(No Model.) 2 Sheets—Sheet 1.

E. FESSARD.

GAS OR OIL ENGINE.

No. 574,723. Patented Jan. 5, 1897.

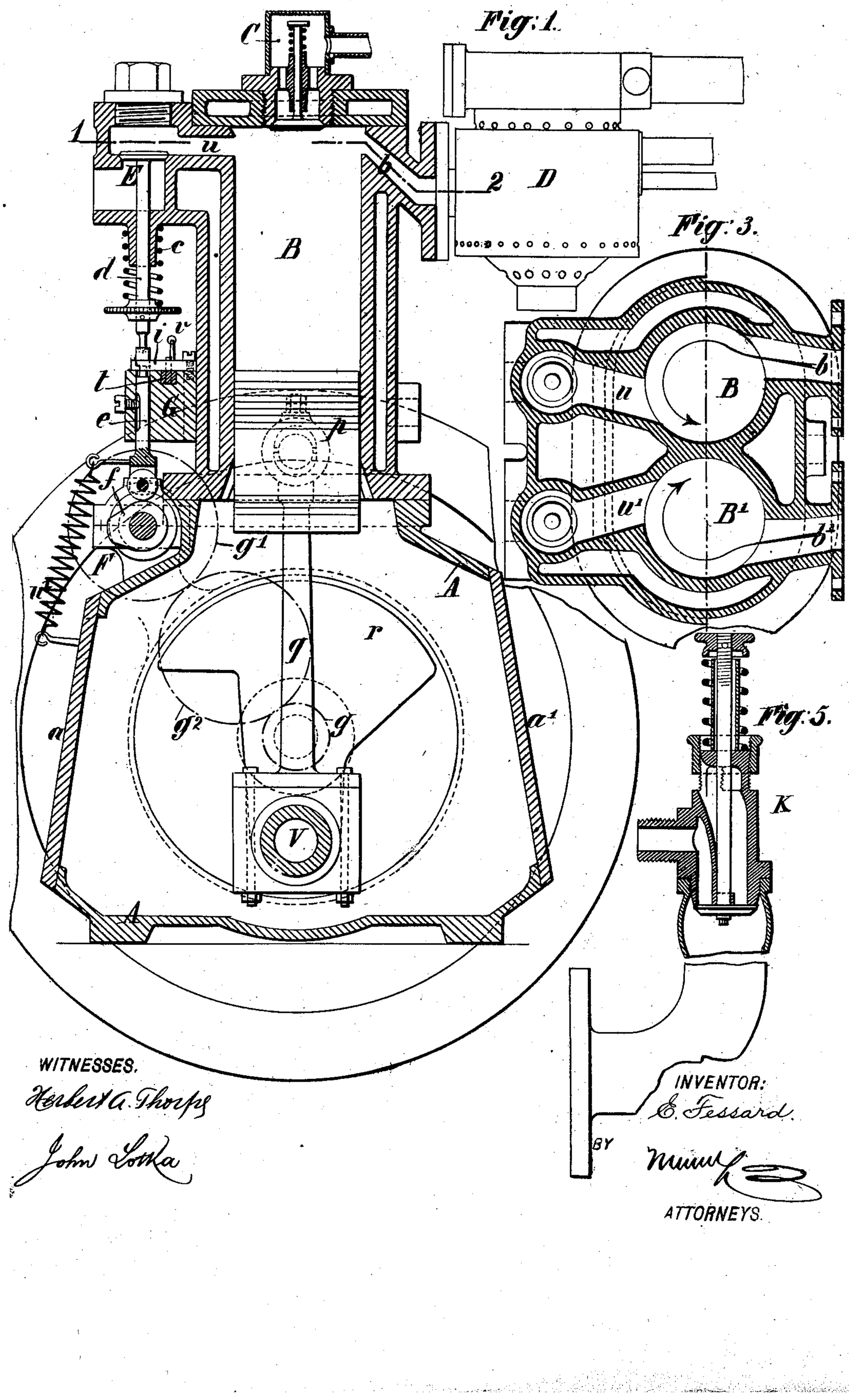

Fig. 1.

Fig. 3.

Fig. 5.

WITNESSES.

Herbert A. Thorpe

John Lotka

INVENTOR:

E. Fessard.

BY

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

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Fig: 2.

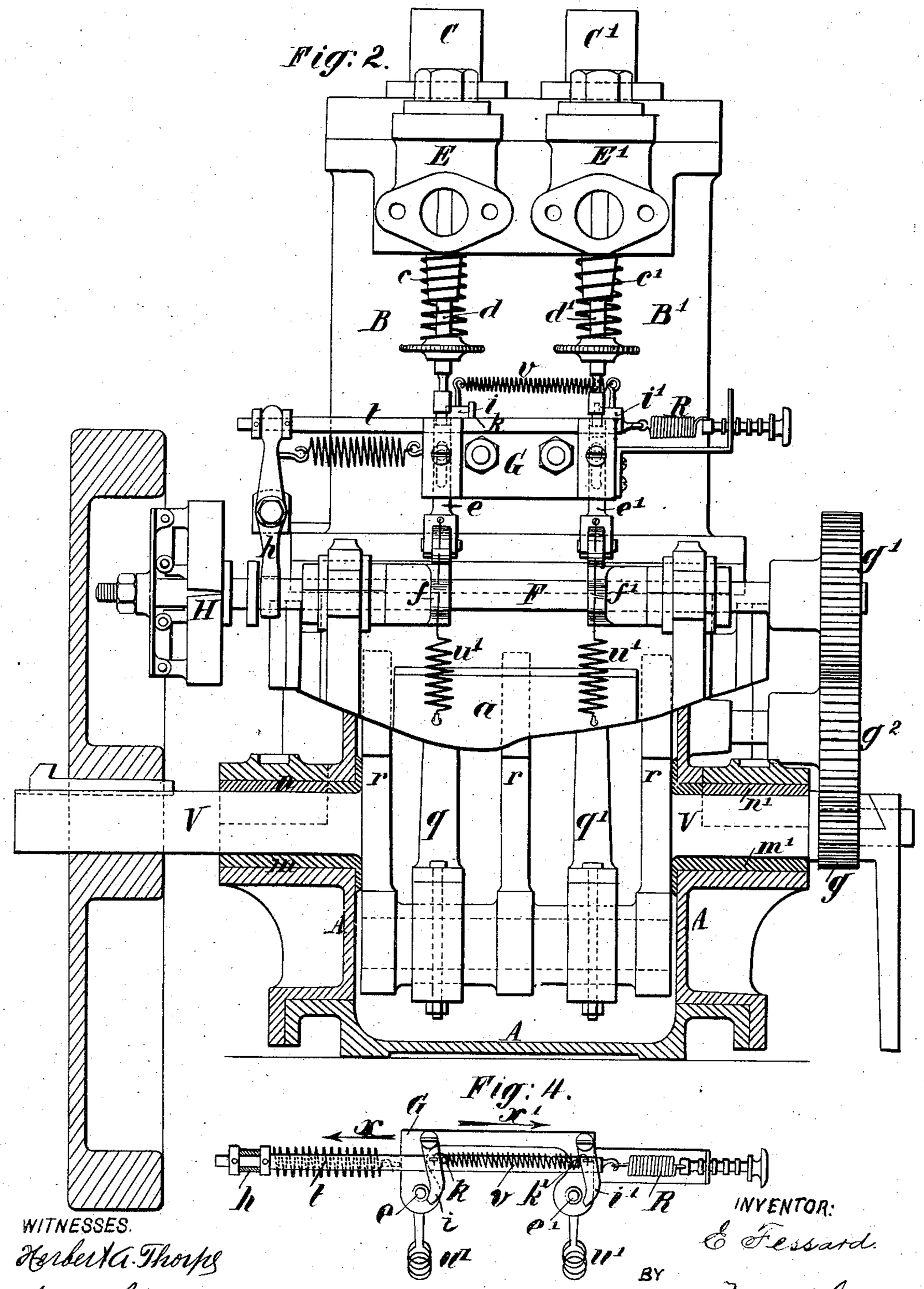

Fig: 4.

WITNESSES.

Herbert G. Thorpe

John Lotka

INVENTOR:

E. Fessard.

BY

Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

EUGÈNE FESSARD, OF POISSY, FRANCE.

GAS OR OIL ENGINE.

SPECIFICATION forming part of Letters Patent No. 574,723, dated January 5, 1897.

Application filed February 26, 1896. Serial No. 580,799. (No model.) Patented in France April 13, 1895, No. 246,621; in Belgium October 14, 1895, No. 117,872; in England November 13, 1895, No. 21,574, and in Austria December 20, 1895, No. 45/4,984.

To all whom it may concern:

Be it known that I, EUGÈNE FESSARD, engineer, a citizen of the Republic of France, residing in Poissy, (Seine and Oise,) France, have invented certain Improvements in Gas or Oil Engines, (for which I have obtained a French patent, dated April 13, 1895, No. 246,621; in Belgium, dated October 14, 1895, No. 117,872; in Great Britain, dated November 13, 1895, No. 21,574, and in Austria, dated December 20, 1895, No. 45/4,984,) of which the following is a specification.

This invention relates to improvements in gas and oil engines constructed either with one or two cylinders.

On the accompanying drawings, Figure 1 is a vertical section of a gas-engine constructed according to my invention, Fig. 2 being a front view of the same, shown partly in section; Fig. 3, a sectional plan on line 1 2 of Fig. 1; Fig. 4, a plan of the clicks working upon the exhaust-valve in connection with the regulator. Fig. 5 is a section of a special valve for use in the case of a gas-engine.

My improved motor or engine, as shown on the drawings, consists of a casing A, inclosing a crank-shaft, one or two cylinders B B', provided with water-jackets, air-inlet valves C C', vaporizers D, exhaust-valves E E', a rod or shaft F for operating the latter, and regulating mechanism connected with the exhaust-valves.

The casing A forms an oil-bath for the shaft and cranks and has two large openings provided, respectively, with covers *a a'* to allow the pistons *p* and crank-rods *q* to be disengaged without removing the other working parts. The crank-shaft V, to which the rods are connected, is supported in bearings *m m'*, provided separately with gun-metal dowels *n n'* upon a portion of its length to give the desired grip, as usual, while the other portion forms a hermetic joint, preventing the escape or discharge of oil from within the casing A. Upon the crank-shaft V are arranged counterweights *r* to balance the cranks and pistons and to allow of great speed being attained without danger of excessive vibration, which is a common cause of deterioration.

The cylinders B, as shown on Fig. 3, have their inlet *b* and exhaust ports *u* so arranged that the explosive mixture cannot combine with the consumed gases. The inlet-port *b* extends from the bottom upward at a tangential inclination to the inner face of the cylinders, so as to direct the explosive mixture in such a manner that the consumed gases are driven back into the lower part of the cylinders and that only the gas itself is in contact with the flame.

The air-inlet valves C may be of ordinary construction and are situated at the top of the cylinders. The exhaust-port *u* is so arranged with respect to the inlet-port *b* that the consumed gases therein cannot unite with the explosive mixture.

In the case of oil-engines the vaporizers D may be of any known form and arrangement.

The exhaust-valves are controlled by a rod or shaft F and cams *f f'*, working upon spindles *e*, independent of the spindles *d* of the valve proper, but situated in a line therewith. A spring *c* tends to keep the valves normally closed, and a second spring *u'* insures the contact of the separate spindle *e* with its respective cam. The spindles *e* are guided in a suitable boss or projection G, secured upon or formed in a piece with the cylinders.

The shaft F for operating the valve is connected with the crank-shaft by means of toothed wheels *g g'*, so geared that the valve-shaft revolves at half the speed of the crank-shaft. An intermediate gearing-wheel g^2 may be employed to avoid the use of large toothed wheels. At its opposite extremity the shaft F carries a centrifugal governor H with very limited movement. The regulator mechanism is connected with the governor H by means of a lever *h* and rod *t*, provided with pivoted catches or clicks *i i'* for engaging the spindles *e* of the valves and keeping the valves E in the raised position. The clicks *i* are pivoted upon the guide-piece or boss G, in which the spindles and also the rod *t* move. They are connected together by a spiral spring *r*. A stud *k*, secured upon the rod *t*, acts upon one of the clicks *i* in one direction (indicated by the arrow *x*) and engages it in an annular groove of the spindle *e* when brought opposite to it. The other click *i'* is similarly engaged in an annular groove of the other spindle *e'* by the action of the spiral spring *r*. Another stud *k'*, likewise secured on the rod *t*, acts

upon the second click in the opposite direction, (indicated by the arrow x',) so as to disengage it from the spindle e', the first-mentioned click i being disengaged by the spiral spring. In this way the two clicks successively engage the two spindles, and consequently the valves, while these latter are liberated simultaneously.

When the speed exceeds a certain limit, the governor-weights II swing outwardly and push the lower end of the lever h toward the right, Fig. 2, so that the upper end of said lever and the rod t, with the clicks i i', are drawn toward the left, as indicated by the arrow x in Fig. 4. Thus when the spindle e is raised by the cam f the click i will engage the notch in said spindle, and thus hold the spindle, and consequently the valve E, in an elevated position. Similarly, as soon as the stem or spindle e' is received after the spindle e the click i' will be drawn into the notch of the spindle e' by the spring r, so that this spindle also, with the corresponding valve E', will remain raised. The exhaust-valves will therefore remain open as long as the speed has not been reduced to its normal limit. With the reduction of the speed, however, the rod t will move to the right, as indicated by the arrow x' in Fig. 4, and the two valve stems or spindles e e' will be released simultaneously, or nearly so, whereafter the exhaust-valves will open alternately in the ordinary manner, that is, intermittently.

The rod t is acted upon by a spring R, the tension of which can be adjusted to vary the speed within wide limits—as, for instance, in the proportion of one to five.

The engine constructed as above described can be worked by ordinary oil of petroleum. When it it is to be worked by gas, the breech of the cylinders is provided with two chimneys and incandescent tubes, or an electric arc, according to the kind of combustion preferred. In this case the air-inlet valves C and the vaporizers are suppressed, and these latter are replaced by a tap or valve K of special construction, as shown in Fig. 5.

The improved engine is of easy construction and may be worked either in a vertical, horizontal, or an oblique position, and, owing to its lightness and the accessibility of its working parts, it is readily adaptable for the purposes of traction, navigation, electrical installations, agricultural work, and other like purposes.

I claim—

1. In an explosive-engine, a plurality of cylinders each provided with an exhaust-valve, a stem movable independently of the exhaust-valve stem and adapted to engage the same, operating mechanism for imparting a reciprocating motion to said independent stems at different times so as to open the exhaust-valves in regular succession, a click or pawl arranged to engage each of the independent stems to hold the same stationary and out of the path of said operating mechanism, a connection between said clicks, a governor actuated by the engine, and a shifting device controlled by the governor and operatively connected to the clicks, substantially as described.

2. In an explosive-engine, a plurality of cylinders each provided with an exhaust-valve, a stem movable independently of the exhaust-valve stem and adapted to engage the same, operating mechanism for imparting a reciprocating motion to said independent stems at different times so as to open the exhaust-valves in regular succession, a click or pawl arranged to engage each of the independent stems to hold the same stationary and out of the path of the said operating mechanism, a movable rod or bar carrying projections adapted to engage said clicks, and a governor controlling the position of said bar according to the speed of the engine, substantially as described.

3. In an explosive-engine, a plurality of cylinders each provided with an exhaust-valve, a stem movable independently of the exhaust-valve stem and adapted to engage the same, operating mechanism for imparting a reciprocating motion to said independent stems at different times so as to open the exhaust-valves in regular succession, a click or pawl arranged to engage each of the independent stems to hold the same stationary and out of the path of the said operating mechanism, a movable rod or bar carrying projections adapted to engage said clicks at opposite sides, a spring connecting the clicks, and a governor controlling the position of said bar according to the speed of the engine, substantially as described.

4. In an explosive-engine, a cylinder having an inlet for the gas, vapor, or other fuel, said inlet being arranged approximately tangentially to the interior curved surface of the cylinder and oblique to the plane of the cylinder-head, substantially as described.

5. In an explosive-engine, a cylinder having an inlet for the gas, vapor, or other fuel, said inlet being arranged approximately tangentially to the interior curved surface of the cylinder, and an outlet likewise arranged tangentially to said surface, but out of line with the inlet, substantially as described.

6. In an explosive-engine, a cylinder provided with a spring-controlled valve, a rod driven from the engine and adapted to periodically actuate said valve, a click or pawl arranged to hold the valve open, independently of the action of said rod, and a governor controlling the position of the click or pawl according to the speed of the engine, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EUGÈNE FESSARD.

Witnesses:
LÉON FRANCKEN,
CLYDE SHROPSHIRE.