N° 14,259 A.D. 1901

Date of Application, 12th July, 1901—Accepted, 24th Aug., 1901

COMPLETE SPECIFICATION.

"Improvements in Explosion Engines."

I, RALPH LUCAS, of Motor Works, Upper Liebert Road, Westcombe Park, London, S.E., Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

The object of this invention is to provide a perfectly balanced oil engine especially applicable for motor cars.

In a cylinder move two pistons which alternately approach and recede from one another and are connected direct to crank pins carried each by two fly wheels rotating in closed crank chambers and driving shafts geared by bevel wheels with the main shaft.

As the pistons travel inwards air is sucked into the crank chambers and is compressed during the outstroke and then admitted to the cylinder, passing on its way the oil feed and taking oil with it: during the instroke the pistons compress the charge which is exploded at the end of the instroke forcing the pistons apart. Each charge as it enters the space between the pistons through a port at one end of the cylinder sweeps out the remains of the former charge through a port at the other end, these ports being covered and uncovered by the pistons.

Figure 1 is a plan and Figure 2 a horizontal section of an engine made according to my invention: Figure 3 is an elevation of the cylinder and oil feed and Figures 4 and 5 sections on the lines 4. 4 and 5. 5 Figure 3.

a is the cylinder provided with a water jacket a^1 and having in it two pistons b b^1 carrying pins c^1 which pivot the rods c^2 connecting the pistons to the crank pins c^3 each of which is carried by two flywheels c^4 c^5 rotating in closed chambers d. One of each pair of wheels c^4 is carried by a stud axle d^1 while the other c^5 is fast with a shaft e which by bevel wheels e^1 drives the main shaft f.

One of the stud axles d^1 carries the governor g comprising two pairs of links g^1 pivotted to one another at g^2 and by their centrifugal movement moving a collar g^3 which actuates through a bell crank g^4 a link g^5 turning a throttle valve g^6 between the oil feed h and the charge inlet port i. The oil feed may be of any convenient form but I prefer to use that described in my former Specification No. 491 of 1900.

In order to 'set' the governor so that the throttle valve may be closed at a predetermined speed I attach an adjustable spring g^7 to the bell crank g^4 and so the valve is closed at a given speed according to the tension of the spring.

The cylinder wall has three ports formed in it, the charge inlet port i never uncovered by the rear of the piston b but admitting the charge of oil and air to the space between the pistons at the end of their outstroke the air inlet port i^1 never uncovered by the front of the piston b and admitting air from the outside atmosphere to the crank chambers d connected together by the pipe d^2 which also opens into the oil feed at d^3 and the exhaust port i^2 uncovered by the piston b^1 at the end of the outstroke.

In order to start the engine a turn is given to the main shaft: as the pistons move inwards, air is drawn through the port i^1 to fill the chambers d and pipe d^2: as the pistons move out the port i^1 is covered, the air is compressed until the port i leading from the oil feed is uncovered when the compressed air rushes in to the cylinder carrying with it some oil which is not in sufficiently intimate

contact with it to form an explosive mixture. The new charge sweeps through the cylinder clearing out of it the remains of the old charge through the exhaust port i^2 which is slightly wider than the port i (so that the exhaust is uncovered before the inlet) but only so wide that it is covered again by the piston b^x before the new charge can reach it and escape. The charge is exploded in any convenient way preferably by an electric spark in the ignition chamber a^2 furnished by a battery and a commutator driven from the main shaft. An explosion takes place at the end of every instroke and forces the pistons apart to compress the air for the next charge.

It will be observed that owing to the proximity of the oil feed to the charge inlet port, no oil ever passes back into the crank chambers.

c^{3x} are passages for the conveyance of lubricant to the crank pins. Oil supplied from cups e^2 passes along the shafts e and axles d^1 to the annular chambers e^3 d^3 whence it passes by the passages c^{3x} to the crank pin.

Though the engine has been described as an oil engine it is equally applicable for use with gas.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. The combination of two pistons connected to two crank pins each carried by a pair of flywheels with two shafts geared together substantially as described.
2. The combination of a cylinder, two pistons moving therein and connected to two crank pins each carried by a pair of flywheels rotating in closed chambers, an exhaust port uncovered by one of the pistons near the end of the outstroke, a port connecting the chambers with the cylinder and uncovered by the other piston just after the exhaust port has been uncovered and a port admitting air to the chambers and uncovered by one of the pistons near the end of the instroke substantially as described.
3. Engines substantially as described and illustrated.

Dated this 10th day of July 1901.

RALPH LUCAS.

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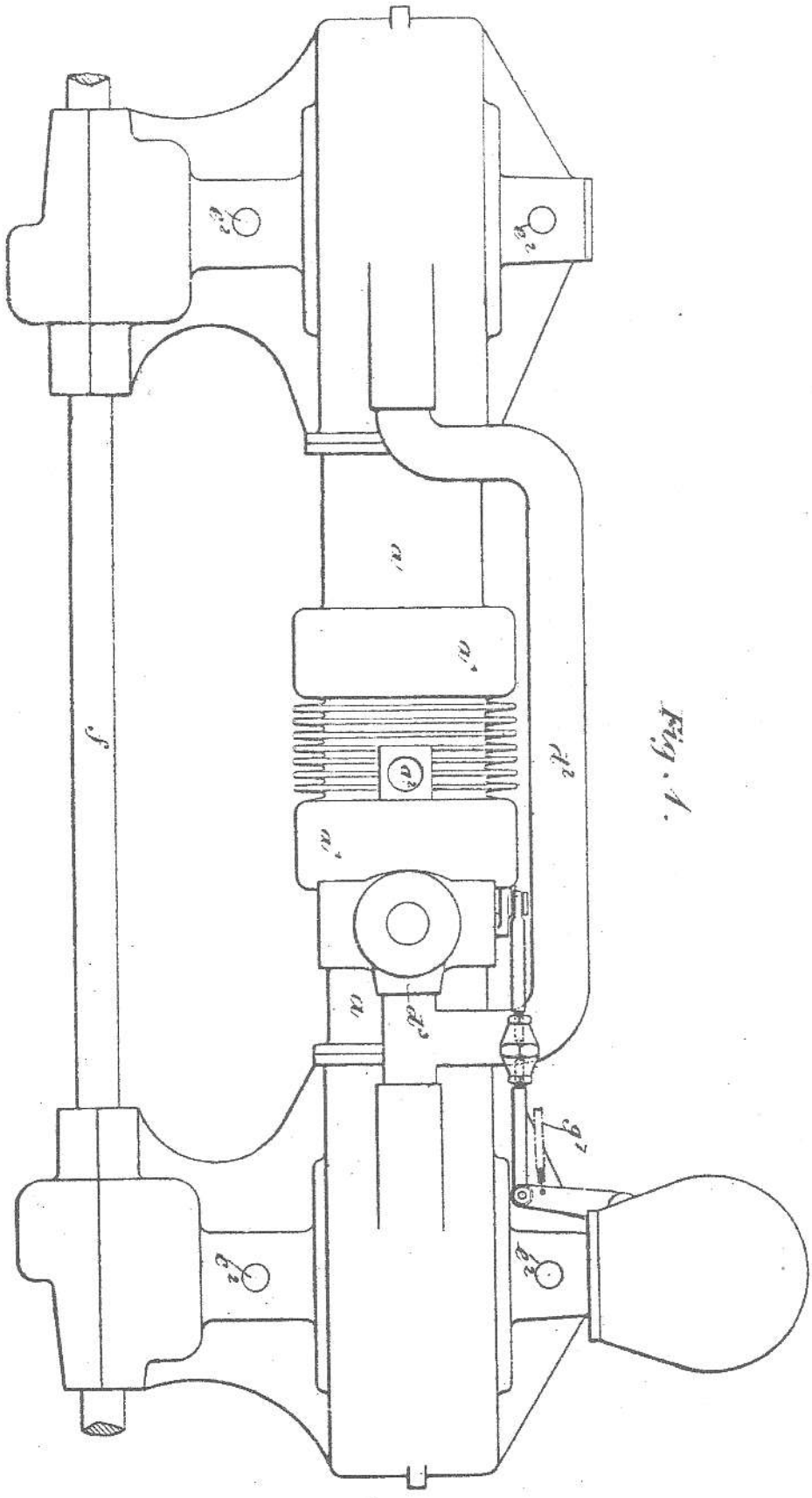


Fig. 1.

[This Drawing is a reproduction of the Original on a reduced scale]

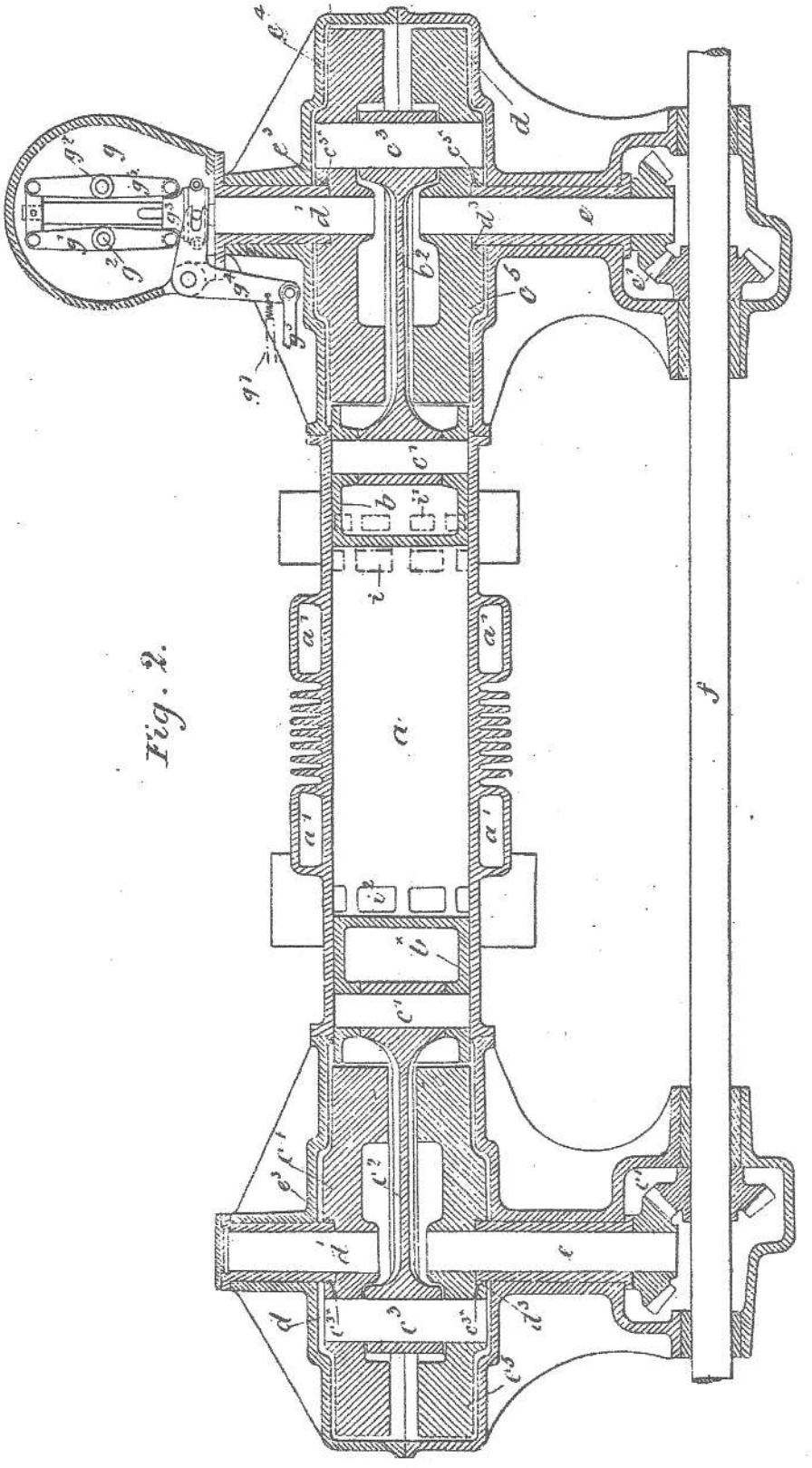
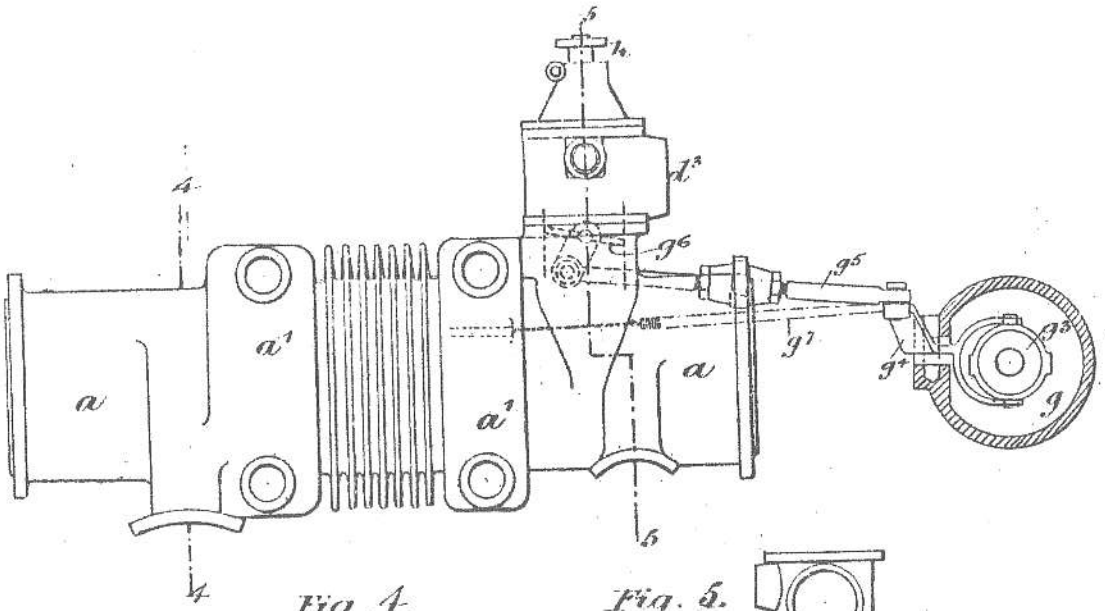


Fig. 2.

Fig. 3.



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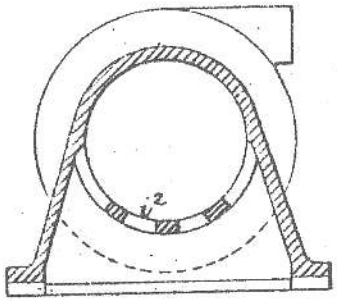

Fig. 5.