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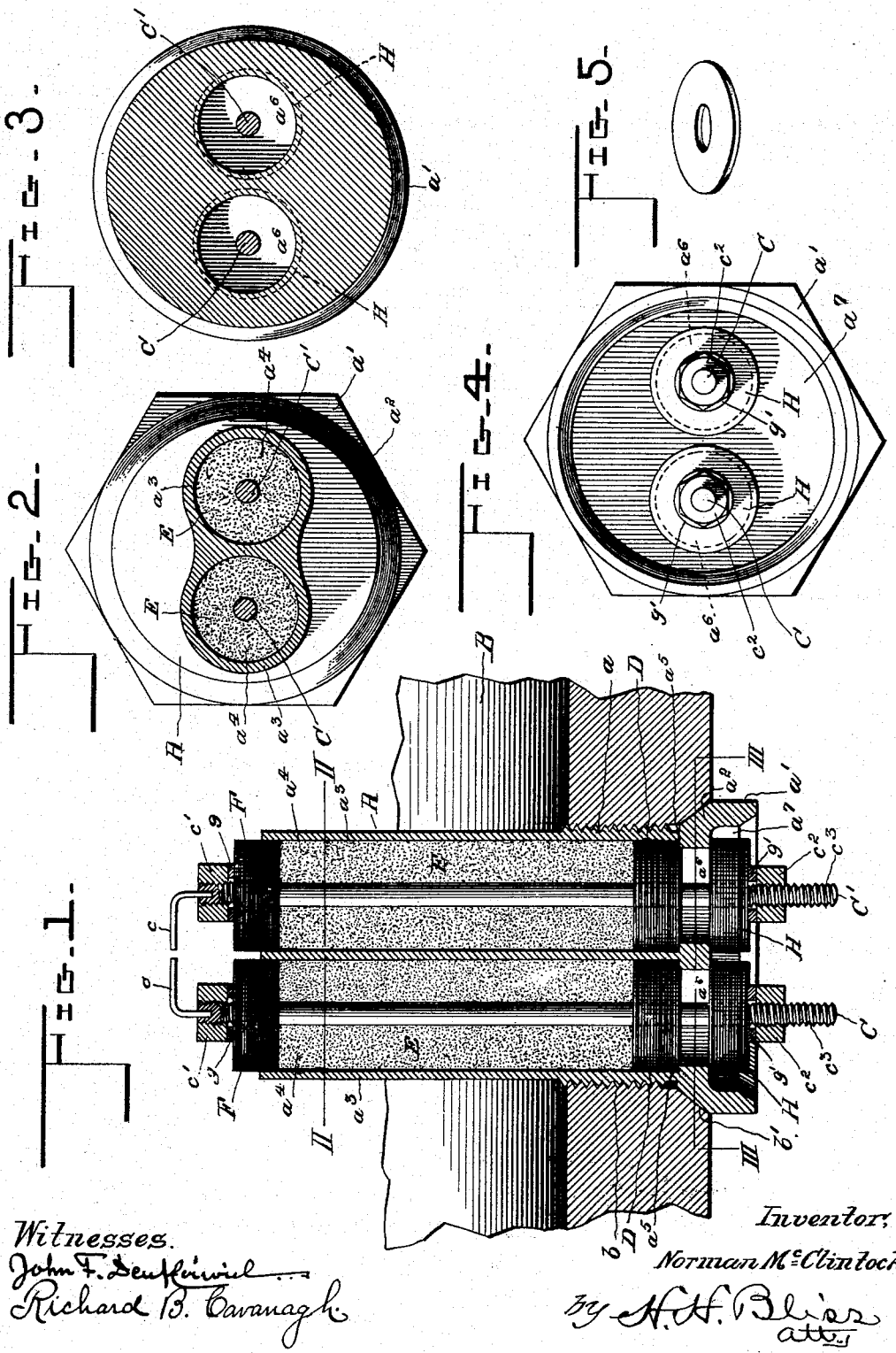
N. McCLINTOCK.

IGNITION PLUG FOR GAS ENGINES.

(Application filed Sept. 30, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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IGNITION-PLUG FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 676,468, dated June 18, 1901.

Application filed September 30, 1899. Serial No. 732,234. (No model.)

To all whom it may concern:

Be it known that I, NORMAN McCLINTOCK, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Ignition-Plugs for Gas-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

In order to make my invention more clearly understood, I have shown in the accompanying drawings means for carrying the same into practical effect without limiting my improvements in their useful applications to the particular construction which for the sake of illustration I have delineated.

In said drawings, Figure 1 is a longitudinal sectional view of an igniting-plug for gas-engines embodying my invention. Fig. 2 is a sectional view of the same on line II II, Fig. 1. Fig. 3 is a sectional view of the plug detached on line III III, Fig. 1. Fig. 4 is an end view of the head of the plug. Fig. 5 is a perspective view of one of the insulating mica washers.

Referring to the drawings, A indicates the body of the plug, preferably of brass and having a cylindrical screw-threaded portion a, adapted to be screwed into the wall of the cylinder B of the engine. To receive said plug, the cylinder is formed with a screw-threaded opening b, at the outer end of which latter is formed a beveled or tapered seat b'. The plug is constructed with an enlarged head a', at the inner portion of which is a valve portion a^2, corresponding with and adapted to fit tightly the seat b'. Beyond the thread a the plug extends within the cylinder in the form of two tubular portions a^3, which are preferably cast together, as shown. Each of said portions a^3 is bored from the inner end for the greater portion of the length of the plug to form a chamber a^4. These chambers terminate at shoulders a^5, beyond which are openings a^6 of smaller diameter than the chambers. Within the head of the plug is a larger chamber or space a^7, with which the openings a^6 communicate.

The electrodes or conducting-wires for the electrical current are shown at C C', extending longitudinally through and substantially concentric with the chambers a^4 from the head of the plug to points beyond its inner end, where they are provided with sparking-points c. At the inner ends the electrodes are provided with heads or nuts c' and at their outer ends, in or beyond the chamber a^7, with nuts c^2, which are adjustable upon screw-threads c^3, formed on the outer ends of the electrodes.

D indicates a series of washers, of insulating material, such as mica, perforated to receive the electrodes and resting upon the shoulders a^5. At the inner side of the washers D the chambers a^4 are filled with a pulverized insulating material E, such as pulverized mica. At its inner end each of the chambers a^4 receives and is closed by a series of washers F, of mica, which are free to enter the chamber to any desired distance until they rest upon the surface of the pulverized material. At their inner sides the washers F are engaged by the heads c' of the electrodes or by interposed washers g.

In the chamber a^7 each electrode is provided with a series of washers H, which are of greater diameter than the openings a^6 and engage the inner surface or wall of said chamber. At their outer sides the washers H are engaged by the nuts c^2 or by interposed washers g'.

The parts being assembled as above described, the nuts c^2 are screwed up, drawing the washers F within the chambers a^4 until the pulverized material is compressed and packed around the electrodes and against the washers D, which latter are thus seated firmly against the shoulders a^5. The igniting-plug thus complete may be inserted into the combustion-cylinder of the engine and screwed into the threaded opening of the latter until the valve portion a^2 tightly engages the seat b'.

The electric current may be conducted to the outer ends of the electrodes C C' by any suitable means.

The washers F when the insulating parts are compressed and clamped as above described will extend beyond the inner end of the plug and hold the heads c' of the electrodes at a suitable distance therefrom.

It will be understood that in place of the insulating material E the chambers of the plug may be entirely filled with mica washers.

The heads c' are preferably made in the

form of nuts screwing upon the inner ends of the electrodes, so that the electrodes may first be inserted through the washers H and D, the plug-chambers charged with the pulverized mica, the washers F fitted over the electrodes, and lastly the heads c' put in place. By the combined action of the parts c' c^2 the electrodes may be adjusted longitudinally in the plug, as desired.

Heretofore ignition-plugs have been made or proposed with electrodes passing longitudinally through the plug and insulated therefrom by means of spools or blocks of porcelain; but it has been found impossible to properly and thoroughly pack the passage-way around the electrodes and extending through the plug when the insulation is made of this material. The porcelain is not sufficiently yielding or elastic to insure that a tight joint or packing shall be attained. It does not fit accurately either the electrodes or the plug against which it bears. Again, the materials of this sort are fragile and are constantly liable to breakage because of the force applied to them by the fierce explosions which take place in the cylinders of explosive, engines. From both these causes (the lack of a perfect packing and the cracking or breaking of the insulators) there have resulted leakage of the gas or vapors and products of combustion and also a loss of current due to the inferiority of the insulation. These difficulties I have avoided by employing a combined packing and insulating material which is elastic or yielding and capable of being drawn tightly against the electrodes and also against the seat for the packing in the plug or cylinder-wall, such packing and insulating material being provided in masses preferably made up of thin elastic refractory disks or sheets of suitable material, such as mica cut into the form of washers. Preferably these are used in the way above described—that is to say, a suitable number of the refractory washers are placed together to form a gasket. In order to have them available both for packing the passage-way and for insulating the electrodes, two of these elastic laminated refractory gaskets are used, one arranged to press inward and the other to press outward against suitable seats either formed in or on the detachable plug or in or on the wall of the explosion-chamber. By the screw-threaded devices the gaskets may be compressed to such an extent as to prevent any leaking of gas or vapor, and the parts engaging with the gaskets shall be so shaped as to cause them to hold the electrodes properly. Such an insulating-packing will always furnish a strong elastic and non-fragile means for closing the aperture through the cylinder-wall and one capable of resisting effectually the high pressure caused by the explosions within the cylinder.

What I claim is—

1. An ignition-plug for gas-engines, having longitudinal chambers each formed with an internal shoulder near its outer end, electrodes passing through said chambers and provided with clamping means or heads, insulating material surrounding the electrodes within said chambers and held against said shoulders, and insulating material at the head of the plug coöperating with the electrodes to hold the material within said chamber against said shoulders, substantially as set forth.

2. An ignition-plug for gas-engines having longitudinal chambers each formed with an internal shoulder near its outer end, electrodes passing through said chambers, insulating material such as washers D resting on said shoulders and surrounding the electrodes, insulating material such as washers F at the inner end of the plug surrounding the electrodes and closing said chambers, pulverized insulating material within the chambers and clamping means for compressing and packing said insulating material, substantially as set forth.

3. An ignition-plug for gas-engines, having longitudinal chambers each formed with an internal shoulder near its outer end, electrodes passing through said chambers, a series of mica washers H at the outer end of the plug, a series of mica washers D within each chamber and engaging said shoulder, a series of mica washers F at the inner end of the plug and partially entering and closing each chamber, insulating material filling said chambers and packed and clamped between said inner and outer series of washers, and clamping means on the electrode for compressing the insulating material, substantially as set forth.

4. An ignition-plug for gas-engines having a head a' formed with a valve portion a^2 and formed with longitudinal chambers a^4 having shoulders a^5 near the outer end of the plug, insulating material within said chambers, near their outer ends and engaging said shoulders, insulating material engaging the outer end of the plug, insulating-washers F fitting within the inner ends of said chambers and adapted to move longitudinally thereof under a clamping force, insulating material filling said chambers between the outer and inner bodies of insulating material, electrodes passing through said chambers and insulating material, and means for clamping all of said parts together, substantially as set forth.

5. A shell for an ignition-plug for gas-engines formed with a head a', a valve portion a^2, an end chamber a^7 in the head of the plug, openings a^6 formed in the head of the plug, longitudinal chambers a^4 of larger diameter than said openings, forming shoulders a^5, and means for securing said plug in the cylinder, substantially as set forth.

6. In a gas or explosive engine, the combination, with the cylinder having a passage-way through its wall, and an electrode ex-

tending through said passage-way, of an insulating-packing for said electrode surrounding it, and formed of a series of non-conducting, non-fragile, incombustible, flexible laminæ superposed one upon another, and means for clamping together the laminæ of the insulating-packing, the electrode and the cylinder-wall, substantially as set forth.

7. In a gas or explosive engine, the combination, with the cylinder having a passage-way through its wall, and an electrode extending through said passage-way, of an insulating spacing and packing device for the electrode comprising an inwardly-forced gasket, an outwardly-forced gasket, and a mass of non-conducting material interposed between and compressed by the said two gaskets, substantially as set forth.

8. In an ignition-plug for gas-engines, the combination with the shell and an electrode carried thereby, of a packing and insulating gasket consisting of a series of laminæ of thin, elastic refractory material, and means for clamping together the shell, the electrode and the packing, substantially as set forth.

9. In an ignition-plug for gas-engines, the combination with the shell detachably connected to the cylinder and having a chamber or passage extending through the wall of the cylinder and formed with a flange projecting transversely of the said chamber, of an electrode extending through the chamber, and two packing and insulating gaskets each consisting of a series of superposed laminæ of thin, elastic refractory material, one bearing outward against the said flange, and the other bearing inward against it, and means for compressing the laminæ of said gaskets and clamping together the electrode, the gaskets and the shell, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

NORMAN McCLINTOCK.

Witnesses:

W. W. W. BAKER,

KATHARINE MOORE.