Chas P Leavitt's

Improvement In Gas Engines

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PATENTED AUG 15 1871

Fig. 2.

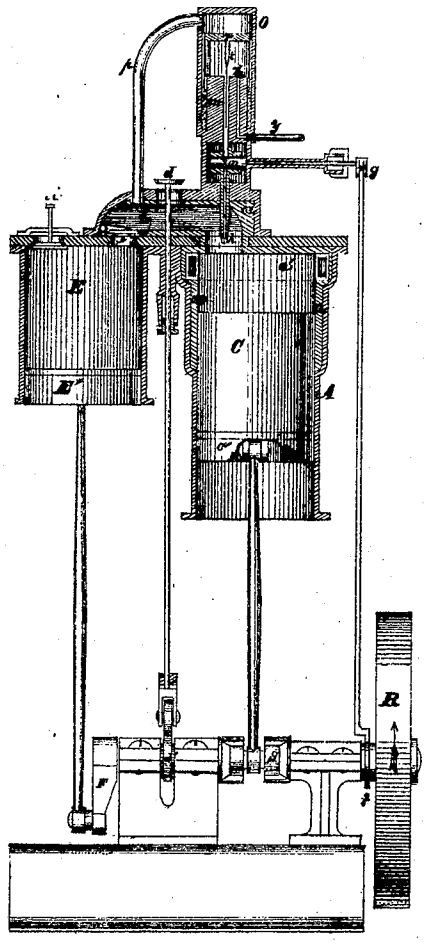
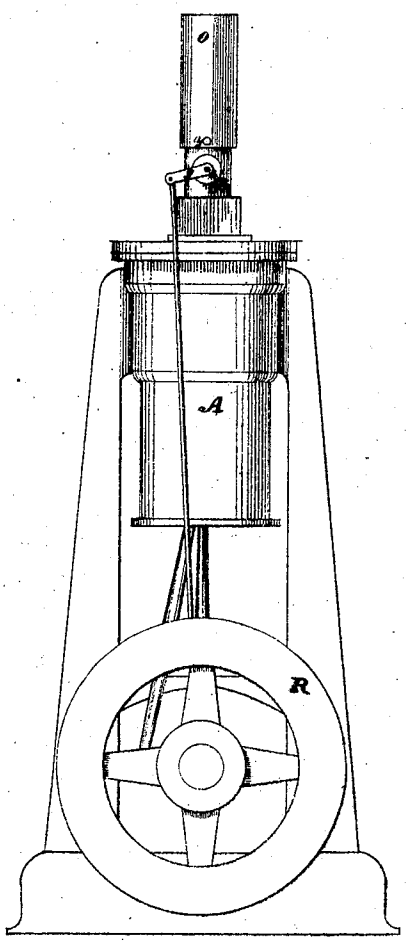


Fig. 1



Witnesses
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UNITED STATES PATENT OFFICE.

CHARLES P. LEAVITT, OF NEW YORK, N. Y.

IMPROVEMENT IN GAS-ENGINES.

Specification forming part of Letters Patent No. 118,028, dated August 15, 1871; antedated August 3, 1871.

To all whom it may concern:

Be it known that I, CHARLES P. LEAVITT, of New York, and of the county and State of New York, have invented a new and useful Improvement in Gas-Engines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon forming a part of this specification.

The nature of my invention consists in the use of gas as a flame within a cylinder, instead of as forming part of an explosive mixture, as it is commonly used in the arrangement of a miniature gasometer, subject to the varying pressure within the cylinder, in the arrangement of a pump to force air into the cylinder, and in various minor matters connected with the engine.

In the drawing, Figure 1 is an end elevation of the engine, and Fig. 2 is a central vertical section drawn in a plane at right angles to Fig. 1. The framing is not shown in Fig. 2, except the portion that braces the cam-rod of *d'*.

Similar letters refer to similar parts in both views.

A is the main cylinder, which is more than twice the stroke of the crank in length, and is considerably larger in diameter at the upper part than it is at the lower. This is to allow of the cylinder being lined at its upper part with a non-conducting material, *a*, to resist the passage of heat, and to receive the hollow metallic ring *a'*. These materials, in combination with the cylinder, renders the whole of a uniform bore. The ring *a'* is to receive kerosene or other oil to be converted into gas by the heat generated within the cylinder, where, from motives of economy, the common street gas is not used. The lining *a* not only coats the concave surface of the cylinder in its upper part, but is interposed between the ring *a'* and the cylinder; it also coats the upper head and the passage *b* leading thereto. Fitted within the cylinder A, so as to be as large as possible, without touching, is the piston or plunger C. This is in depth greater than the stroke, and is mainly composed of a non-conducting material. The lower end is made of iron, neatly fitting the cylinder, and is packed with the ring of cupped leather, *c'*. The connecting-rod connects the piston to the bell-crank S, as shown. By this arrangement the piston-packing *c'* always travels on the lower end of the cylinder, the metal of which is cold. In the hot portion of the cylinder there is no friction, since the plunger C is smaller than the bore of the cylinder. E is the barrel of the pump; E', the piston, packed with cupped leather; and F, the crank that drives it. This crank is at right angles (more or less, according to the amount of heat given to the air in the cylinder) to the crank S, and follows it. The pump induction-valve is marked *i*, and the eduction-valve *e*. The valve *d* is the exhaust-valve, and is so moved by the rolling cam *d'* that it is opened when the cylinder-piston C is rising and closed when it is descending. Both the cylinder and pump are open at their lower ends. R is the fly-wheel. O is the outer shell of the gasometer, in which is stored sufficient gas to heat the amount of air required for one stroke. The central core *m* is made smaller than O, so as to leave an annular-shaped space, which is filled with mercury. Inverted over *m* is the cup *r*, moving freely over *m*, and dipping in the cup of mercury. It moves freely up or down, and the mercury serves to prevent the escape of any gas except through the proper pipes. The pipe *y* connects with the source from which the gas is taken. The passage through *m*, into which this pipe leads, is fitted with the small valve *x* within the cup *r*. This valve is self-acting and opens upward, to allow gas to enter the gasometer, but closes whenever the pressure becomes greater in the gasometer than it is in the pipe *y*. The bent pipe *p* is for the purpose of securing an equilibrium of pressure between the gasometer and the passage *b*.

The passage of the gas from the gasometer to the burner *h* is regulated by the cock-valve *n*, which has a long stem extending through a stuffing-box, and connecting with the arm *g*, which in its turn connects with the rod that is moved by the cam *f*. At stated times this cam, by means of the connections spoken of, moves the valve *n*, and allows the gas to flow to the burner, where it is lit by the electric spark. The small taper rod *t* that is suspended from the center of the cup *r* and enters the passage leading to the valve *n* is for the purpose of partially closing that orifice, and thus reducing the size of the flame at the burner when the gas is nearly exhausted. In the drawing the piston C is rising, and the heated air is being forced out under the valve *d;*

the pump-piston, immediately following, also forces air out of the same valve. When the piston is at the top of the stroke the valve is made to close, and, as at that time the pump-piston only made half its up-stroke, one-half a cylinder full of air is thus confined in the engine, the pump and cylinder being of the same area of piston and the same stroke. As the piston C then descends, the air is forced into A by the pump, and at this instant the cam *f* lifts the lever *g*, causing the valve *n* to turn and admit gas to the burner *h*, where it may be lit by an electric spark, the flame being maintained by the air that comes from the pump. When the pump-crank is at the top center the air within the engine has the same volume as when the piston C was at the top of the stroke; but in the latter case, the air being heated, its pressure is greatly increased. During the time the air was passing from the cold pump into the hot cylinder the pipe *p* allowed the pressure to increase in the gasometer as fast as it increased in the passage *b;* and hence the gas continued to flow to the burner as though no such variation were taking place; but this increase of pressure closed the small valve *x*, and prevented the escape of the gas through the pipe *y*. As soon as the pump reaches the top of its stroke the valve *n* closes and cuts the gas off from the burner. The air then expands in the cylinder until the close of the stroke, when the valve *d* opens as before and permits the escape of the rarefied air on the ascent of the piston C. At this time, the pressure being removed from the gasometer, it receives a new supply of gas by the pipe *y*. Instead of supplying the gas to the burner from the gasometer, it may be supplied from a reservoir into which the gas is condensed to a pressure slightly greater than the greatest pressure within the engine, and instead of using the inverted cup *r* to contain the gas, a flexible bag may be secured above *m*, so as to receive the gas and give it to the burner as it is required. The arrangement here shown I, however, conceive to be the best.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The arrangement here shown for the introduction and gradual combustion of the gas, consisting of the pipe *y*, the gasometer O, and the burner *h*, combined, arranged, and operated substantially as described.

2. The hollow ring *a'*, in combination with the cylinder A, substantially as described and for the purpose set forth.

3. The cylinder A, the pump E, and the valve *d*, combined, arranged, and operated substantially as described.

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Witnesses:
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