

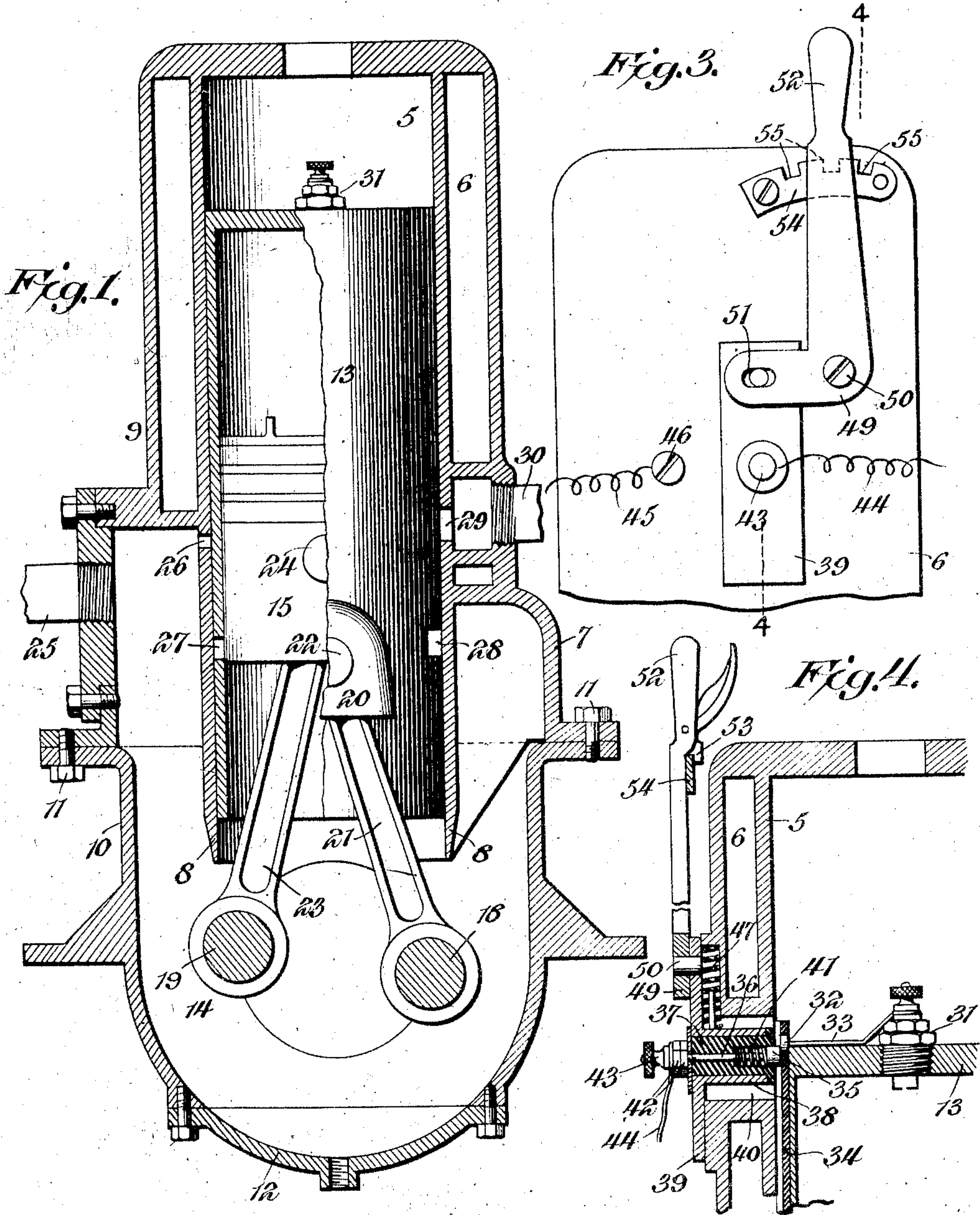
A. F. TOWLE.
EXPLOSIVE ENGINE.

APPLICATION FILED AUG. 23, 1907.

905,389.

Patented Dec. 1, 1908.

2 SHEETS—SHEET 1.



Witnesses:

Howard W. Orr.

B. J. Foster

Alton F. Towle, Inventor,

By

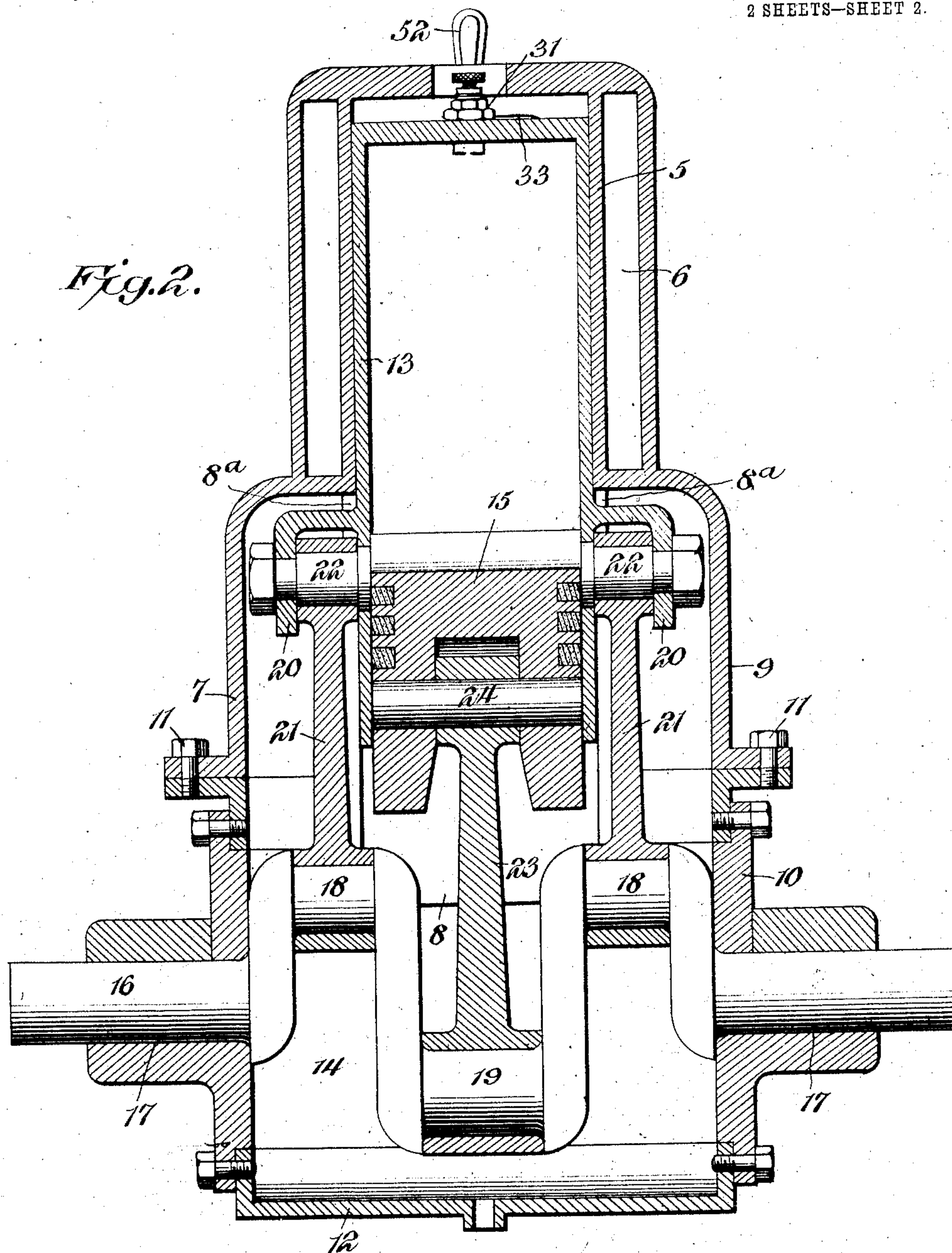
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UNITED STATES PATENT OFFICE.

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EXPLOSIVE-ENGINE.

No. 905,389.

Specification of Letters Patent.

Patented Dec. 1, 1908.

Application filed August 23, 1907. Serial No. 339,843.

To all whom it may concern:

Be it known that I, ALTON F. TOWLE, a citizen of the United States, residing at Colorado Springs, in the county of El Paso and State of Colorado, 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, preferably of the two cycle type, though there are features probably useful in engines having different cycles of movement.

The primary object of the present invention is to provide novel, simple and practicable means, whereby the force emanating from the explosions operates against oppositely movable heads, thereby securing a decided increase in power and a better balanced engine, said means being so constructed that the engine is very compact, and ports that are movable into and out of register take the place of the ordinary valve mechanism, the arrangement of said ports being exceedingly simple.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein

Figure 1 is a sectional view through the engine, showing the cylinder, partially in elevation. Fig. 2 is a sectional view at right angles to Fig. 1. Fig. 3 is a side elevation of a portion of the casing, and Fig. 4 is a sectional view on the line 4-4 of Fig. 3.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In the embodiment disclosed, a casing is employed, which comprises a tubular guide 5, preferably water-jacketed, as shown at 6, and an enlarged crank case 7 located at one end of the guide, said guide having opposite portions 8 that project into the crank case and are spaced apart, forming slots 8^a. The crank case is preferably formed of sections 9 and 10 bolted together, as shown at 11, the section 9 being integral with the tubular guide 8, and the section 10 having a removable bottom 12. A reciprocating cylinder 13 operates in the tubular guide, and has an open end that is in communication with the interior of the crank case, said interior constituting a compression chamber 14. A reciprocating piston 15 operates in the cylinder. An engine shaft 16, journaled in suit-

able bearings 17 in the opposite sides of the crank case, has oppositely disposed cranks 18 and 19 located in the crank case. The cylinder 13 is provided with outstanding ears 20 that reciprocate in the slots 8^a, and pitmen 21 journaled on pivot bolts 22 secured to the ears and cylinder, are connected to the cranks 18. Another pitman 23, pivotally connected, as shown at 24 to the piston, is connected to the opposite crank 19. In practice, the cylinder 13 with its pitmen 21 is preferably of the same weight as the piston 15 and its pitman 23, so that these oppositely reciprocating parts will be balanced.

The charges of motive fluid are supplied to the compression chamber 14 from any suitable source through a pipe 25, and the extension 8 of the tubular guide 5, is provided with a port 26 that communicates with said compression chamber. The cylinder 13 is also provided with a port 27 movable into and out of alignment with the port 26, said port 27 registering with the port 26 when the cylinder is in its outermost position. The exhaust takes place through an opposite port 28 formed in the cylinder and movable into and out of register with a port 29 formed in the tubular guide opposite the port 26. An exhaust pipe 30 has its inlet end in communication with the port 29.

An igniter 31 of any suitable structure is mounted on the head of the cylinder, and a contact element 32, located at one side of the cylinder, has an electrical connection 33 with the igniter. The contact element 32 is preferably located in the upper end of an insulating strip 34 carried by one side of the cylinder. Another contact element, in the form of a head 35, is provided with a stem 36 mounted in an insulator 37, and said insulator is carried by a bushing 38 formed upon a supporting plate 39 that is slidably mounted on one side of the case. The bushing operates in a slot 40 formed in said case. A spring 41, located in the insulator, bears against the head 35 to force the same inwardly, and nuts 42, threaded upon the outer end of the stem, serve to limit the distance said head may move inwardly. These nuts constitute part of a binding post, which includes a binding screw 43 for one of the electrical leads 44. The other lead 45 is grounded, as shown at 46 directly on the casing. A spring 47, seated in one side of the case, bears downwardly against the bushing 38,

and constitutes means for urging the same downwardly, and a bell crank lever 49, fulcrumed as shown at 50 on one side of the case, has a pin and slot connection 51 with the supporting plate 39. The other arm of the lever constitutes a handle 52, and a suitable dog 53, carried thereby, coöperates with a holding rack 54, and has a plurality of notches 55 therein to receive the dog.

The operation of the structure is substantially as follows: Assuming the cylinder in elevated position, the piston will be in its lowermost position, in which case, the ports 26 and 27 will be in alinement, and a previously compressed charge in the chamber 14 will pass through the said ports into the cylinder above the piston. Upon the downward movement of the cylinder, the piston will move upwardly. Consequently the ports 26 and 27 will move out of alinement, and the piston 15, passing the port 27, will compress the charge in the cylinder. As the cylinder reaches the limit of its downward movement, the contact element 32 of the igniter 31 will engage the contact head 35, and consequently, a circuit will be closed, which includes the igniter. A spark will thereupon be formed, and a compressed charge exploded. The force of this explosion will be against the head of the cylinder, and the piston. Consequently they will be moved in opposite directions until the port 28 of the cylinder alines with the exhaust port 29, whereupon the spent gases can escape. During the upward movement of the piston while the charge above described is being compressed, another charge will be drawn through the pipe 25 into the chamber 14, and as the piston moves downwardly under the force of the explosion, this charge will be compressed. Therefore while the exhaust through ports 28 and 29 is taking place, the said compressed charge will be admitted through the registering ports 26 and 27. Consequently the operation will be repeated, as will be evident. The timing of the explosion can be readily altered by operating the handle 52 of the lever 49, which as will be evident, will cause the contact head 35 to be moved to different positions with respect to the contact element 32. Moreover the contact head 35 has a movement sufficient to carry it to a position so that it will not be engaged by the element 32, in order that the explosions may be prevented if desired. With this structure therefore, it will be evident that a simple and practicable engine is provided which will develop a greater amount of power than an engine having a stationary cylinder, and said engine furthermore is balanced so that vibration is materially reduced.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will

be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention. For instance, in the present embodiment, a single cylinder is shown, but it will be understood that engines may be constructed with as many cylinders as desired.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In an explosive engine, the combination with a casing having a compression chamber and a guide projecting into said compression chamber in spaced relation to the walls thereof, said guide being provided in one side with an intake port communicating directly with the compression chamber, of a reciprocatory cylinder operating in the casing and guide and having a port in one side that is movable into and out of register with the intake port, a reciprocatory piston operating in the cylinder and movable to positions to cover and uncover the port therein, means for effecting the opposite movements of the cylinder and piston to cause the latter to uncover the cylinder port when the same is in register with the intake port in the guide, and means for supplying motive fluid to the compression chamber.

2. In an explosive engine, the combination with a casing having a closed crank case forming a compression chamber, said casing having a guide projecting into the compression chamber in spaced relation to the walls thereof and having opposite slots and an intake port, of a reciprocatory cylinder operating in the casing and guide and having a port in one side that is movable into and out of register with the intake port, a reciprocatory piston operating in the cylinder and movable to positions to cover and uncover the cylinder port, a shaft extending through the crank case and having a plurality of cranks, outstanding ears carried by the cylinder and operating in the slots of the guide, and pitmen connected to the cranks of the shaft and the ears and to the piston.

3. In an explosive engine, the combination with a casing having a closed crank case forming a compression chamber and having a guide projecting into said chamber, said guide being provided with opposite slots and an intake port located between the slots, the casing furthermore being provided with an exhaust port arranged opposite the intake port, of a reciprocatory cylinder operating in the case and guide and having opposite outstanding ears that reciprocate in the slots of said guide, said cylinder being provided with opposite ports movable respectively into and out of register with the ports of the

guide and casing, a reciprocatory piston
operating in the cylinder and movable to
cover and uncover the ports thereof, a shaft
extending across the crank case and having
5 a plurality of cranks thereon, pitmen con-
nected to the ears of the cylinder and to cer-
tain of the cranks, and a pitman connecting
another crank and the piston, said pitmen
and cranks being so disposed that the piston
10 uncovers the ports of the cylinder when said

ports are in register with the ports of the
guide and casing, and means for supplying
motive fluid to the crank case.

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

ALTON F. TOWLE.

Witnesses:

HARRY MOYER,
LOUISE OPPENHEIMER.