

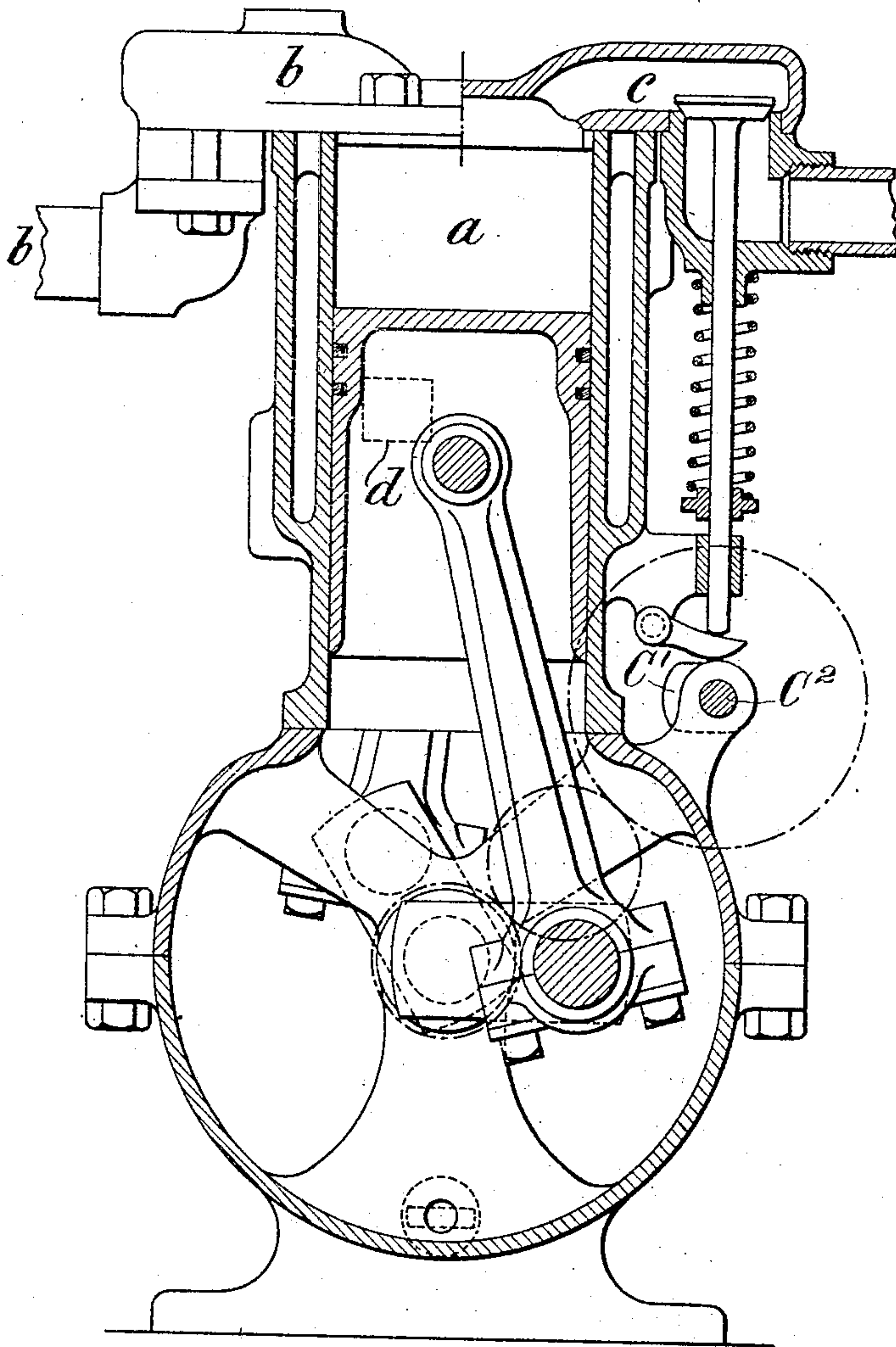
No. 803,623.

PATENTED NOV. 7, 1905.

E. T. POLLARD.
EXPLOSION ENGINE.
APPLICATION FILED OCT. 20, 1904.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
W. Fanning
K. F. Gary

Inventor.
E. T. Pollard
By his attorneys
Baldwin & Wright.

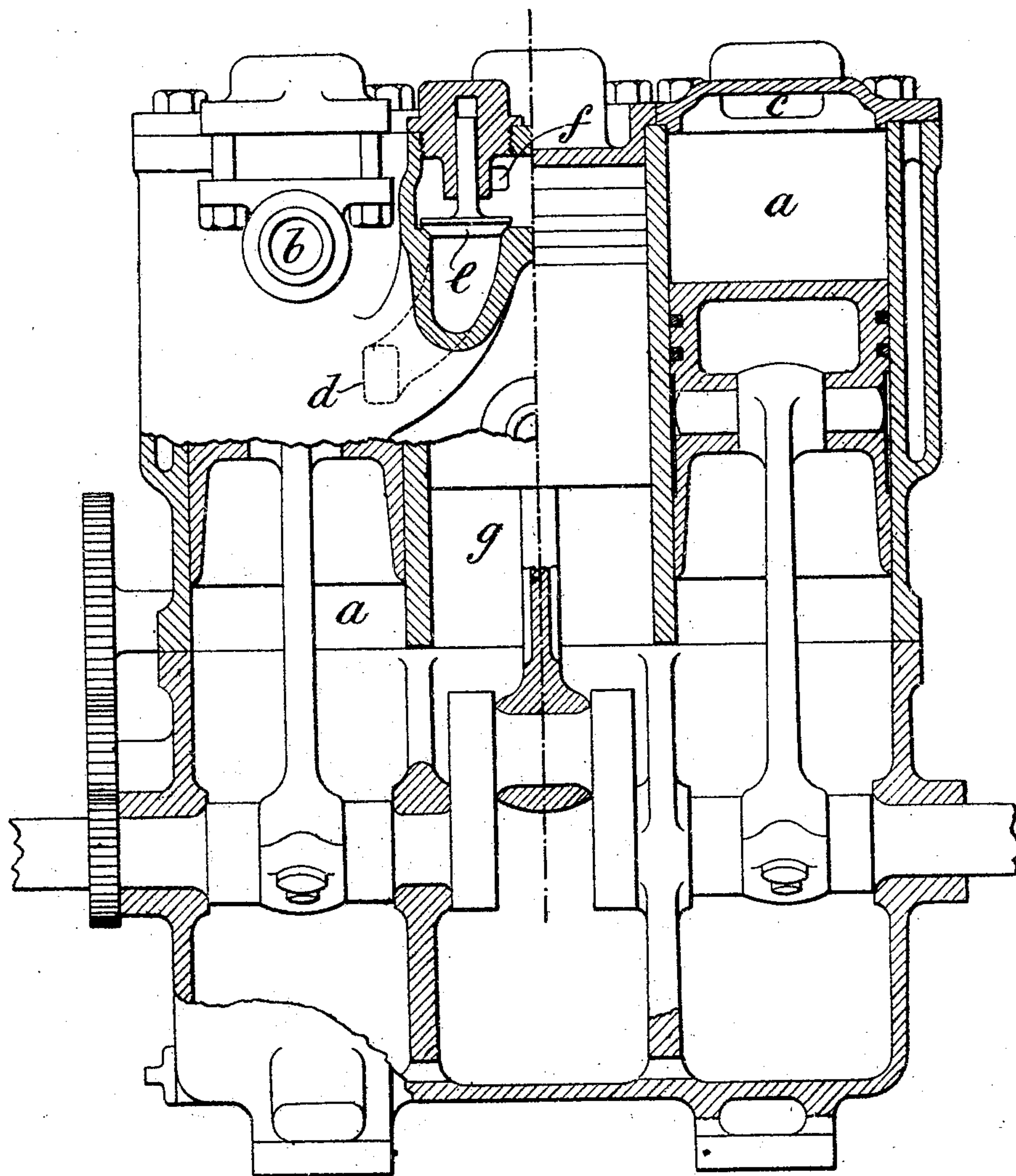
No. 803,623.

PATENTED NOV. 7, 1905.

E. T. POLLARD.
EXPLOSION ENGINE.
APPLICATION FILED OCT. 20, 1904.

3 SHEETS—SHEET 2.

Fig. 2.



Witnesses.

L. H. Penning
K. F. Gary

Inventor.

E. T. Pollard
By his attorneys
Baldwin & Wright

No. 803,623.

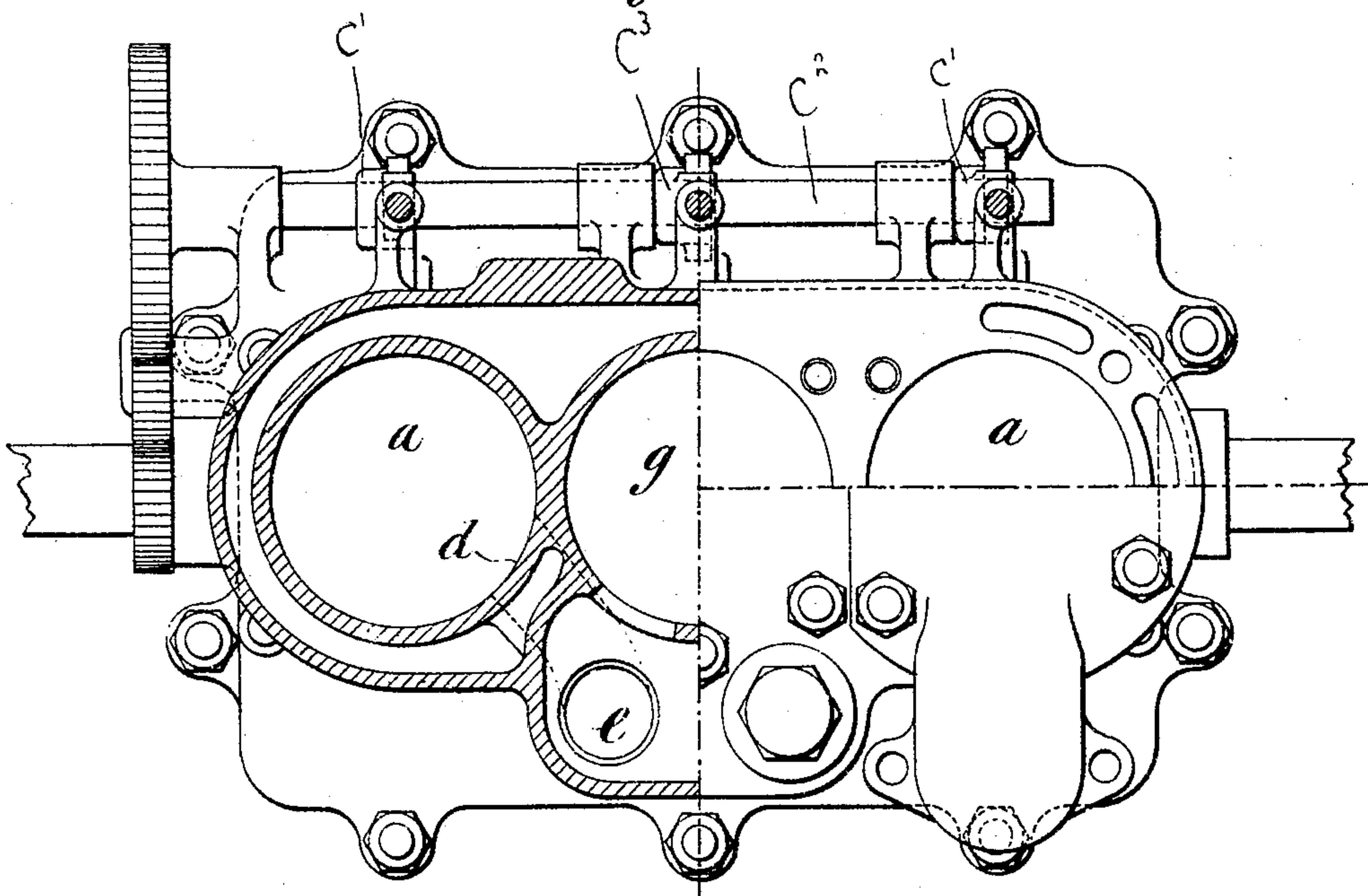
PATENTED NOV. 7, 1905.

E. T. POLLARD.
EXPLOSION ENGINE.

APPLICATION FILED OCT. 20, 1904.

3 SHEETS—SHEET 3.

Fig. 3.



Witnesses
L. H. Fanning
K. F. Gary

Inventor.
E. T. Pollard
By his attorneys
Baldwin & Wright

UNITED STATES PATENT OFFICE.

EDWARD THOMAS POLLARD, OF LONDON, ENGLAND.

EXPLOSION-ENGINE.

No. 803,623.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed October 20, 1904. Serial No. 229,297.

To all whom it may concern:

Be it known that I, EDWARD THOMAS POLLARD, engineer, a citizen of the United States of America, residing at 49 Cannon street, in the city of London, England, have invented certain new and useful Improvements in Explosion-Engines, of which the following is a specification.

The object of this invention is to provide a compound explosion-engine of high efficiency. With this object my engine has three cylinders, two of which (preferably the two outside cylinders) are ordinary explosion-cylinders, but each provided with a port or ports so situated as to be uncovered by the piston just at the end of its outstroke. The port communicates by a passage in which is a non-return valve with the rear of the middle cylinder. Thus the products of combustion pass from the explosion-cylinders to the middle cylinder, where they act expansively. An explosion takes place every revolution, but alternately in the two outside cylinders, so that the middle piston receives an impulse every revolution.

A great advantage of my arrangement is that all back pressure on the pistons in the explosion-cylinders is avoided, for each explosion-cylinder has its own independent exhaust-valve, which, owing to the non-return valves in the passages, can be opened immediately the dead-center has been passed without allowing any loss of pressure in the expansion-cylinder, and thus a very free exhaust is obtained.

Figure 1 is a section at right angles to the shaft; Fig. 2, a section parallel to the shaft, and Fig. 3 a plan.

a a are the two explosion-cylinders, an explosion taking place in the one every even stroke and in the other every odd stroke.

b represents the admission-ports; *c*, the exhaust-ports, each operated every alternate stroke by cams *c'* on the cam-shaft *c''*.

The pistons in the cylinders *a a* uncover just at the end of their outstroke ports *d*, by which the products of combustion pass by non-return valves *e* to passages *f*, and so to the top of the cylinder *g*, the piston in which is connected to a crank at a suitable angle (say about one hundred and twenty degrees behind) to those of the other pistons and is acted upon every stroke by the products of combustion from one or other of the explosion-cylinders.

The exhaust-valve of the cylinder *g* is not

shown, but is similar to those of cylinders *a*, one of which is shown in Fig. 1, except that it is opened once every revolution by its cam *c''* instead of once every two revolutions.

In place of the low-pressure cylinder being alongside the explosion cylinder or cylinders it may be arranged at an angle, while its piston is connected to the same crank as the explosion-piston or to one in line with it.

The cycle is as follows: An explosion occurs in the left-hand cylinder and the piston therein is driven out, uncovering at the end of its stroke the port *d*, through which the products of combustion expand into and fill the passage *f* and enter the middle cylinder, whose piston should be just at its inmost position as the port begins to be uncovered. Meanwhile a charge has been drawn into the right-hand cylinder. As soon as the left-hand piston starts its instroke its exhaust-port is opened and the valve *e* closes, owing to the pressure in the middle cylinder, and there is therefore no back pressure to retard the instroke of the left-hand piston. The charge in the right-hand cylinder is compressed and as soon as the central piston has completed its outstroke the central exhaust-valve is opened. An explosion occurs in the right-hand cylinder and the products of combustion pass by port *d* and passage *f* to the central cylinder, and so on. It will thus be seen that except for the compression of the charge in the two outer cylinders there is a free exhaust whenever any one of the pistons is moving inward.

A further advantage given by my arrangement is that the reduction of pressure in the explosion-cylinders before the opening of the exhaust-valves allows of a more complete combustion than is usually possible. Thus both the smell and the noise of the exhaust are greatly lessened, if not completely done away with.

What I claim is—

1. The combination of two explosion-cylinders, an expansion-cylinder, ports in the explosion-cylinders uncovered at the end of the outstroke, passages connecting the ports to the rear of the expansion-cylinder, and non-return valves in the passages, substantially as described.

2. The combination of two explosion-cylinders, an exhaust-valve for each cylinder, an expansion-cylinder, an exhaust-valve opening from this cylinder, ports in the explosion-cylinders uncovered at the end of the out-

stroke, passages connecting the ports to the rear of the expansion-cylinder, and non-return valves in the passages, substantially as described.

- 5 3. The combination of two explosion-cylinders, an exhaust-valve for each cylinder, means for opening these valves alternately every revolution, an expansion-cylinder, an exhaust-valve opening from this cylinder,
10 means for opening this last-mentioned valve

every revolution, ports in the explosion-cylinders uncovered at the end of the outstroke, passages connecting the ports to the rear of the expansion-cylinder, and non-return valves in the passages, substantially as described. 15

EDWARD THOMAS POLLARD.

Witnesses:

EMIL J. PETERMANN,
R. WESTACOTT.