11 as an advantage over the old normal system in which the full primary ignition current is carried by these points, but a great advantage is secured with greatly prolonged life and full efficiency of these points where the current

through this control circuit is reduced to 1 ampere or below, and there is also advantage secured in any make-and-break switch 17 in the primary ignition circuit 15 which has a materially increased life, such, for example, as gas sealed or vacuum enclosed contacts, over the old form of open contacts 11 which cannot be enclosed and sealed. However, the liquid contacts are much better as they will outlast at least fifty to one any solid contacts now known.

Having thus set forth the nature of my invention, I claim:

1. In an ignition system for internal combustion engines, a control circuit including a source of current, a make-and-break device and a resistance in said circuit to materially reduce the normal current therein including a magnetic coil, a primary circuit including said source of current and a make-and-break switch in series therewith, said switch comprising sealed mercury make-and-break contacts including a contact movable to and from a stationary contact, and an armature connected to said movable contact operated by said coil to shift this contact to engagement with the stationary contact to close the primary circuit, and a secondary circuit inductively coupled to the primary circuit and including ignition means for the engine.

2. In an ignition system for internal combustion engines, a control circuit including a source of current, a cam-operated make-and-break device and a magnetic coil in series therewith, a primary circuit including said source of current and a make-and-break switch in series therewith including sealed mercury make-and-break contacts, said switch including a contact movable to and from a stationary contact and an armature connected to said movable contact operated by said coil to shift this contact to engagement with the stationary contact to close the primary circuit, said coil having sufficient resistance to materially reduce the current in the control circuit from that in the primary circuit, and a secondary circuit inductively coupled to the primary circuit and including ignition means for the engine.

3. In an ignition system for internal combustion engines, a primary circuit including a source of current and a make-and-break switch in series therewith including sealed mercury make-and-break contacts one of which is a stationary contact and the other a contact movable to and from the first contact and an armature connected to the movable contact, a secondary circuit inductively coupled to the primary circuit and including ignition means for the engine, and a control circuit including said source of current, a make-and-break device and a magnetic coil for operating the armature to shift the movable contact of the said switch into engagement with the stationary contact to close the primary circuit, said coil having sufficient resistance to materially reduce the normal current in the control circuit below that in the primary circuit.

4. In an ignition system for internal combustion engines, a control circuit including a source of current, cam-operated make-and-break contacts and a magnetic coil in series therewith, said coil having sufficient resistance to materially reduce the normal current in said circuit and prolong the normal operation of said contacts, a primary circuit including said source of current and a switch including sealed relatively movable mercury make-and-break contacts in series therewith and an armature connected to one of said contacts operated by said coil to shift this contact to engagement with the other contact to close the primary circuit, and a secondary circuit inductively coupled to the primary circuit and including ignition plugs for the engine.

References Cited in the file of this patent

UNITED STATES PATENTS

798,702	Rennell	Sept. 5, 1905
978,197	Osburn	Dec. 13, 1910
1,017,300	Lincoln	Feb. 13, 1912
1,783,495	Burkas	Dec. 2, 1930
2,459,306	Burton	Jan. 18, 1949

FOREIGN PATENTS

622,683	France	June 3, 1927