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M. J. B. BARBAROU

METHOD AND MEANS FOR THE IGNITION IN INTERNAL COMBUSTION ENGINES

Filed June 10, 1925

Fig. 1

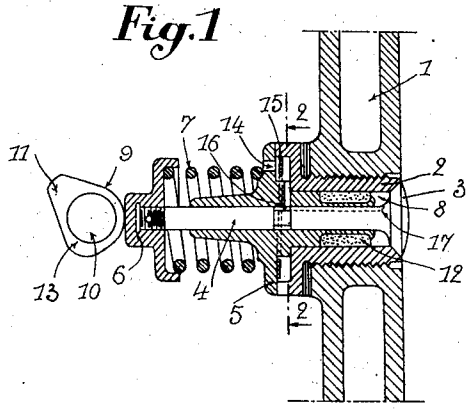


Fig. 2

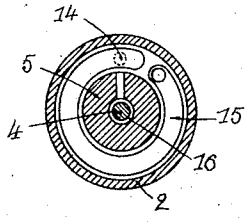


Fig. 3

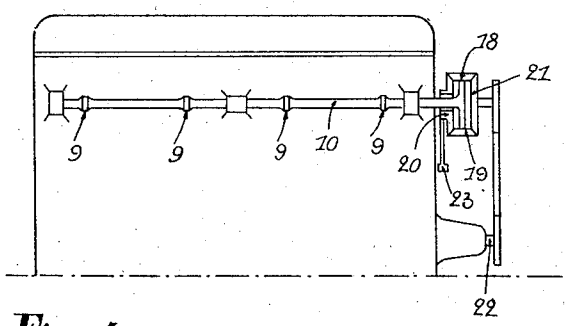


Fig. 4

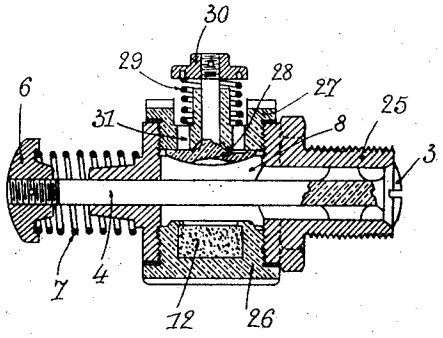
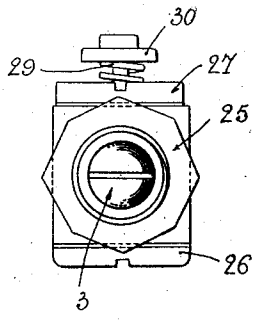


Fig. 5



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UNITED STATES PATENT OFFICE.

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METHOD AND MEANS FOR THE IGNITION IN INTERNAL-COMBUSTION ENGINES.

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The ignition of fuel mixtures in internal combustion engines is obtained as a rule by electric means. This invention has for its object the obtainment of the ignition of the fuel mixture in internal combustion engines by the use of the catalytic properties of certain substances which although remaining unaffected in themselves will cause the combination of the oxygen of air with the fuel in the form of gas or vapour, which is mixed with the air. Among the catalyzers which are available for this purpose are platinum sponge, colloidal platinum, various metallic oxides such as oxide of copper, nickel or other metals, or mixtures of these substances.

The invention has for further object suitable means provided upon internal combustion engines whereby the said catalyzers may be employed in an adequate manner for ignition purposes, said means being chiefly characterized in that they comprise in combination, a chamber containing the catalyzer, a valve or like movable means adapted to normally separate the catalyzer from the compression chamber of the engine cylinder, and control means such as a cam for lifting the said valve at the end of the compression period. With the said means further means are also preferably provided, comprising for instance a spring controlled clack valve affording the exhaust of the residual gas from the said catalyzer chamber and the substitution of pure air for the same gas.

Further characteristic features will be set forth in the following description with reference to the appended drawings which are given by way of example, and in which:

Fig. 1 is a partial section of the wall of a cylinder of an internal combustion engine provided with the ignition device according to the invention.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a partial side elevation of the engine showing the cam shaft control.

Fig. 4 is an axial section of a modification and

Fig. 5 is an end view of the same.

In the construction illustrated in the drawings, 1 is the double wall of a cylinder of an internal combustion engine, the interior of said cylinder being situated to the right of Fig. 1. A plug 2 is secured—for instance by screwing—in the place of the usual sparking plug; the plug 2 forms the seat of a valve 3 whose stem 4 is guided in a member 5 which is coaxial with the plug 2. A cap 6 is secured to the end of the valve stem 4 and serves as an abutment for the reaction spring 7 of said valve. A chamber 8 is provided between the front of the member 5 and the plug 2, and serves to contain the substance operating by catalytic action, which consists preferably of asbestos impregnated with one or more suitable catalyzers. The valve 3 is controlled by the cam 9 which is keyed to the shaft 10 and acts upon the cap 6.

When the sparking is about to occur, the valve 3 is lifted by the boss 11 of the cam, so that at the end of the compression stroke, the fuel mixture will enter the chamber 8 and will come into contact with the catalyzer 12; the latter will start the combustion, which will then continue in the known manner, and the valve 3 is now closed.

In order to discharge the burnt gas from the chamber 8 and to substitute pure air, the said spring may be calibrated so that upon the occurrence of the suction, the valve 3 will be slightly lifted, or I may provide a second boss 13 upon the said cam which is spaced at a suitable angle relatively to the boss 11 and serves for the control of the said valve. Means are further provided whereby during the lifting period of the valve, the fresh fuel mixture shall have no access to the catalyzer and said means may for instance provide for a supply of pure air to the chamber 8. It is observed in the drawing that the member 5 is apertured at 14, and that the outer air will raise the elastic blade forming a valve 15, and will thus attain the channel 16 formed in the valve stem 4 and proceeds through the conduit 17 into the chamber 8. The gas under the pressure prevailing in the cylinder 1 can in no wise escape to the exterior through the ignition device, since the orifice 14 is closed by means of the spring 15.

An internal combustion engine provided with the said ignition device is preferably completed by the addition of suitable means for varying the ignition period, and the said means may be disposed in order that they may control the angular position of the cam shaft 10. A suitable arrangement for this purpose is shown in Fig. 3. The shaft 10 carrying the cam 9 for the control of the valve 3 (Fig. 1) is under the control of the planetary pinions 18 and 19 pertaining to a set of gearing which comprises the station-

ary sun ring 20, and the like ring 21 which is rotated at the same speed as the crankshaft 22. The shaft 10 is thus rotated at half the speed of the crankshaft; and by modifying the angular position of ring 20, for instance by means of the lever 23, the lifting of the ignition valves 3 may be suitably timed.

In the modification illustrated in Figs. 4 and 5 a plug 25, which constitutes the main body of the sparking plug and is screwed to the engine in the usual place, forms the seat for the valve 3 as well as a guide for the valve stem 4. The cap 6 mounted at the end of the said valve stem serves as an abutment for the reaction spring 7 for the said valve. A chamber formed in the plug 26 serves to contain the catalytic product 12. A second plug 27 which is situated opposite the plug 26, serves as a seating and a guide for the valve 28 controlled by the spring 29 which bears at one end on the outer face of said plug and at the other on the cap 30 secured to the end of the stem of said valve.

When the ignition is to take place, i. e. at the end of the compression stroke, the valve 3 is lifted by a cam not shown and operated in the same manner as cam 9 shown in Figs. 1 to 3 and the gas will thus proceed into the chamber 8 and will enter into contact with the catalytic product 12, thus starting the combustion which will then continue in the usual manner, and the valve now closes.

To provide for the evacuation of the burnt gas and the substitution of pure air for the same, thus renewing the catalyzer, the lifting of the valve 3 during the suction stroke, may be obtained either by means of a cam or by the suitable calibration of the spring 7, and the air will enter through the apertures 31 which may be uncovered by the valve 28, due to a suitable calibration of spring 29 also.

Obviously, the sparking plug as hereinbefore described is susceptible of various detail modifications without departing from the principle of the invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a catalytic ignition device for internal combustion engines, means whereby a current of scavenging atmospheric air is caused to flow at a notable speed over said catalyzing substance after each ignition.

2. A catalytic ignition device for internal combustion engines comprising a chamber containing the catalyst, means for connecting said chamber with the engine cylinder, controlling means for said connecting means adapted to afford communication between said chamber and said cylinder substantially at the end of the compression stroke and during the suction stroke, means for connecting said chamber with the atmosphere and means for controlling said latter connecting means whereby communication between said chamber and the atmosphere is afforded during a portion of said suction stroke.

3. A catalytic ignition device for internal combustion engines comprising a chamber containing the catalyst and communicating with the engine cylinder, a spring controlled valve adapted to automatically afford the communication between said chamber and the engine cylinder during the suction stroke, a cam adapted to open again said valve substantially at the end of the compression stroke, and means whereby communication is afforded between said chamber and the atmosphere during a portion of said suction stroke.

4. A removable catalytic ignition device for internal combustion engines comprising a plug having a screwthreaded end portion adapted to be screwed in a screwthreaded hole of the wall of the engine cylinder, a chamber extending through said end portion of the plug and containing a catalyzing substance, a spring and cam controlled valve normally closing said chamber and affording communication between said chamber and said cylinder at the ignition instant and during the suction stroke, air inlet openings adapted to establish communication between said chamber and the outer air and means whereby said communication is afforded only when a suction takes place in said chamber.

5. In an ignition device as claimed in claim 4, the further feature residing in that said means consist of an elastic blade valve.

6. A removable catalytic ignition device for internal combustion engines comprising a plug having a screwthreaded end portion adapted to be screwed in a screwthreaded hole of the wall of the engine cylinder, a main chamber extending through said end portion of the plug and containing a catalyzing substance, a spring and cam controlled valve normally closing said chamber and affording communication between said chamber and said cylinder at the ignition instant and during the suction stroke, an auxiliary chamber communicating with said main chamber, air-inlet openings adapted to establish communication between said auxiliary chamber and the outer air and a valve normally closing said openings and adapted to open the same when a suction takes place in both chambers.

In testimony whereof I have signed my name to this specification.

MARIUS JEAN-BAPTISTE BARBAROU.