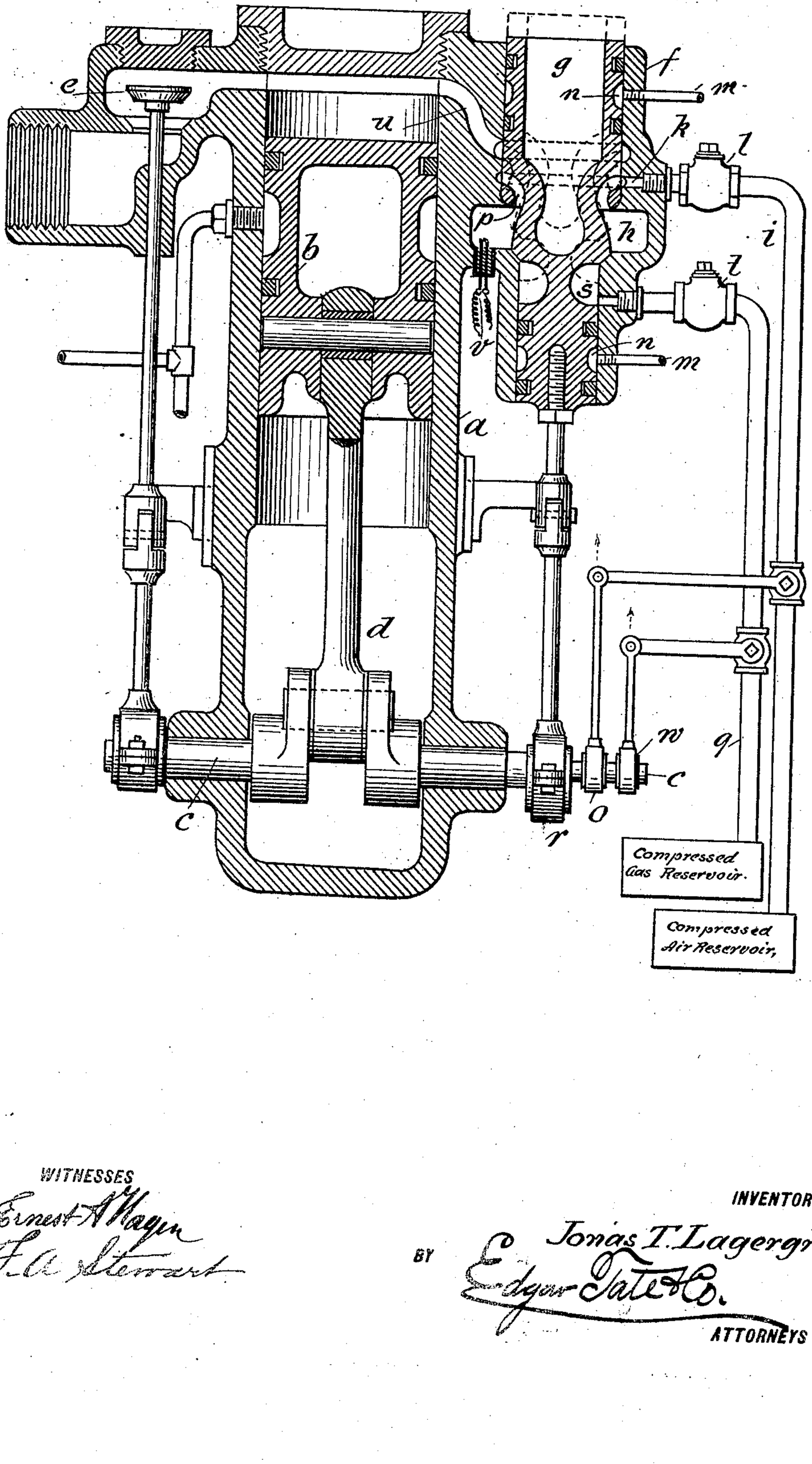
No. 842,468. PATENTED JAN. 29, 1907.

J. T. LAGERGREN.

EXPLOSION ENGINE.

APPLICATION FILED MAY 16, 1905.



WITNESSES

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EXPLOSION-ENGINE.

No. 842,468. Specification of Letters Patent. Patented Jan. 29, 1907.

Application filed May 16, 1905. Serial No. 260,605.

To all whom it may concern:

Be it known that I, JONAS T. LAGERGREN, a subject of the King of Sweden, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Explosion-Engines, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to what are known as "explosion-engines," and the object thereof is to provide an improved device of this class in which air and gas are used and in which the explosion takes place in an independent chamber separated from the main piston-cylinder and adapted to be placed in communication therewith at the moment the explosion is effected, this communication being controlled by a valve construction whereby the exploded gases are led into the main piston-cylinder for the purpose of expanding therein, a further object being to provide an engine of the class specified with chambers into which air under pressure and into which gas under pressure is admitted prior to the time of commingling of such gas and air and prior to the time that the explosion is desired and in which at the moment of explosion the communication between the main cylinder and the explosion-chamber is established; and with these and other objects in view the invention consists in an improvement in explosion-engines as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my improvement are designated by suitable reference characters, said drawing being a sectional view of an explosion engine or motor constructed according to my invention.

In the application of my invention as shown in the drawing I provide an auxiliary piston-cylinder *f*, arranged, preferably, longitudinally to the main cylinder *a* of any form of pressure-fluid explosion-engine. As illustrated, the main cylinder *a* is provided with a piston *b*, actuating in the usual manner the crank-shaft *c* by means of the connecting-rod *d*. The piston *b* is shown as finishing its return stroke and the exploded gases are escaping, as usual, by means of an exhaust-valve *e*, which latter is operated by means of an eccentric fastened to the main shaft *c*. As is usual with this style of engines, the same is provided with packing-rings, means for lubrication, &c., all such features not forming a part of my invention and not being specifically claimed herein.

The auxiliary piston-chamber *f* is provided with a spool-shaped reciprocating piston-valve *g* and contains a centrally-located chamber *h*, which is concentric to the central portion of the piston-valve *g*. Compressed air from a reservoir, as shown in the drawing, or direct from an air-compressor is admitted by means of a pipe *i* into the port *k* of the piston-cylinder *f*. A check-valve *l* is interposed to intercept, as is usual, the back pressure from the piston *f* into the compressed-air reservoir. Pipes *m* admit lubricating-oil to the inner chambers *n* of the piston *g*.

As is shown in the drawing, in this instance the air is admitted direct from an air-tank, such admission being controlled by means of an eccentric *o* placed on the main shaft *c*. Instead of this construction any other device, such as a compressor, may be used for admitting the air into the annular chamber *h*. The air-inlet port *k* of the valve-cylinder *f* communicates, when in the position shown in the drawing, with communicating ports *p*, which form part of the piston *g*, and said ports *p* enter into the annular chamber *h*, thereby establishing direct communication between the compressed-air reservoir and said annular chamber *h*.

Compressed gas is admitted to an annular chamber *s* in the piston-valve *g* from a reservoir by means of the pipe *q* and check-valve *t*, such admission being regulated by means of the eccentric *w*, located on the main shaft *c*. Both annular chambers *h* and *s* are separated from each other when the valve is seated as shown in full lines in the drawing, but will communicate with each other and form one single chamber when the valve is brought in position as shown by dotted lines in the drawing, at which position the air-ports *p* communicate with an admission-port *u*, which latter leads to the main piston-cylinder *a*, giving thereby access to the same and to the gas contained in the now combined chamber *h* and *s*.

In the operation of my invention compressed air is admitted, by means of the pipe *i*, check-valve *l*, the port *k*, and supplemental ports *p*, into the annular chamber *h*, and compressed gas is admitted, by means of the pipe *q*, check-valve *t*, into the annular cham-

ber *s*. The eccentric *r*, which governs the reciprocating motion of the valve-piston *g*, is set in such a manner that when communication between the supplemental ports *p* and the air-inlet port *k* has been cut off by the forward motion of the piston *g* and just prior to the explosion of the commingled air and gas by means of the electric generator *j* inter communication between *u* and *p* will be established immediately prior to the finish of the outwardly-extending reciprocating stroke of the piston *g*, and the exploded gases contained in the now combined chamber *s* and *h* will have free access to the admission-port *u* back of the cylinder *b* in order to produce, by means of its expansion, its actuating force against the main piston *g*.

It will thus be seen that the explosion of the pressure fluid contained within the annular chambers *h* and *s* actually takes place within the latter instead of directly behind the piston, thereby producing a more even explosion and longer duration of time in expanding than if the same would have been exploded back of the main piston *b*, as is usual in many cases of pressure-engines of similar construction.

As above described, the check-valves *l* and *t* prevent back pressure and back explosion into the compressed air and compressed-air tank. At the return stroke of the valve-piston *g* the inlet-port *u* is cut off again, and the port *k* for the compressed air, as well as the port for the compressed gas, are again placed in communication with the compressed air and compressed-gas reservoir, and the two annular chambers *h* and *s* are again separated from each other and form independent chambers for a repetition of the above-described method of charging, igniting, and exploding the combustible material needed for the operation of my improved explosion-engine.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an explosion-engine, a main cylinder provided with a reciprocating piston, a valve-cylinder and a valve working therein and forming separate annular air and gas chambers when the valve is in the closed position, means for introducing compressed air and gas into said air and gas chambers respectively, said chambers upon the opening of the valve being united into one chamber which after the union of said separate annular chambers serves as an explosion-chamber for the therein-contained fluids under pressure, and an intercommunicating port between said explosion-chamber and the main piston-cylinder, substantially as shown and described.

2. In an explosion-engine, a main cylinder, a casing adjacent thereto and the opposite end portions of which are formed into piston-valve cylinders, a combination piston-valve mounted in said casing and comprising two end piston-valve members movable in said cylinders and connected by a reduced portion forming a gas-chamber, said casing being also provided centrally thereof with an air-chamber, said gas and air chambers being thrown into communication by the movement of the piston-valve to form an explosion-chamber, a gas-supply connected with one end portion of said casing and adapted to supply gas to said gas-chamber, an air-supply connected with the opposite end portions of said casing, and ports or passages formed in the piston-valve member in the last-named end portion of said casing and adapted to form a communication between the air-supply and the air-chamber, the last-named end portion of said casing being also provided with a port or passage which communicates with the main-piston cylinder and said air-chamber being provided with an igniter, substantially as shown and described.

3. In an explosion-engine, a main cylinder provided with a main piston and a casing at one side thereof, said casing being composed of two parts forming piston-valve cylinders, a combination piston-valve mounted in said casing and composed of two piston-valve members connected by a reduced neck-shaped portion forming a gas-chamber, said casing being also provided with an air-chamber, an air-supply device connected with one end portion of said casing, a gas-supply connected with the opposite end portion of said casing, and means whereby the movement of said piston-valve will form a communication between the gas-chamber and the air-chamber, and between the air-supply and the air-chamber, and between the air-chamber and the main cylinder, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of the subscribing witnesses, this 13th day of May, 1905.

JONAS T. LAGERGREN.

Witnesses:
F. A. STEWART.
C. J. KLEIN.