T. W. HENDRY.

INTERNAL COMBUSTION ENGINE.

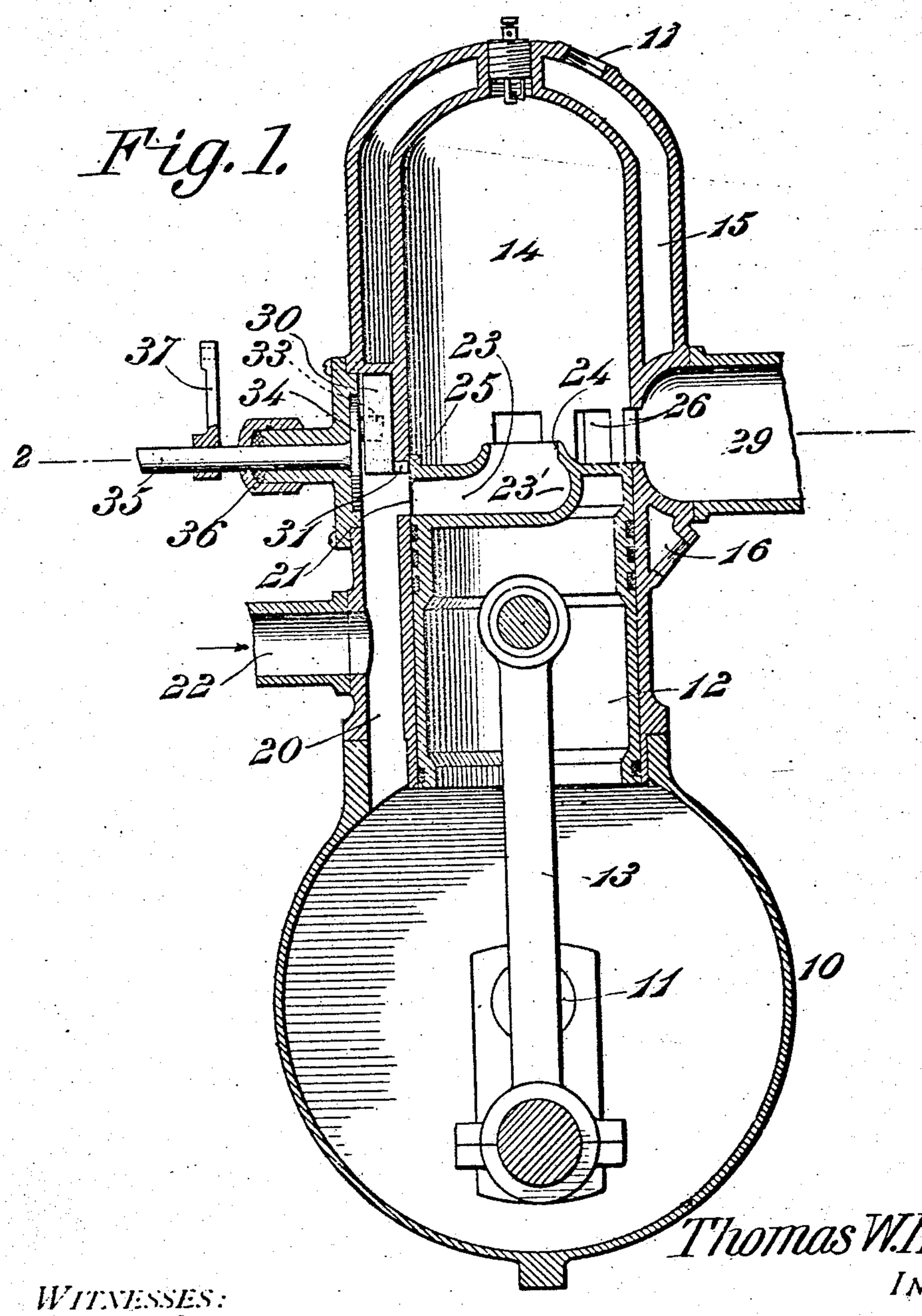
APPLICATION FILED NOV. 6, 1906.

899,216.

Patented Sept. 22, 1908.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

E. G. Stewart

Jno. E. Parker

Thomas W. Hendry,

INVENTOR.

By C. A. Snow & Co.

ATTORNEYS

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2 SHEETS—SHEET 2.

Fig. 2.

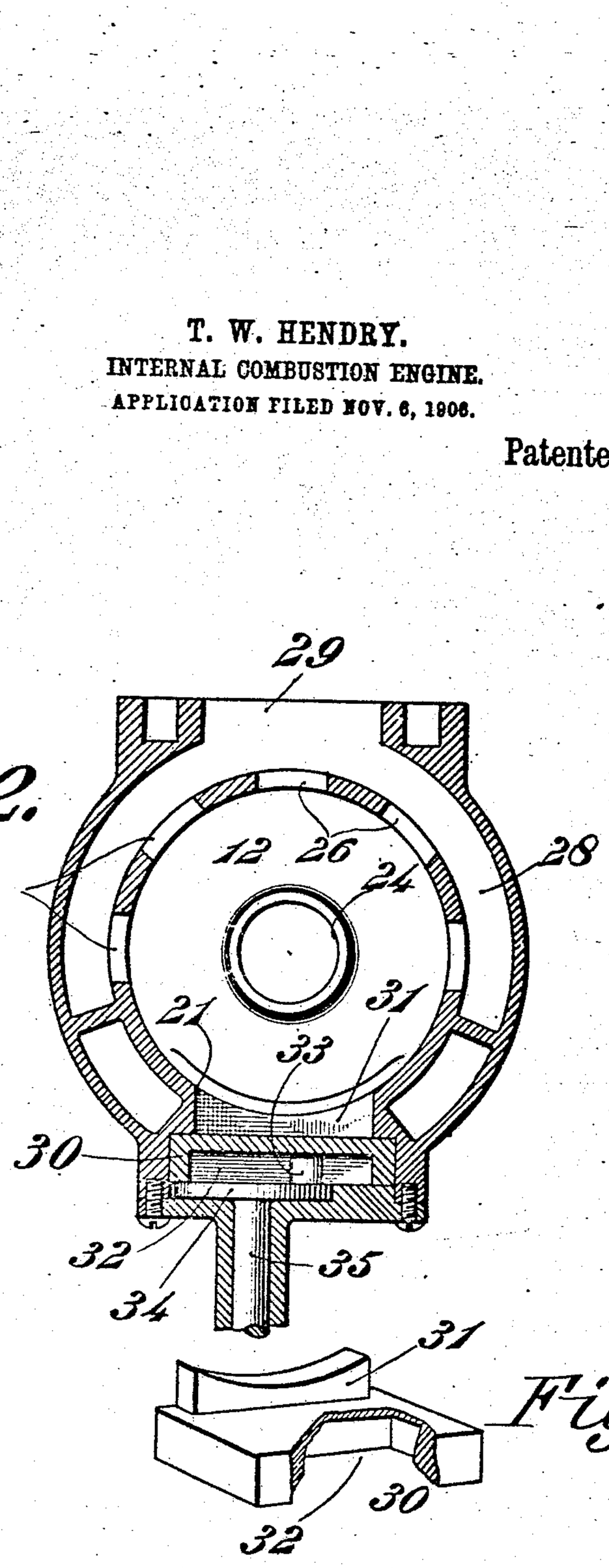
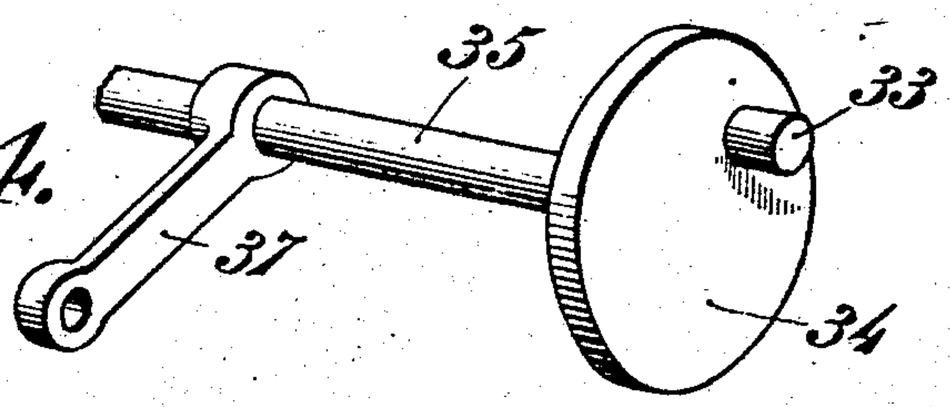


Fig. 3.

Fig. 4.



WITNESSES:

E. F. Edwards

Jno. E. Parker

Thomas W. Hendry,

INVENTOR

By C. A. Snow & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

THOMAS W. HENDRY, OF SAN FRANCISCO, CALIFORNIA.

INTERNAL-COMBUSTION ENGINE.

No. 899,216. Specification of Letters Patent. Patented Sept. 22, 1908.

Application filed November 6, 1906. Serial No. 342,247.

To all whom it may concern:

Be it known that I, THOMAS W. HENDRY, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented a new and useful Internal-Combustion Engine, of which the following is a specification.

This invention relates to internal combustion engines, and has for its principal object to provide a novel form of engine of that class in which the piston is provided with an inlet port that is arranged to alternately open and close communication with a port leading to the crank case or other point of supply, the piston port in the present construction being arranged to direct the explosive charge in a direct stream into the central portion of the cylinder and explosion chamber.

A further object of the invention is to so shape the piston port and the discharge nozzle leading therefrom as to effectually direct the stream of explosive compound in a straight line, axially of the explosion chamber, avoiding danger of spreading of the stream until it strikes the head of the chamber, and preventing loss through premature excape through the exhaust ports.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a sectional elevation of an internal combustion engine constructed in accordance with the invention. Fig. 2 is a sectional plan view of the same on the line 2—2 of Fig. 1. Fig. 3 is a detail perspective view of the controlling valve detached, parts being broken away in order to more clearly illustrate the construction. Fig. 4 is a detail perspective view of the valve adjusting mechanism.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The crank casing 10 is provided with bearings of any desired type for the support of a main crank shaft 11 which is connected to the trunk piston 12 by a suitable rod 13.

To the crank casing is secured the cylinder 14, the explosion chamber of the latter being surrounded by a water jacket 15 through which water or other fluid may be circulated from an inlet 16 to a discharge 17.

At one side of the cylinder is arranged a passage 20 communicating at its lower end with the crank casing, and at its upper end with a port 21 which leads through the wall of the cylinder, and this passage 20 has an inlet port 22 that is in communication with the carbureter or other source of gas supply, a charge being drawn in through this port on the compression or out stroke of the piston, and being delivered into the crank casing, while on the working stroke of the piston the charge drawn into the crank casing will be compressed and forced through this passage to the port 21, and from thence to the cylinder.

In order to direct the explosive charges into the central portion of the cylinder and thus sweep out the products of combustion resulting from an explosion of a previous stroke, the piston is provided with a passage 23, opening at one side of the piston and arranged to communicate with the cylinder port 21. The passage 23 terminates in a discharge nozzle 24 disposed at the axis of the piston and arranged to direct the volume of the incoming charge in the axial line of the cylinder and the explosion chamber.

In devices of this general class I have found it impracticable to effectively direct the stream of gas satisfactorily in perfectly straight lines with the axis of the cylinder. Where the passage in the piston curves from the inlet end to the nozzle, the incoming stream of gas will hug the curved wall for a short distance and then will rebound and be deflected out of the axial line and will strike against one or the other side of the cylinder. In carrying out the present invention, this difficulty is overcome by employing a pocket 23' in alinement with the inlet end of the passage 23, and in advance of the nozzle, the bottom of the pocket bulging or concaving away from, and being disposed beyond that wall of the nozzle distant from the inlet end of the passage. As a result of this construction the incoming stream of gas passing through the straight portion of the passage will strike against the concaved or outwardly bulged wall of the

pocket, and the stream will rebound to a certain extent against the inflow, so that its force will be somewhat checked, causing the volume of gas to issue from the nozzle in straight lines, in the direct axis of the cylinder, striking against the central portion of the head of the explosion chamber and thence being deflected downwardly alongside the side walls of the cylinder to force out the burned gases of the previously exploded charge. It will, furthermore, be noted that the discharge end of the nozzle is somewhat above the lowermost edges of the discharge ports, so that there will be no chance of lateral escape of the charge, and the body of products of combustion which is swept down along the walls of the explosion chamber and cylinder may strike against the top of the piston, and thence pass out through the exhaust ports without mingling with the entering charge. The top of the piston is further provided with a lip 25 at the inlet side, which at all times extends above the top of the valve which controls the main inlet port, so that said valve will never be exposed to the action of the products of combustion, and no deposits of carbon or other residue can form to prevent movement of the valve.

That wall of the cylinder opposite the inlet port 21 is provided with a large number of discharge ports 26, all of which communicate with an arcuate chamber 28 from which leads the main exhaust 29. These discharge ports afford ample opportunity for the escape of practically all of the products of combustion, so that there will be no appreciable residue left over to reduce the quality of the fresh charge.

In the upper portion of the passage 20 which constitutes a valve chamber is arranged a slide valve 30, the body portion of the valve being substantially rectangular in form and being provided at that end nearest the main crank shaft with a projecting flange 31 that extends through the port 21, and the inner face of this flange is shaped to conform exactly to the bore of the cylinder, so that there can be no passage of gas between the piston and the valve. When this valve is moved in the direction of the crank shaft, the effective area of the port 21 will be decreased, and when moved in the opposite direction the effective area of the port will be increased.

In the outer face of the valve 30 is an elongated slot 32 arranged for the reception of a pin 33 that projects from a disk 34, said disk being carried by a suitable rock shaft 35 extending through a stuffing box 36. When the shaft is turned, the pin 33 will ride in the groove 32, and will move the valve to alter the effective area of the port. In the present instance the shaft is shown as carrying a rocker arm 37 which may form a lever for turning the valve, or the rocker arm may be connected to a suitable valve operating mechanism of any desired type.

With a valve and valve operating mechanism constructed in accordance with this invention the engine is at all times under perfect control, and its operation may be regulated at any speed.

I claim:—

In an internal combustion engine, a cylinder having discharge ports, and an inlet port, a piston having a laterally extended straight wall passage arranged to communicate with the inlet port, the piston passage terminating in a short nozzle at the center of the piston head in the line of the axis of said piston, the wall of the said passage opposed to and distant from said port being provided with a curved pocket concaving or bulging away from said inlet port and providing for the impingement of the charge thereagainst and by which the force of the stream of incoming gas is broken and the stream is thence deflected through the nozzle in a straight line following the axis of the cylinder.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

THOMAS W. HENDRY.

Witnesses:

ALEXANDER DIJEAU,

GEORGE DIJEAU.