

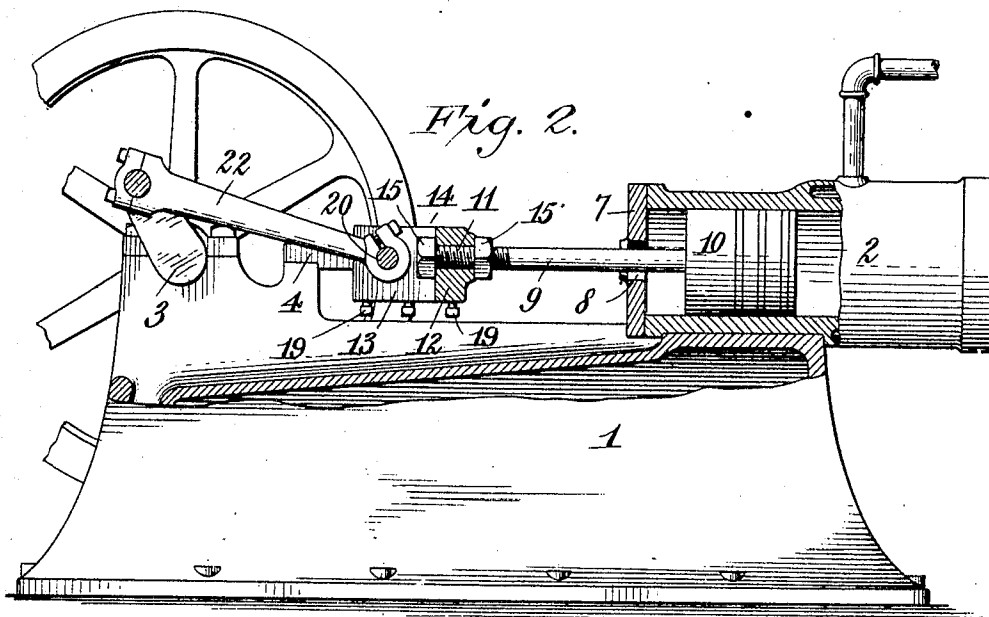
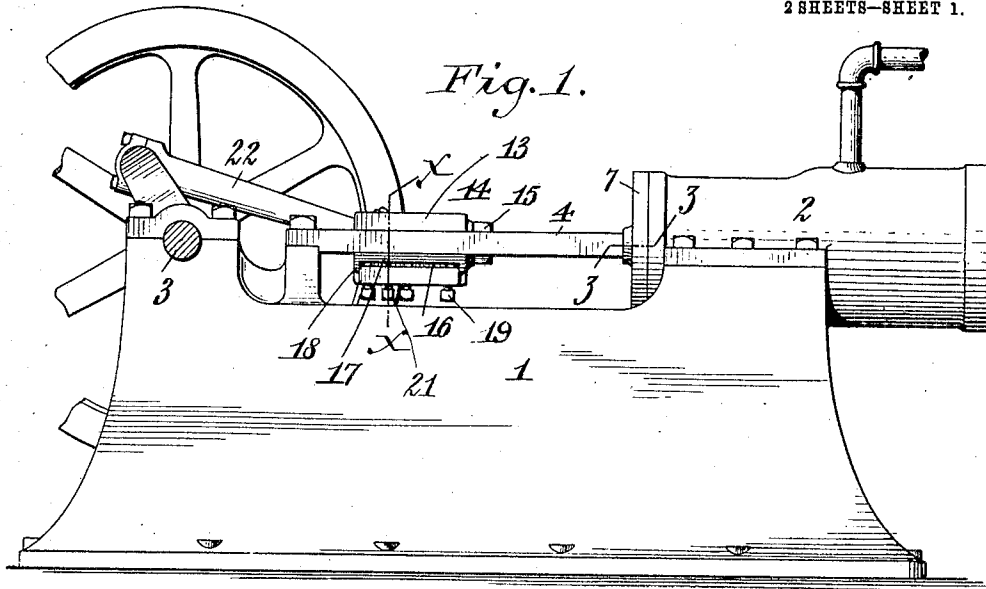
No. 856,808.

PATENTED JUNE 11, 1907.

W. ROBERTSON.
ENGINE.

APPLICATION FILED NOV. 9, 1905.

2 SHEETS—SHEET 1.



Witnesses:

William Robertson, Inventor.

Julius Lanke

By Emil Neubach

Harry Harris

Attorney.

W. ROBERTSON,
ENGINE.

APPLICATION FILED NOV. 9, 1906.

3 SHEETS—SHEET 2.

Fig. 3.

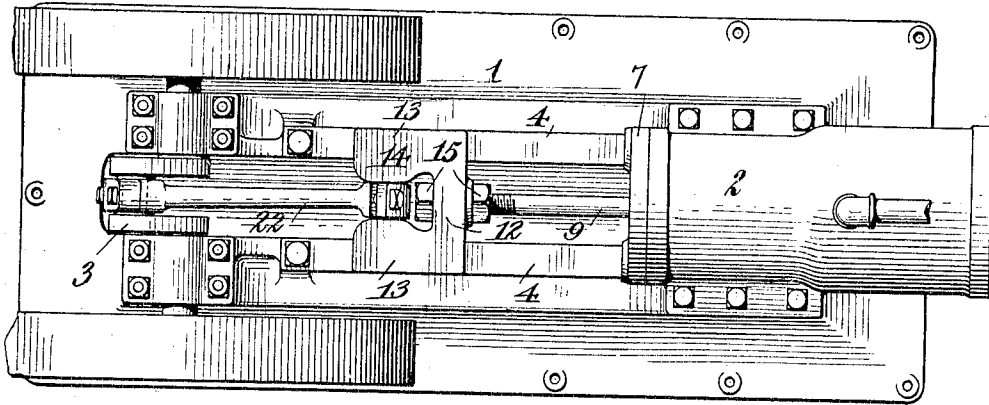


Fig. 4.

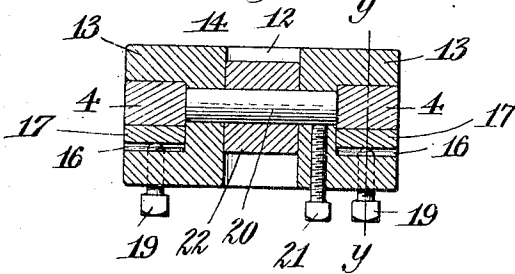


Fig. 5.

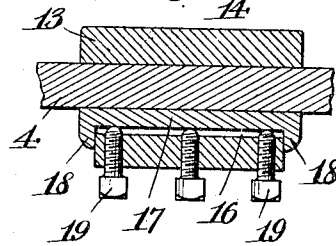
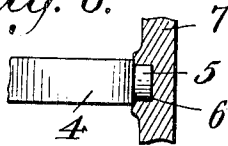


Fig. 6.



Witnesses:

Julius Lanke

Harry Harris

William Robertson, Inventor.

By Emil Heuback

Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM ROBERTSON, OF BUFFALO, NEW YORK, ASSIGNOR TO THE
ROBERTSON MANUFACTURING COMPANY, OF BUFFALO, NEW YORK,
A CORPORATION OF NEW YORK.

ENGINE.

No. 856,808.

Specification of Letters Patent.

Patented June 11, 1907.

Application filed November 9, 1905. Serial No. 286,577.

To all whom it may concern:

Be it known that I, WILLIAM ROBERTSON, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Explosive Engines, of which the following is a specification.

This invention relates to improvements in explosive engines.

The primary object of my invention is the production of an engine in which the piston positively travels in a straight line, and in which the angularity of the piston-rods on gas-engines now in use, is dispensed with.

In gas-engines now in use, the angularity of the piston-rod, or in other words the constantly changing angle of the piston-rod with respect to the axial line of the engine-cylinder, causes the bore of the cylinder to become concaved, allowing escape of the gases between the cylinder and piston and thereby reducing compression which results in a reduction of power and a waste of gas, and tending also to cause pounding; moreover, the piston-rings are under constant action by expanding and contracting in diameter at different parts of the engine stroke, all of which is undesirable and causes undue friction, unnecessary wear, and undesirable heating. When the engine is running above a slow speed, the expanding and contracting action of the piston-rings is not in proportion to the speed of the piston, and at such times, the proper compression of the gases cannot be obtained, as they are permitted to leak between the cylinder and piston.

It is also the object of my invention to overcome these and other objections.

With the above mentioned objects in view, my invention consists in providing a piston with a piston-rod rigid therewith, a cross-head slidable and adjustably connected to the outer end of said piston-rod, and a connecting-rod having connection with the crank-shaft of the engine and the said cross-head.

The invention further consists in the construction, arrangement and combination of parts to be hereinafter described, and particularly pointed out in the appended claims.

Referring to the drawings,—Figure 1 is a side elevation of an engine embodying my

invention. Fig. 2 is a sectional elevation of the same. Fig. 3 is a plan view. Fig. 4 is an enlarged transverse section taken on line $x-x$, Fig. 1. Fig. 5 is a vertical longitudinal section taken on line $y-y$, Fig. 4. Fig. 6 is an enlarged horizontal section taken on line $z-z$, Fig. 1.

Referring to the drawings in detail, like numerals of reference refer to like parts in the several figures.

The reference numeral 1 designates the base or frame of the engine which may be of any shape or construction, and on which is secured the cylinder 2, also of any suitable construction capable of use in an explosive-engine. Journaled in the frame of the engine is a crank-shaft 3, and secured to said frame with one of their ends are the parallel guide-rods 4 which have tenons 5 at their other ends that fit into pockets 6 formed in the open head 7 of the cylinder. Said head is herein termed an "open-head" for the reason that no packing is necessary and it has centrally an opening 8 through which passes a piston-rod 9 rigidly connected at its inner end in any suitable manner to the piston 10 of the engine; said piston-rod being somewhat smaller in diameter than the opening 8 so that no friction is induced at this point. The outer end of the piston-rod is threaded, as at 11, and extends through a cross-member 12 connecting the ends of side members 13 of a cross-head 14; said piston-rod having nuts 15 thereon which are screwed against opposite sides of the cross-arm and thus rigidly connect the piston-rod to said cross-head, while permitting adjustment of the piston within the cylinder for increase of compression, if desired.

The cross-member 12 and the side-members 13 of the cross-head form a substantially U-shaped head, and said side-members have their outer faces grooved, as at 16, for the reception of the guide-rods, the thickness of which latter is less than the width of said grooves so that gibs or shoes 17 may be introduced between the guides and the bottom of said grooves, each gib or shoe having depending lips 18 at its ends that lie against the ends of the cross-head, thereby preventing lengthwise movement of the shoes. Adjusting screws 19 extend with their ends into the grooves 16 and serve to take up the wear

on the shoes 17, to permit of accurately adjusting the cross-head to maintain the piston-rod in line with the axial center of the cylinder; and to provide an easy sliding fit with
 5 out lost motion in the cross-head. The side-members 13 of the cross-head furnish long bearings for the cross-head, which aids materially in maintaining a straight-line movement. The guide-rods must necessarily be
 10 set in line with the axis of the cylinder bore, or exactly parallel thereto, so that they may guide the piston to cause the same to travel in a straight-line. In this manner the walls of the cylinder are maintained exactly parallel, there being no angular pressure on the
 15 piston as in the case when the piston-rod is compelled to pass through a constantly changing angular movement which tends to concave the bore of the cylinder, as hereinbefore stated.

A cross-head pin 20 is fitted in the cross-head so that its ends are flush with the inner walls of the grooves 16 therein; said pin being secured in said cross-head by a set-
 25 screw 21 entering the cross-head from the underside thereof. A connecting rod 22 has one of its ends connected to said cross-head pin, and its other end affixed to the crank of the crank-shaft 3. In this manner the recip-
 30 roating movement of the cross-head is transformed into rotary movement of the crank-shaft; the whole being arranged to provide an easy running, economical, practically noiseless, and highly effective engine, in
 35 which the pounding and wear of the parts is reduced to a minimum, and in which rebor-ing of the cylinder is unnecessary, even after long and constant usage.

Having thus described my invention, what
 40 I claim is,—

1. In an explosive-engine, the combination with a suitable frame having a cylinder provided with sockets at one end, of a crank-shaft journaled in said frame, guide-rods se-
 45 cured at one of their ends to said frame and at their other ends entering said sockets, a piston reciprocal within said cylinder, a

cross-head guided on said guide-rods, a piston-rod rigidly affixed at one end to said piston and at its other end adjustably affixed
 50 to said cross-head, and a connecting-rod connecting said cross-head with the crank-shaft of the engine.

2. In an explosive-engine, the combination with a suitable frame having a cylinder
 55 and parallel guide-rods, of a crank-shaft journaled in said frame, a piston reciprocal within said cylinder, a cross-head guided for movement on said guide-rods and having grooves in its sides for the reception of said
 60 guide-rods, shoes within said grooves underneath the guide-rods, adjusting-nuts to take up the wear on said shoes, and a piston-rod and a connecting-rod connecting the cross-head with said piston and with the crank-
 65 shaft, respectively.

3. In an explosive-engine, the combination with a suitable frame having a cylinder and parallel guide-rods, of a crank-shaft
 70 journaled in said frame, a piston reciprocal within said cylinder, a cross-head guided for movement of said guide-rods and comprising a cross-member and side-members connected by said cross-member and having grooves in
 75 their outer faces to receive said guide-rods, shoes within said grooves underneath said guide-rods and having depending lips lying against the ends of said side-members, and adjusting-nuts entering said side-members
 80 from the underside thereof and bearing against said shoes to permit of adjusting the latter, a piston-rod rigidly secured at one end to said piston and having its other end adjustably threaded into the cross-head, and
 85 a connecting-rod connecting said cross-head with the crank-shaft.

In testimony whereof, I have affixed my signature in the presence of two subscribing witnesses.

WILLIAM ROBERTSON.

Witnesses:

FRANK J. L. SMITH,
 EMIL NEUHART.