E. D. IRWIN.

INTERNAL COMBUSTION ENGINE.

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1,204,986. Patented Nov. 14, 1916

Fig. 1.

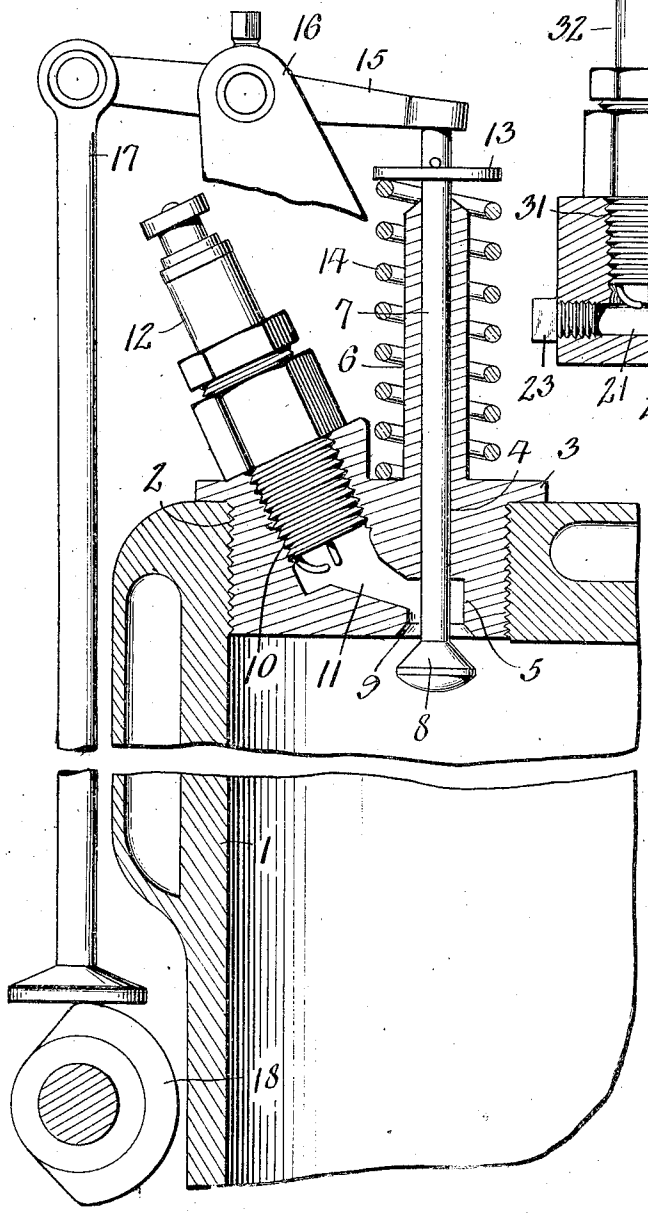
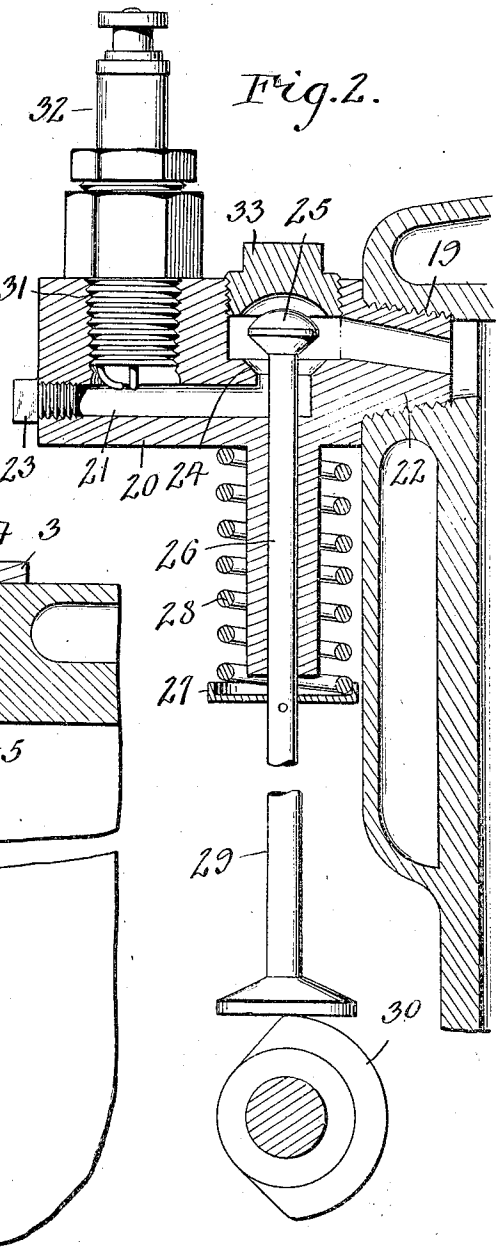


Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

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To all whom it may concern:

Be it known that I, EDGAR D. IRWIN, a citizen of the United States of America, residing at Johnstown, in the county of Cambria and State of Pennsylvania, have invented new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention relates to improvements in internal combustion engines and has particular application to means for holding the gas in the combustion chamber out of contact with the terminals of the spark plug until the time of the spark.

In carrying out the present invention, it is my purpose to provide a device whereby the gas in the combustion chamber and cylinder will be held out of contact with the terminals of the spark plug during the compression stroke of the piston so as to prevent the rapid accumulation of carbon in the terminals of the spark plug, and which will permit the gas to enter the zone of the terminals at the time that the spark is made so that the mixture in the combustion chamber may be exploded to propel the piston.

It is also my purpose to provide a device of the class described which may be readily applied to any internal combustion engine cylinder without changing the structure of such cylinder, which may be manufactured and marketed at a minimum expense and which will operate efficiently and effectively for its intended purpose.

With the above and other objects in view, the invention consists in the construction, combination and arrangement of parts hereinafter set forth in and falling within the scope of the claim.

In the accompanying drawing, Figure 1 is a fragmentary longitudinal sectional view through an internal combustion engine cylinder equipped with a device constructed in accordance with the present invention, the device being shown in longitudinal section and the spark plug connected therewith being shown in side elevation. Fig. 2 is a similar view showing a modified construction of the device.

Referring now to the drawing in detail, 1 designates a cylinder of an internal combustion engine formed with an opening 2 threaded interiorly, the opening 2, in this instance, being formed in the top walls of the cylinder. Threaded into the opening 2 is a plug 3 formed with a vertical bore 4 and a recess 5 contiguous to the inner end of the bore 4 and opening onto the inner surface of the plug 3. Formed on the top side of the plug 3 concentrically of the bore 4 and upstanding from the plug is a sleeve 6 and slidably mounted within the sleeve 6 and the bore 4 is a valve stem 7. The lower end of the stem 7 is equipped with a valve disk 8 adapted to engage a seat 9 formed on the inner end of the recess 5. The plug 3 is also formed with a recess 10 having the wall thereof screwthreaded and this recess 10 is disposed at an acute angle to the bore 4 and the lower end of the recess 10 is in open communication with the recess 5 by way of a channel 11. Threaded into the recess 10 is a spark plug 12. Suitably secured to the upper end of the stem 7 is a collar 13 and encircling the sleeve 6 is an expansion spring 14 having the lower end abutting the plug 3 and the upper extremity in engagement with the collar 13, such spring serving to hold the valve 8 normally closed.

15 designates a tappet arm pivoted between its ends upon a bracket 16 carried by the upper end of the cylinder 1 and one end of the tappet arm 15 engages the upper extremity of the valve stem 7, while the remaining end of the tappet arm is pivotally connected with the upper end of a vertical valve rod 17, the lower end of the vertical valve rod 17 being under the influence of a cam 18.

In practice, the valve disk 8 is normally held against the seat 9 under the action of the spring 14 so that on the compression stroke of the piston in the cylinder 1 the gas in the combustion chamber will be held out of contact with the terminals of the spark plug 12. At the time that the spark is to occur the cam 18 engages the lower end of the valve rod 17 and slides the rod 17 upwardly with the effect to swing the tappet arm 15 and so depress the stem 7 against the action of the spring 14, thereby opening the valve 8 so that a portion of the gas in the combustion chamber may flow through the recess 5 and channel 11 into the zone of the terminals of the spark plug 12 and immediately succeeding the opening of the valve 8 the spark occurs and so ignites the charge of gas in the combustion chamber with the effect to explode such charge and drive the piston downwardly within the cylinder.

The operating mechanism of the cam 18

is so timed that the valve 8 remains closed during one quarter of a revolution of the cam shaft and open during the remaining three quarters of the revolution of such shaft so that on the power, exhaust and suction strokes of the piston the valve will be open, while on the compression stroke the valve will be closed As soon as the piston finishes the compression stroke the valve opens so that a portion of the explosive mixture may enter the vicinity of the terminals of the spark plug to be ignited when the spark occurs and on the exhaust stroke of the piston the burnt gases are driven away from the terminals of the spark plug, while on the intake stroke any gas in the vicinity of the terminals of the spark plug is withdrawn therefrom so that on the compression stroke when the valve is closed the gas will remain out of contact with the terminals of the plug.

In the modified form of my invention illustrated in Fig. 2 of the drawing, an opening 19 is formed in the side wall of the cylinder and my improved device comprises a plug 20 formed longitudinally with a passage 21 and provided at one end with an exteriorly screwthreaded nipple 22 adapted to communicate with the passage 21 and threaded into the opening 19 in the side wall of the cylinder, the remaining end of the plug 20 being formed with a threaded opening contiguous to the passage 21 and closed by means of a closure plug 23. The end of the passage 21 extends upwardly at right angles to itself and the upper end of the right angular portion of the passage 21 is disposed contiguous to the bore of the nipple 22 and formed on the upper edge of the wall of the upwardly extending portion of the passage 21 is a valve seat 24. Engaging the valve seat 24 is a valve disk 25 equipped with a stem 26 depending from the disk and extending through the bottom wall of the plug 20. Secured to the lower end of the stem 26 is a collar 27 and encircling the stem between the collar 27 and the adjacent portion of the plug is an expansion spring 28 acting to hold the valve disk 25 normally in engagement with the seat 24. 29 designates a tappet having the upper end thereof connected to the lower end of the stem 26 and the lower extremity disposed within the influence of a cam 30 fixed upon a cam shaft driven from the engine shaft. The upper portion of the plug 20 adjacent to the outer end thereof is formed with a vertical recess 31 and the lower end of the recess 31 opens into the passage 21 and threaded into the recess 31 is a spark plug 32. Also formed in the upper portion of the plug 20 adjacent to the recess 31 and coaxial with the valve seat is an opening and threaded into such opening is a plug 33 which may be removed when it is desired to obtain access to the valve disk and its seat.

The device illustrated in the modified form of the invention and just described operates similarly to the preferred form of the device and therefore a detail description of the operation of the construction shown in Fig. 2 is not thought necessary.

From the foregoing description taken in connection with the accompanying drawing, the construction and mode of operation of my invention will be readily apparent. It will be seen that I have provided means whereby the gas in the combustion chamber is held out of contact with the terminals of the plug on the compression stroke of the piston, thereby preventing the rapid accumulation of carbon on the contact points and prolonging the life of the plug, and whereby such gas is permitted to enter the zone of the terminals of the plug at the time of the spark so that the charge in the cylinder will be exploded.

While I have herein shown and described certain preferred forms of my invention by way of illustration, I wish it to be understood that I do not limit or confine myself to the precise details of construction herein described and delineated, as modification and variation may be made within the scope of the claim without departing from the spirit of the invention.

I claim:

A device of the class described comprising a plug formed with a longitudinally extending passage and provided at one end with an exteriorly screwthreaded nipple adapted to engage in the spark plug opening of an engine cylinder and in comunication with said passage, a valve seat formed between the ends thereof, a closure plug closing the other end of said passage, a sleeve depending from said plug in alinement with the valve seat, a valve stem slidably mounted in said sleeve, a valve disk on said stem adapted to engage said seat, and a plug threaded into the first-named plug immediately above the valve seat and removable from the plug so that access may be had to the valve disk and its seat.

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

EDGAR D. IRWIN.

Witnesses:
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