

T. A. LEAVITT.
INTERNAL COMBUSTION ENGINE.
APPLICATION FILED MAR. 28, 1910.

980,537.

Patented Jan. 3, 1911.

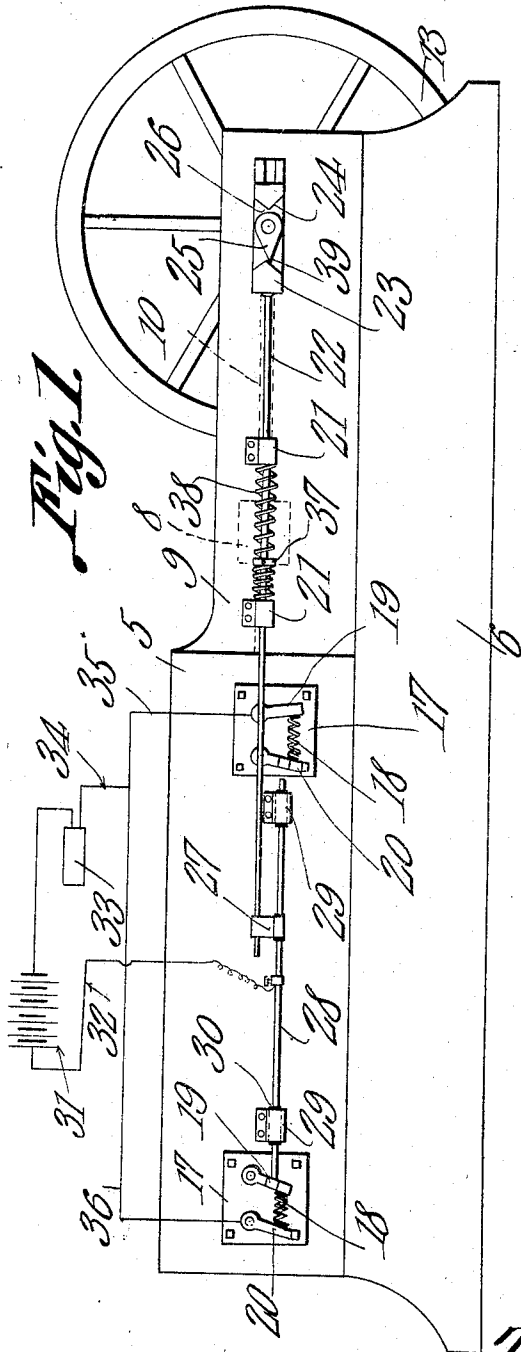


Fig. 1

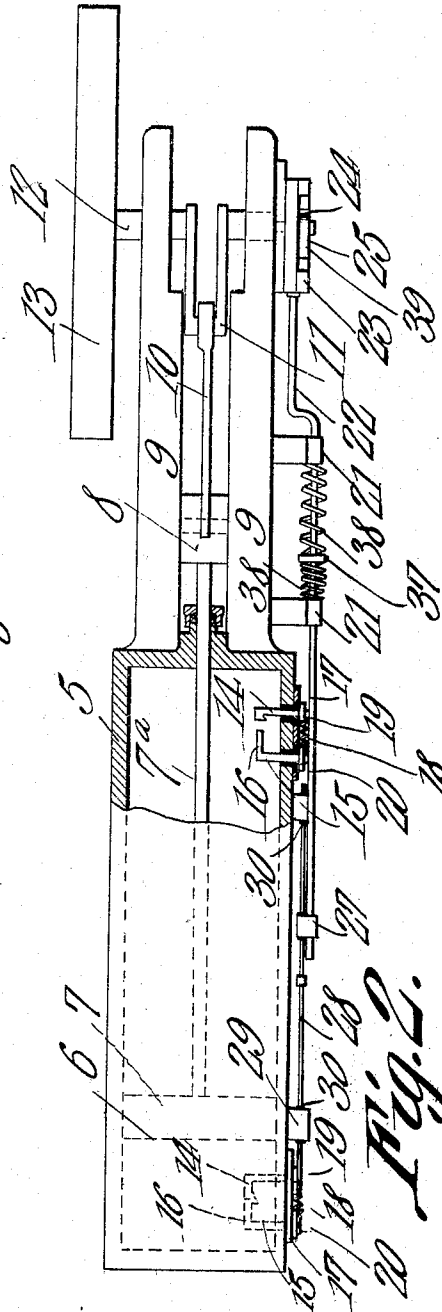


Fig. 2

Witnesses

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THOMAS A. LEAVITT, OF SUTTON, WEST VIRGINIA.

INTERNAL-COMBUSTION ENGINE.

980,537.

Specification of Letters Patent.

Patented Jan. 3, 1911.

Application filed March 28, 1910. Serial No. 552,016.

To all whom it may concern:

Be it known that I, THOMAS A. LEAVITT, a citizen of the United States, residing at Sutton, in the county of Braxton and State of West Virginia, have invented a new and useful Internal-Combustion Engine, of which the following is a specification.

This invention relates to internal combustion engines of that type in which an explosion takes place alternately upon opposite sides of a piston reciprocating in a cylinder.

The invention relates more particularly to a device for igniting the charge in the engine cylinder, and it has for its object to provide an ignition device embodying certain novel features of construction to be hereinafter described and claimed.

In order that the invention may be better understood, reference is had to the accompanying drawing, in which,

Figure 1 is a side elevation, largely diagrammatic, showing the application of the invention. Fig. 2 is a plan view of the engine cylinder partly broken away, showing the parts of the ignition device located within the cylinder.

In the drawing, 5 denotes the engine cylinder, the same being supported on a suitable base 6. In the cylinder reciprocates a piston 7 connected by a rod 7^a to a cross head 8 sliding in cross head guides 9, and connected by a rod 10 to a crank 11 on the engine shaft 12, said shaft being provided with a fly wheel 13. Adjacent to each end of the cylinder is mounted an ignition device. Each of said devices comprises a stationary electrode 14, and a rocking electrode 15, the latter having a laterally extending finger 16, which is adapted to come in contact with the stationary electrode, and to produce a spark when it is withdrawn. The finger, and the part of the electrode 14 which it engages, are located in the cylinder. The two electrodes are carried by a plate 17 bolted to the cylinder wall, and they pass through openings in said wall, said openings being lined with a bushing of insulating material. On the outside of the cylinder, the electrodes have laterally extending arms between which is located a coiled spring 18. The arm of the electrode 14 is indicated at 19, and the arm of the electrode 15, at 20. The springs are also insulated from the arms 19 and 20. The spring 18 is confined between these two arms, and its function is to normally hold

the same spread apart. The electrode 14 is stationary as already stated. The spring being confined between the two arms, tends to swing the arm 20 in such a direction as to disengage the finger 16 from the contact point of the electrode 14. This is the normal position of the two electrodes. To produce the spark, the finger 16 is brought in contact with the point of the electrode 14, whereupon an electric circuit is closed, and upon withdrawing the finger 16, a spark is made.

The following means are provided for rocking the electrode 15 to bring the finger 16 in contact with the point of the electrode 14, and to withdraw the same. In bearings 21 on the engine frame, is mounted to slide in the direction of its length, a rod 22. One end of this rod carries a head 23 having on one side a recess 24 in which works a wiper or cam 25 mounted on the engine shaft 12. The head has a slot 26 through which the engine shaft passes. The cam 25 working in the recess 24, reciprocates the rod 22. Secured to the opposite end of the rod, by a suitable clamp 27, is a stem 28, which is slidably mounted in bearings 29 carried by the cylinder 5. These bearings are provided with insulating bushings 30, so that the stem will be insulated from the engine frame. The clamp 27 is also insulated from the stem. The stem 28 extends parallel to the rod 22, and as it is fastened thereto, it reciprocates with said rod. The stem is located between the arms 20 of the rocking electrodes, and is adapted to engage the same alternately.

At 31 is indicated diagrammatically a battery or other source of electrical energy, one pole of which is connected by a conductor 32 to the stem 28. The other pole is connected to a spark coil 33, from which extends a conductor 34 having branches 35 and 36 which are connected respectively to the stationary electrodes 14.

In operation, when the engine is in motion, the stem 28 is reciprocating between the arms 20 of the rocking electrodes, one end of the stem striking one of said arms on one stroke of the engine, and the opposite end of the rod striking the other arm on the next stroke. A spark is thus produced alternately on opposite sides of the piston 7. When the end of the stem strikes the arm 20, the electrode 15 is rocked in a direction to bring the finger 16 in contact with the sta-

tionary electrode 14, whereupon the electric circuit is closed. This circuit may be traced as follows: from one pole of the battery or other source of electrical energy 31 through the spark coil, and by the conductor 34, and one of its branches to the stationary electrode, and then to the rocking electrode and to the stem 28, and by the way of the conductor 32 to the other pole of the battery. When the stem 28 engages the arm 20 to make a contact between the electrodes, the spring 18 is compressed, and when the stem moves away from said arm, the spring expands and swings the arm in a direction to separate the electrodes to produce the spark, the spark being produced when the finger 16 leaves the contact point of the stationary electrode. It will be noted that the cam 25 extends from the same side of the engine shaft 12 as the crank 11, so that the ignition will take place at the proper time during the piston travel. The spark may be advanced or retarded by changing the position of the cam relative to the crank.

Between the bearings 21, the rod 22 carries a collar 37, on opposite sides of which are located coiled springs 38, said springs at one of their ends abutting against the collar, and at their opposite ends against the bearings, these springs being provided for a purpose which will now be described.

Referring to Fig. 1 of the drawing it will be noted that the opposite walls of the recess 24 come to a point 39, said walls being inclined in opposite directions from the point. The engagement of the extremity of the cam with the point limits the extent of the travel of the rod 22 and the stem 28. Fig. 1 shows the extremity of the cam engaging the point, and it has therefore moved the rod and the stem to the end of its forward movement, the stem 28 having engaged the arm 20 of the rocking electrode at the left hand end of the cylinder. During this movement of the rod 22, one of the springs 38 has been compressed, so that when the cam slips off the point, the rod will be returned by the expansion of said spring, thus withdrawing the stem from

the arm, and permitting the spring 18 engaging said arm to separate the electrodes. The electrodes are separated with a sudden jerk, whereby a more effective spark is produced. As the cam 25 continues its rotation, it engages the point 39 opposite to the one just described, whereupon the parts are moved in a direction to actuate the ignition device at the right hand end of the cylinder, the operation being the same as the one just described.

It will be understood, of course, that an explosive mixture is introduced into the cylinder 5 alternately upon opposite sides of the piston. The means whereby this is effected forms no part of the present invention, and need therefore not be described.

What is claimed is:

In an ignition device for internal combustion engines of the double-acting type, the combination with the engine cylinder, of a pair of stationary and rocking electrodes carried by the cylinder on opposite sides of the piston, arms projecting from the electrodes on the outside of the cylinder, yielding means interposed between the arms for normally holding the points of the electrodes separated, a rod mounted for reciprocatory movement, means carried by the rod and engageable alternately with the arms of the rocking electrodes for rocking the same to bring their points in contact with the points of the stationary electrodes, a head carried by the rod and having a slot through which the engine shaft passes, and a recess on one side, a cam on the engine shaft working in the said recess, the opposite walls of the recess being brought to a point and inclined in opposite directions from said points, and the cam working between the points, and resilient means opposing the movement of the rod in both directions.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

THOMAS A. LEAVITT.

Witnesses:

M. B. JAMES,
J. E. BAUGHMAN.