Aug. 19, 1924. 1,505,100

E. N. LIGHTFOOT

INTERNAL COMBUSTION ENGINE

Filed June 8, 1918

Fig. 1.

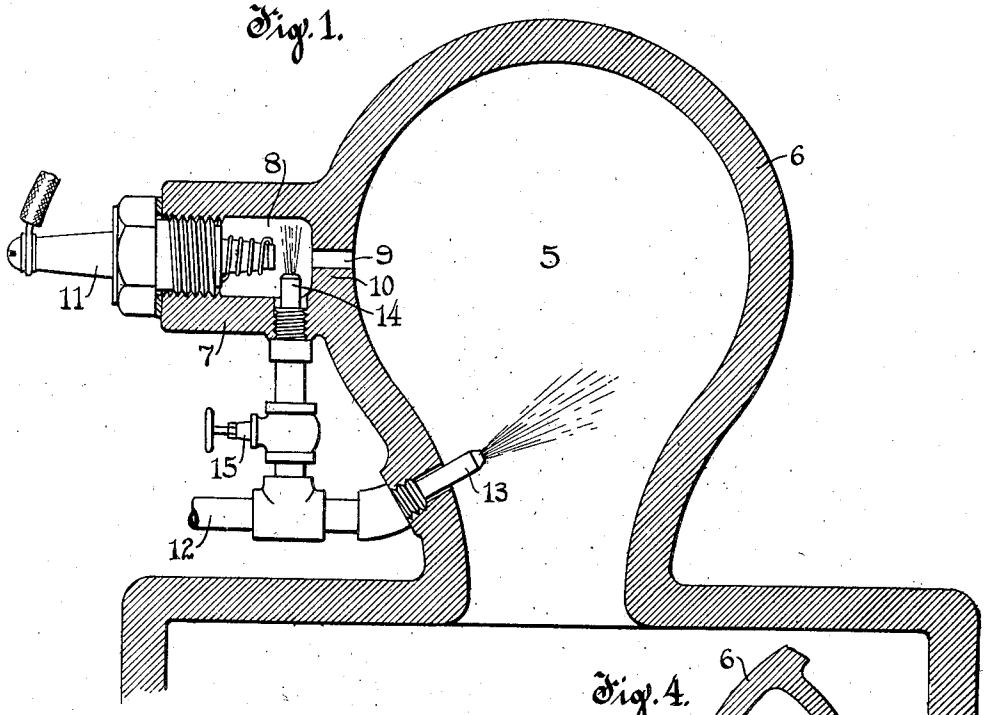


Fig. 2.

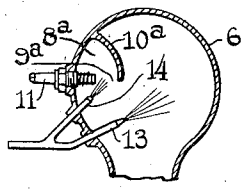


Fig. 3.

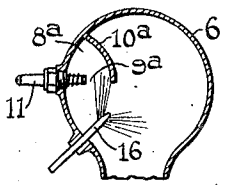
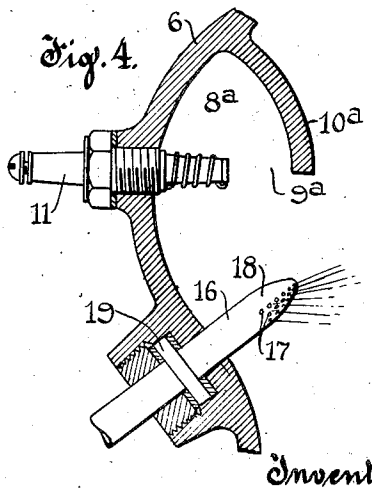


Fig. 4.



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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

Application filed June 8, 1918. Serial No. 238,849.

To all whom it may concern:

Be it known that I, EDWIN N. LIGHTFOOT, a citizen of the United States, residing at New York, in the county of Bronx and State of New York, have invented new and useful Improvements in Internal-Combustion Engines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention relates to internal combustion engines and more particularly to ignition devices therefor.

In heavy oil engines which are not designed to develop sufficient compression for insuring automatic ignition under all conditions and which therefore require the use of special ignition means, it has heretofore been customary to locate the active parts of such ignition device within the engine combustion chamber with the result, particularly if the ignition device be electrical in character, that such active parts are subjected to rapid deterioration due to unfavorable conditions which necessarily obtain within said chamber.

The present invention has among its objects the provision in engines of the character stated of ignition means wherein the parts particularly susceptible to deterioration are effectively protected from the action of the deleterious agencies within the combustion chamber.

A further object is to provide in engines of the character stated a protected ignition device having a supply of fuel regulable for rendering the device active or inactive at will.

Other objects and advantages will hereinafter appear.

According to the present invention it is proposed to provide for housing the ignition device within an ignition chamber located within or adjacent to the combustion chamber of the engine and communicating therewith through a restricted passage. It is furthermore proposed to supply fuel to both of said chambers and to regulate the supply of fuel to the ignition chamber at will, the fuel entering said chamber being projected against or adjacent to said ignition device for ignition thereby and such ignition being communicated to the combustion chamber through the passage aforementioned. However, owing to the restricted character of said passage, the ignition device is protected while the combustion effects are substantially limited to the combustion chamber particularly while the engine is firing automatically and no fuel is being supplied to the ignition chamber.

In the accompanying drawing wherein are illustrated certain of the embodiments which the invention may assume in practice,

Figure 1 is a fragmentary elevational view partly in section, illustrating one form of the invention;

Figs. 2 and 3 are similar views on a reduced scale schematically illustrating certain slightly modified constructions; while,

Fig. 4 is an enlarged detailed view further illustrating certain features of Fig. 3.

Referring to Fig. 1 of the drawing, the same illustrates an engine combustion chamber 5 having a surrounding casing 6, the latter being provided with a hollow extension 7 providing an ignition chamber 8 communicating with the combustion chamber through a restricted passage 9 formed within the intermediate wall 10. The extended portion 7 of the casing is provided with an opening to receive an ignition plug 11 which is screwed or otherwise rigidly secured therein with its exposed ignition parts located within said ignition chamber. In practice the ignition plug 11 may be of any suitable construction but is preferably an electrical resistor plug of the character disclosed and claimed in my Patent No. 1,454,549, dated May 8, 1923.

Fuel is supplied to the combustion chamber through a pipe 12 terminating within said chamber in an atomizer nozzle 13 in the usual manner while the ignition chamber 8 is similarly supplied with fuel from the pipe 12 by means of an auxiliary nozzle 14 located within said chamber and arranged to direct a spray of fuel upon or in proximity to said plug, the supply of fuel thereto being controllable by means of a manually operable valve 15.

In practice the aforedescribed ignition means may be employed continuously during operation of the engine if required, or under conditions of automatic firing of the engine, said ignition means may be rendered inactive by cutting off the supply of fuel thereto through the valve 15, while the electric circuit of the plug 11 may also be inter-

rupted. Under these conditions the working parts of the plug are practically isolated from the combustion chamber by the partition 10 and are surrounded by the relatively inert spent gases contained within the ignition chamber, whereby deterioration of said parts due to combustion effects is minimized. Moreover during activity of the ignition means said partition also serves to shield the plug from the destructive agencies which act within the combustion chamber.

Referring now to Fig. 2 of the drawing, the same discloses an arrangement similar in general to that hereinbefore described, but wherein the ignition chamber 8^a is located within the contour of the casing 6 and substantially separated from the combustion chamber by an interiorly located shield 10^a formed integral with said casing or otherwise rigidly secured thereto. The ignition plug 11 and the auxiliary nozzle 14 are secured within the portion of the casing adjacent the ignition chamber and are thus separated from the combustion chamber by the shield 10^a except for a communicating passage 9^a provided at the lower extremity of said shield.

In the construction illustrated in Figs. 3 and 4 the structure and arrangement of the combustion and ignition chambers and the location of the ignition plug within the latter are similar to those last described while in this instance a single fuel induction nozzle 16 is employed. Said nozzle is preferably constructed substantially cylindrical in shape and provided with peripherally located reduced openings 17 so arranged as to direct a spray of fuel within the combustion chamber and also within the ignition chamber to be ignited by the plug 11.

To provide for cutting off the supply of fuel to the ignition chamber, a limited peripheral portion 18 of said nozzle is constructed imperforate and the entire nozzle is swivelly mounted within the casing as indicated at 19, whereby upon rotating the same said imperforate portion may be brought into register with the entrance to said chamber, thus directing the spray within the combustion chamber alone.

By the arrangements above described the action of the ignition means may be readily initiated or suspended at will while those portions of the device which are most susceptible to damage due to conditions within the combustion chamber are amply protected thereagainst.

What I claim as new and desire to secure by Letters Patent is:

1. In an internal combustion engine, the combination with a casing having parts providing a combustion chamber and an ignition chamber in communication therewith, of an ignition plug penetrating said casing and extending within said ignition chamber, and means for supplying fuel to said chambers jointly and for cutting off the supply of fuel to one of said chambers at will.

2. In an internal combustion engine, the combination with a casing having parts providing a combustion chamber and an ignition chamber in communication therewith, of an ignition plug penetrating said casing and extending within said ignition chamber, and means for supplying fuel to said chambers jointly and for interrupting the supply of fuel to said ignition chamber while continuing the supply to said combustion chamber.

3. In an internal combustion engine, the combination with a combustion chamber housing having an interiorly located partition arranged to divide said chamber into a pair of communicating recesses, of an ignition plug extending within one of said recesses, means for supplying fuel to both of said recesses and means for interrupting the supply of fuel to the first mentioned of said recesses at will.

In witness whereof, I have hereunto subscribed my name.

EDWIN N. LIGHTFOOT.