M. M. METZINGER.

MULTIGAP SPARK PLUG.

APPLICATION FILED APR. 18, 1918.

1,298,368. Patented Mar. 25, 1919.

Fig. 1.

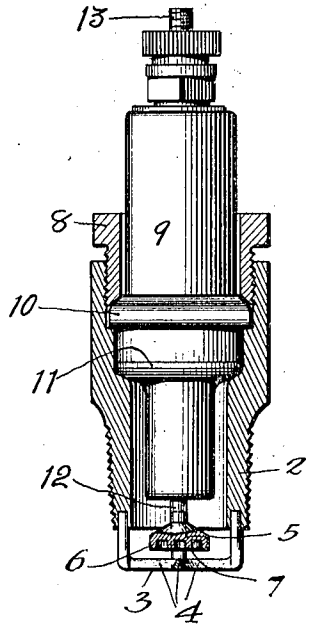
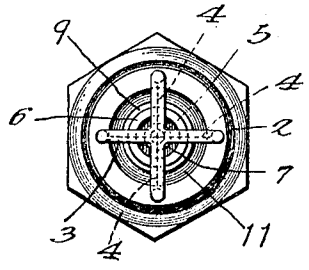


Fig. 2.



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UNITED STATES PATENT OFFICE.

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MULTIGAP SPARK-PLUG.

1,298,368. Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed April 18, 1918. Serial No. 229,291.

To all whom it may concern:

Be it known that I, MYRON M. METZINGER, a citizen of the United States of America, residing at Blair, in the county of Washington and State of Nebraska, have invented certain new and useful Improvements in Multigap Spark-Plugs, of which the following is a specification.

My invention relates to electric ignition spark plugs for internal combustion engines; and the objects of my improvement are, first, to provide means to prevent the fouling of the electrodes by the lubricating oil in the cylinders; second, to provide in a spark plug a multiplicity of spark gaps and thereby increase the probability of a spark and the certainty of the ignition of the fuel; third, to provide an electrode that automatically works itself clean from any fouling matter, especially soot or carbon; fourth, the provision of means to prevent any misplacement of either electrode with reference to the other, during assembling, or displacement in transportation or during regular use, whereby the spark gaps would be varied and the efficiency of the plug injured or destroyed; and, fifth, to reduce the liability of the metal, at opposite sides of the gap, to become deteriorated by charring. All of which objects, with others more particularly hereinafter disclosed, I attain by the contrivance and structure illustrated by the accompanying drawing in which—

Figure 1, is a vertical longitudinal section, partly in side elevation; and Fig. 2, is an under end view. In all of which views similar reference numerals indicate like parts of the structure.

The cylindrical exteriorly-threaded seating shell 2 receives the threaded nut-headed gland 8 in its top end to securely seat the insulation tube 9 therein; suitable gaskets 10 and 11 being provided, and all constructed and assembled in the usual manner and as shown in Fig. 1. A vertical rod 12 disposed axially in the insulation tube is suitably connected to the binding post 13 and carries at its lower end the upper electrode 5.

The upper electrode is discal in shape and disposed coaxial with its current-connecting and supporting rod 12 and has its lower face disposed in a plane at right angles to its axis. The lower gap-face of this compound electrode consists of the pendent annular flange 6 along its circumferential outer edge and the inner pendent annular flange 7 of less diameter, spaced from the outer flange. The lower or projecting edges of these flanges are disposed in the same plane, at right angles to their axis.

The opposite or lower electrode 3, consists of two U-shaped loops, their bases arranged transversely and integrally connected at the centers of their bases,—as shown in Fig. 2. The connected bases form the four radial bars 4, 4, etc., their intersection agreeing with the axis of the discal electrode above and all lying in a plane parallel with the pendent edges of its flanges. The upstanding ends of the branches, at the outer ends of the radial bars, are seated and fastened in the lower rim of the seating shell 2, to set the radial bars spaced below the discal electrode. Each radial bar is thus disposed crosswise of the edges of both annular flanges, and spaced therefrom, forms two spark gaps. The aggregate for the whole being eight spark gaps. For light service a single radial arm supported at one side of the rim of the seating shell and extending inwardly only to the axial line of the discal electrode and giving two gaps, will suffice. But, for ordinary service at least one full U-shaped loop, attached in opposite sides of the seating shell rim, as shown in Fig. 1, giving four spark gaps and a more stable structure, is preferable.

It is obvious that a greater number of radial arms may be added, each increasing the number of spark gaps by two. When a magneto system is the source of the electric current, the spark intensity normally varies with the armature speed. This multiplicity of spark gaps, so arranged as to be substantially equal in length,—in resistance throughout the numerical field of gaps, prevents the liability to that intense heating of the electrodes which results in charring them.

Any accumulation of lubricating oil, even to the extent of flooding the surfaces in the combustion chamber, will, invariably drip from the outer flange, leaving clean all gaps between the inner or smaller flange and the radial bars beneath. It is obvious that accumulations of oil or other liquid obstructions will not stand on the top edges of the opposed radial bars. Further, the initial explosion, of the carbureted mixture, is of that portion occupying the central cavity and the groove lying between the annular flanges of the face of the upper electrode; the force of this initial explosion

acting downwardly, toward and against the bars, cleans and retains them clean at and during each explosive impulse of the engine.

I claim:

1. In a device as described, in combination, a tubular shell, a plug held against longitudinal displacement and concentrically within said shell, an elongated rod removably held against longitudinal displacement within said plug and projecting beyond the latter, and an integral disk electrode formed terminally upon the projecting end of said rod, said disk being bored out to provide a pair of concentric rings upon its flat surface.

2. In a device as described, in combination, a shell, a plug mounted concentrically therein, a rod removably carried by said plug concentrically thereof, an enlarged portion formed terminally upon said rod and projecting in spaced relation from said plug, said enlarged portion having an under flat side, said head being cored out so as to provide a central ring, and a member having depending portions secured to said shell and including a portion extending transversely of said shell in parallel relation oppositely to the under flat side of said enlarged portion.

3. In a device as described, in combination, a shell, a plug secured concentrically in said shell, a rod removably carried by said plug concentrically thereof, and projecting therebeyond, an enlarged disk formed terminally upon the projecting portion of said disk being cored out centrally to provide an inner ring and being formed with a concentric annular groove around said ring so as to provide an outer ring, and a member having four arms supported dependingly from said shell in a concentric relation and carrying two transverse arms arranged at right angles to each other and parallel to the under side of said disk so as to form a central base portion directly under but larger than the bore of the inner ring of said disk.

In testimony whereof I have hereto affixed my signature.

MYRON M. METZINGER.