No. 869,393.

PATENTED OCT. 29, 1907.

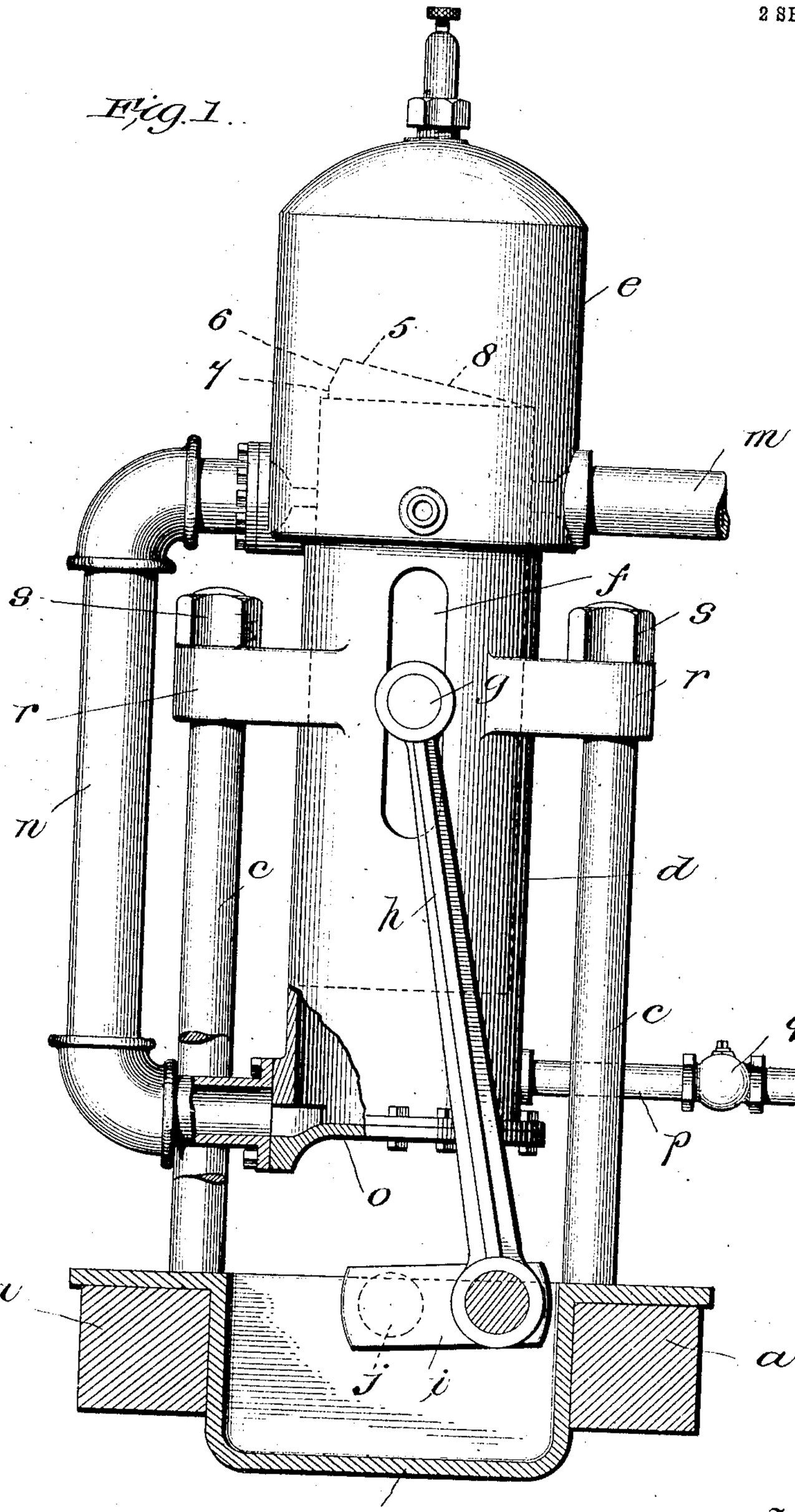
R. W. POWELL & C. F. NORTON.

GAS ENGINE.

APPLICATION FILED JAN. 3, 1907.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

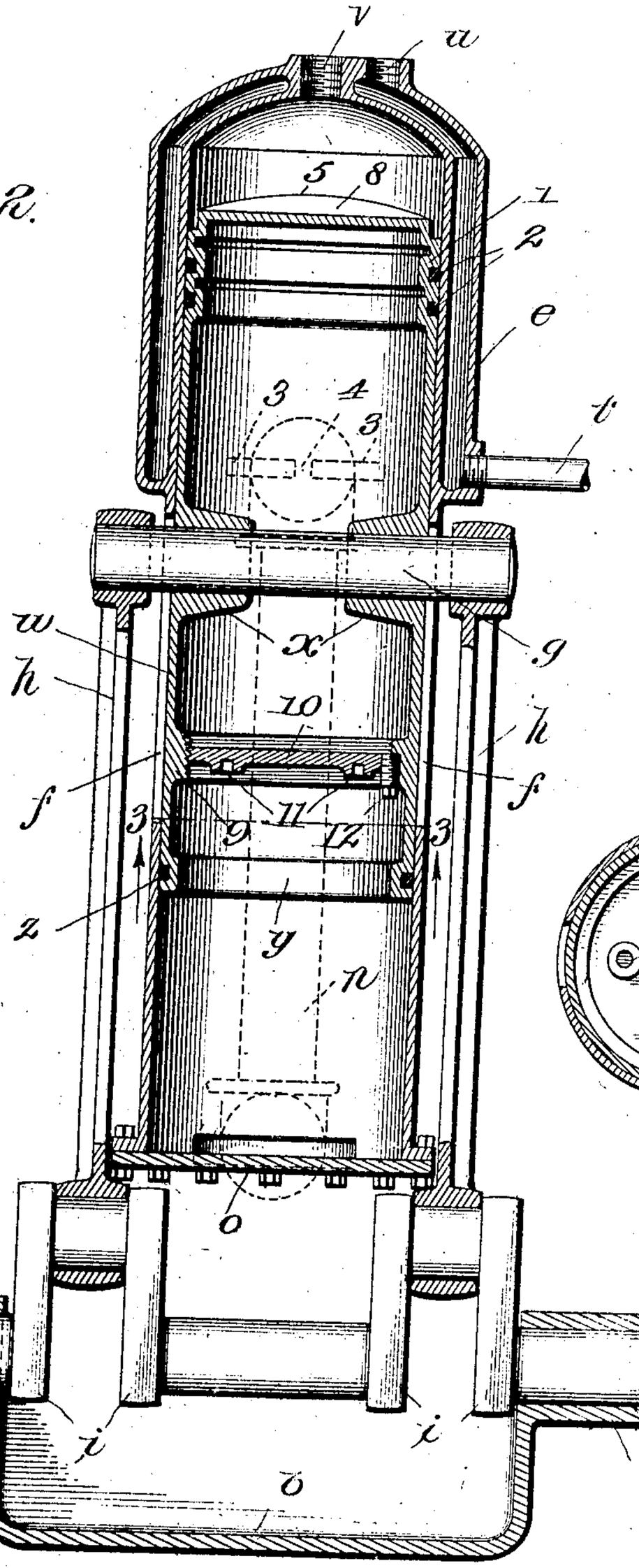
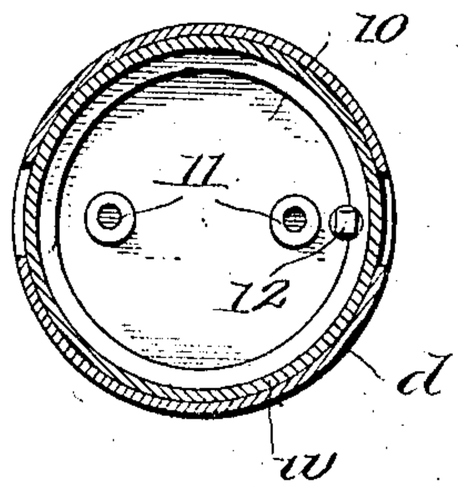


Fig. 3.



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UNITED STATES PATENT OFFICE.

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GAS-ENGINE.

No. 869,393. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed January 3, 1907. Serial No. 350,655.

To all whom it may concern:

Be it known that we, ROYSTON W. POWELL and CHRISTOPHER F. NORTON, both citizens of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Gas-Engines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to improvements in gas engines, and the object of our invention is to provide a simple gas engine, having its parts readily accessible, in which the size of the compression chamber may be easily varied, and the whole structure light and of simple construction.

With these objects in view, our invention consists in the construction and combinations of parts as hereinafter described and claimed.

In the accompanying drawings—Figure 1 is a side elevation partly in section of our improved gas engine; Fig. 2 is a vertical section thereof; and Fig. 3 is a cross section of the same taken on the line 3—3 of Fig. 2 and looking in the direction of the arrows.

a represents a supporting framework on which is mounted the U-shaped base plate *b*. Carried by the base plate *b* are a plurality of columns *c* designed to screw into the base plate and to support the engine proper.

d represents a single cylinder in which both the compression pistons and explosion pistons, which are combined into a single piston, work. Surrounding the upper part of the cylinder *d* is a casing *e* forming a water jacket for the upper part of the cylinder, where the explosion takes place. The cylinder *d* is provided near its center with two long slots *f* through which passes the wrist pin *g*, which is mounted on the upper ends of connecting rods *h*, the lower ends of these rods being mounted in cranks *i*, on the shaft *j*, which shaft is carried in bearings *k* in the bed plate *b*.

The cylinder *d* is provided with a discharge pipe *m* for the burned gases, and an inlet pipe *n* leading from the lower part of the cylinder to the upper part thereof. This inlet pipe enters the lower end of the cylinder *d*, and as shown in Fig. 1 it extends below the lower end *o* of this cylinder, so as to afford a free exit for gasolene or other fuel if any should happen to be condensed in the cylinder. If any of the fuel in a liquid state happens to collect in the lower part of the cylinder *d*, the rush of air or gas due to the downward stroke of the piston, will pick up such fluid bodily and carry it up into the explosion end of the cylinder, probably vaporizing it during its passage.

p represents a pipe for the inlet of the gaseous fuel mixed with air, which leads from any suitable carbureting device, and is provided with a check valve *q* of any desired form.

The cylinder is supported on the base plates by means of the columns *c*, which pass through holes in lugs *r*, cast integral with the outside of the cylinder. The columns *c* are provided with shoulders upon which the lugs *r* rest, and nuts *s* are used to hold the cylinder firmly on the columns *c*.

t represents an inlet pipe for delivering water to the water jacket, and *u* represents the orifice for the escape of the heated water.

A spark plug of any desired construction is shown inserted through the top of the cylinder *d* at *v*, but obviously it could be put through the side thereof, if desired.

w represents the piston which operates in both the compression and explosion portions of the cylinder *d*. This piston is of special construction, designed to produce a very large and at the same time a very light piston. It is made hollow as shown in Fig. 2, and is provided near its center with inwardly projecting lugs *x*, through which the wrist pin *g* passes. By the use of these lugs a long bearing on the wrist pin is secured. The lower end of the piston is enlarged as shown at *y* to furnish a suitable bearing for a packing ring *z*, of any suitable material. Similarly, the upper end of the piston is enlarged as shown at 1, for the reception of packing rings 2. Of course, any number of packing rings may be used both at the top and bottom of the piston.

3 represents the inlet ports or slots for the compressed charge of carbureted air leading from the pipe *n* into the explosion end of the cylinder, and to prevent the packing rings from expanding into these slots cross pieces, such as 4 are used.

As said before, the bottom of the piston is open, but the top is closed by means of a plate 5 of the shape shown in Fig. 1. This may either be made integral with the body of the piston, or made separately, and secured thereto by any suitable means, such as brazing. Similarly, in the drawings, the top of the cylinder is shown as made integral with the body thereof, but this top, may, if desired, be made separate and secured to the body by bolts or several fastening means.

The plate 5 is a baffle plate or deflector, and, as shown in Fig. 1, is made with a vertical portion 7, then a sharply inclined portion 6, and a slowly inclined portion 8, the result of this construction being, that when the charge of carbureted air is forced in through the ports 3, it first strikes the vertical portion 7, and is forced directly upward, and then by means of the incline 6 is allowed to spread out into the upper part of the cylinder, thus thoroughly scavenging the explosion end of

the cylinder, forcing the burned gases out through the pipe *m*. In the lower part of the piston *w* an extension is made forming a ring, as shown at 9, which is screw threaded on its interior, and into this ring is adapted to screw a plate 10, which is provided with spanner holes 11. The bottom *o* of the cylinder *d* and plate 10 form with the sides of the cylinder *d*, a compression chamber, and the size of this compression chamber may be varied by screwing the plate 10 up or down in the ring 9. In the drawings this ring is shown of small width, but obviously it can be made of any width desired. To hold the plate 10 in any one of its possible adjusted positions, a screw 12 is provided which fits in a circular opening formed half in the plate 10 and half in the ring 9. Before the plate 10 can be adjusted, the screw 12 must, of course, be removed and the plate must turn exactly a full revolution, or a plurality of full revolutions, before the screw can again be re-inserted to lock the plate 10 firmly in the ring 9.

It will thus be seen that we have provided an engine with the crank shafts and connecting rods outside the cylinder, whereby the leakage which often occurs when the crank casing is used as a compression chamber, is avoided, such leakage being of common occurrence owing to the wearing or loosening of the parts. Furthermore, we have provided an engine in which both the compression chamber and explosion chamber are made in a single cast cylinder. We have also provided a hollow piston with one end open and the other closed, and having a removable and adjustable plate near one end thereof, the result being that we have an exceedingly light, compact, and strong engine, easy of adjustment and repair, and of comparatively small expense to build. Furthermore, we can obtain any desired degree of compression in the lower part of the cylinder.

In the drawings, we have shown the engine as vertically arranged, but of course, it could be arranged horizontally or at any desired inclination.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. In a gas engine, the combination of supports, a single cylinder mounted in said supports, said cylinder having one end adapted to act as an explosion chamber and the other end as a compression chamber, and a single hollow piston mounted in said cylinder, one end of said piston being closed, and a removable and adjustable plate inserted in said piston near its other end, substantially as described.

2. In a gas engine, the combination of a supporting frame, a single cylinder carried by said frame, said cylinder having one end adapted to act as an explosion chamber and the other as a compression chamber, and said cylinder being provided with centrally arranged slots, a hollow piston mounted in said cylinder, one end of said piston being closed, and a removable and adjustable plate in said piston near its other end, a wrist pin passing through said slots, said piston being mounted on said wrist pin, a shaft and connections between said shaft and said wrist pin, substantially as described.

3. In a gas engine, the combination of a supporting frame, a single cylinder carried thereby, one end of said cylinder acting as an explosion chamber, and the other end as a compression chamber, said cylinder being slotted near its center, a single hollow piston mounted in said cylinder having one end closed and having a removable and adjustable plate located near its other end, and being also provided with lugs at or near its center, a wrist pin passing through said piston lugs through the slots in the cylinder, connecting rods located outside of said cylinder and a cranked shaft to which said rods are connected, substantially as described.

4. In a gas engine, the combination of a single cylinder having one end thereof adapted to act as an explosion chamber and the other end adapted to act as a compression chamber, and provided with connections between said chambers, and a single hollow piston mounted in said cylinder, said piston being closed at one end and having a baffle plate on said closed end, and said piston being also provided with a removable and adjustable plate near its other end, substantially as described.

5. In a gas engine, the combination of a single cylinder, one end of which acts as an explosion chamber and the other as a compression chamber, a pipe connecting said chambers, said pipe where it connects the compression chamber being narrowed vertically and extended below the bottom of the cylinder, said cylinder being provided with ports connecting with both ends of said pipe, and a single hollow piston mounted in said cylinder, said piston having one end closed and being provided with a baffle plate thereon, and having an adjustable plate located near its other end, substantially as described.

In testimony whereof, we affix our signatures, in presence of two witnesses.

ROYSTON W. POWELL.
CHRISTOPHER F. NORTON.

Witnesses:
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