

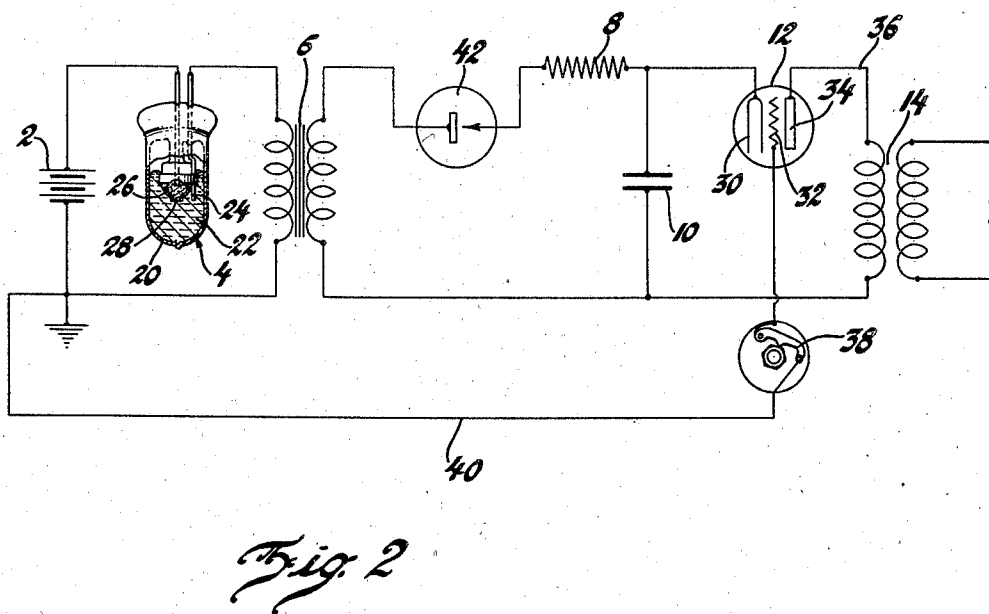
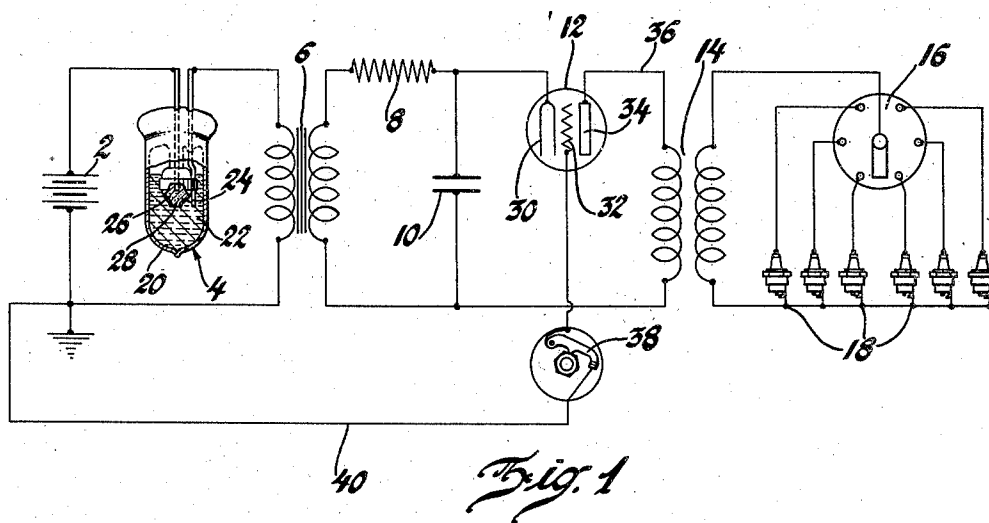
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IGNITION CIRCUIT

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IGNITION CIRCUIT

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This invention relates to ignition means and more specifically to an ignition system for providing igniton means for an internal combustion engine.

5 Since it is of course necessary to provide some means for igniting the fuel in an internal combustion engine and it has been conventional to provide such means by causing a high tension electric spark to jump across a set of terminals
10 provided within a cylinder to ignite said gas, it has been a problem to supply such high tension current within the cylinder in some manner so that the movable contacts or other contacting means utilized will not be burned or disintegrated
15 through long continued wear at a high rate. Utilizing mechanical breakers in such a system is not satisfactory since the arc drawn between the two points of such a breaker cause disintegration of the contact surfaces and therefore
20 rapid wear and requires frequency replacement.

It is therefore the object of my invention to provide means for making and breaking the circuit through means wherein there is no mechanical movement or disintegration of contact
25 members such as through tubes where current is allowed to flow or its flow prevented through potential differences in the electrodes.

With the above and other objects in view, the embodiments of my invention will be best shown
30 by reference to the following specification and claims and the illustrations in the accompanying drawing, in which:

Figure 1 is a schematic wiring diagram of an ignition system embodying my invention.

35 Figure 2 shows also a schematic wiring diagram of a modified form of a circuit embodying my invention.

Referring now specifically to the showing of Figure 1, there is provided a suitable source of
40 power 2, an automatic circuit interrupter 4, a transformer 6, a resistance element 8, a condenser 10, an electron tube 12 of the type commercially known as the "Thyratron," an inductance coil 14, a distributor 16 and a plurality
45 of spark plugs 18. The mercury interrupter shown broadly at 4 consists of an envelope 20 within which is supported a pool of mercury 22 having immersed therein a plurality of contacts 24, 26, the latter being a carbon electrode, only
50 a small portion 28 of which contacts the mercury path, the current flowing from this portion to the electrode 24. The localized heat adjacent the surface 28 causes vaporation of the mercury and momentary circuit breakage which is im-
55 mediately remade through condensation and thus

a periodic, automatic circuit making and breaking. The electron tube 12 is provided with a series of electrodes such as input electrode 30, a grid or control electrode 32 and a plate 34, the latter being connected to the primary of the inductance coil 14 through line 36 and the input electrode 30 being connected to the secondary of the transformer 6 through resistance 8. The grid is connected through a mechanical circuit breaker
5 such as 38 to the negative side of the battery 10 through line 40, the mechanical breaker 38 being operated by the cam shaft of the motor to accurately time the opening and closing of the switch 38.

The operation of the system is as follows: The current from the battery 2 which is supplied to the primary of the transformer 6 is automatically, periodically interrupted so that the current may be transformed in any desired ratio from the primary to the secondary of the transformer.
20 The current flowing in the secondary through the supply from the primary is utilized to charge the condenser 10 which is directly connected across the secondary. The potential across the condenser 10 is therefore built up and this potential is present upon the input electrode 30 of the Thyratron tube. This potential after it has reached a certain degree would tend to flow to the plate 34 but this flow is prevented by a negative
30 biasing potential present on the grid 32, this negative potential being applied through the closed switch 38 and the line 40 from the battery. However when the switch 38 is mechanically opened the negative bias on the grid 32 is reduced and this allows the condenser 10 to discharge
35 through the tube 12 and through the primary of the inductance coil 14 at which instant the distributor 16 is in contact with one of the circuits leading to a spark plug and that particular plug will fire.

When the switch 38 again closes, the negative bias prevents any flow through the Thyratron tube 12, allowing the condenser 10 to again build up and the tube 12 will only fire when the potential of the grid 32 has been made less negative
45 through the opening of the switch 38. It will thus be seen that the only mechanical switch utilized in the circuit is switch 38 and this switch only handles a very small negative current to the control grid so that its life will be practically
50 indefinite, and the Thyratron tube having no moving parts or no arcing contacts would have an indefinite life as well as the mercury interrupter 4 so that I have provided a very simple and substantially long-lived system.

In the modification shown in Figure 2, the system is substantially that of Figure 1 except that the spark plugs are not shown in detail, the load of the secondary of the inductance coil 14 being indicated only as one gap and by the inclusion of a rectifier such as 42 between the secondary of the transformer 6 and the resistor 8, the rectifier being placed therein to provide direct current to load the condenser instead of the alternating current as applied in the first instance which increases to some extent the efficiency of the system and reduces the load on the battery; otherwise the operation is exactly the same as in the first instance.

I claim:

1. In an ignition system, a battery, interrupter means, a transformer primary connected in series with the battery and interrupter, a transformer secondary, a condenser charged from the secondary, a coil connected to and adapted to be supplied with current from the condenser and an electronic tube interposed between the condenser and coil having a control electrode and means for periodically varying the voltage on the control electrode to cause current to flow through the tube at given intervals.

2. In an ignition system, a source of alternating current, means for rectifying the same, condenser means supplied from the rectifier, electronic valve means connected to the condenser output, and an induction coil also connected to the condenser and the valve whereby the latter controls the energization of the coil from the alternating source.

3. In an ignition system, a source of alternating current, means for rectifying the same, con-

denser means supplied from the rectifier, electronic valve means connected to the condenser output, an induction coil also connected to the condenser and the valve whereby the latter controls the energization of the coil from the alternating source, and periodic timing means controlling valve operation whereby the coil energization is entirely separate from the frequency of the alternating source.

4. In an ignition system, a direct current source of power, an automatic mercury interrupter connected thereto, a condenser connected to the interrupter output, an induction coil fed by the condenser and an electronic valve between the condenser and the coil to control flow therebetween.

5. In an ignition system, a direct current source of power, an automatic mercury interrupter connected thereto, a condenser connected to the interrupter output, an induction coil fed by the condenser, an electronic valve between the condenser and the coil to control flow therebetween, and timing means controlling the valve operation.

6. In an ignition system, a direct current source of power, an induction coil, automatically operable means to produce a fluctuating current connected to the source, storage means connected to the automatically operable means and to the coil and a thermionic three-electrode valve connected between the storage means and the coil to control the flow and a separately actuated timing device connected to the control electrode of the valve, its frequency of operation being entirely independent of the automatic fluctuating means.

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