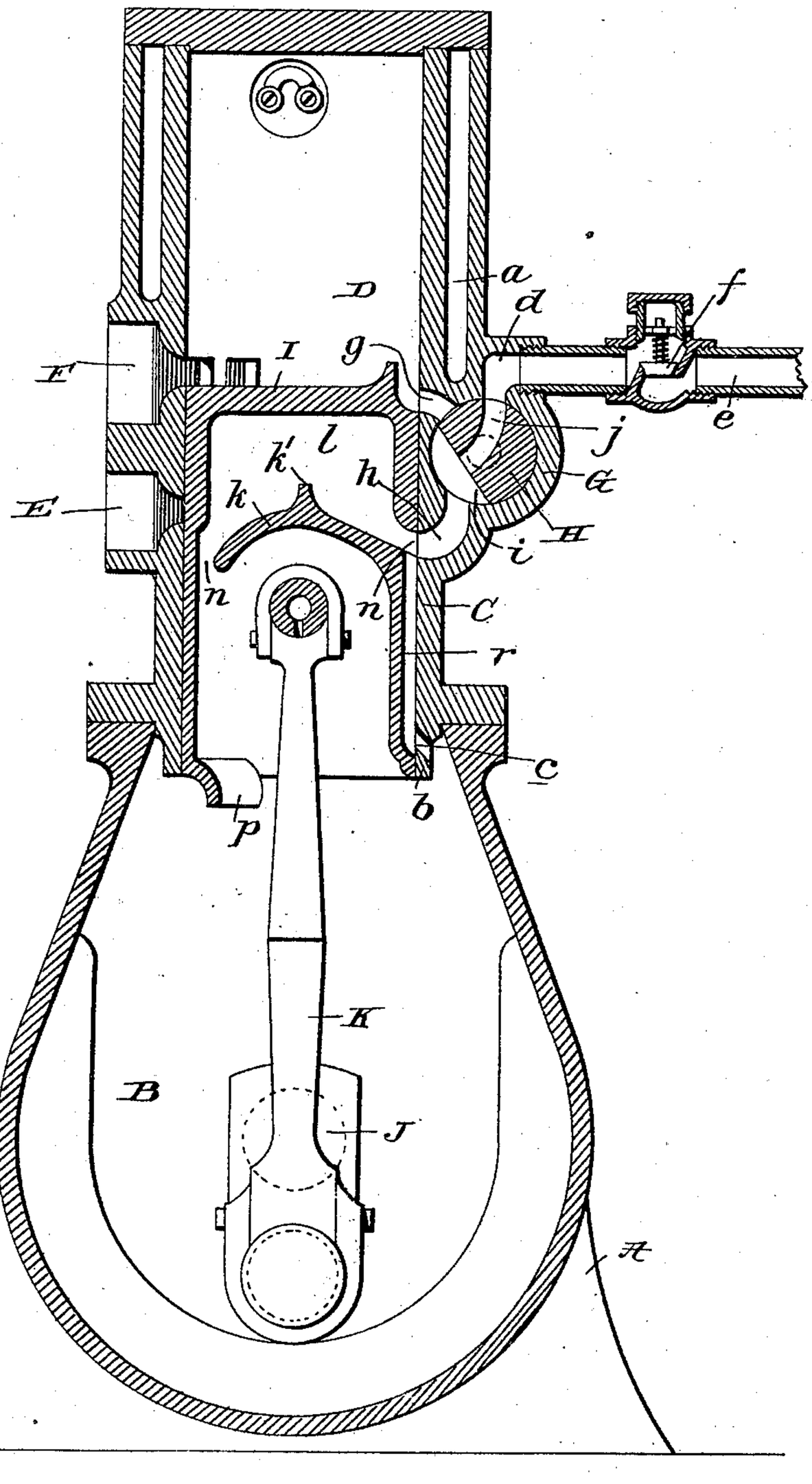
No. 665,881. Patented Jan. 15, 1901.

C. R. DAELLENBACH.

REAR COMPRESSION EXPLOSIVE ENGINE.

(Application filed May 8, 1900.)

(No Model.)



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REAR-COMPRESSION EXPLOSIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 665,881, dated January 15, 1901.

Original application filed February 23, 1900, Serial No. 6,277. Divided and this application filed May 8, 1900. Serial No. 15,896. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. DAELLENBACH, a citizen of the United States, residing at Park Gate, in the county of Beaver and State of Pennsylvania, have invented new and useful Improvements in Explosive-Engines, of which the following is a specification.

My invention relates to explosive-engines, and has for its general object to provide a simple and durable explosive-engine which, without the employment of check or non-return valves or other small working parts such as are likely to frequently get out of order, is calculated to effectually prevent commingling of air and gas or other fuel prior to the passage thereof into the explosive-chamber and the objectionable and dangerous back explosions so frequently incident thereto.

Another object of the invention is to provide an explosive-engine in which various low-grade hydrocarbons may be used to advantage as fuel without the necessity of changing the fuel-supply pipe.

Other advantageous features of the invention will be fully understood from the following description and claims when taken in conjunction with the accompanying drawing, in which the figure is a vertical central section of a two-cycle engine constructed in accordance with my invention.

Referring by letter to said drawing, A is the base or pedestal of my improved explosive-engine, in which is formed a crank-chamber B, and C is a cylinder mounted and suitably secured on the base and provided in its upper portion with an explosion or combustion chamber D, surrounded by the usual water-jacket *a*. The cylinder C extends down into the crank-chamber a slight distance, as indicated by *b*, and is provided in said extension with a port *c*. It is also provided at one side with an air-inlet port E and an exhaust-port F and at its opposite side has an offset forming a valve-casing G. This casing G has a port *d* for the connection of a fuel-supply pipe *e*, in which is a non-return valve *f*, and is connected with the interior of the cylinder by upper and lower ports or passages *g h*, the latter being curved, as shown, so as to form a pocket to catch gasolene or other fuel, as will be hereinafter pointed out.

H is a rocking valve arranged and adapted to turn in the casing G. This valve is of circular form in cross-section with a segment removed, as indicated by *i*, and is provided with a port *j*. It is adapted in one position to establish communication between the fuel-inlet port *d* and the port *h* and close the port *g* and in another position to close the port *d* and establish communication between the ports *h* and *g*.

I is the working piston of the engine. This piston is hollow and is peculiar in that it is provided with a partition *k*, with a deflector *k'* thereon, a gas-chamber *l* above the same, and ports *n n* communicating with the chamber. Said piston is also peculiar in that it has a depending deflector *p* at its lower end and is provided in its outer side with a longitudinal conduit *r*, which extends downwardly from the port *n* and is adapted, when the piston is in the position shown, to communicate with the port *c*.

J is a crank-shaft journaled in the side walls of the base or pedestal, and K is a rod interposed between and connected to said shaft and the piston after the usual manner.

The parts of my improved engine are so arranged that when the piston moves inward it creates a partial vacuum in the crank-chamber and at the same time draws a charge of gas or gasolene through the valve-port *j*, the cylinder-port *h*, and the piston-ports *r n* into the gas-chamber *l*, where such gas is heated and expanded by the hot inner end wall of the piston. At the completion of the inward stroke of the piston the air-inlet port E is uncovered and air rushes in and occupies the crank-chamber, while upon the subsequent outward stroke of the piston such air is compressed and backed against the gas, whereby more gas is prevented from entering the gas-chamber. This continues until the piston-port *n* becomes coincident with cylinder-port *h*, and the valve H is moved to a position to establish communication between the cylinder-ports *h* and *g*, when the gas, followed by the air, will rush into the explosion-chamber D, wherein they will be com-

mingled and from which they will expel the products of the previous explosion. In passing through the gas-chamber of the piston *en route* to the explosion-chamber the air will also be heated and expanded, and hence enabled to commingle more quickly and thoroughly with the previously-heated gas and form a highly-explosive mixture, which conduces to the quick action and power of the engine. Incident to the subsequent inward stroke of the piston the explosive mixture is compressed in the explosion-chamber, and the valve H is moved to the position shown, so that a fresh charge of gas is drawn into the chamber *l*, and at the completion of such inward movement the explosive in the explosion-chamber is ignited, when the piston will be forced outwardly and the operation described will be repeated.

The pocket formed by the curved cylinder-port *h* serves to catch and hold gasolene, but in the event of any gasolene or gas entering the piston-port *r* it will, when the piston reaches the position shown and the valve H connects the ports *h* and *g*, be blown out of said port *r* and mixed with gas passing from chamber *l* by the compressed air in the crank-chamber acting through the cylinder-port *c*.

The depending deflector *p* on the piston serves, when the port E is uncovered, to direct the entering air downwardly, so that the gas will be held in the gas-chamber, and when communication is established between the gas and explosion chambers the gas will enter the latter chamber in advance of the air, which is desirable, as it lessens the liability of a premature explosion.

In addition to forming a pocket adapted to catch and hold gasolene the curved port *h* serves, when communication is established between the gas and explosion chambers, to discharge the gas and air toward the latter.

By virtue of the construction described it will be observed that incident to the normal running of the engine a full charge of gas is drawn into the chamber *l* at each revolution of the shaft J. It will also be observed that the gas, which alone is non-explosive, is not commingled with the air necessary to support combustion until the explosion-chamber is reached, and consequently back explosions are effectually prevented.

The valve H may be operated and the explosive mixture ignited in the chamber D by any suitable means, although I prefer to employ the mechanism disclosed in my contemporary application filed February 23, 1900, Serial No. 6,277, of which this application is a division.

Having thus described my invention, what I claim is—

1. An explosive-engine comprising a cylinder and a piston therein, the cylinder being divided by the piston into an explosion-chamber and a compression-chamber, and the piston having a gas-chamber, an air-inlet port opening into the compression-chamber, a fuel-inlet port, and means for controlling communication between the gas and explosion chambers and communication between the fuel-inlet port and said gas-chamber.

2. An explosive-engine comprising a cylinder and a piston therein, the cylinder being divided by the piston into an explosion-chamber and a compression-chamber and the piston having a gas-chamber in constant communication with the compression-chamber, a passage for connecting the gas and explosion chambers, a fuel-inlet port, a valve for controlling the said passage and also controlling communication between the fuel-inlet port and the gas-chamber, and means for operating the valve.

3. An explosive-engine comprising a cylinder and a piston therein, the cylinder being divided by the piston into an explosion-chamber and a compression-chamber, and the piston having a gas-chamber in constant communication with the compression-chamber and also having an auxiliary passage, an air-inlet port opening into the compression-chamber, a port for connecting the compression-chamber and the auxiliary passage of the piston, a fuel-inlet port, and means for controlling communication between the gas-chamber and auxiliary passage of the piston and the explosion-chamber, and communication between the fuel-inlet port and the gas-chamber of the piston.

4. An explosive-engine comprising a cylinder and a piston therein, the cylinder being divided by the piston into an explosion-chamber and a compression-chamber and the piston having a gas-chamber in constant communication with the compression-chamber, an air-inlet port opening into the compression-chamber, a valve-casing having a fuel-inlet port and also having ports for connection with the explosion and gas chambers, and a suitably-operated valve in said casing for controlling communication between the gas and explosion chambers and communication between the fuel-inlet port and the gas-chamber, substantially as specified.

5. An explosive-engine comprising a cylinder and a piston therein, the cylinder being divided by the piston into an explosion-chamber and a compression-chamber and the piston having a gas-chamber in constant communication with the compression-chamber and also having an auxiliary passage connected with the gas-chamber, an air-inlet port opening into the compression-chamber, a port for connecting said compression-chamber and the auxiliary passage of the piston, a valve-casing having ports for connection with the gas and explosion chambers and also having a fuel-supply port, and a suitably-operated valve in said casing for controlling communication between the gas and explosion chambers and communication between the fuel-inlet port and said gas-chamber, substantially as specified.

6. An explosive-engine comprising a cylin-

der and a piston therein, the said cylinder being divided by the piston into an explosion-chamber and a compression-chamber, and the piston having a gas-chamber, an air-inlet port opening into the compression-chamber, a fuel-inlet port, and means whereby the fuel is conducted into the gas-chamber of the piston prior to being carried with the air into the explosion-chamber.

7. An explosive-engine comprising a cylinder having an explosion-chamber and a compression-chamber, a piston therein having a gas-chamber connected with the compression-chamber, an air-inlet port opening into the compression-chamber, a fuel-inlet port and means whereby fuel is conducted into the gas-chamber and is then carried before the air into the explosion-chamber, substantially as specified.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES R. DAELLENBACH.

Witnesses:

JOHN PARKER,

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