J. W. BRADLEY.

EXPLOSION ENGINE.

APPLICATION FILED MAR. 4, 1914.

1,155,297.

Patented Sept. 28, 1915.

Fig. 2.

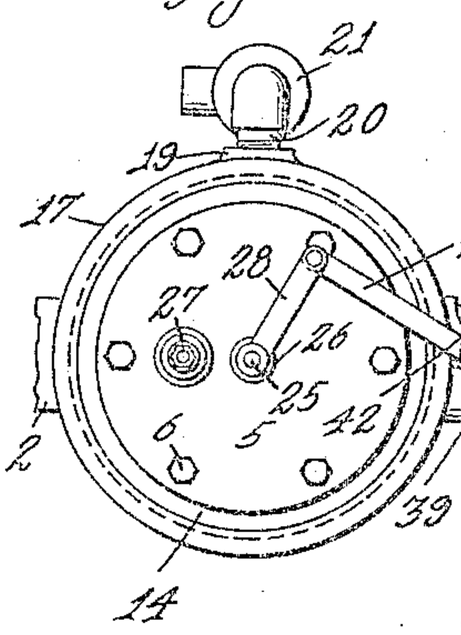


Fig. 3.

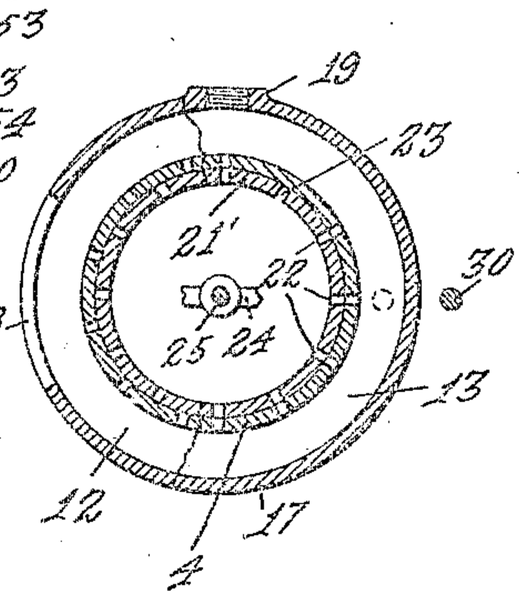


Fig. 1.

Fig. 4.

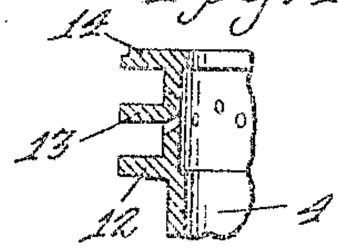


Fig. 5.

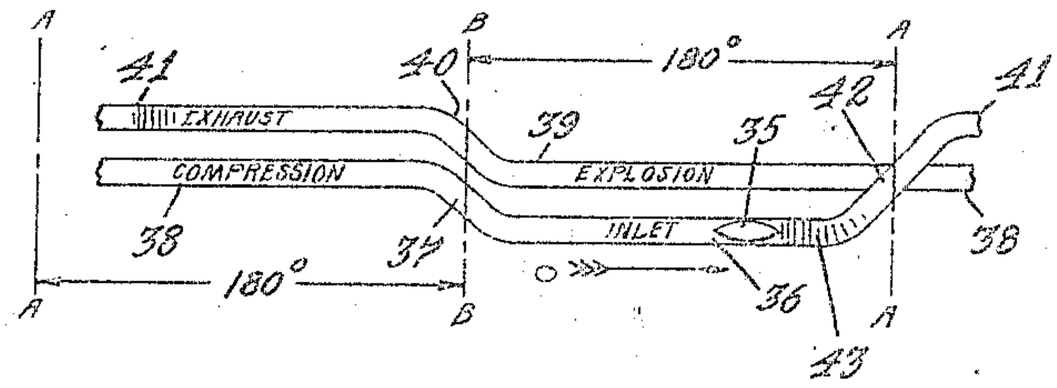
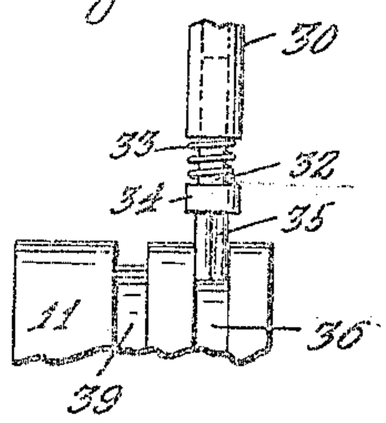


Fig. 6.



WITNESSES:

F. A. Tinney.

A. H. Kephart

INVENTOR.

JOHN W. BRADLEY.

BY

Carlos P. Griffin

ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN W. BRADLEY, OF FRUITVALE, CALIFORNIA.

EXPLOSION-ENGINE.

1,155,297. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed March 4, 1914. Serial No. 822,291.

To all whom it may concern:

Be it known that I, JOHN W. BRADLEY, a citizen of the United States, residing at Fruitvale, in the county of Alameda, State of California, have invented a new and useful Explosion-Engine, of which the following is a specification in such full and clear terms as will enable those skilled in the art to construct and use the same.

This invention relates to explosion engines and its object is to reduce the number of parts of said engine by the elimination of the ordinary timing gears.

An object of the invention is to produce a single valve capable of supplying the explosive gas to and exhaust the same from the explosion chamber.

Another object of the invention is to provide means whereby the cooling of the explosion chamber may be assisted by a travel of air blown around the same.

An embodiment of the invention is shown in the drawing in which the same reference numeral is applied to the same portion throughout, but I am aware that there are many modifications thereof.

Figure 1ª is a vertical sectional view of the complete engine, Fig. 2 is a plan view of the operative parts of the engine, the fly wheel being omitted for purposes of illustration, Fig. 3 is a plan view broken on the line 3—3 Fig. 1 of the exhaust and inlet chambers, Fig. 4 is an enlarged sectional view of one side of the exhaust and inlet chambers, Fig. 5 is a development of the grooves in the timing cam, and Fig. 6 is an enlarged view of the timing cam illustrating the differences in the depth of the grooves therein.

The numeral 1 indicates the engine base which may be of any suitable form to carry the engine shaft bearings 2 and 3 and the explosion cylinder or chamber 4. The explosion cylinder has a removable head 5 secured in place by a suitable number of bolts 6.

The piston 7 is of a well known form used in connection with the ordinary four cycle engines and has the piston rod 8 connected with the crank shaft 9, on which is a common type of fly wheel 10. The crank shaft also carries the timing cam 11, said cam carrying out the functions of the ordinary one to two timing gears used with the four cycle engines, as will be later explained.

At the upper end of the engine cylinder there are three outwardly extending flanges 12, 13 and 14, said flanges forming the exhaust chamber 15 and inlet chamber 16 by having the ring 17 placed thereover, said ring having a suitable shoulder at its upper edge to prevent the same from dropping off when placed in the position shown in Fig. 1. The ring 17 has an exhaust port at 18 and a boss at 19 into which the inlet pipe 20 extending to the carbureter 21 is screwed.

A plurality of holes are bored into the engine cylinder back of the ring 17 from each of the chambers 15 and 16, said holes being substantially equidistantly placed and bored upon such an angle as to have their inner terminations as nearly in the same plane as possible. Within the cylinder there is the valve ring 21′. This valve ring has a plurality of holes 22 therein which holes are so placed as to precisely meet the holes from the inlet or the holes from the exhaust chamber whenever the valve is in either of said positions, being alternately so placed, and close enough together so that the total motion of said valve ring is not more than three-quarters of an inch to an inch and a half, depending upon the size of the exhaust ports desired. The valve ring is slotted at 23 to permit it to elongate under temperature changes without sticking. At its upper edge the valve ring is slotted at both sides to receive a transversely extending bar 24 carried on the pin 25 extending through the stuffing box 26 in the center of the engine head.

The engine is fired from the usual form of spark plug 27 at the side of the stuffing box 26. The pin 25 has a crank arm 28 thereon to which is connected the link 29 which is in turn connected with a lever 30 extending down to the cam 11 and being pivoted on an arm 31 on the side of the engine cylinder. The lever 30 has a hole bored therein as indicated in dotted lines in Fig. 6 and it has inserted therein a pin 32, said pin having a

spiral ring 33 surrounding the same and bearing upon the bottom of the lever 30 and upon a collar 34 integral with the pin 32, said pin also having a shoe 35 rounded at both ends which travels in the grooves of the cam 11.

The shoe 35 travels through both of the grooves in the cam in two revolutions of the engine shaft, the offset portions thereof being so positioned as to deliver the fuel to the cylinder and hold it therein and exhaust it therefrom in a manner well known with the four cycle engine.

It will be observed in the development of the cam Fig. 5 that the groove is divided into seven parts 36, 37, 38, 39, 40, 41 and 42, of which the parts 38 and 39 are in the same plane, while the parts 36 and 41 are equidistantly placed on the opposite sides of the plane of the parts 38 and 39. It will also be seen that the part 36 is curved deeper at 43 in order that the groove 42 may be deeper than either of the grooves 38 or 39 to insure the proper shifting of the shoe 35 from the groove 36 to the groove 41, while the groove 41 is connected with the groove 39 by the groove 40, while the groove 38 is connected with the groove 36 by the groove 37.

Assuming the engine to be rotated in the direction indicated by the arrow Fig. 1, it will be seen that the travel of the grooves along the shoe 35 will be in the direction of the arrow Fig. 5, the engine being shown substantially in the position indicated by the shoe 35, a plan view of which appears in Fig. 5. It will, therefore, be seen that during a movement of substantially 180 degrees the lever 30 will have been so moved as to permit the ports therein to match the ports leading in to the engine explosion chamber from the supply chamber 16. At the conclusion of the down stroke the groove 37 will shift the lever to an intermediate position, whereupon it will pass into the groove 38, which groove is in the same plane as the groove 39.

The groove 38 and the groove 39 will maintain the shoe 35 and the valve 21 in the intermediate position during substantially 360 degrees of the movement of the cam, the crank shaft thereby enabling the piston to carry out the compression cycle and the explosion cycle. At the end of the groove 39 the groove 40 will shift the shoe and lever 30 closer to the engine frame into the groove 41, which groove will maintain the exhaust open during substantially 180 degrees of movement of the crank shaft, thereby enabling the exhaust gases to escape, whereupon at the end of the groove 41 the groove 42 will quickly shift the shoe 35 and its connected lever to the inlet position to repeat the cycle.

In order to assist in cooling the engine, a suitable fan 50 surrounded by a casing 51 may be installed on the crank shaft inside the engine base, said fan having a pipe 52 extending around through the engine frame and out into a pipe 53, which pipe is connected with the flange 12 at a point substantially opposite the exhaust opening in the ring 17. In order to prevent the exhaust gas from blowing back into the fan, the pipe 53 is provided with a suitable check valve 54.

From the above description it will be seen that during all of the time that the engine is running air will be blown through the pipe 53 into the exhaust chamber, except when the pressure therein is greater than the pressure supplied the source of cooling air.

Such additional cooling devices may be used as may become necessary, but such devices other than the ones indicated herein form no part of this invention and hence are not illustrated.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States, is as follows, modifications within the scope of the claims, are expressly reserved:

1. In an explosion engine, an engine frame having an explosion chamber therein, a plurality of flanges carried by said engine frame and forming with a ring an exhaust chamber and an inlet chamber around the explosion chamber, a crank shaft, a piston connected with the crank shaft, an annular valve within the explosion chamber and having ports capable of being placed in juxtaposition with ports extending through the holes of the explosion chamber into the inlet chamber and the exhaust chamber respectively, levers to oscillate said valve, and a cam on the crank shaft to cause said valve to be oscillated to be placed successively position to permit the inlet of the explosive gas on a compression thereof and the exhaust thereof from the explosion chamber.

2. In an explosion engine, an engine frame having a combustion chamber therein and provided with a plurality of flanges adjacent the end of said chamber and forming with a ring an inlet chamber and an exhaust chamber, a crank shaft, a piston connected with said crank shaft, a fan, means to deliver air to the exhaust chamber, and a suitable valve for carrying out the cycles of the explosion engine.

3. In an explosion engine, an engine frame having an explosion chamber therein, a plurality of flanges carried by the engine frame and forming with a ring an exhaust chamber and an inlet chamber around the explosion chamber, a crank shaft, a piston connected with the crank shaft, an annular valve within the explosion chamber and having ports capable of being placed in register with ports extending through the walls of

the explosion chamber into the exhaust chamber and inlet chamber respectively, and means to oscillate said valve to successively place the openings therethrough in register with the inlet ports and exhaust ports.

In testimony whereof I have hereunto set my hand this 2d day of February A. D. 1914, in the presence of the two subscribed witnesses.

JOHN W. BRADLEY.

Witnesses:
C. P. GRIFFIN,
L. H. ANDERSON.