No. 877,483. PATENTED JAN. 28, 1908.

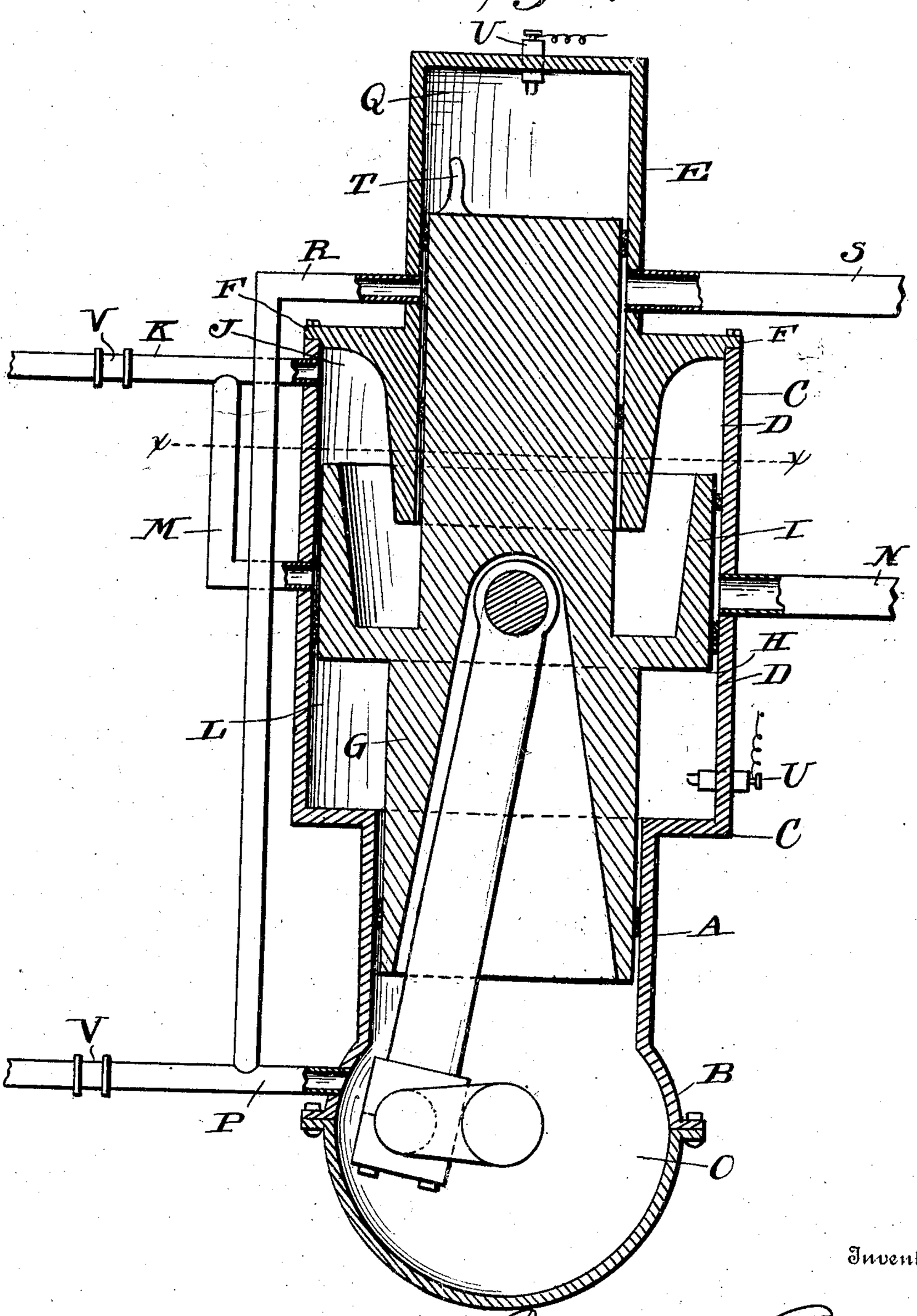
W. L. BOYER.

EXPLOSIVE ENGINE.

APPLICATION FILED JAN. 31, 1907.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

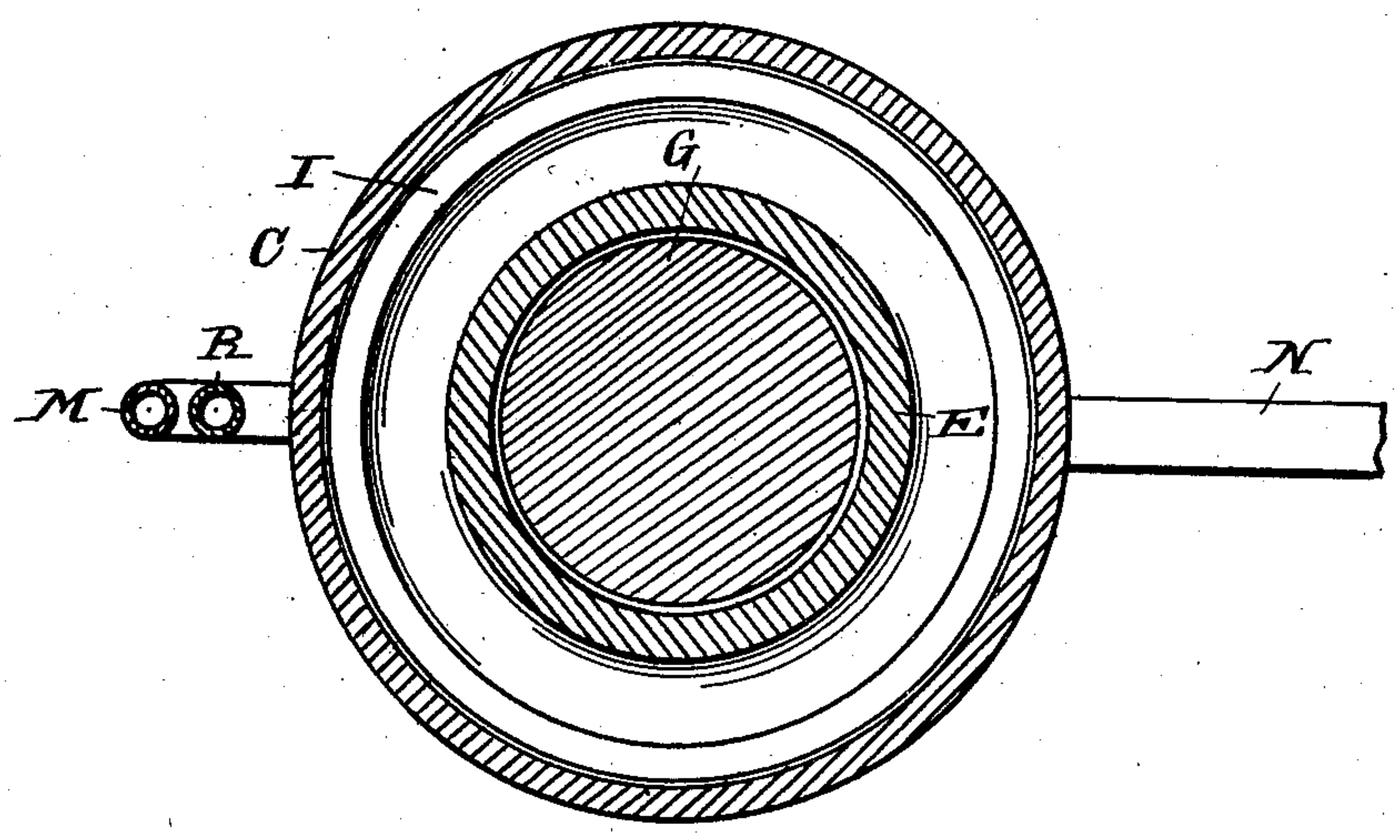
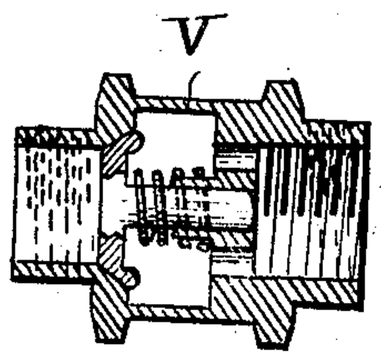


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM L. BOYER, OF KANSAS CITY, KANSAS.

EXPLOSIVE-ENGINE.

No. 877,483. Specification of Letters Patent. Patented Jan. 28, 1908.

Application filed January 31, 1907. Serial No. 355,103.

To all whom it may concern:

Be it known that I, WILLIAM L. BOYER, a citizen of the United States, residing at Kansas City, in the county of Wyandotte and State of Kansas, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a specification.

My invention relates to explosive engines of the two cycle, reciprocating piston type and has for its object the provision of an engine constructed so that both ends of the piston receive explosive impulses alternately and separate compression chambers are provided to supply the explosive mixture to the respective explosion chambers. This I accomplish by providing an enlarged chamber in the central portion of the cylinder into which an extension of the upper portion of the cylinder extends while the piston is provided with an annular offset and an upwardly projecting flange having gas-tight connections with the wall of the central enlarged portion, the upper end of said central enlarged portion being connected with the carbureter and answers for the compression chamber for the explosion chamber formed by the lower end of the central enlarged portion below the annular off-set of the piston aforesaid, the two chambers at the upper and lower ends of said central enlarged portion being connected by a pipe so as to convey the charge from the compression chamber to the explosion chamber. The upper end of the cylinder comprises another explosion chamber and is connected with a compression chamber located in the crank casing by means of another pipe.

My invention will be described in detail hereinafter and illustrated in the accompanying drawings in which—

Figure 1 is a central vertical sectional view of my improved engine, Fig. 2, a cross section on the line *x*—*x* of Fig. 1, and Fig. 3, a detail view of one form of check valve that may be used with my engine.

In the drawings similar reference characters indicate corresponding parts throughout the several views.

The cylinder consists of a lower portion A which is formed as a continuation of the crank-casing B and provided with an off-set C forming an enlarged chamber D. The upper end E of the cylinder is smaller in diameter than the lower end A and provided with an annular flange F intermediate of its ends which is secured to the top edge of off-set C, the lower end of the upper portion E extending down into chamber D.

G indicates the piston slidably mounted in the cylinder and provided with the usual packing rings.

H indicates an annular offset or flange intermediate the ends of piston G and I an upwardly extending portion having packing rings secured thereto and bearing against the wall of offset C. Offset H divides enlarged chamber D into two chambers, the chamber J being a compression chamber having connection by means of pipe K with a carbureter (not shown) for conveying the explosive gas thereto, while the chamber L, below offset H is an explosion chamber connected with chamber J by means of a pipe M.

N indicates an exhaust pipe for explosion chamber L. The crank casing B and the lower portion A of the cylinder below piston G is also utilized as a compression chamber O and is connected with the carbureter (not shown) by means of pipe P while the chamber Q in the upper part E of the cylinder above piston G is another explosion chamber connected with compression chamber O by means of pipe R.

S indicates an exhaust for explosion chamber Q.

T indicates a vertical plate or baffle extending upwardly from the top of piston G and arranged to be opposite the delivery end of pipe R so as to cause the explosive charge flowing into the chamber to be deflected upward and be more thoroughly distributed throughout the chamber.

U indicates electric sparkers in the explosion chambers L and Q to fire the explosive charges at the proper time the operation of this feature of the engine being understood by persons skilled in the art so that a detailed description thereof is thought to be unnecessary.

A check valve V is provided in each pipe K and P to prevent the flow of the charge back to the carbureters, one form of valve being illustrated in Fig. 3 though any other form may be substituted therefor, the form shown being for the purpose of illustration only.

For the purpose of description of the operation it will be assumed that the chambers J, L, O and Q are filled with the explosive mixture and that an explosion has taken place in chamber Q. This will drive the piston G

downward compressing the gas in explosion chamber L and compression chamber O until the outlet to exhaust S is reached when the burned gases in said chamber will escape therethrough more rapidly as the piston continuing to descend uncovers more of the entrance to the exhaust and finally uncovering the mouth of pipe P allows the explosive mixture in chamber O to flow into said chamber Q and being diffused therethrough by striking plate T it drives out the balance of the burned gases. At the same time the suction created in chamber J draws the explosive mixture thereinto through pipe K.

When the piston reaches the extremity of its down-stroke the charge in chamber L is exploded driving the piston G upward compressing the charge in explosive chamber Q and the mixture in compression chamber J and drawing a fresh supply of the mixture into chamber O through pipe P. When the piston G has traveled upward far enough to expose the entrance to exhaust N the burned gases begin to escape and when the mouth of pipe M is exposed the compressed mixture in chamber J will pass thereinto forcing the remainder of the gases in chamber L out, the trunk of piston G causing the explosive mixture to diffuse throughout the chamber so as to more thoroughly clear it of said burned gases. When the extremity of the upward stroke of the piston G is reached the charge in chamber Q is again fired and the cycle just described repeated.

Having thus described my invention what I claim is—

1. In an explosive engine, a cylinder having an enlarged offset intermediate of its ends a piston fitting the smaller bore of the cylinder, an annular offset or flange on the piston to fit the offset in the cylinder, an explosion chamber at one end of said enlarged offset and a compression chamber at the other end thereof and connected with the explosion chamber aforesaid, and an explosion chamber at one end of the smaller portion of the cylinder and a compression chamber at the other end, the last named explosion and compression chambers being connected, substantially as shown and described.

2. In an explosive engine, a cylinder having an enlarged offset intermediate of its ends, a piston fitting the smaller bore of the cylinder, an annular offset or flange intermediate of the ends of the piston, an upwardly extending portion on said offset or flange fitting the bore of the offset to the cylinder, a pipe for delivering an explosive mixture to the chamber formed in one end of the offset to the cylinder by the offset on the piston, a pipe connecting said chamber with the chamber in the other end of the offset, a pipe for delivering an explosive mixture to the chamber in the cylinder at one end of the piston, and a pipe connecting the chambers at the two ends of the cylinder, substantially as shown and described.

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

WILLIAM L. BOYER.

Witnesses:
JULE L. WIDMER,
J. E. BURNS.