M. T. MINOGUE.

SPARK PLUG FOR EXPLOSIVE ENGINES.

APPLICATION FILED DEC. 18, 1909.

973,873. Patented Oct. 25, 1910.

Fig. 1.

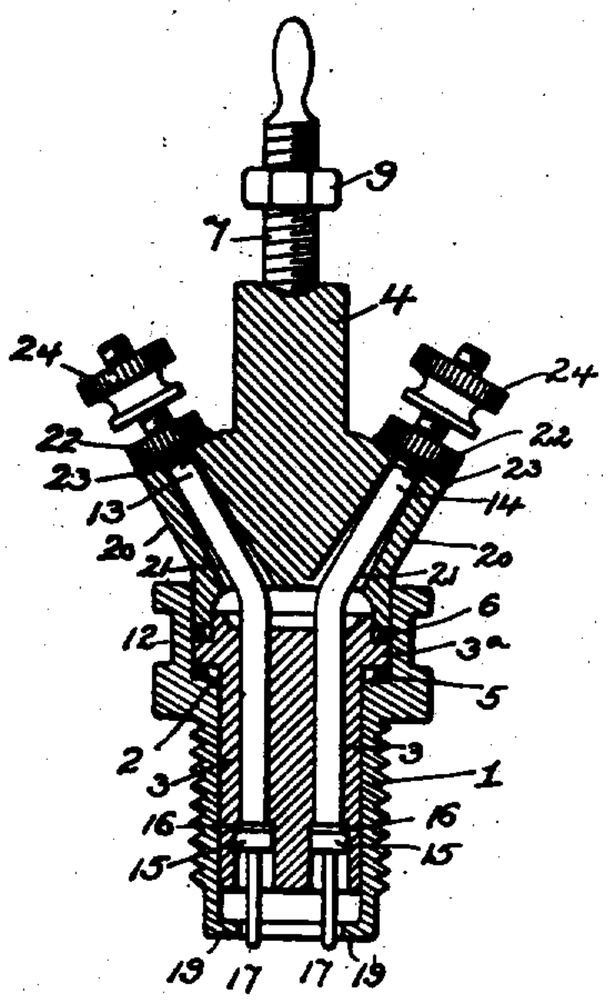


Fig. 2.

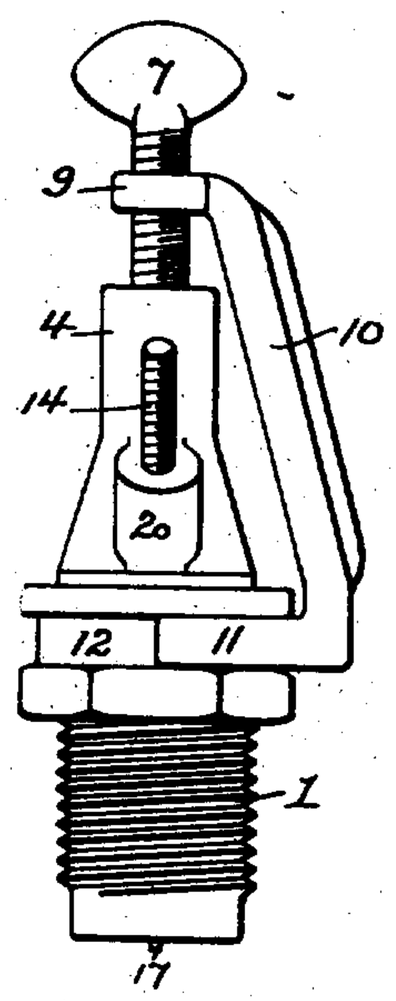


Fig. 3.

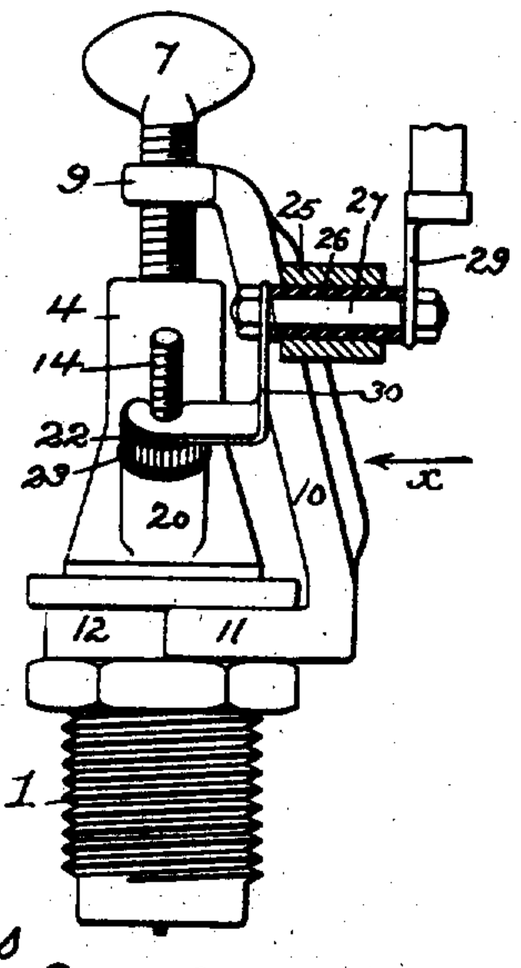
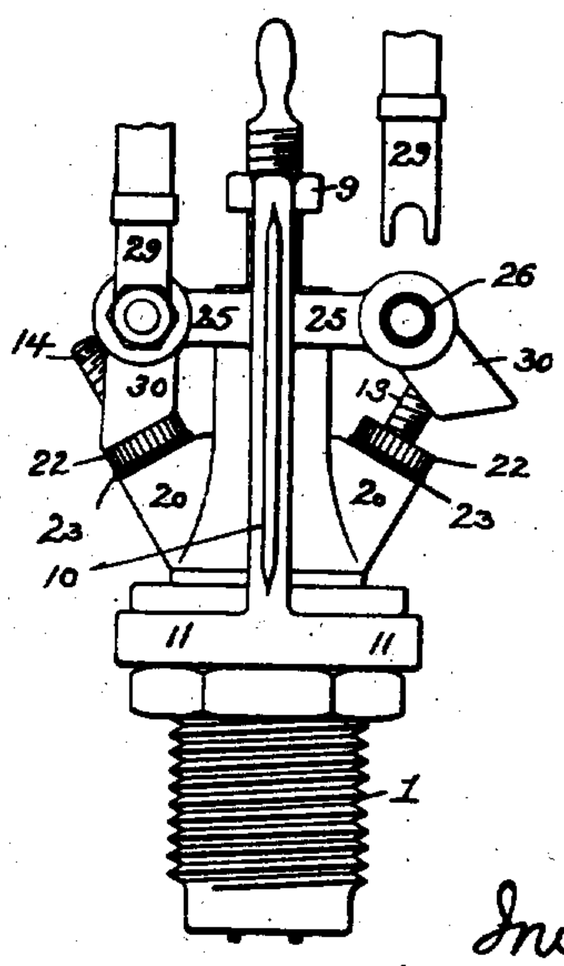


Fig. 4.



Witnesses
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UNITED STATES PATENT OFFICE.

MARTIN T. MINOGUE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE SUPERIOR MOTOR SPECIALTY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SPARK-PLUG FOR EXPLOSIVE-ENGINES.

973,873. Specification of Letters Patent. Patented Oct. 25, 1910.

Application filed December 18, 1909. Serial No. 533,957.

To all whom it may concern:

Be it known that I, MARTIN T. MINOGUE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Spark-Plugs for Explosive-Engines, of which the following is a specification.

My invention relates mainly to duplex or multiple spark plugs for use in connection with engines of the explosive type, although some of the features of my invention can be used in connection with single spark plugs.

One object of my invention is to so construct the spark plug that the porcelain insulating member of the same can be molded without difficulty and the electrodes can be readily combined therewith, a further object being to prevent fracture of the porcelain member of the plug because of uneven expansion and contraction of the same, and a still further object being to provide means whereby an external spark gap can be produced in order to test the sparking capacities of the plug without removing the same from the engine. These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawing, in which—

Figure 1 is a view, partly in elevation and partly in transverse vertical section, of a spark plug constructed in accordance with my invention; Fig. 2 is a side elevation of the plug with the binding nut removed from the electrode; Fig. 3 is a similar view illustrating another feature of my invention, and Fig. 4 is an end view looking in the direction of the arrow, *x*, Fig. 3.

In the drawing, 1 represents the threaded metal plug which is screwed into the head or other portion of the cylinder of the engine and is bored out to form a socket for the reception of the porcelain insulating member of the plug, said socket being enlarged in diameter at its outer end so as to form a shoulder 2 some distance below the outer end of the socket.

The porcelain insulating member comprises the lower section 3 and the upper section 4, said lower section having a flange 3^a which fits the enlarged upper portion of the socket and bears upon a packing ring 5 of copper or other soft metal resting upon the shoulder 2 in said socket. This flange also supports another and similar packing ring 6 upon which bears the lower end of the upper section 4 of the porcelain insulating member, the latter h ng centrally recessed to receive the upper end of the lower section 3, and the latter being also recessed, by preference, so as to provide a considerable space between the upper and lower sections, as shown in Fig. 1.

The flange 3^a is pressed firmly upon the ring 5 and the lower end of the upper section 4 of the insulating member is pressed firmly upon the ring 6 by means of a pressure screw 7 adapted to a nut 9 at the upper end of a yoke 10, which has a forked lower end 11 fitting in an external groove 12 formed in the head of the plug 1, as shown in Fig. 2. By this means joints are formed between the two sections of the insulating member and between the lower section of the same and the shoulder in the socket, which joints are proof against the escape of gas under pressure.

The two electrodes with which the plug is equipped are shown, respectively, at 13 and 14, each of these electrodes being passed through a vertical opening in the lower section 3 of the porcelain insulating member of the plug, which opening is enlarged in diameter at or near its lower end for the reception of a head 15 upon the electrode, asbestos or other packing rings 16 being inserted between these heads and the shoulders in the section 3, so as to prevent any leakage of gas around the electrodes. From the heads 15 of the electrodes project the platinum terminals 17, the sparks being formed between these terminals and the inner wall of an inwardly projecting flange 19 at the lower end of the socket 1.

The upper section 4 of the insulating member of the plug has, at each side, an inclined lug 20, these lugs being perforated for the reception of the outwardly bent upper portions of the electrodes 13 and 14 and said perforations being, by preference, flared at their inner ends, as shown at 21, so that the upper ends of the electrodes can be readily passed through the openings in assembling the parts of the plug, the chamber formed between the two sections of the insulating member of the plug providing

for an easy curve between the vertical and outwardly inclined portions of the electrodes. The outer end of each electrode is threaded for the reception of a confining nut 22 between which and the upper end of the lug 20 is interposed a packing washer 23, the threaded end of the electrode projecting beyond the nut 22 for the reception of the binding nut 24 between which and the nut 22 the conducting wire is confined.

When fresh sparking surfaces are desired, the yoke 10 and the insulating member of the plug can be turned part way around in the socket 1 so as to bring the terminals 17 opposite another portion of the inner face of the flange 19.

By the use of the two electrodes either a battery or a magneto current can be employed as desired, or one electrode can be quickly brought into service if the other becomes defective for any reason.

When the porcelain insulating member of the plug is made in two sections, as shown and described, each section can be readily molded, as the necessary openings therein are straight and can be formed by removable plungers or cores, and the application of the electrodes is facilitated, the straight electrodes being first passed through the openings in the lower section 3 and then bent outwardly for application to the inclined openings in the upper section 4. The sectional construction of the porcelain insulating member of the plug, moreover, lessens the tendency to fracture to which a single porcelain member is subject because of the unequal expansion and contraction of the same due to the different degrees of heat to which its upper and lower portions are subjected.

It is frequently advisable to provide a spark plug with means for forming an external spark gap so that the sparking capacities of the electrodes can be determined without removing the plug and in order that this may be conveniently done, I provide the yoke 10 with oppositely projecting wings 25, each having an opening therein for the reception of an insulating tube 26 through which passes a stem 27. To the outer end of this stem is secured the notched terminal 29 of one of the conductors and to the inner end of the stem is secured a finger 30 notched for the reception of the projecting portion of one of the terminals 13 or 14 of the plug, said notched finger fitting between the confining nut 22 and the binding nut 24, and, when the latter is loosened, being free to be swung sidewise so as to produce a spark as soon as a gap is formed, as shown at the right, in Fig. 4.

I claim:

1. A spark plug containing a socket, and an insulating member composed of upper and lower sections in said socket, the lower section having an opening therein and the upper section having an opening inclined in respect to that in the lower section, and an electrode passing through said openings in the sections of the insulating member.

2. A spark plug containing a socket, an insulating member composed of upper and lower sections with a chamber between them in said socket, the lower section having an opening therein and the upper section having an opening inclined in respect to that in the lower member, and an electrode passing through said openings and bent in the chamber between the two sections of the insulating member.

3. A spark plug containing a socket, an insulating member composed of upper and lower sections in said socket, the lower section having an opening therein and the upper section having an opening inclined in respect to that in the lower member, and flared as to its inner portion, and an electrode passing through the openings in the two sections of the insulating member, and having upper and lower engagement therewith so as to retain the sections in proper relation to one another when the insulating member is removed from the plug.

4. A spark plug having an insulating member with projecting electrode, a device for holding the said insulating member to the plug, and a finger having an insulating pivotal mounting upon said holding device which permits of swinging movement of the finger in order to form a spark gap on the outside of the plug.

5. A spark plug having an insulating member with electrode stems having outwardly projecting ends, a yoke for holding said insulating member to the plug, and fingers one on each side of the yoke, said fingers having insulating pivotal mountings which permit swinging movement of the fingers, whereby a spark gap can be formed on the outside of the plug between either of the electrodes and its corresponding finger.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

MARTIN T. MINOGUE.

Witnesses:

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