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IGNITER.

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1,106,525.

Patented Aug. 11, 1914.

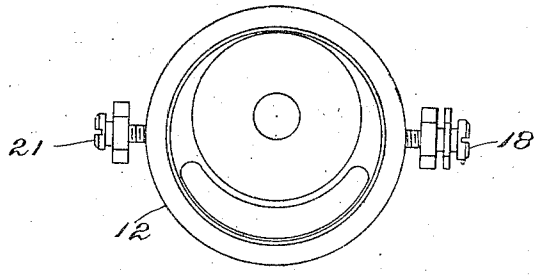


Fig. 3.

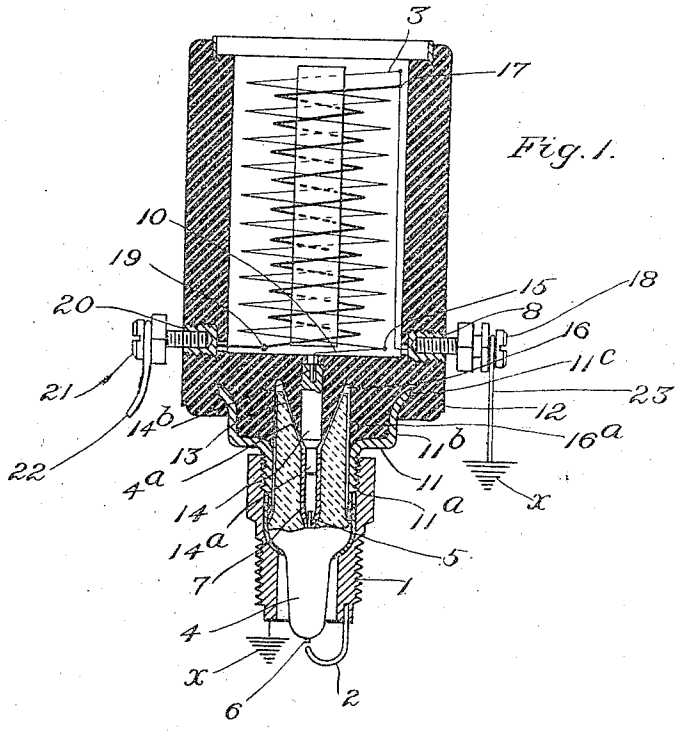


Fig. 1.

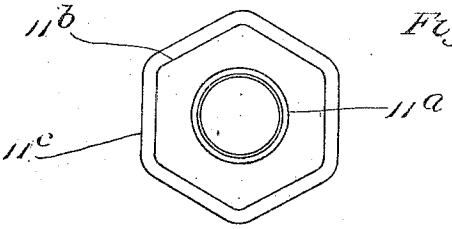


Fig. 2.

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UNITED STATES PATENT OFFICE.

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IGNITER.

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To all whom it may concern:

Be it known that we, HENRY C. THOMSON and HAROLD N. MICHAELSEN, citizens, respectively, of the United States and of Norway, and residing, respectively, in Boston, in the county of Suffolk, State of Massachusetts, and in Canton, county of Norfolk, Massachusetts, have invented a certain new and useful Improvement in Igniters, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to spark producing apparatus or igniting devices designed to ignite the explosive gaseous mixtures within the cylinder of an internal combustion engine. More particularly it relates to igniters in which the spark plug carrying the spark points serves to support the shell or casing in which is contained an induction coil for producing a high-tension spark-producing current.

Our invention in one of its features more particularly concerns the constructional means employed for supporting said casing with respect to said spark plug body. In another it relates to a special formation of the inter-engaging parts arranged to effect the electric communication between a center-pin mounted in the casing and leading to one of the high-tension terminals of the induction coil, and a contact member carried in the porcelain core and connected to the central spark point of the spark plug.

The first mentioned feature of our invention serves to provide an efficient means of supporting said casing upon the spark plug shell, which means is embodied in a single part, inexpensive in initial cost and in mode of attachment to the casing which it supports. Further the formation of such part is one which is intended to coöperate in more effectively securing the result which is more especially the object of the second feature of my invention, as hereinafter mentioned. The second feature serves to locate the point of engagement between the exposed end of the center-bar and the contact member in the porcelain core leading to the spark point, well within the end of the porcelain core, and at a point wherein it is insulated by said core from the wall of spark plug head nut.

Both the above mentioned features of our invention coöperate to secure a high degree of electrical isolation, relative to the spark plug head nut, of the exposed or unprotected portion of the center-pin at or near the point where said exposed end makes engagement with the said contact in the porcelain core. In consequence of which isolation, the leakage of the high-tension current employed for producing the igniting sparks from said exposed end of the center pin and the spark plug shell is essentially eliminated. At the same time the simple formation of said casing supporting means and the simple mode of attaching the same to the casing rendered possible by such formation contributes to lessening the cost of manufacture of the igniter.

Our invention is shown in the drawings which accompany the specification, and form a part of this application.

In said drawings Figure 1 is a side elevation, partly in section, showing the construction of our igniter. Fig. 2 is a plan view showing the element employed to support said casing with reference to the body of the spark plug. Fig. 3 is a top view of our igniter.

Having reference to said figures, 1 represents the shell of a spark plug, on which shell is carried one of the spark points, 2, which is in electrical connection with one terminal, 3, of the induction coil, preferably by grounding, as will be hereinafter set forth. Within said shell is located a central core, 4, preferably of porcelain or other suitable insulating material, the upper or inner end of which core is concaved conically or cupped as at 4^a, preferably quite deeply as shown in said Fig. 1. Embedded in said porcelain core 4 and extending longitudinally therethrough is a conductor, 5, terminating in, or connected at its lower, or outer end, with the spark point, 6, and having its other, or inner end, in electrical connection with a contact element adapted to engage the exposed end 14^a of the center-pin, 14, hereinafter mentioned; said contact element being preferably embodied as a quill 7 set within a short axial extension from the cup or recess, 4^a, provided at the inner end of the core. The said porcelain or core, 4, is secured in its assembled position in said spark plug body by means of the spark plug head-nut, 11, in usual manner. Such head-nut which also performs the function of a coil supporting element, as hereinafter set forth, is preferably formed

of a single metal stamped piece, and comprises a threaded neck, 11^a, adapted to engage a correspondingly threaded seat in the spark plug shell, 1, which neck, 11^a, leads upwardly to a preferably hexagonal portion, 11^b, above which extends a projecting portion, 11^c, which is secured to the base of the igniter casing 12. In the preferred form of igniter now being described said projecting portion 11^c of the spark plug head nut is flared outwardly and is embedded within the material comprising the base of the igniter casing 12 when the material of which the same is formed is in a plastic condition; said casing being composed preferably of electrically insulating material which may be molded or pressed into shape while plastic and thereafter solidifies or hardens. By this construction the projecting portion of the spark plug head nut becomes permanently embedded in the material forming said base and through such embedded portion the spark plug head nut becomes inseparably attached to the base of the casing, being capable of detachment only through the breakage of the casing.

Extending from the lower end or base of the igniter casing, 12, and lying within that position the spark plug head-nut above the neck, 11^a, is a conical or tapered projection, 13, hereinafter referred to as a pillar, through which axially extends a center-pin 14, whose outer or lower end, 14^a, projects beyond said pillar and is therefore electrically unprotected or exposed for a short distance. The upper or inner end, 14^b, of said center-pin, 14, is connected with one terminal 15 of the high-tension winding of the induction coil as by the connection, 10. The other terminal, 3, of the said high tension winding, jointly with one primary terminal, 17, is connected to the metal insert 8 provided with a binding screw, 18, is in electrical connection with the spark plug shell, 1, and the spark plug head-nut, 11, through an external grounded circuit, x—x, in a manner understood by those conversant in the art of electric ignition. The other primary terminal 19 is connected to a similar insert 20 having a binding screw 21 for attachment to one terminal 22 of a battery and vibrator circuit not shown in the figures, having its other terminal 23 connected preferably through grounding to the screw 18. Surrounding the pillar 13 is an annular chamber of which the upper end is shown at 16, which is exteriorly bounded by a wall or lining 16^a formed of the insulating material filling the interior of the spark plug head-nut, 11, lying above the neck, 11^a, of the same. Such wall or lining 16^a of said annular chamber 16 is substantially flush with, and forms a continuation of, the interior bore of the neck, 11^a. Said annular chamber is, in consequence, of such diameter as to permit the cupped, or conical inner or upper end of the porcelain core, 4, to freely enter within the same. Said wall or lining 16^a is commonly formed during the process of attaching the spark plug head nut to the casing through the molding of the projecting portion of the same into the base of the casing. During the process of such molding an excess of the plastic material required for such base is caused to be protruded from the base into said hexagonal portion of the head nut so as to interiorly line the same.

The cup or recess, 4^a, on the top of the inner or upper end, 4, of the porcelain core is so contoured and sized with respect to the contour and size of the pillar, 13, projecting from the base of the casing, 12, and lying within said annular chamber, 16, that said cupped core end, 4^a, is adapted to fit over said pillar, 13, so as to permit the exposed end, 14^a, of the center-pin, 14, to enter within the cup or recess, 4^a, at the end of the porcelain core, 4, sufficiently to bring the exposed end, 14^a, of the center-pin, 14, into engagement with the quill, 7, located at the bottom of said cup or recess, 4^a, and in electrical connection with the spark point, 5.

It will be evident that by means of the construction hereinbefore described there is secured an air gap between the exposed end 14^a, of the center-pin, 14, and that portion of the spark plug head-nut which is nearest adjacent thereto, of a length determined by the peripheral distance from such nearest point of the inner wall of the spark plug head-nut 11 along the interior lining 16^a around the top edge of the cupped recess, 4^a, of the porcelain core and down into said cup or recess, 4^a, until the exposed end, 14^a, of the center pin, 14, is reached. This length of air gap so provided effectively secures the electrical separation or isolation of the said exposed end, 14^a, of the center-pin, which is connected to the high tension terminal, 15, from the spark plug head-nut 11, which is in grounded electrical connection, as hereinbefore described, with the other high tension terminal 3, of the induction coil. In consequence the leakage of high tension current between such exposed end, 14^a, and the wall of spark plug head-nut, 11, which has been often found to occur between such parts where a straight or rounded-top porcelain core has been employed, is practically eliminated. At the same time my construction preserves all the characteristic features of simple construction and of a readily detachable engagement between the spark plug porcelain and the center-pin which is present in the prior igniters having the straight or rounded top porcelain. Furthermore the use of a spark plug head-nut having its upper part molded into the base of the igniter casing, and engaging the body of the spark plug

through the threaded neck 11ª integral with said upper part, provides a simple and reliable manner of supporting said casing with respect to said spark body by reason of which economy in cost of construction may be realized, and one which is particularly resistant to the effect of the jarring or vibration commonly met with in the situations where igniters are located.

In addition the type of head-nut describes, and the manner of attaching the same to the casing provides a mass of insulating material forced upon said head-nut, which coöperates with the pillar and recess respectively carried in casing and core end, in lengthening the in gap between the center pin and the spark plug head-nut.

What we claim as our invention is,—

1. In an igniter, in combination with a spark plug having a spark plug shell, and an induction coil; a coil supporting casing embodying a base formed of solidified material originally in a plastic condition, and having a coil inclosing portion carried upon said base, and a casing supporting element embodying at one end a neck engaging the spark plug shell, and at the other a projecting portion permanently embedded in the material forming said base so as to be inseparably attached thereto.

2. In an igniter, in combination with a spark plug having a spark plug shell, and an induction coil; a coil supporting casing embodying a base formed of solidified insulating material originally in a plastic condition and a coil inclosing portion carried upon said base, and a spark plug head-nut supporting said coil upon said spark plug, said head-nut comprising a neck engaging the spark plug shell, a projecting portion permanently embedded in the material forming said base so as to be inseparably attached thereto, and an hexagonal portion connecting said neck and said projecting portion; said hexagonal portion being interiorly lined with insulating material integral with said base.

3. In an igniter, in combination, the center pin surrounded by a projecting pillar of insulating material, outside of which is an annular chamber, a core having its inner end cupped or recessed, and with the contact element located at the inner end of the cup or recess, and the edge or wall lying around the cup or recess at the end of the core and entering within the said annular chamber lying outside the said pillar of insulating material.

4. In an igniter, in combination, a center-pin surrounded by a projecting pillar of insulating material, an annular chamber lying outside of said pillar, a core having its inner end cupped or recessed with a contact element located at the inner or lower end of said cup or recess, and having an edge or wall surrounding the cup or recess at the end of the core and adapted to enter into said annular chamber and to lie outside said projecting pillar.

5. In an igniter, in combination, a spark plug having a spark plug shell, an induction coil, a casing supporting said coil, said casing having a center pin located in the base of the same and surrounded by a projecting pillar of insulating material a spark plug head nut comprising a portion embedded with the casing, an hexagonal portion projecting below said casing, said portions being interiorly filled with insulating material, and a tubular neck, integral with the aforesaid portions and engaging the spark plug shell, the opening in said neck being continued upwardly through the said insulating material filling the upper portions of the head nut to form an annular chamber lying around said projecting pillar, and a porcelain or core having its inner end cupped or recessed, and with a central contact element located at the inner end of the cup or recess, the edge or wall surrounding the cup or recess being adapted to enter into said annular chamber and to lie outside the said pillar.

In testimony whereof we affix our signatures in presence of two witnesses.

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