O. C. WINESTOCK.

SPARK PLUG.

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945,890.

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Fig. 3.

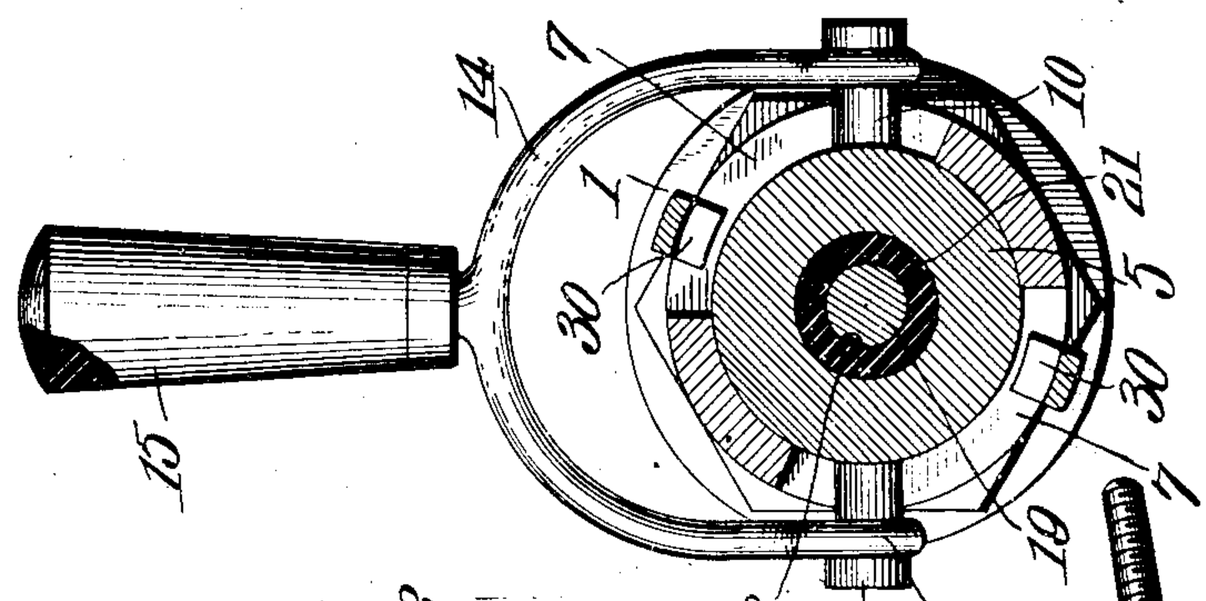

Fig. 2.

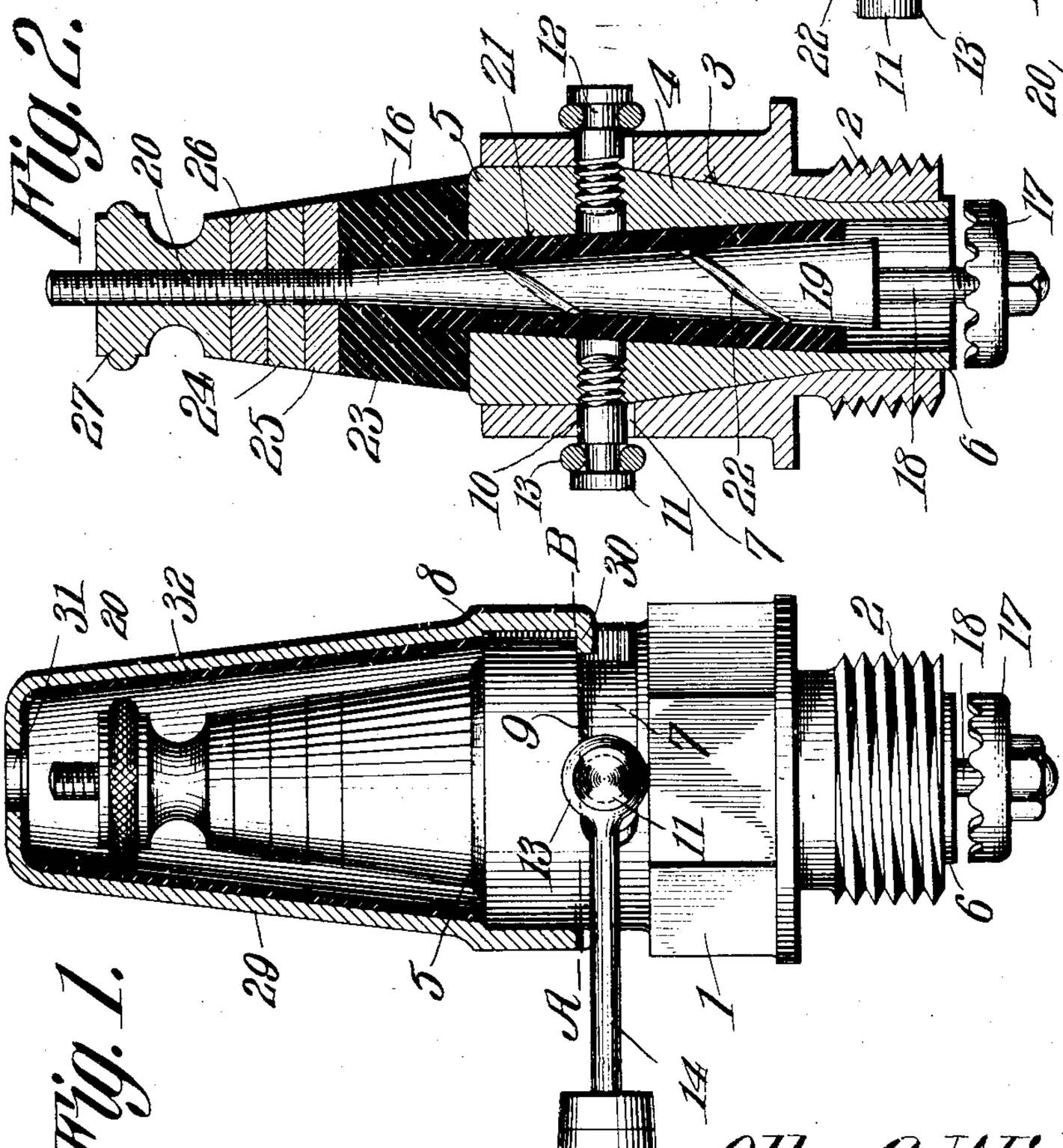

Fig. 4.

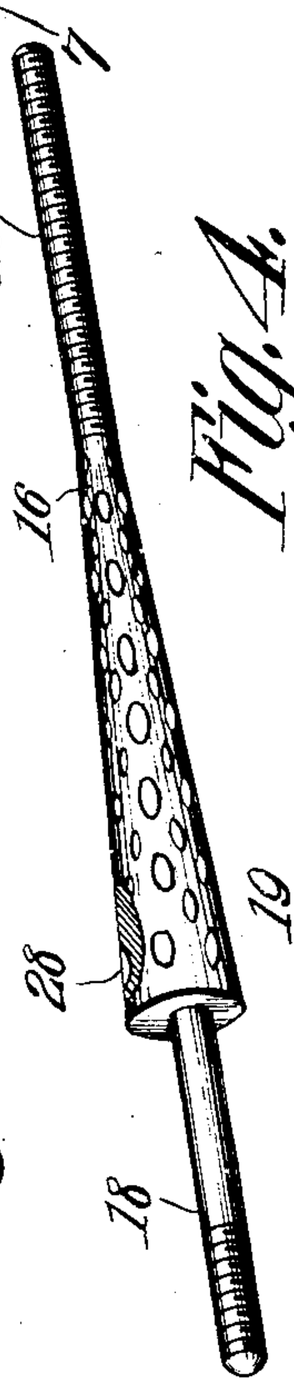

Fig. 1.

Witnesses

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SPARK-PLUG.

945,890. Specification of Letters Patent. Patented Jan. 11, 1910.

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To all whom it may concern:

Be it known that I, OTTO C. WINESTOCK, a citizen of the United States, residing at Perkinsville, in the county of Windsor and State of Vermont, have invented a new and useful Spark-Plug, of which the following is a specification.

This invention has reference to improvements in spark plugs and is designed more especially for use in connection with explosive engines, and the invention is also more particularly directed to improvements in that type of spark plug known as the jump spark type.

In accordance with the present invention there is provided a spark plug wherein both terminals of the plug are readily removable from or insertible into the explosive chamber so that the spark plug may be quickly removed without the aid of tools for the purposes of inspection and repair or replacing if necessary.

It has been proposed to make the spark plug of two parts, one of which is to remain in the walls of the explosion chamber and is provided with a seat for the other member of the plug which latter carries both of the spark terminals. The two members of the plug are united by means of a bayonet joint so that by a partial rotation of the removable member of the plug upon its longitudinal axis it may be either firmly locked in the fixed member of the plug or may be readily removed therefrom. In the form heretofore proposed those members of the bayonet joint which were attached to the removable member of the plug were extended into handles by means of which the removable member was readily manipulated.

In accordance with the present invention those members of the bayonet joint carried by the removable member of the plug are no longer formed into handles but are each provided with a head whereby a bail may be attached to the bayonet joint studs which project diametrically opposite from the removable member of the plug and this bail is provided with an insulating handle extending radially from the removable member of the plug so that normally it is out of the way but when it is desired to rotate the removable member of the plug it may be readily done by grasping the handle and through the bail imparting the requisite movement to the said removable member. In some types of engines the plug of the first type stated cannot be used because of the projecting handles and it is to adapt this type of plug to all types of engines that the bail with the single handle is provided.

The invention furthermore includes means whereby the plug may be adapted for use where the engine is liable to be subjected to wet or moist conditions and for this purpose the invention includes an insulating covering for the removable member of the plug whereby the plug is protected from short circuiting because of the access of moisture thereto.

Furthermore the invention contemplates a construction of the central conducting member of the plug carrying the insulated terminal whereby expansion and contraction due to temperature changes is provided for and the assembling of the plug is facilitated.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings forming a part of this specification, in which drawings,

Figure 1 is an elevation of the plug with portions shown in section. Fig. 2 is a central longitudinal section of the plug with parts shown in Fig. 1 omitted. Fig. 3 is a cross section on the line A—B of Fig. 1, and Fig. 4 is a detail view of a modified form of a portion of the structure shown in Fig. 2.

Referring to the drawings, there is shown a member 1 having one end formed with screw-threads 2 so that it may be screwed into a suitably threaded passage leading to the explosion chamber of an explosive engine. The member 1 has a central passage with a taper seat 3 for the reception of a correspondingly tapered portion 4 of a metal plug 5 adapted to be seated in the body portion 1 through the upper end thereof. The inner or threaded end of the body portion 1 has its central bore adapted to the passage of the corresponding end 6 of the body 5, which portion 6 projects beyond the threaded portion 2 of the body 1 and constitutes one terminal of the spark plug in metallic contact with the body 1 and so with the metal parts of the engine, the electric circuit being as usual completed through the metal parts of the engine. Formed in the walls of the body portion 1 near the upper end thereof are circumferentially disposed slots 7 on opposite sides of said body portion 1 and each slot is entered at one end by another slot 8 parallel with the longitudinal axis of

the body portion 1 and opening at the upper end thereof, the two slots 7 and 8 forming a right angle slot of a bayonet joint, one wall of the slot 7 being slightly inclined as indicated at 9.

Projecting at diametrically opposite points and radially from the body portion 5 of the removable section of the plug are two studs or pins 10 each terminating in a head 11 at the outer end inside of which there is formed an annular groove 12 in the body of the pins. When the body portion 5 of the removable section of the plug is introduced into the member 1 the pins 10 will enter through the slots 8 and ultimately be brought into alinement with the slots 7 and then a rotative movement on the longitudinal axis of the body portion 5 will cause the pins 10 to move along the slots 7 toward the closed ends thereof engaging the inclined walls 9 which tend to force the body 5 firmly into the seat 3. Under these conditions the grooved portions 12 of the pins 10 project beyond the outer walls of the corresponding portion of the body 1.

Applied to the pins 10 and seated in the grooves 12 thereon are eyes 13 on the free ends of the legs of a bail 14. Applied to the middle portion of the bail 14 is a handle 15 made of insulating material.

The handle 15 provides a convenient means for manipulating the movable member of the plug and for turning it on its axis either to cause it to be locked to the fixed member 1 or to be unlocked therefrom. Furthermore this provides a means for the minimum projection of the pins 10 from the member 1 so that the plug may be applied to an engine in positions impossible where the pins are extended into manipulating handles. Also the bail and handle provide a means whereby the removable member of the plug may be put in place or removed from the engine without danger of shock from the accidental closure of the circuit when the plug is being removed or replaced.

The removable member of the plug comprises not only the block 5 but a central stem 16 carrying at one end a circular terminal 17 in operative relation to the head 6 of the block 5 and this terminal may be serrated as shown or may be shaped in any other desired manner. The stem 16 is connected to the terminal 17 by a short stem extension 18 central to the end 6 of the block 5 and from the stem 18 toward the other end of the stem 16 the latter is tapered as indicated at 19, while the end remote from the stem 18 is screw-threaded as indicated at 20.

The tapered portion 19 of the stem 16 is insulated from the block 5 by a taper sleeve 21 of insulating material preferably mica and along the portion of the taper section 19 within the sleeve 21 the said taper portion is formed with a spiral groove or flute 22 which not only provides for expansion and contraction of the metal parts on each side of the insulating sleeve but also facilitates the application of the insulation to the taper portion of the stem 16 when the parts are assembled.

Applied to the top of the block 5, that is that portion of the removable part of the plug which is exterior to the fixed member 1 there is insulating material 23 and this insulating material is held against the corresponding end of the block 5 and about the stem 16 by means of a suitable nut 24 and washer 25. The nut 24 is held in place by a lock nut 26. The lock nut 26 forms a convenient abutment for a terminal conductor which however is not shown in the drawings and which in practice is held in place on the nut 26 and about the stem 16 by a suitable thumb nut 27.

Instead of forming the spiral flute 22 about the taper portion 19 of the stem 16 this taper portion may be provided with a number of pits or depressions 28 shown in Fig. 4, but in either instance the unbroken surface of the taper portion 19 is more extensive than the area of the spiral flute 22 or of the pits or depressions 28.

Under working conditions the spark plugs are subjected at times to danger of short circuiting, and this occurs more particularly when the spark plugs are used in connection with engines in motor boats or launches where the engines are often wet with salt water which latter constitutes a good conductor for the high tension currents employed in spark plugs. To protect the insulated side of the plug from the bridging effect of water or even other materials there is provided a hood or casing 29 adapted to rest on the upper end of the body portion 1 and this casing may be provided with inturned tongues 30 adapted to enter through the slots 7 and to then engage the walls 9 of the slots 8 so as to lock the casing to the fixed member 1 when the casing is turned on its longitudinal axis in the proper direction. The outer end of the casing is closed in except for a passageway 31 for an electric conductor to be attached to the stem 16. The casing 29 may of course be made of insulating material but it is preferable to make it of metal and line it with insulating material as shown at 32. With such a casing the insulated side of the plug is protected completely from any solid bridging material, nor can salt water or other such liquid bridging material enter the casing in sufficient quantities to form a conducting bridge between the stem 16 and the block 5 or fixed member 1.

What is claimed is:—

1. A spark plug comprising a member adapted to remain in the walls of an ignition chamber and provided with bayonet

joint slots in diametrically opposite walls, another member carrying the electric terminals of the plug and having diametrically opposite projecting studs adapted to the bayonet joint slots of the fixed member, and a bail member pivotally connected to both studs and provided with a handle.

2. A spark plug comprising a member adapted to remain in the walls of an ignition chamber and provided with bayonet joint slots in diametrically opposite walls, another member carrying the electric terminals of the plug and having diametrically opposite, projecting studs adapted to the bayonet joint slots and each formed with a circumferential groove and a head exterior thereto at the free end, and a bail member having eyes at its free ends seated in the grooves in the studs and an insulating handle at the intermediate portion.

3. In a spark plug, an interior tapering conducting stem surrounded by insulating material and having its surface along substantially the whole length of the portion engaging the insulating material in part sunk or depressed, such sunken or depressed portion being of less area than those parts engaging the insulating material which are not sunken or depressed.

4. In a spark plug, an interior tapering conducting stem surrounded by insulating material and having its surface along substantially the entire length of the portion engaging the insulating material in part removed to form a spiral flute or groove of less area than the remainder of the wall in which said flute or groove is formed.

5. A spark plug having a fixed member with bayonet joint grooves, a removable member with parts co-acting with the bayonet joint grooves to lock the removable member to the fixed member, and a casing or cap inclosing the removable member beyond the fixed member and having means for engaging the bayonet joint grooves to hold the cap in place.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

OTTO CHARLES WINESTOCK.

Witnesses:
SADIE N. BLANCHARD,
A. M. WILDER.