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MOISTUREPROOF DISTRIBUTOR HEAD

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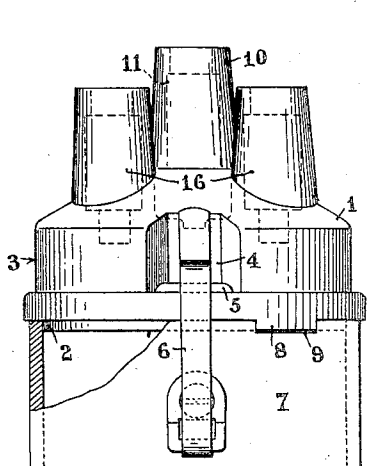


Fig. 1.

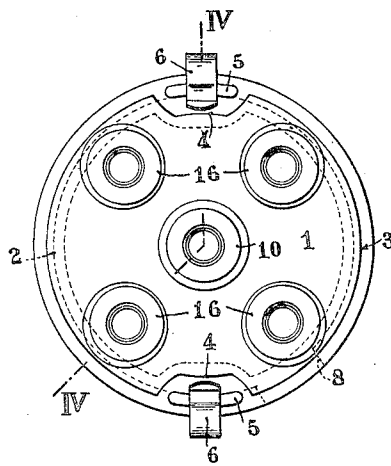


Fig. 2.

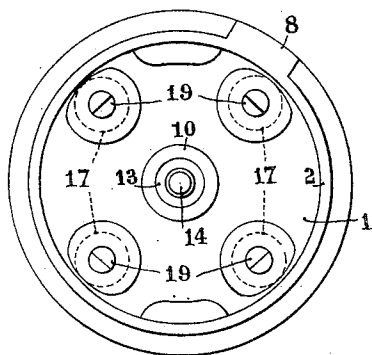


Fig. 3.

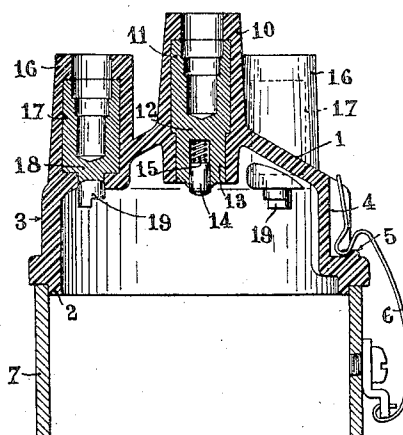


Fig. 4.

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MOISTUREPROOF DISTRIBUTOR HEAD

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2 Claims. (Cl. 200—19)

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This invention relates to novel and moisture-proof distributor heads for the ignition systems of internal combustion engines, comprising novel and moisture-proof distributor caps having fixed on one face contact studs and, on the other face, terminals or sockets connected through the cap with these studs and adapted to receive the ends of high-tension conductors, one of these conductors being connected to the high-tension winding of the induction coil and the others to the various spark plugs provided in the system, these novel and moisture-proof distributor heads being made of cellulose acetate butyrate thermoplastic material.

Heretofore known distributor heads are made of an insulating material which in most cases is a phenol aldehyde resin condensation product sold under the trade name of "Bakelite." In order to make it possible to observe the various parts of the distributor such as the rotor and the make-and-break contacts during operation the use of distributor heads of glass or other dielectric and transparent material has been advocated. Other suggestions in this respect include the provision of prisms on these transparent distributor covers for rendering visible the electrical flashes produced within the distributor upon the completion of each circuit to the various spark plugs.

It is also known in the art to make distributor heads of materials including no carbon, such as glass; in these conditions, when a short circuit occurs due to moisture, the same will cease as soon as the inner surface of the head is dry, no conductive carbonaceous path being formed, and thus the ignition system again functions as desired.

In spite of these improvements, distributor heads, transparent or not, are still a source of trouble due to short-circuits produced when the head is exposed to the action of moisture. This is a serious drawback in automobile operation, chiefly under heavy rain or when driving along road portions that are submerged in water, or simply after the automobile has been washed at the garage. It is known that in the construction of amphibian vehicles this inconvenience has led manufacturers to make extremely thick distributor heads. If it is attempted to protect the latter in a water-tight manner in order to prevent external water entering the distributor caps, the condensation water cannot escape therefrom and detrimental short circuits will result. None of the hitherto known distributor heads has given satisfactory results as far as this inconvenience is concerned, in the present state of the art, and short circuits due to moisture are a common trouble.

According to this invention, it has been found that by using as a thermoplastic material cellulose acetate butyrate, sold under the trade name "Tenite II" in the manufacture of distributor heads, utterly unexpected and hitherto unknown

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results are obtained regarding the protection against short circuits due to moisture, these results having never been attained, even to a much lesser degree, with other insulating substances, as will appear clearly from the Example 1 reported hereafter; this experiment was repeated a great number of times and the same and constant results were recorded each time.

Besides, it has been found that in comparison with conventional "Bakelite" distributor heads, the effective output of power of an internal combustion engine was increased under high-speed conditions by the use of the distributor heads according to the invention, as will appear clearly from the Example 2.

It has been further found that hitherto unknown results are obtained with the same novel distributor heads regarding the protection to short-circuits due to cracks or breaking, as will appear from the hereinafter Example 3.

Example 1

A distributor head of the conventional black synthetic resin type for the ignition system of a four-cylinder engine, is immersed during half-an-hour in water. Then the distributor head is removed from the water and mounted immediately on a testing apparatus fitted with a 1,200-volt oil-immersed high-tension coil. The peripheral terminals of the distributor head are then connected to circuits comprising spark-gaps, each pair of points forming a gap ranging from 5 to 15 mm. Then the distributor rotor is driven at a progressively increasing speed.

Up to 1,000 rotations per minute, blue, regular and straight sparks are produced in each spark-gap.

From about 1,200 R. P. M. up interruptions are observed in the production of sparks between the pairs of points, and the number of interruptions rises in proportion with the speed of rotation of the rotor.

At about 2,500 R. P. M., yellow, irregular sparks are produced; one and even two pairs of spark-gaps out of four cease producing sparks. Through the narrow slit left between the distributor cap and the distributor body a flash indicates that sparks are still produced within the space covered by the distributor cap.

At about 3,000 R. P. M. no more sparks are produced between the spark-gaps of the circuits and if the points of each pair are moved towards each other some irregular sparks are observed. At this rotor speed and when the distributor head is seen in the dark, the distributor head is fluorescent and a great number of sparks flash from its whole mass, which seems to indicate that high-tension short-circuits occur in the porous structure of the moistened insulating material.

If such a damped distributor head is mounted on the distributor of an engine, it is immediately seen that no correct ignition can occur

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before at least several minutes after this head has been carefully wiped.

Subsequently, a similar distributor head made of a thermoplastic cellulose acetate butyrate sold under the trade name "Tenite II," is immersed in water during half an hour under the same conditions as for the distributor head tested as described above, and then the Tenite II distributor head is mounted on the same testing apparatus and connected to the same spark-gaps with the same initial air-gap.

With a rotational speed ranging from 1,000 to 5,000 R. P. M. the sparks produced between the points of the four pairs are identical, without any interruption. On observing the distributor head, which is transparent, a few sparks are seen between the studs and droplets projected by the high-speed rotation of the rotor, but the constancy and steadiness of the sparks produced between the pairs of points are by no means influenced thereby. It is therefore apparent that no voltage drop occurs by leakage in the insulating material.

If such a damped distributor head is mounted on the distributor of an engine, the ignition is immediately good and no failure is to be noted.

Example 2

If both aforesaid distributor heads are mounted in succession on the same engine, without the conventional one having been previously immersed or damped, it is observed that with the Tenite II head the effective output of power under high-speed conditions, measured by means of a power-brake, is higher at least by 7%.

Example 3

If a conventional distributor head of "Bakelite" synthetic resin is cracked, it no longer operates. However, the Tenite II head, after having been broken with a hammer into two main portions, is still in running order if both portions are held with an elastic, even if small portions are missing in the vicinity of the terminals.

From the above-reported tests the following conclusions may be drawn.

The advantages of distributor heads according to this invention may be divided into two principal groups:

1. They are transparent, have a high dielectric power of more than 80,000 volts per millimeter, a high resistance to shock and to relatively high temperatures of the order of 100° C.; they are unacted upon by acids, oils, gasoline and benzols.
2. They still operate when wet or broken and the spark production is constant at all speed rates, whereas conventional synthetic resin or glass distributor heads do not operate any longer when they are wet and cracked, and cause drops in efficiency at certain speeds. Moreover, Tenite II heads do not produce a carbonaceous path likely to induce short circuits. These properties of Tenite II distributor heads have been duly registered through repeated tests and were totally unexpected and truly surprising.

The affixed drawing forming part of this specification illustrates diagrammatically by way of example one embodiment of the invention. In the drawing:

Figure 1 is an elevational view of the distributor head.

Figure 2 is a plane view of same.

Figure 3 is a plane view of the distributor head seen from beneath, and

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Figure 4 is a sectional view according to the line IV—IV of Fig. 2.

The distributor head 1 consists of molded cellulose acetate butyrate thermoplastic material known under the trade name of Tenite II. This material is transparent provided that no components likely to render it opaque are included therein. The lower edge of this head is formed with an annular depending flange 2 adapted to fit the inner top wall of the distributor body. This head is formed with a lateral cylindrical wall 3 having a pair of diametrically opposite recesses 4. Each recess 4 is formed with a heel 5 adapted to retain the upper portion of spring clips 6 hingedly mounted on the distributor body 7. The head 1 is suitably positioned on the distributor body 7 by means of a projection 8 depending from the bottom edge of the head and engaging a corresponding notch 9 formed in the top wall of the body.

A tubular projection 10 is cast centrally of the top surface of the head. This projection opens to the outside and is lined internally with a tubular insert 11 of conductive material having a bottom 12 and a lower tubular portion 13 extending through the top wall of the distributor head as illustrated in Fig. 4. This tubular lower portion 13 has a smaller diameter than the top portion of the insert and contains a brush contact 14 urged downwards by a spring 15. Other tubular projections 16 are cast circumferentially at equal angular spaces round projection 10 and provided with tubular inserts 17 also of conductive material. Each insert 17 has a closed bottom and a fixed depending contact stud 19. In operation, the rotor (not shown), constantly engaged by the central contact 14 is rotated past contact studs 19. The inserts 17 receive the ends of conductors leading to the spark plugs of the engine and the central insert 11 receives the end of a conductor from the high-tension ignition coil (not shown).

The molded material used in the manufacture of the distributor head 1 is a thermoplastic plasticized cellulose resin material called cellulose acetate butyrate, sold commercially under the name of Tenite II.

What I claim is:

1. A distributor head comprising a cover of cellulose acetate butyrate thermoplastic material, terminals for the high-tension circuit conductors on the outer face of said cover, and contact studs for the distributor rotor on the inner face of said cover, said studs being respectively electrically connected with said terminals through said cover.

2. A distributor head comprising on one face terminals for the high-tension circuit conductors and, on the other face, contact studs for the distributor rotor, said studs being connected to said terminals respectively, said head being formed of a cellulose acetate butyrate thermoplastic material.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,085,522	Bergstrom	July 13, 1937
2,365,925	Zoerlein	Dec. 26, 1944
2,365,926	Zoerlein	Dec. 26, 1944
2,412,878	Fischer	Dec. 17, 1946