

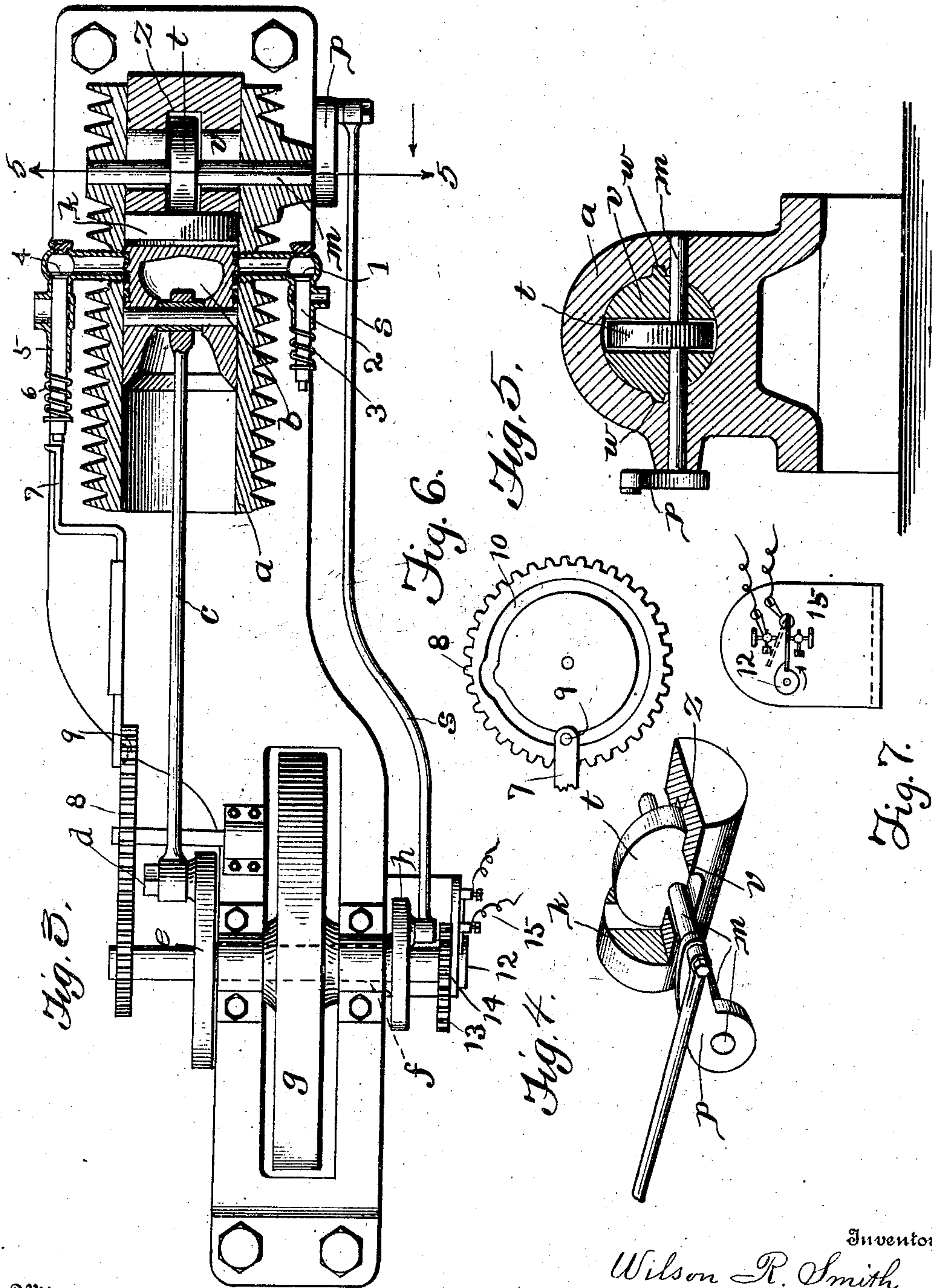
No. 859,852.

PATENTED JULY 9, 1907.

W. R. SMITH.
GAS ENGINE.

APPLICATION FILED DEC. 7, 1906.

2 SHEETS—SHEET 2.



Witnesses

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UNITED STATES PATENT OFFICE.

WILSON R. SMITH, OF BELOIT, WISCONSIN.

GAS-ENGINE.

No. 859,852.

Specification of Letters Patent.

Patented July 9, 1907.

Application filed December 7, 1905. Serial No. 290,855.

To all whom it may concern:

Be it known that I, WILSON R. SMITH, a citizen of the United States, and a resident of Beloit, in the county of Rock and State of Wisconsin, have made a certain new and useful Invention in Gas-Engines; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a longitudinal section of my invention as applied, with the fly wheel in dotted lines, and the piston at the outer end of its stroke. Fig. 2 is a similar view with the piston at about the middle of its stroke. Fig. 3 is a plan view of the same partly in section. Fig. 4 is a detail perspective view partly in section of the cam *t* and head *k* with adjacent parts. Fig. 5 is a section on the line 5—5, Fig. 3. Fig. 6, is a detail view showing the roller working in the cam groove for actuation of the tappet to open the exhaust valve. Fig. 7, is a detail view of the ignition cam and the contact devices.

The invention has relation to gas engines, and has for its object the provision of simple means for insuring that the position of the driven crank be off center, during the action of the engine, before the explosion takes place, and at the same time, keeping the explosion chamber small.

With this object in view, the invention consists in the novel construction and combination of a movable head in the cylinder behind the piston head, and means for moving the same in connection with the driven crank, as hereinafter set forth.

In the accompanying drawings, the letter *a*, designates the cylinder of a gas engine, having a piston *b*, which is connected to a piston rod *c*, pivoted to the wrist pin *d*, of the driven crank or crank disk *e*, on the transverse shaft *f*, which usually carries the fly wheel *g*. On the same shaft is a crank or crank disk *h*.

Behind the piston in the cylinder is a movable head *k*, having a seat in engagement with which is provided a rocking cam *t*, on a transverse shaft *m*, pivoted in bearings of the cylinder. At the side of the cylinder, on the shaft *m*, is secured a crank arm *p*, to which is pivoted one end of a connecting rod *s*, the other end of which is pivoted to the crank disk *h*. The crank arm *p*, is arranged to have vibratory motion, so that its connecting rod is never on center, and, when the pis-

ton rod is on center with the driven crank *e*, the piston being adjacent to and in direct engagement with the movable head *k*, the cam is in oblique position approaching its full stroke in said head.

In the operation of the engine, after it has been started, the forward movement of the crank-arm *p*, causes the cam to turn forward to its full stroke, thereby moving forward the movable head which follows up the piston head, thereby providing for keeping the explosion chamber of limited capacity. At the same time, the shaft *f*, is turned sufficiently to take the crank of the piston rod well off the dead center before the explosion takes place. The explosion is designed to take place at this time and the expansion of the gases then drives the piston forward from the movable head as a backing to the explosion chamber, said head being kept solidly in place by means of the cam engaging the same.

1, is the inlet valve, provided with a stem 2, and is kept normally closed by means of the spring 3. When a vacuum or partial vacuum is created in the cylinder by the movements of the reciprocating piston, the valve is opened automatically and the desired quantity of the hydro-carbon and atmospheric air drawn in to form an explosive mixture. The cylinder is also provided with an exhaust valve 4, having a stem 5, and is kept normally closed by means of the spring 6. A sliding tappet 7, is arranged at one side of the engine frame, and is designed to be actuated from the crank shaft by means of the gearing 8, at each alternate stroke of the engine, so as to mechanically open such valve at the desired time during the backward stroke of the engine and permit the consumed gases and products of combustion to escape. This sliding tappet is provided with a roller 9, which enters a cam slot 10, of one of the gear 8, to operate the slide at the desired time and for the desired purpose.

11, is the igniting device, of common electrical character.

12, is an ignition cam keyed on the shaft of gear 13, meshing with gear 14, on the main shaft and operating contact devices 15 but the explosive charge may be provided and ignited by any ordinary means, the explosion being designed to occur at the time and place hereinbefore referred to.

Having described the invention, what I claim and desire to secure by Letters Patent is:—

1. In a gas engine, a piston cylinder having in rear of the piston a movable head provided with a cam seat, a cam engaging said seat and having a crank arm, and means for

operating said crank arm from the driven shaft of the engine.

2. In a gas engine, the combination with a cylinder, its piston, piston rod, crank shaft and driven crank, of a movable head provided with a cam seat and located in said cylinder in rear of said piston, a rocking cam engaging said cam seat and means for operating said cam from the driven crank shaft.

3. In a gas engine, the combination with a driven crank shaft, piston and piston rod, and cylinder, of a reciprocating

head in the cylinder in rear of the piston, a rocking cam engaging said head, and means for operating said cam from the driven crank shaft.

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

WILSON B. SMITH.

Witnesses:

GEO. H. CRAM,
JOEL B. DOW.