June 7, 1927. 1,631,615

J. E. BLANDING

INTERNAL COMBUSTION ENGINE

Filed Jan. 10, 1923 2 Sheets-Sheet 1

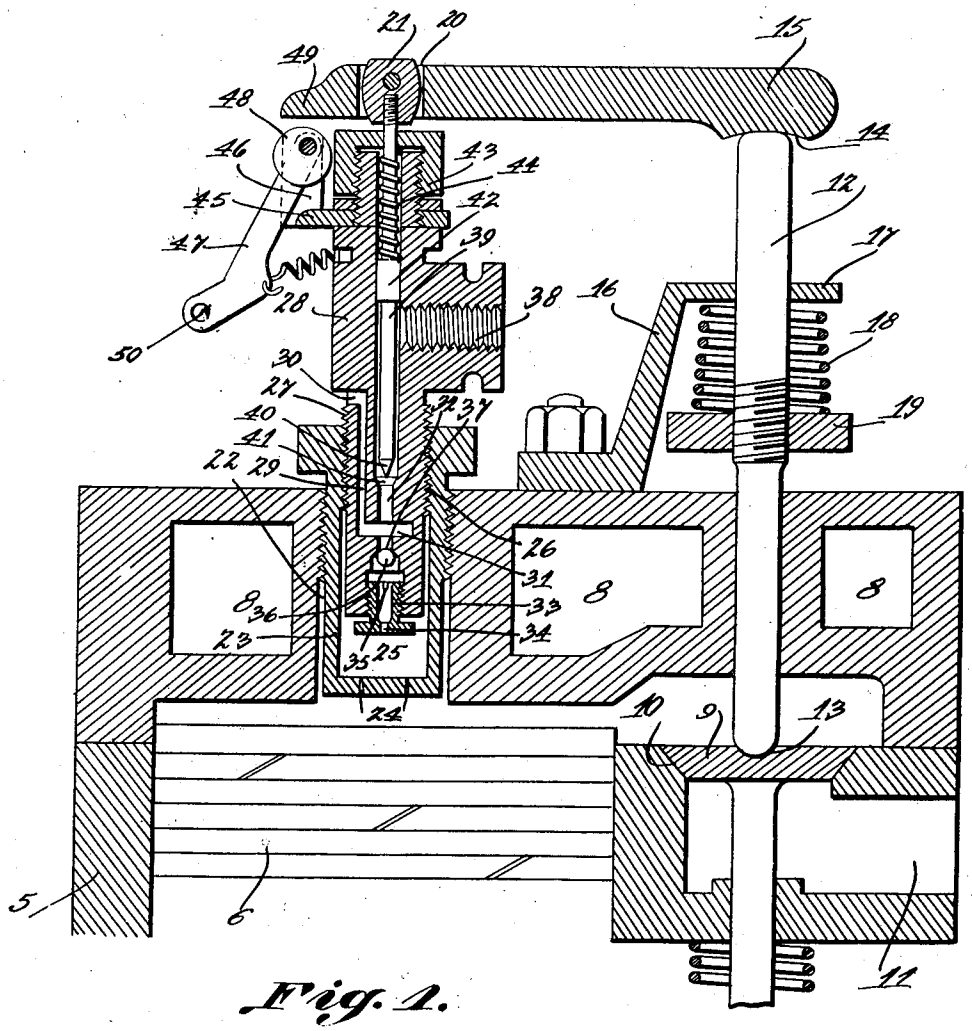


Fig. 1.

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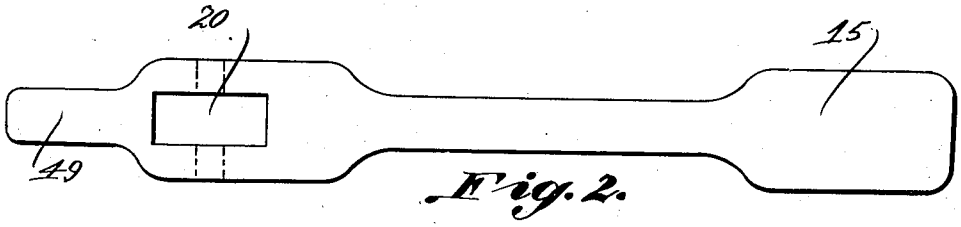


Fig. 2.

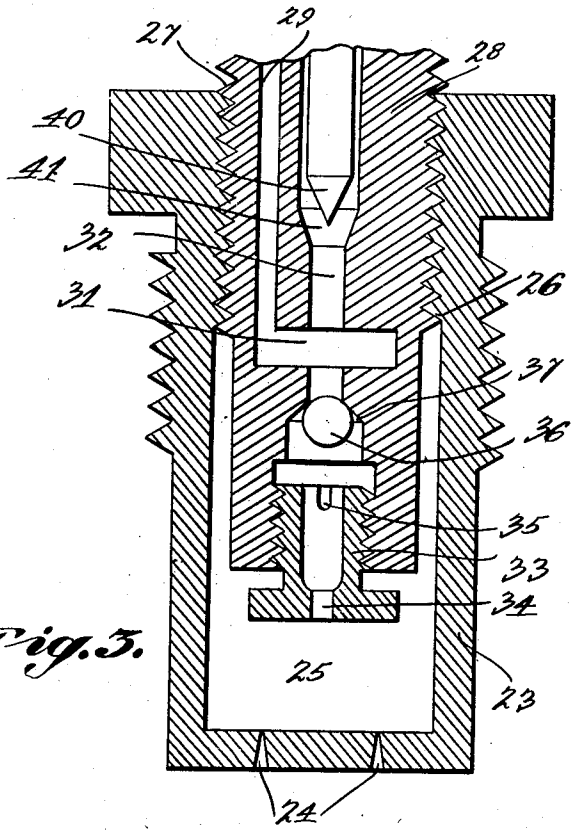


Fig. 3.

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UNITED STATES PATENT OFFICE.

JOSEPH EDW. BLANDING, OF NEW LONDON, CONNECTICUT, ASSIGNOR OF ONE-HALF TO PATRICK B. McNAMARA, OF GROTON, CONNECTICUT.

INTERNAL-COMBUSTION ENGINE.

Application filed January 10, 1923. Serial No. 611,753.

This invention relates to internal combustion engines and more particularly to that type of internal combustion engine wherein the spark plugs and other ignition elements are eliminated, utilizing the heat of the compression for firing the charge.

The primary object of the invention is to provide novel means for feeding the liquid fuel in an uncarborated condition, directly to the combustion chamber of the engine.

Another object of the invention is to provide novel means for operating the needle valve controlling the passage of fuel to the cylinder, means being associated with the needle valve for regulating the stroke thereof to vary the speed of the engine.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

Referring to the drawings:

Figure 1 is a fragmental sectional view through the upper portion of an engine cylinder, constructed in accordance with the invention.

Figure 2 is a plan view of the rocker arm.

Figure 3 is an enlarged sectional view through the lower portion of the valve chamber.

Referring to the drawings in detail, the reference character 5 designates the engine cylinder in which the piston 6 operates, in the usual and well known manner.

7 designates the cylinder head which is provided with the usual openings 8 through which the cooling fluid circulates to accomplish its purpose.

An intake valve is indicated at 9 and seats at 10 to allow communication between the intake passageway 11 and the combustion chamber during the intake stroke of the piston 6.

The usual exhaust valve of the engine is not shown.

Operating through a suitable opening formed in the head 7 is a push rod 12 that has its lower end disposed in the recess 13 of the valve 9, the upper end thereof being positioned in the recess 14 of the rocker arm 15 to eliminate lateral movement between the members 12 and 15. A bracket member 16 is secured to the cylinder head and has a right angled extremity 17 formed with an opening to accommodate the push rod 12, the right angled portion 17 being however disposed in spaced relation with the upper surface of the head 7.

Supported under the right angled portion 17 of the bracket 16, is a coiled spring 18 that has its upper end bearing against the under surface of the right angled portion 17, the lower end thereof resting on the nut 19 adjustably supported on the push rod 12 to vary the tension of the spring 18. Formed at one end of the rocker arm 15, is a cut out portion 20 which is relatively long as compared with the pivoted head 21 supported therein, so that the arm 15 may pivot with respect to the head 21. Positioned in the opening 22 formed in the cylinder head 7 is a valve support 23 which is provided with openings 24 in the lower wall thereof, which openings provide communication between the valve casing 25 and cylinder.

Threads 26 are formed in the support 23 and accommodate the threads 27 of the valve casing 25, which valve casing is formed with a bore 29 communicating with the atmosphere through the opening 30, the lower end of the bore communicating with the opening 31, which intersects the bore 32 formed centrally of the valve casing 28. This bore 32 extends throughout the length of the valve casing 28, the lower extremity of the bore being enlarged to accommodate the removable member 33, which is formed with an opening 34 and adjustable within the enlarged portion of the bore to vary the area of the enlarged portion.

This member 33 is formed with cut out portions 35 adjacent to the upper end thereof, the extreme upper end of the member 33 acting as a seat for the ball valve 36 to control communication between the bore 32 and cylinder, to a degree, on the suction stroke of the piston in its cylinder.

Directly above the upper end of the member 33, is an inclined wall 37 that also provides a seat for the ball valve 36 during the compression and firing stroke of the piston in its cylinder, to cut off communication between the cylinder and bore 23 during this stroke of the piston. A lateral opening 38 is formed in the valve body and is provided

with threads to accommodate the threaded extremity of an oil feed pipe not shown. The needle valve operating in the central bore is indicated at 39 and is provided with a tapered extremity 40 adapted to seat on the inclined wall 41 of the bore to cut off the oil feed to the engine cylinder.

In order that the valve 39 will be held in spaced relation with the walls of the bore, an enlargement 42 is provided thereon, which enlargement contacts with the wall of the bore and holds the valve member 39 in proper alignment with the wall of the bore. A cap 43 closes the upper end of the valve member, to which cap the coiled spring 44 is secured the opposite end of the coiled spring 44 being secured to the enlargement 42 to normally urge the valve member 39 to its inactive position. Thus it will be seen that as the push rod 12 is actuated to move the rocker arm 15 upwardly, the valve member 39 will move upwardly, but when this pressure is relieved, the coiled spring will operate to return the valve member 39 to its initial position.

The controlling means embodies a supporting disk 45 which is provided with upwardly extended arms 46 between which the arm 47 moves, there being provided a cam 48 secured to the arm 47 and adapted to engage the tail 49 of the rocker arm 15 to raise the valve member 39 to a position in spaced relation with its seat.

The usual control rod not shown, has connection with the arm 37 as through the opening 50, so that various portions of the periphery of the cam 48 may be brought into engagement with the tail 49 to adjust the length of the stroke of the rocker arm 15. In the position of the elements as shown by Figure 1 of the drawings, the piston 6 is started on its down stroke, the charge which was previously compressed having been fired.

It is to be understood that the valve member 9 is so timed that on the intake stroke of the piston, the valve 9 will open to permit the fuel to pass into the cylinder.

What is claimed as new is:—

1. An internal combustion engine including a cylinder, a hollow valve supporting member removably supported within the cylinder and having openings to establish communication between the cylinder and valve supporting member, a valve casing within the support, said valve casing having a longitudinal bore and having a lateral bore establishing communication between the first mentioned bore and atmosphere, a vertically movable valve in the bore for controlling the passage of fuel to the valve support, a rocker arm connected with the valve at a point intermediate the ends of the rocker arm, means at the outer end for moving the rocker arm to operate the valve, and adjustable means arranged adjacent to the valve casing for engagement with the rocker arm to throw the rocker arm into and out of operation.

2. An internal combustion engine including a cylinder, a valve casing supported within the cylinder, said valve casing having a longitudinal bore and having a lateral bore establishing communication between the first mentioned bore and atmosphere, a valve member operating in the valve casing, a head mounted on the valve, a rocker arm, means for pivotally connecting the head and rocker arm to permit the rocker arm to move independently of the head, means at the outer end of the rocker arm for moving the rocker arm, and means adapted to engage the opposite end of the rocker arm to cause the rocker arm to elevate the valve.

3. An internal combustion engine including a cylinder, a valve support within the cylinder, a valve casing removably supported within the valve support and having a longitudinal bore, said valve casing having a lateral bore establishing communication between the first mentioned bore and atmosphere, a valve operating in the valve casing, an arm having pivotal connection with the valve, means at the outer end of the arm for rocking the arm under normal conditions, an arm having a cam, said cam adapted to engage the rocker arm to elevate the valve when the rocker arm is moved, and means for operating the rocker arm.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

JOSEPH EDW. BLANDING.