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IGNITION SYSTEM FOR INTERNAL COMBUSTION ENGINES

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FIG. 1

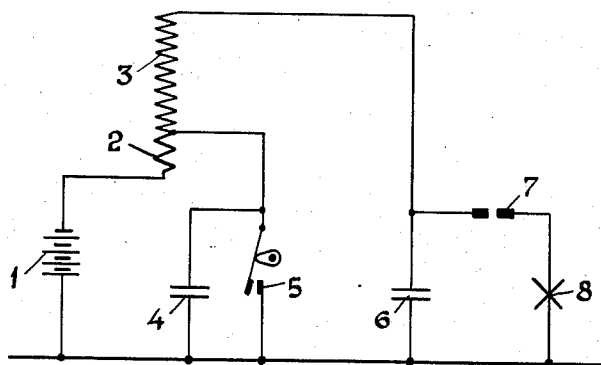
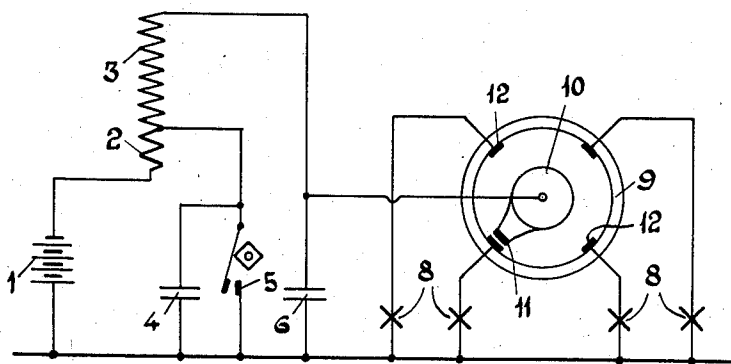


FIG. 2



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IGNITION SYSTEM FOR INTERNAL COMBUSTION ENGINES

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1 Claim. (Cl. 315—214)

The invention relates to an ignition system for internal combustion engines. For many years such ignition systems used to consist of a high-tension coil the primary winding of which was connected via a primary circuit breaker to a storage battery, while the secondary winding, which supplied a tension of the order of magnitude of 20,000 volts, was connected via a distributor or switch to the sparking plugs or plug. In the course of the past few years, however, a low-tension ignition system was developed in which use was made of an ignition coil the secondary winding of which only supplies a tension of the order of magnitude of 2,000 volts, by means of which an ignition condenser is charged, which is adapted to discharge via a spark gap and a switch or distributor through one or more sparking plugs.

In changing over from high-tension ignition to low-tension ignition for internal combustion engines hitherto the ignition coil, the distributor, and the sparking plugs of the high-tension system were all replaced by new parts, which had been constructed for low-tension ignition, which circumstance entailed a certain amount of expense.

According to the invention, on the other hand, if an existing high-tension system is to be converted into a low-tension system, the high-tension coil need no longer be replaced by a low-tension coil, but parallel to the secondary winding of the high-tension coil there is connected a condenser of smaller capacity than is customary with the known low-tension systems. This condenser supplies a lower tension and can discharge via the switch or distributor through the sparking plug or plugs.

The sparking plugs preferably used are the low-tension surface discharge sparking plugs already known per se, in which case the condenser is so dimensioned that the sparking plugs receive a tension of the order of magnitude of 1,500 volts.

A surface discharge sparking plug with condenser discharge produces sufficient ignition nuclei to ignite the gas mixture completely, because all the energy of the high-tension coil is used to charge the condenser. It has, however, been found that the normal high-tension sparking plugs can also be used, if the distance between the poles is maintained at a smaller value, and the condenser and the contact distance in the distributor are so dimensioned that the sparking plugs receive a higher tension than in systems with surface discharge sparking plugs.

In this case, too, the high-tension sparking plug in spite of the smaller distance between the poles produces sufficient ignition nuclei, because the spark occurring is a condenser spark, which is mainly capacitive and not, as with normal high-tension ignition, mainly and practically entirely inductive. Because the system operates with condenser discharges, in both cases any deposit

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between the electrodes or poles will at once be burned by the sparks themselves, so that the short-circuiting of the poles, which is feared so much in the known high-tension systems, no longer occurs.

When the invention is applied in the construction of a system for low-tension ignition therefore the only thing required is to connect, parallel to the secondary winding of the high-tension coil, a condenser of a given capacity and either to replace the high-tension sparking plugs by low-tension sparking plugs or to reduce the distance between the poles of the high-tension sparking plugs considerably.

The difference between the application of the normal low-tension system and the known high-tension system is that in the known low-tension system the moment of ignition is determined by means of the distributor, whereas upon application of the invention in both cases the moment of ignition is determined by means of the primary contact, in which case variations of this moment may occur.

The invention entails, among other things, the advantage that high-tension sparking plugs with much higher glow values than are normal can be used. Another advantage consists in that, with the application of surface discharge sparking plugs to a much greater extent than with the use of high-tension sparking plugs, engines with higher compression ratios can now be constructed. In engines with higher compression ratios it was hitherto necessary, when high-tension ignition was applied, to increase the tension of the ignition coil to 30,000 volts and higher. In practice it has now been found that the low-tension surface discharge sparking plugs are practically independent of the pressure, and that the operating tension may be much lower if the parallel-connected condenser has a capacity of, for example, 3,000–5,000 pf., so that the tension on the sparking plugs is only 1,500–2,000 volts.

Finally it has been found that according as the high-tension coil supplies a higher secondary tension the distance between the contacts of the fixed or the rotating spark gap may be taken larger. Finally it is to be noted that the invention is also applicable to systems with magneto-ignition.

The wiring of the ignition system according to the invention is illustrated by way of example in the drawing.

Fig. 1 shows the system according to the invention for a single cylinder engine.

Fig. 2 shows the system according to the invention for a four cylinder engine.

In Fig. 1 there is a storage battery which feeds the primary winding 2 of a high-tension ignition coil via the usual primary circuit breaker 5, the contacts of which are shunted for the extinction of the sparks by a condenser 4. In the secondary winding 3 of the ignition coil voltage impulses are thus excited which charge the ignition condenser 6, and when a given tension has been reached, the spark gap 7 will break down and the condenser 6 is discharged through the sparking plug 8.

In Fig. 2 a similar wiring is shown for a four cylinder engine; in this figure the elements corresponding to those of Fig. 1 have been given the same reference numbers. In this case the ignition condenser 6 will discharge via the distributor 9, consisting of the rotating arm 10 with the rotating contact 11 and the fixed contacts 12, through the sparking plugs 8.

I claim:

A low voltage ignition system for internal combustion engines comprising, in combination, an ignition coil having a secondary coil, the secondary coil normally supplying a voltage in the order of 20,000 volts, an ignition condenser of 3,000 to 5,000 pf. connected in parallel with said ignition coil, the voltage in the secondary coil being reduced to 1,500 to 3,000 volts and a series connected spark gap and low tension surface discharge spark plug disposed in parallel with said condenser.

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