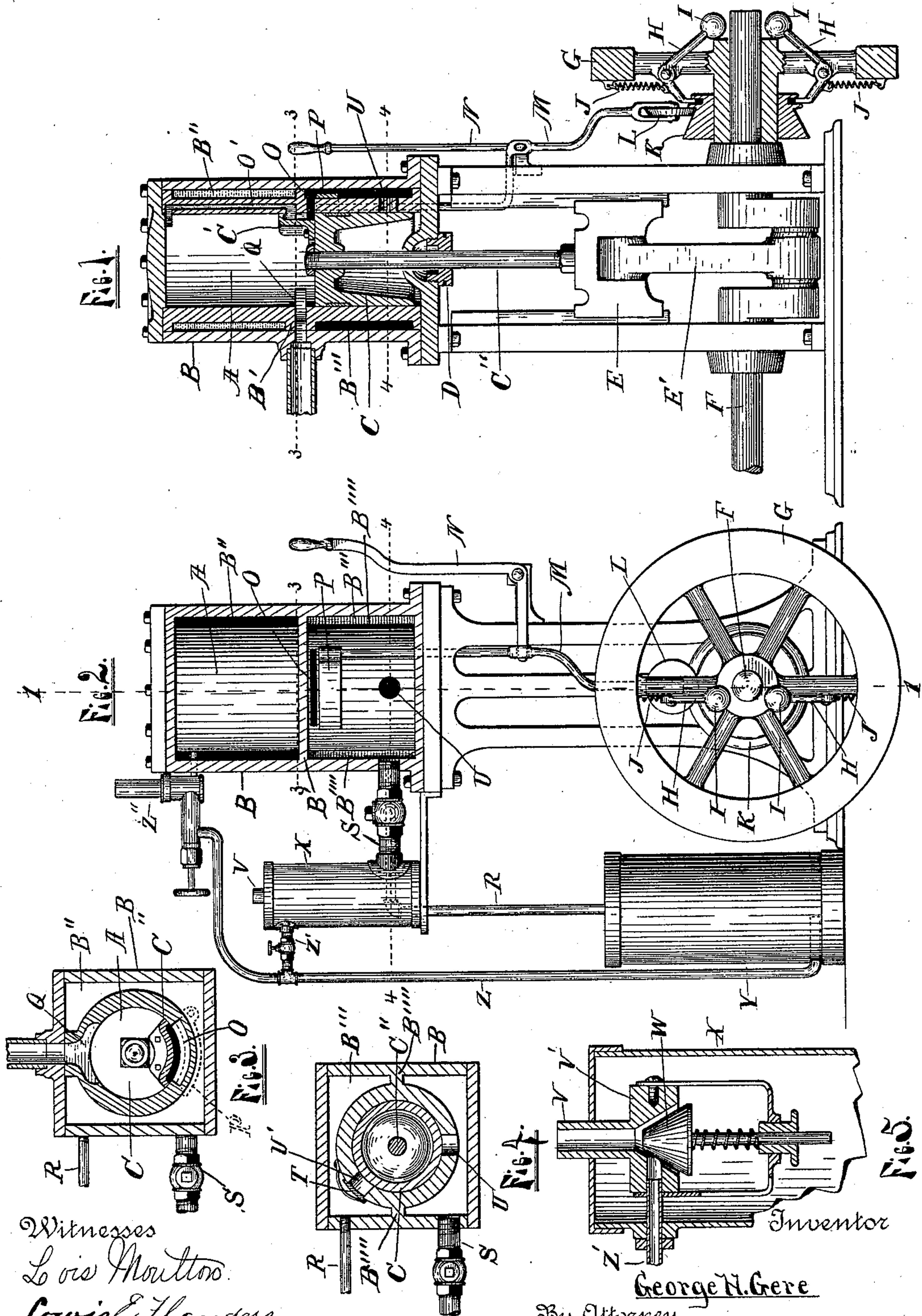


(No Model.)

G. H. GERE.
COMBUSTIBLE VAPOR ENGINE.

No. 598,986.

Patented Feb. 15, 1898.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE H. GERE, OF GRAND RAPIDS, MICHIGAN.

COMBUSTIBLE-VAPOR ENGINE.

SPECIFICATION forming part of Letters Patent No. 598,986, dated February 15, 1898.

Application filed December 28, 1895. Serial No. 573,582. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. GERE, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Combustible-Vapor Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in combustible-vapor engines; and its object is to provide the same with certain new and useful features, hereinafter more fully described, and particularly pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section, on the line 1 1 of Fig. 2, of a device embodying my invention, the frame being shown in side elevation. Fig. 2 is an end elevation of the same, with the cylinder-casing shown in vertical section. Fig. 3 is a horizontal section on the line 3 3 of Figs. 1 and 2; Fig. 4, the same on line 4 4 of the same figures; and Fig. 5, an enlarged detail, in vertical section, of the inlet-valve of the vaporizer.

Like letters refer to like parts in all of the figures.

A represents the working cylinder, closed by suitable heads at its respective ends.

C is the piston, having a bearing-surface on the cylinder of slightly less than one-half the length of the same.

C' is the piston-rod, passing through a gland D in the lower cylinder-head and connected to the crank-shaft F by the cross-head E and rod E'.

Surrounding the cylinder A is a jacket B, divided horizontally near the middle by a diaphragm B', forming an upper chamber B'' for water to cool the cylinder and a lower chamber B''' to receive the compressed charge.

Near the middle of the cylinder and on one side is the exhaust-port Q, communicating with the open air, and at the other side is an intake-port O, connecting the chamber B''' with the upper end of the cylinder A by means of the passage O' in the wall of said cylinder, having its upper end opening into the upper

end of the cylinder and its lower end opening into said cylinder close above the port O.

C' is a chambered hood on the piston that serves to connect the port O and passage O'.

P is a slide adapted to partially or wholly close the port O. A rod M is attached to said slide at one end and extended downward to near the crank-shaft F and is provided with a roll L, which engages a conical sleeve K, longitudinally movable on said shaft and adjusted by means of bell-crank levers H, pivoted on the arms of the fly-wheel G and having their inner arms engaged with said sleeve and their outer ends provided with weights I. Springs J, attached to said bell-crank and fly-wheel, tend to move said sleeve inward and bring the small end of the same below the wheel L, and the weights I tend to move the sleeve outward and bring the larger end of the same beneath said wheel. A hand-lever N engages the rod M, by means of which lever said rod and slide may be lifted to wholly close the port O.

The lower chamber B''' is divided into two parts by vertical walls B'''. Openings U U' connect the lower end of the cylinder A with both parts of the lower chamber B'''. One part of said chamber connects with the upper end of the cylinder by means of the port O, and the other part is connected by the pipe R to a reservoir Y, located below the level of the cylinder and adapted to contain gasoline or other suitable liquid fuel, and the opening U' is closed by a suitable check-valve T. Z is a pipe leading upward from said reservoir to supply said fuel to the vaporizer X, through a branch Z', and also to the igniter Z''.

V is the air-inlet pipe to the vaporizer, having an enlarged inner end V', into which is inserted the end of the fuel-pipe Z', both pipes V and Z' being closed simultaneously by a cone-check W, seated in the enlarged end V' and pressed upward by a suitable spring. S is a pipe and check connecting the lower end of the cylinder A and the vaporizer X.

The operation of my device is as follows: As the piston rises a charge is drawn from the vaporizer into the lower end of the cylinder. This forms a partial vacuum in the vaporizer, which draws air in at the pipe V. This depresses the valve W and opens the pipe Z,

admitting a supply of liquid from the reservoir Y, which strikes the valve and is divided and scattered thereby, so that it becomes intimately mixed with the inflowing current of
 5 air. The downward movement of the piston compresses said charge in the lower end of the cylinder, which charge is forced out into both parts of the lower chamber B'''. As the piston descends the port O is opened to per-
 10 mit the charge to pass into the upper end of the cylinder and expel the old charge. The new charge is now compressed by the piston when it rises, being fired after compression by the igniter Z'' to drive the piston down
 15 again. That portion of the charge passing through the check T flows through the pipe R and serves to maintain pressure in the reservoir Y equal to the maximum due to compression in the lower end of the cylinder A.
 20 This pressure serves to feed the fuel to the vaporizer and igniter, and when the engine stops, the pressure being no longer kept up by the action of the engine, the contents of the reservoir will no longer flow and therefore
 25 will not accidentally escape. The flow of the same is also automatically cut off from the vaporizer, except at the time air is passing into the same. Thus when the engine is not
 30 in action the valve W is always closed without special attention. As the speed rises the weights I I tend to separate and, overcoming the springs J J, move the sleeve K outward on the shaft F, thus bringing its larger part
 35 under the wheel L and gradually raising the rod M and slide P. This gradually closes the port O and thus reduces the charge passing upward into the cylinder. This reduces the power and consumption of fuel and thus automatically governs the speed of the engine.
 40 By moving the lever N and raising the slide P to wholly close the port O the engine may be stopped.

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

1. The combination of the engine-cylinder, having a chamber about its lower part for the compressed charge, and provided in its upper part with an inlet from said chamber and with
 50 an exhaust-opening, said chamber being divided vertically into two parts each having a port connecting it with the lower end of the cylinder; a check-valve for one of said ports; a piston within the cylinder; a vaporizer con-
 55 nected with one part of said chamber and having an air-inlet; a spring-pressed valve for said air-inlet; the reservoir below the level of the engine; a pipe connecting the other part of said chamber with said reservoir; the ig-
 60 niter connected with said reservoir; the liquid-fuel inlet entering the lower part of the air-inlet and controlled by said valve therein, said fuel-inlet being connected with the reser-

voir; and a governor-operated valve for controlling the inlet to the cylinder from the lower
 65 chamber, substantially as described.

2. In a combustible-vapor engine, the combination of the cylinder having a chamber around its lower end for the compressed
 70 charge, said chamber being divided vertically into two parts, one of which is formed with a port communicating when open with the upper part of the cylinder and also with a port communicating with the lower part of the cyl-
 75 nder, and the other of which parts is formed with a port communicating only with the lower end of said cylinder, a fuel-reservoir below the level of the engine, a vaporizer, a pipe leading from said chamber to the reservoir, a pipe ex-
 80 tending from the reservoir to the vaporizer, a pipe connecting the vaporizer with the lower end of the cylinder, and the piston within the cylinder.

3. The combination with the reservoir, the igniter and the vaporizer of a combustible-vapor engine, of the engine-cylinder, having an
 85 exhaust-opening in its upper part and provided with a chamber around its lower part, said chamber being divided longitudinally into two parts each of which has ports open-
 90 ing into the lower end only of said cylinder, and said cylinder also having a port through which its upper end has communication with one of said parts of the chamber, an automatically-controlled valve for the latter port, a
 95 piston operating in said cylinder and controlling the other ports, and connections between one part of the chamber and the reservoir and the other part thereof and the vaporizer.

4. In a combustible-vapor engine, the combination with the cylinder, having a port
 100 through which its upper and lower parts have communication with each other, and the piston in said cylinder, of means for controlling said communication through the port auto-
 105 matically, consisting of a slide to partially or wholly close said port, the crank-shaft to which the piston is connected, the conical sleeve slidably mounted on said crank-shaft, the fly-wheel also mounted thereon, bell-crank
 110 levers pivoted to said fly-wheel between their ends and each attached at one end to the end of said conical sleeve, a weight on one arm of each lever, a spring engaging the other arm of each lever, and a longitudinally-movable
 115 rod carrying said slide and having a roller bearing on said sleeve; and a bent pivoted lever, attached to said rod, by which the slide may be moved manually when desired.

In testimony whereof I affix my signature
 120 in presence of two witnesses.

GEORGE H. GERE.

Witnesses:

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