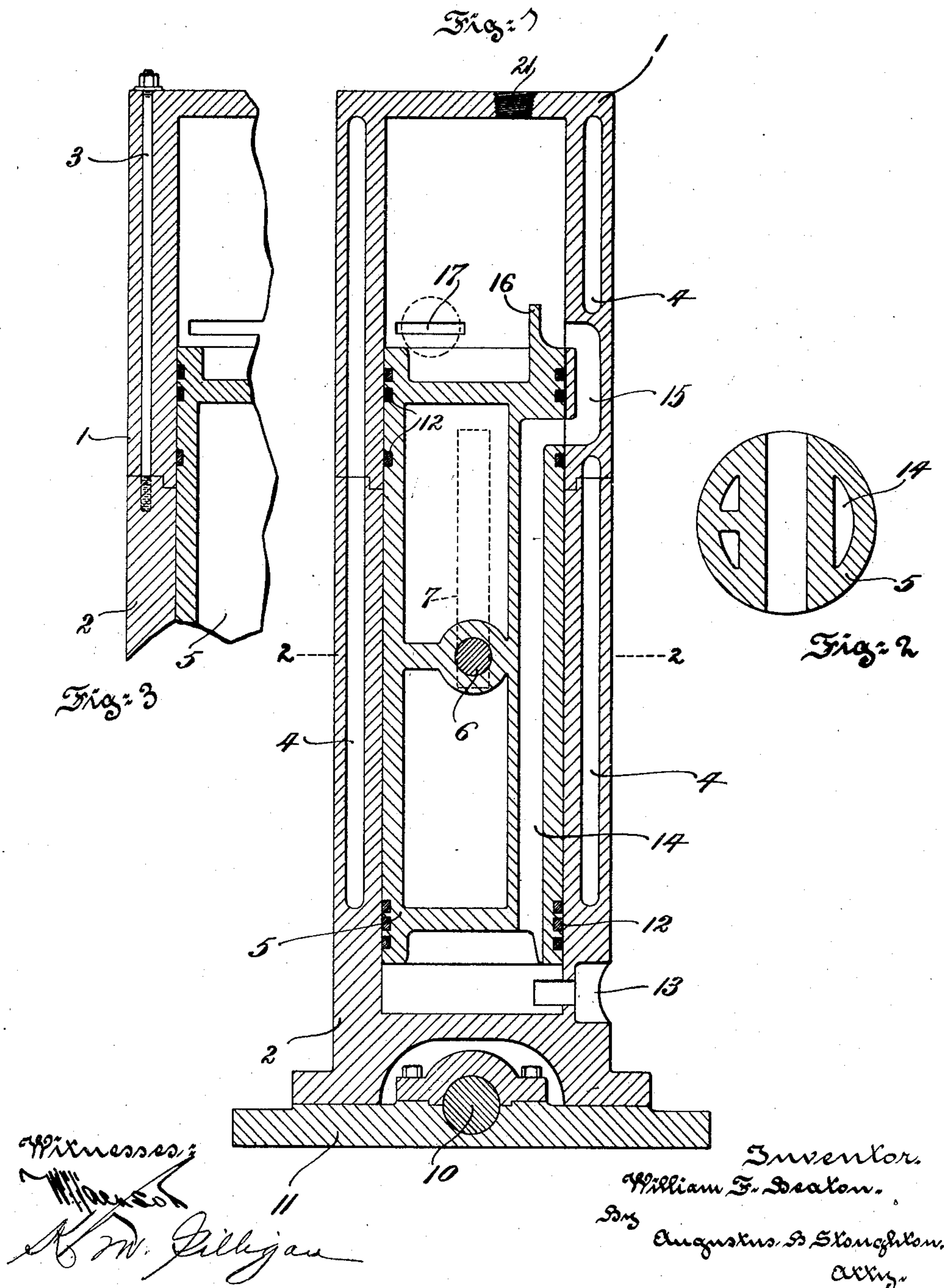


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EXPLOSIVE ENGINE.
APPLICATION FILED SEPT. 2, 1904.

931,176.

Patented Aug. 17, 1909.

2 SHEETS—SHEET 1.



Witnesses:

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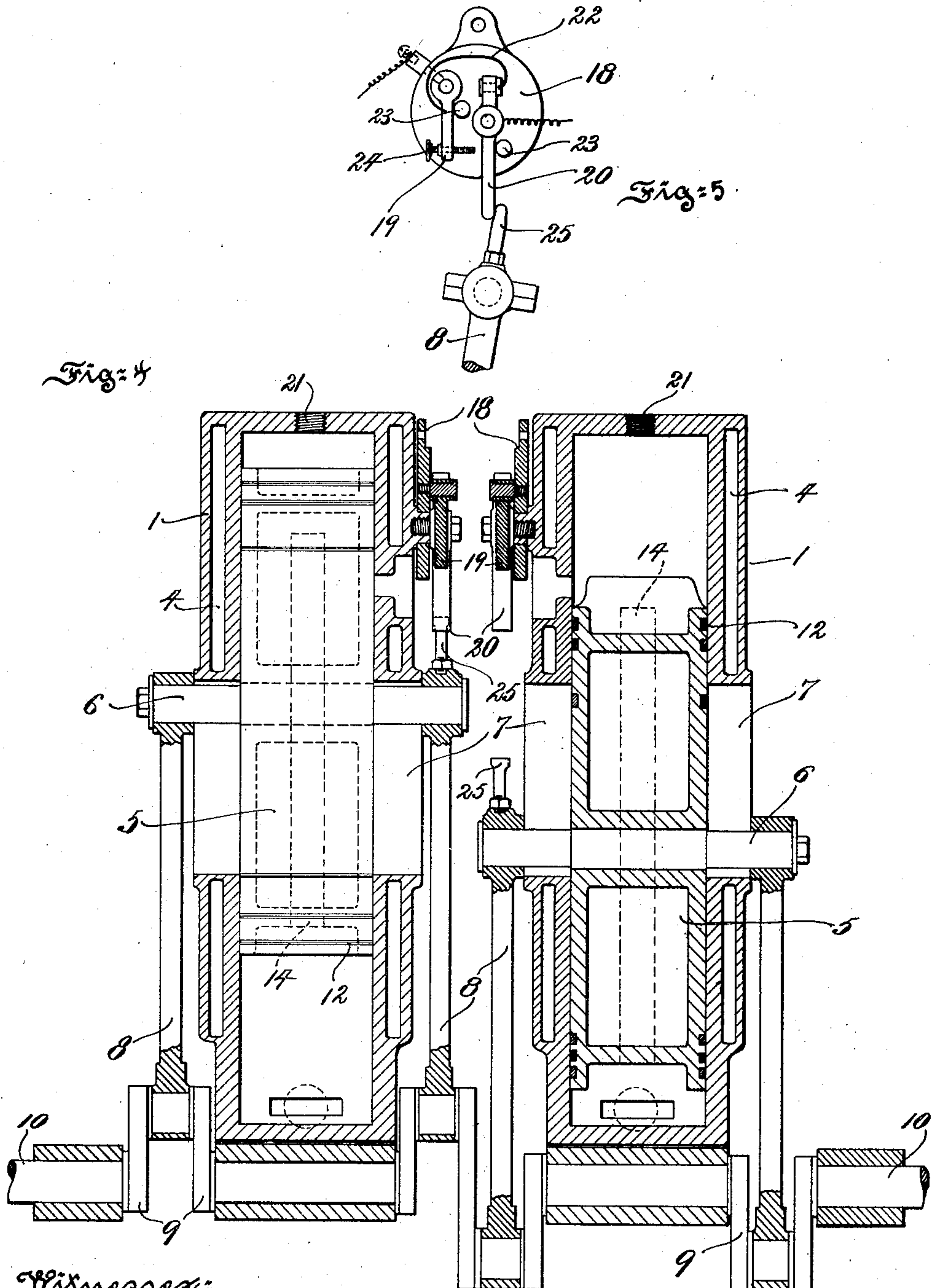
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UNITED STATES PATENT OFFICE.

WILLIAM F. BEATON, OF FRANKFORD, PENNSYLVANIA.

EXPLOSIVE-ENGINE.

No. 931,176.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed September 2, 1904. Serial No. 223,131.

To all whom it may concern:

Be it known that I, WILLIAM F. BEATON, a citizen of the United States, residing at Frankford, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a specification.

Objects of the present invention are to provide a compact, reliable and efficient explosive engine which may be used alone or arranged with others of the same kind in a series, so as to economically provide for attaining an increase in horse power; to so construct and arrange the various parts that they may be conveniently and comparatively inexpensively constructed and assembled; to arrange for the provision of a supply of clean mixture for a two-cycle operation; and generally to provide a compact, durable and powerful engine which in use shall be both economical and reliable.

To these and other ends hereinafter set forth the invention stated in general terms comprises the improvements to be presently described and finally claimed.

The nature, characteristic features and scope of the invention will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof and in which—

Figure 1, is a view principally in central section of a cylinder and piston embodying features of the invention. Fig. 2, is a sectional view taken on the line 2—2 of a piston. Fig. 3, is a vertical sectional view illustrating a portion of the cylinder. Fig. 4, is a sectional view illustrating a pair of cylinders and pistons arranged to operate as a two-cycle engine, and Fig. 5, is a face view of a sparker.

Operations occur at each end of the cylinder and piston so that the cylinders are made in two parts 1 and 2 in order that the pistons may be properly and conveniently placed within them. The parts 1 and 2 are shown as respectively flanged at their meeting ends, thus insuring accuracy of fit and there are lag bolts 3 (Fig. 3) which afford means for connecting these two parts. The parts of the cylinder are shown as provided with cavities 4 which constitute water jackets. Connected with the pistons 5, which are shown as hollow so as to reduce their weight, are rigid wrist pins 6 that project

through slots 7 in the cylinders and afford means for connecting the links 8 which operate upon the cranks 9 carried by the driving shaft 10, which is journaled in a base 11 upon which may be mounted and secured the required number of cylinders and pistons. At its ends the piston 5 is provided with packing 12.

Referring more particularly to Fig. 1, the proper explosive mixture is delivered from appropriate valve mechanism not shown, but which may be of any well understood type, into the opening or intake 13. Upon the descent of the piston 5, this mixture is compressed and passes by way of the duct 14 which ranges lengthwise and laterally of the piston and by way of the U-shaped duct 15 formed in the cylinder wall to the upper cylinder. The guard 16 directs it away from the exhaust 17, the piston then rises whereupon the mixture is exploded, driving it downward again permitting the exploded mixture to escape by way of 17 and compressing and taking in a new charge. Thus there is an explosion at every revolution. Of course the duct or passage 14 is closed from communication with the explosion chamber in every position of the piston, except its lowest position and since in its lowest position the packing rings 12 are on opposite sides of the inlet to the passage 15, there is no escape or leakage of the mixture. The exhaust leaves so rapidly by way of the port 17, that the incoming mixture traveling as it does under pressure is not materially contaminated. In a general sense the lower end of the cylinder takes the place of and performs the function often performed by a crank case, but the mixture is not contaminated by the oil which is usually present in a crank case; thus there is secured a clean mixture and leakage is obviated.

The arrangement shown in Fig. 4 in which two of the cylinders and their accessories shown in Fig. 1 are employed, obviously produces two explosions for each revolution of the driving shaft 10 and they occur 180° apart.

The described construction permits of the use of the sparking device which will now be described in connection with Fig. 5. 18 is a base or support which is shown as attached to the side of the cylinder. Pivoted to this base are a pair of contacts 19 and 20 connected respectively with the terminals

of a battery or other suitable source of current and with the coil and its accessories including a vibrator which are connected with the sparking plug, the latter being properly placed, for example, in the opening 21. The contact 20 is pivoted intermediate of its ends and the contact 19 is pivoted at one of its ends. The spring 22 operating upon the shank of the contact 19 and the end of the contact 20, but being, of course, properly insulated, tends to turn these contacts up against their back stop 23 so as to hold the adjustable contact screw 24 in position for breaking the circuit. The link 8 is provided with an extension 25 which collides with the contact 20, turns both of the contacts 20 and 19, and brings the screw 24 into position for closing the circuit, which of course is interrupted as soon as the part 25 permits of the return of the contacts to normal position. To retard or advance the spark the angle of the base 18 is changed.

The base or support 11 is provided with pillow blocks for the shaft, with openings for the accommodation of its cranks, and with suitable surface upon which one or more of the cylinders are secured, thus it is possible to conveniently duplicate the cylinders indefinitely and secure them to a single base and permit them to operate upon the same shaft, thus affording convenient means for increasing the available horse power. Clearly the effect of the described arrangement is to produce, what is called, a well balanced engine, in that it receives power at frequent intervals.

The piston is relatively very long and the purpose of this is to cover the slots in the cylinder through which the wrist pin which is carried by the piston extends and in which it works. The lower end of this relatively long piston is closed so as to provide a comparatively small space between it and the lower end of the cylinder, within which comparatively small space compression takes place. The relatively long duct 14, is pro-

vided to convey the compressed charge to the explosion end of the cylinder when the duct 14, registers with the lower inlet of the by-pass opening 15.

It will be obvious to those skilled in the art to which my invention relates that modifications may be made in details without departing from the spirit thereof, hence the invention is not limited further than the prior state of the art may require, but

Having thus described the nature and objects of my invention what I claim as new and desire to secure by Letters Patent is—

In combination a cylinder provided with an exhaust 17, communicating with its explosion chamber, and a U-shaped by-pass 15, and with an intake 13, communicating with the compression end of the cylinder, and having a head at each end and also having lengthwise ranging slots in its curved wall, an elongated piston of sufficient length for covering said slots in all positions of the piston and said piston having an upper head and a lower head which latter limits the space in respect to the lower head of the cylinder and within which space compression occurs, and said piston provided with a duct 14, extending longitudinally of the piston and opening through the lower head thereof and opening through the side wall of the same near the upper head, the by-pass 15, being so located as to communicate with the upper end of the duct 14, and with the explosion chamber when the piston is in its lowermost position, a wrist pin connected with the piston and working in said slots, a crank shaft provided with cranks and arranged outside of the cylinder, and connecting rods interposed between the wrist pin and cranks, substantially as described.

In testimony whereof I have hereunto signed my name.

WILLIAM F. BEATON.

In the presence of—

JOHN C. SHARTLE,

WILLIAM J. MULLIN.