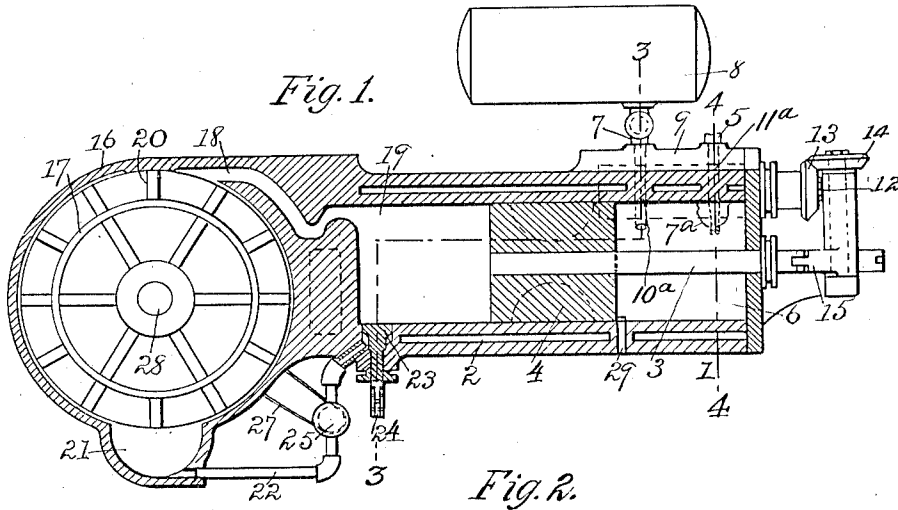
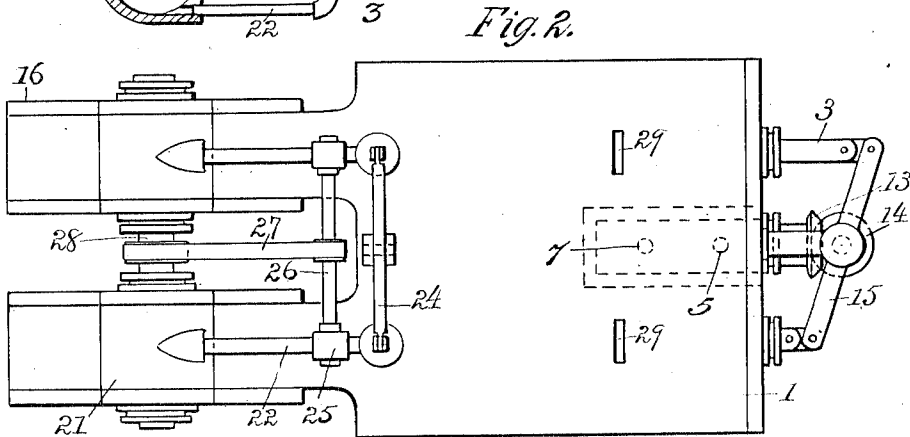
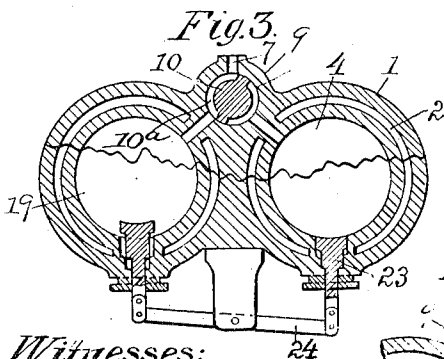
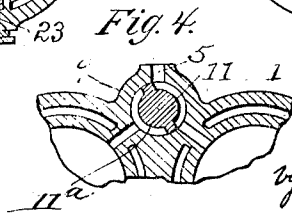
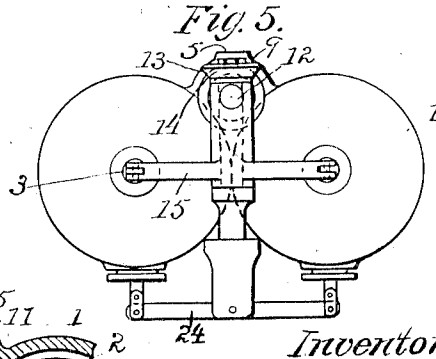


E. L. SEERY.
ENGINE.
APPLICATION FILED MAR. 10, 1905.

1,107,853.

Patented Aug. 18, 1914.



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UNITED STATES PATENT OFFICE.

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ENGINE.

1,107,853.

Specification of Letters Patent.

Patented Aug. 18, 1914.

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To all whom it may concern:

Be it known that I, EDWARD L. SEERY, a citizen of the United States, and a resident of Waterbury, in the county of New Haven and State of Connecticut, have invented a new and Improved Engine, of which the following is a specification.

My invention relates more especially to the class of engines known as explosive or gas engines, in which gas is admitted to the cylinder and then expanded as by exploding with an electric spark, the force of the explosion driving the piston.

The object of my invention is to provide a device of this class in which the full benefits of the force of the explosion may be obtained; and a further object of the invention is to provide a device in which the force generated by the explosion shall be gradually communicated to the driven mechanism.

One form of device in the use of which these objects may be attained is illustrated in the accompanying drawings, in which—

Figure 1 is a view in central longitudinal section through the left hand cylinder of an engine embodying my invention, the term "left" being used with respect to the device as seen in Fig. 5. Fig. 2 is a bottom view of the engine, the pistons being shown in a position reversed from that shown in Fig. 1. Fig. 3 is a view in cross section through the cylinders on plane denoted by dotted line 3—3 of Fig. 1, the parts being in the position denoted by Fig. 2 with the exception of the valves 23, which are in the position assumed just after the piston in the left hand cylinder begins its forward stroke, the left hand cylinder being uppermost in Fig. 2. The point of view is from the left of the device as seen in Fig. 1. Fig. 4 is a view in cross section through a valve chamber on plane denoted by dotted line 4—4 of Fig. 1, the point of view being from the right of the device as shown in Fig. 1 and the parts being in the position as shown in Fig. 2. Fig. 5 is an end view of the engine.

In the accompanying drawings the numeral 1 denotes cylinders, of which there are preferably two, as shown in Figs. 3 and 5 of the drawing. These cylinders are constructed in any well known manner common to devices of this class, with spaces 2 forming water jackets and heads through which piston rods 3 of pistons 4 extend. The openings through which said rods extend are suit-

ably packed and each of the pistons may be constructed in any well known manner.

Inlets 5 communicate with one end of each of the cylinders, these inlets extending from a carbureter, common to this type of engine, by means of which a combustible mixture of gas and air is supplied to the chamber 6 in each of the cylinders. The carbureter has not been shown in the drawings as its location and function will be readily understood by those skilled in the art. Wires or terminals 7^a, connected with any suitable source of electric energy, are located in each of the cylinders as a means for exploding the charge, the spark for obtaining this result being obtained in any well known manner common to devices of this class. An air inlet 7 communicates with each of the cylinders on that side of the piston in which the explosion takes place, and this air inlet may be connected with any suitable source of air supply. In the drawings herein I have shown a tank 8 in which the air may be contained, but it will be obvious that the air may be supplied from any other suitable source.

A valve casing 9 is located preferably between the two cylinders, in which casings are mounted a valve 10 for controlling the supply of air from the air supply 8 and a valve 11 for controlling the supply of gas to the cylinder. These valves are preferably located on the same valve shaft and occupy the relative positions illustrated in Figs. 3 and 4, that is, both valves are opened to each cylinder during the movement of its piston under the force of explosion. The valve shaft 12, to which the valves 10 and 11 are connected, is of cylindrical form and has its greater part practically of the same size as the valves, as shown in dotted outlines in Figs. 1 and 2 of the drawing, that portion of the shaft forming the valves having ports 10^a and 11^a, as clearly shown in Figs. 3 and 4 of the drawing.

It will be understood, of course, that the control of the supply of air and of gas may be regulated by a single valve having passages for the flow of air and gas. These means for controlling said flow are so arranged that after the explosive charge is delivered from the carbureter through the inlet 5 into the cylinder, and before the spark is created to cause explosion in that cylinder, the valve shaft rotates sufficiently

to close the inlet 5, which inlet is closed at the time the explosion takes place.

The admission of air from the tank 8 to the cylinder after the explosion takes place, and the opening of the port 29, hereinafter referred to, causes matter extraneous to the explosive charge to be driven out at the end of the inward stroke of each piston.

The valve shaft 12 extends through the end of the valve casing and bears a bevel gear 13 in mesh with a bevel gear 14 suitably mounted on an extension from the cylinder head. A gas valve lever 15 is secured to the shaft of the gear 14, and each end of the lever extends into the path of movement of the piston rods 3. It will be understood, of course, that these piston rods move in opposition to each other, and the lever 15 is therefore timed in its operations to admit the explosive charge from the carbureter and air from the tank 8 at the proper time into each of the cylinders.

At the opposite end of each of the cylinders from that in which the explosive charge is admitted and exploded is located a motor, as herein shown, this including a turbine casing 16 in which a turbine 17 is mounted. A passage 18 leads from the chamber 19 in each of the cylinders to the interior of the turbine casing, preferably at the upper side thereof and in position to conduct a liquid against the buckets 20 of the turbine.

A reservoir 21 is located underneath each of the turbine casings, and a pipe 22 extends from each of the reservoirs to the chamber 19. A valve 23 controls the passages from each of the pipes 22 into the chambers 19, and these valves are operated as by means of a driving fluid valve lever 24 suitably connected to each of the valves. Small rotary pumps 25 are located appurtenant to the pipes 22, these pumps 25 being operated as by means of a shaft 26 connected as by a belt 27 with a pulley on the shaft 28 of the turbine.

In the operation of the device the reservoirs 21 are filled with a driving fluid, as oil, and this is introduced by the action of the pumps 25 into the chambers 19 of the cylinders.

The operation of the device is as follows: The parts being in the position shown in Figs. 2, 3 and 4 of the drawing, and the piston in the left hand cylinder (the upper cylinder shown in Fig. 2) having just started its inward movement, the valve 23 is immediately closed as shown in Fig. 3, and before the piston in the left hand cylinder has scarcely moved. The valves 10 and 11 are in position to close the openings into the left hand cylinder. As the piston in the left hand cylinder travels inward the valves 10 and 11 are rotated in a clockwise direction as viewed from the right hand of Fig. 2, this causing the upper edge of the valve

as seen in Fig. 3 to move to the left. This movement opens the passages 5 and 7 to the left hand cylinder permitting the explosive charge to enter, and as the piston reaches the extreme forward limit of its movement the air from the tank 8 is permitted to enter and blow out the extraneous matter ahead of the explosive charge. When the piston in the left hand cylinder has reached this limit of its inward movement the explosion takes place in the right hand cylinder effecting the same operation of the parts with respect to that cylinder as above described.

It will be understood that the explosive mixture is treated in the carbureter in a manner well known to devices of this class.

It will be obvious that the lever 24 may, if desired, be operated by mechanism differently constructed from that herein shown, and I do not desire to limit myself to the details of construction in this respect.

I claim:—

1. In an engine, a pair of cylinders, pistons located in said cylinders, means connecting the pistons to cause them to work in opposition to each other, means for alternately admitting gas to said cylinders on one side of the pistons, means for igniting the gas alternately in said cylinders, a rocking lever, a valve secured to each end of said lever to admit fluid alternately to the cylinders, each valve controlling the flow of fluid to the cylinder, and a motor appurtenant to each cylinder and driven by the fluid in its passage from the cylinder.

2. In an engine, a pair of cylinders, pistons located in said cylinders and working in opposition to each other, means for alternately admitting gas to said cylinders on one side of the pistons, means for alternately admitting fluid to the opposite sides of said pistons, a rocking lever pivotally connected at each end to a piston whereby each is actuated in one direction solely by the other, means for igniting the gas alternately in said cylinders, and a motor appurtenant to each cylinder and driven by the fluid in its passage from the cylinder.

3. In an engine, a pair of cylinders, a turbine appurtenant to each of the cylinders, a reservoir to receive liquid discharged from the turbine, means for forcing liquid from the reservoir into one end of the cylinder, a valve for controlling the flow of liquid into each of the cylinders, means connecting said valves to cause them to work in opposition to each other, a gas valve chamber, a passage for gas into said gas valve chamber, a gas valve for alternately admitting gas into that end of each cylinder opposite that into which the liquid is admitted, pistons located in said cylinders, a lever connected with the pistons, connections between the lever and gas valves for operating the latter, and

means for igniting the gas alternately in said cylinders.

4. In an engine, a pair of cylinders, pistons located in said cylinders, means connecting the pistons to cause them to work in opposition to each other, means for admitting gas to the cylinders, means for admitting air to the explosion side of said cylinders, valves for controlling the admission of said air and gas, connections between said valves and said pistons whereby the former are operated to alternately admit gas to the cylinders, means for admitting liquid to the opposite ends of each of said cylinders, means for alternately exploding the gas in said cylinders, and mechanism to be actuated by the liquid forced from the cylinders.

5. In an engine, a pair of cylinders, pis-

tons located in said cylinders and working in opposition to each other, connections between the pistons, means for admitting gas to said cylinders, means for exploding said gas alternately in said cylinders, means for admitting fluid to each cylinder, a motor located appurtenant to each cylinder to receive fluid as it is emitted therefrom, a passage extending from each motor to each cylinder, a valve controlling each of said passages, and a rocking lever attached at opposite ends to said valves, said valves opening inward.

EDWARD L. SEERY.

Witnesses:

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F. L. EAGER.