Oct. 16, 1928. 1,687,547

J. E. DE BAUN

INTERNAL COMBUSTION ENGINE

Filed June 21, 1927

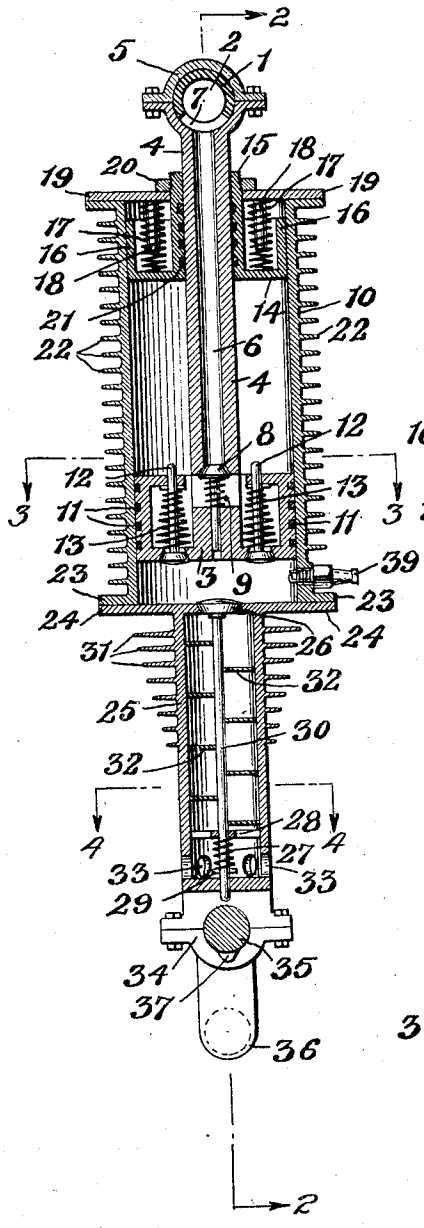


Fig. 1.

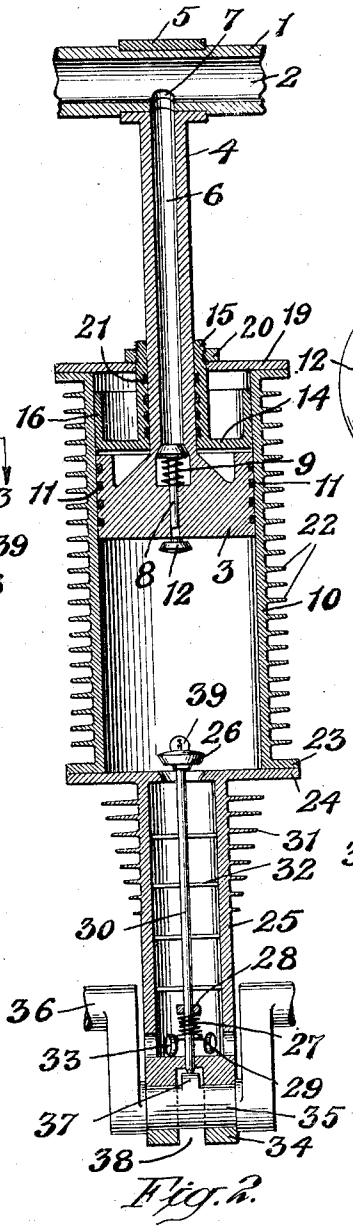


Fig. 2.

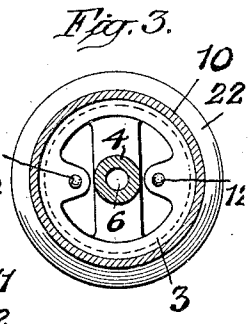


Fig. 3.

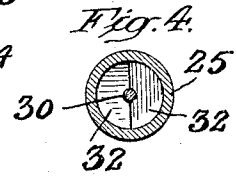


Fig. 4.

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INTERNAL-COMBUSTION ENGINE.

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This invention relates to an improvement in an internal combustion engine and has for its object to provide such a type of engine in which a minimum of moving parts will be utilized, thus greatly simplifying construction and the likelihood of wear or breakage.

A further object of this invention is to provide a novel form of construction in which many of the important parts found in internal combustion engines at the present date, such as chains, gears and the like are dispensed with, so that an extremely simplified construction results, without a sacrifice of efficiency or power.

A still further object of this invention is to provide an internal combustion engine, which shall, by reason of its novel construction, be extremely powerful and efficient and reliable in operation.

With these objects and such other objects as may hereinafter appear, in view, I have devised the embodiment of my invention disclosed in the accompanying drawing and more particularly pointed out in the claims appended hereto.

Reference is to be had to the accompanying drawing, forming a part hereof, in which

Figure 1 is a vertical sectional view of my improved engine;

Figure 2 is a sectional view at right angles to that shown in Figure 1, such view being taken on the line 2—2 of Figure 1, looking in the direction of the arrows;

Figure 3 is a sectional view on the line 3—3 of Figure 1, looking in the direction of the arrows; and

Figure 4 is a sectional view on the line 4—4 of Figure 1, looking in the direction of the arrows.

Throughout the various views of the drawings, similar reference characters designate similar parts.

In the embodiment of my invention disclosed in the accompanying drawing, I show my improved engine as being of the one cylinder type. It will be understood however, that a multi-cylinder engine may be readily constructed by a duplication of the parts and arrangements to be hereinafter described.

It will therefore be understood that in referring to the cylinder, piston and other parts, this shall be interpreted as applying to as many cylinders, pistons and the like as may be employed in various types of engines.

In the accompany drawing, 1 indicates an inlet manifold, which may be supported in any suitable frame or casing and which may be connected to a carburetor or other mixing device for supplying an explosive mixture through the internal passage 2 of the manifold 1. This manifold 1 acts as a support for a stationary piston 3, said piston being connected to the manifold 1 by means of a tubular arm 4. This tubular arm 4 may, if desired, be formed integrally with the piston 3 or it may be a separate piece bolted or otherwise secured thereto. Said arm 4 is provided with a bearing 5 which extends around the manifold 1 so that a pivotal connection is established between said manifold 1 and the piston 3. The arm 4 is also provided with a continuous internal passage or bore 6, which has its upper end located in registration with an opening 7 so that the explosive mixture fed from a carburetor through the passage 2 in the manifold 1 will pass through the opening 7 and down through the bore 6 and into the cylinder of the engine as will be hereinafter explained. The lower end of the supporting arm 4 is normally closed by a valve 8 which is held upon its seat by a spring 9 until opened by suction to permit the entrance of explosive mixture into the cylinder 10, as will be hereinafter explained.

The cylinder 10 just mentioned is arranged to reciprocate relatively to the stationary or fixed piston 3, this action being just the reverse of the ordinary internal combustion engine, wherein the cylinder is usually stationary and the piston reciprocates therein.

The piston 3 is provided with the usual packing rings 11 which bear against the inner walls of the cylinder 10 in the conventional manner and prevent leakage.

The piston 3 is provided with a pair of inlet valves 12 which are normally held in closed position by springs 13. These valves are intended to be opened at the proper time to permit explosive mixture to enter below the piston 3 and thereafter be compressed by an upward movement of the cylinder 10. For raising the valves 12 from their respective seats, tappet means 14 is provided, such means consisting of a cylindrical member having a central boss 15, and a circumferential flange 16. Said tappet member 14 is carried within and moved with

the cylinder 10 on its movement relative to the piston 3. The tappet member 14 is normally spring pressed by means of coil springs 17 which surround studs 18, projecting downward from the end plate 19 secured on the top of the cylinder 10.

At 20 is shown a securing nut which is threaded on the upper end of the boss 15 and prevents the tappet member 14 from dropping downward into the cylinder under the impulse of the springs 17. At 21 are shown packing rings which are provided in the boss 15 and which bear against the outer face of the arm or sleeve 4 and prevent leakage of explosive mixture between the part 14 and the face of the sleeve 4.

It will be understood from the foregoing that when the cylinder descends to substantially the pointed indicated in Figure 2, the part 14 will come in contact with the upper ends of the stems on the valves 12 and will by a resilient, yet firm pressure, force said valves from their seats and permit the entrance of explosive mixture to points below the piston 3.

The cylinder 10 is provided with cooling fins 22 and at its lower end it is provided with a circumferential flange 23, against which rests a flange 24, located on the upper end of a tubular exhaust pipe 25. Said flange 24 may be bolted or otherwise secured to the flange 23, and a suitable gasket may be interposed between these two flanges so that a tight joint will result.

The tubular member 25, which is in the nature of an exhaust pipe is provided at its upper end or entrance with a valve seat intended to receive an exhaust valve 26 which is normally held on its seat or in its closed position by means of a spring 27 which bears against a crossing 28 located in the pipe 25. The opposite end of said spring bears against a pin 29 extending through the valve stem 30.

The outer surface of the pipe 25 is provided with cooling fins 31 and inside of said pipe 25, I provide a number of spaced baffle plates 32 for quieting the engine exhaust.

Adjacent to the lower end of the pipe 25, is provided a plurality of openings or holes 33 to provide the exit of exhaust gases in the ordinary way. The lower end of the pipe 25 is provided with a bearing 34 which embraces the crank part 35 of a crank shaft 36. It will be understood that this crank shaft may be supported at its ends in the conventional way upon suitable bearings which are not shown and any of the well known types of oil feed or lubrication may be employed.

At 37 is shown a cam which is provided on a part of the crank shaft so that at the proper time, said cam will come in contact with the lower end of the valve stem 30 and raise said exhaust valve 26 from its seat to permit the exhaust gases to enter into the pipe 30 and pass out of the same through the openings 33. In order to permit free operation of the cam member 37, the bearing 34 on the end of the pipe 25 is slotted or split as at 38.

From the foregoing, the manner in which my improved engine operates will be readily understood. As was heretofore explained, the explosive mixture passes from a carburetor into the passage 2 and into the bore 6 of the sleeve 4. At this point, the cylinder moving upward creates sufficient suction to cause the valve 8 to be raised from its seat with the result that explosive mixture passes through the end of the bore 6 and into the cylinder above the piston 3. When the downward movement of the cylinder takes place, the tappet member 14 comes into contact with the upper ends of the valve stems 12 and forces these valves from their seats so that the mixture enters through the valves 12 to a point below the piston 3. This position is shown in Figure 2. The cylinder then moves upwardly, the valves 12 then closing and the explosive mixture is compressed between the piston 3 and the lower end of the cylinder 10, and exploded by means of the spark plug 39, which receives its spark from any suitable source of electric current. The cylinder thereupon begins its upward movement, the exhaust valve 26 being opened by the cam 37 to permit the escape of exhaust gases through the exhaust pipe 25.

It will be seen from the design of engine disclosed that a minimum of parts is used, the exhaust pipe 25 being utilized as a connecting rod for the reciprocating cylinder 25. It will also be seen that the parts are so connected and assembled that the same may be dismounted readily for cleaning and renewing and that the engine is readily cooled since the cylinder rather than the piston is movable and that the use of various gears, drive chains and the like commonly employed in internal combustion engines is obviated.

Having described one embodiment of my invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. In an internal combustion engine, a fixed piston, a cylinder surrounding the same and adapted to reciprocate relative thereto, a crank shaft and an extension on said cylinder connected to said crank-shaft, said extension being tubular and constituting an exhaust passage.

2. In an internal combustion engine, a fixed piston, a tubular support therefor comprising an inlet passage for explosive mixture, a cylinder surrounding the piston and

movable relatively to the same, a crank shaft, and a tubular exhaust passage connecting the crank shaft and the cylinder.

3. In an internal combustion engine, an inlet manifold, a fixed piston pivotally connected to the same, a cylinder surrounding the piston and movable relatively to the same, an exhaust pipe carried by said cylinder, a crank shaft, and a pivotal connection between said crank shaft and the exhaust pipe.

4. In an internal combustion engine, an inlet manifold, a fixed piston supported therefrom, an inlet pipe connecting said manifold with the piston, a reciprocating cylinder movable relatively to the piston, an exhaust pipe carried by the cylinder, a crank shaft pivotally connected to one end of said exhaust pipe, an exhaust valve at the entrance to the exhaust pipe, an inlet valve on the piston, and means carried by the movable cylinder for opening said inlet valve.

5. In an internal combustion engine, an inlet manifold, a piston supported therefrom, a tubular inlet pipe constituting a connection between said piston and manifold, a cylinder movable relatively to the piston, an exhaust pipe on said cylinder, a crank shaft pivotally connected to said exhaust pipe, an exhaust valve at the entrance to said exhaust pipe, and means on the crank shaft for opening said valve.

6. In an internal combustion engine, a reciprocating cylinder, a pivotally supported stationary piston therein, an inlet pipe connected to said piston and adapted to support the same within the cylinder, a crank shaft, and a fixed tubular extension on said cylinder pivotally connected to said crank shaft.

7. In an internal combustion engine, a reciprocating cylinder, a piston supported within the same, an inlet pipe extending into one end of said cylinder and connected to the piston, an exhaust pipe connected to the other end of the cylinder and forming a continuation of the same, a crank shaft, and a pivotal connection between the end of said exhaust pipe and the crank shaft.

8. In an internal combustion engine, a fixed piston, a cylinder adapted to reciprocate on the same, inlet valves in said piston, means carried by the cylinder for operating said valves, an exhaust pipe secured to and extending from one end of said cylinder, a crank shaft, a pivotal connection between the end of said pipe and said crank shaft, an exhaust valve within the cylinder and at the entrance to the exhaust pipe, and means carried by the crank shaft for operating said exhaust valve.

Signed at the city, county and State of New York, this 20th day of June, 1927.

JOHN E. DE BAUN.