G. V. NOLTE AND J. E. SMITH.

IGNITION PLUG.

APPLICATION FILED FEB. 4, 1919.

1,330,335. Patented Feb. 10, 1920.

Fig. 1

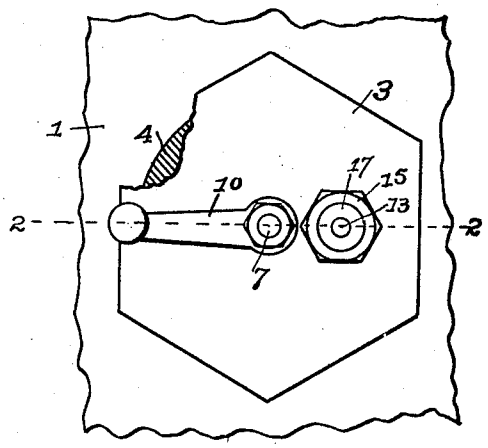


Fig. 2

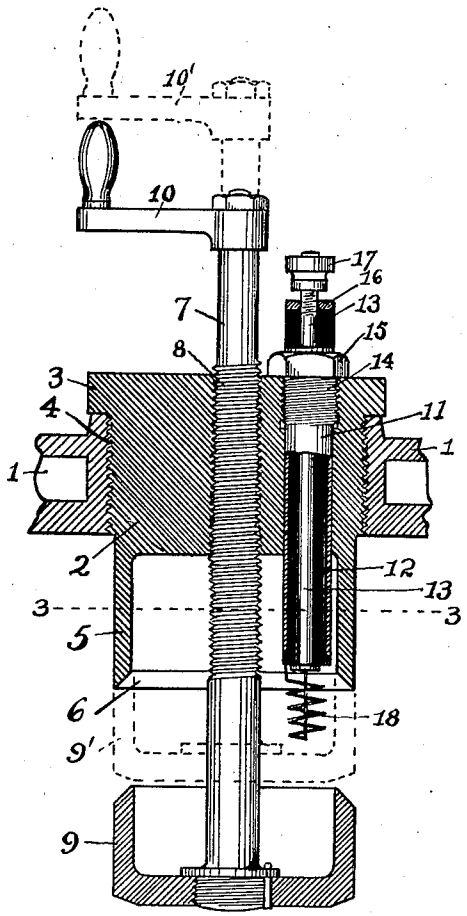
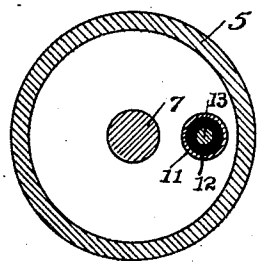


Fig. 3



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IGNITION-PLUG.

1,330,335. Specification of Letters Patent. Patented Feb. 10, 1920.

Application filed February 4, 1919. Serial No. 274,842

To all whom it may concern:

Be it known that we, GEORGE V. NOLTE and JAMES E. SMITH, citizens of the United States, and residents of Bellingham, in the county of Whatcom and State of Washington, have invented certain new and useful Improvements in Ignition-Plugs, of which the following is a specification.

Our invention relates to improvements in ignition plugs for use in so-called semi Diesel, interior combustion engines which require the services of an ignition plug only at short and infrequent intervals. We have been granted a patent for a spark-plug, No. 1,249,465 on Dec. 11, 1917 in which the ignition element is mounted in a protractile and retractile cage adapted to expose the element to and protect it from the explosive gases within the cylinder at will, and also adapted for the convenient removal of the spark-plug from the cylinder during engine operation. We have also been granted Patent No. 1,293,520 on Feb. 4, 1919, in which the ignition element is retained in a revoluble cage, and is caused to be exposed to and shielded from said cylinder gases, as desired, by revolving said cage and element. In this invention, also, the element is conveniently removable during engine operation. In both of the later mentioned inventions the ignition plug must be moved during the normal operation of the devices. This invention has for its main objects those recited above, but its special object is to attain them without moving the ignition plug, excepting to remove it from the cylinder.

We attain these objects by the mechanism illustrated in the accompanying sheet of drawing in which Figure 1 is a plan view of our ignition plug in place in the cylinder of an internal combustion engine, Fig. 2 is an elevation of Fig. 1 in section on the dotted line 2—2, and Fig. 3 is a plane section of Fig. 1 on the dotted line 3—3.

Similar characters refer to similar parts in the several views. Certain parts are broken away in order to reveal others hidden thereby.

1 is the engine cylinder, a fragmentary part only of which is shown. Stud 2 has a hexagonal head 3 and a threaded body 4 which is engaged in a threaded hole in engine cylinder 1. The interior end of stud 2 projects within cylinder 1, is hollow and has the valve seat 6. In a central tapped hole in plug 2 is the threaded body 8 of valve stem 7 to the upper end of which is rigidly fastened hand crank 10 for the convenient rotation of said valve stem. The lower end of valve stem 7 projects within cylinder 2, and to it is rigidly fastened cup-form valve 9 adapted to seat on valve seat 6 when stem 7 has been revolved to carry it to its other extreme position indicated by dotted lines. The ignition plug comprises metallic casing 11, central metallic rod 13, insulating bushing 12, ignition element 18, and binding post nut 17. Hexagonal head 15 is on the upper end of casing 11 and close beneath it is an enlarged threaded part of the body 14. The upper end of an eccentric hole through stud 2 is threaded to receive threaded body 14 and the inner end of said hole is fitted to receive the cylindrical inner end of casing 11. Said ignition plug is installed in stud 2 and removed therefrom by revolving said plug with the aid of a wrench on head 15. As shown in Fig. 2, it is preferred that ignition element 18, when in operative position, protrudes below valve seat 6 where it is fully exposed to the explosive gases within cylinder 1 when valve 9 is in its extreme lower position shown in full lines in Fig. 2. The cup of valve 9 is sufficiently large to inclose element 18 without touching the same when said valve is seated as shown in dotted lines at 9′. When thus seated valve 9, together with the hollow cylindrical end 5 of stud 2, seals element 18 from exposure to the gases within cylinder 1. The inner and outer ends of element 18 are respectively connected to the lower ends of rod 13 and casing 11. Therefore by connecting one wire of an electric source of supply to the engine frame and the other wire of said electric supply to rod 13 by clamping it under binding-post nut 17, element 18 is within an electric circuit and may be rendered incandescent by electricity from said source, not shown. It is assumed that an electric switch is, as usual, included in the electric circuit, referred to. Then to operate my device when installed as shown in Fig. 2 and connected to a source of electricity, as described, to start the engine, valve 9 is carried to its lowest position, shown in full lines, and the circuit of the source of electric supply is closed, and the conduit to the fuel and air supply opened. The electric current caused to flow through element 18 will so heat it that it will cause the explosive mixture of volatile oils and air in the surrounding media to explode and

thus start the engine. After said engine operation is well under way certain metallic parts exposed to said gases and vapors become sufficiently hot to cause the requisite recurrent explosions and the services of the heated element are not needed. Then valve 9 is carried to its dotted position in Fig. 2, by using crank 10, thus seating valve 9 and separating element 18 from contact with said cylinder gases. The said electric circuit through said element is broken and said element may be allowed to remain in its protected position in cylinder 1 or removed therefrom by using a wrench on head 15.

Thus the normal operations are conducted without moving our ignition plug except it is desired to remove it from its operative position. If desired, we install two or more ignition plugs in stud 2 and connect them in parallel relation electrically. Also it is readily apparent that the heating element 18 may be replaced by the ordinary jump-spark terminals if desired.

Having thus fully disclosed our invention, what we claim as new and desire to secure by Letters Patent is,

1. In combination, the cylinder of an internal combustion engine, a stud engaged in the walls of said cylinder having a hollow cylindrical inner end with a valve seat protruding within said cylinder, a threaded valve stem operable from without said cylinder engaged in a central threaded hole in said stud, a valve on the inner end of said stem closable on said valve seat, and a removable ignition plug in an eccentrically placed hole in said stud with its element in the cylindrical cavity on the inner end of said stud.

2. In combination, the cylinder of an internal-combustion engine, a screw stud engaged in the walls of said engine cylinder having a hollow cylindrical inner end with a valve seat protruding within said engine cylinder, an ignition plug having a threaded body engaged in a threaded eccentric hole in said stud with its ignition element protruding within said engine cylinder, a valve stem operable in a central hole in said stud having a cupform valve on its interior end adapted to seat on said valve seat and separate said element from communication with the contents of said engine cylinder.

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