(No Model.)

H. K. CLOVER.

OIL GAS MOTOR.

No. 603,318. Patented May 3, 1898.

Fig 1

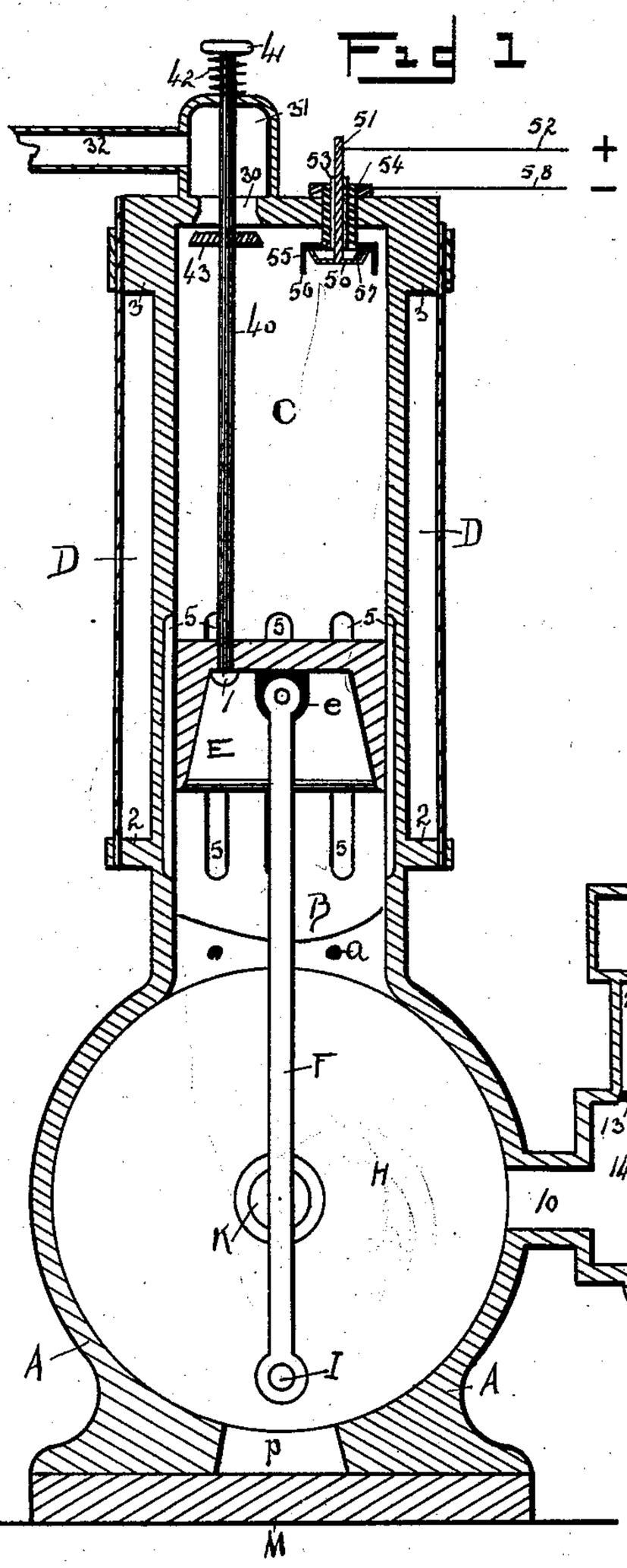


Fig 2

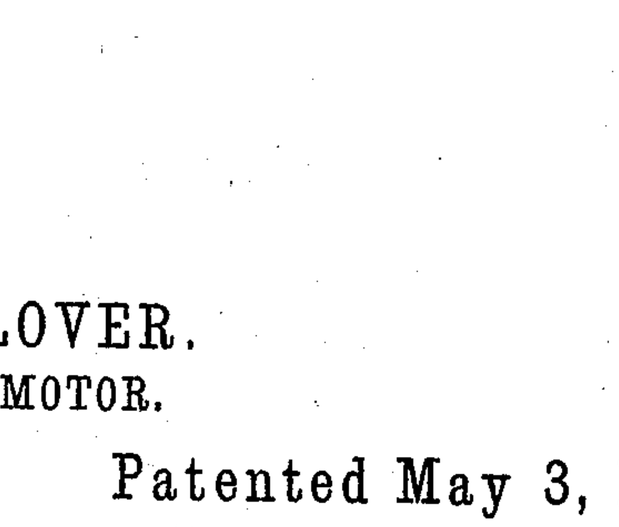
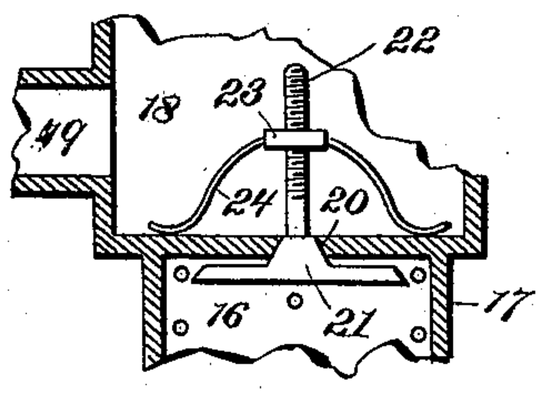


Fig. 3,



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OIL-GAS MOTOR.

SPECIFICATION forming part of Letters Patent No. 603,318, dated May 3, 1898.

Application filed August 5, 1895. Serial No. 558,350. (No model.)

To all whom it may concern:

Be it known that I, HOWARD K. CLOVER, residing at Council Bluffs, in the county of Pottawattamie and State of Iowa, have invented certain useful Improvements in Oil-Gas Engines; and I do hereby declare that the following is 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, reference being had to the accompanying drawings, which form a part of this specification.

This invention has relation to a new and useful improvement in oil-gas engines, the object being to provide a high-speed gas or vapor engine that shall be simple of construction, compact, readily adjustable, and the parts of which shall be readily accessible.

In the accompanying drawings, Figure 1 shows a central sectional view of a gas-engine embodying my invention, while Fig. 2 is an end view of one of the driving-disks used in my device, and Fig. 3 is a detail in section.

A represents the lower portion of the main housing or casting of my improved engine, which may be of any suitable size or material. This lower portion comprises a cylindrical housing, one side of which for convenience sake is cast separate from the housing A and is secured thereto by means of suitable bolts. Continuing from this housing is a neck portion B, which is continued to form the cylinder C, the lower portion A, the neck portion B, and cylinder C all being cast in one piece. This cylinder portion C is made of a suitable thickness and is preferably provided with the rims 2 and 3, which project and are adapted to give a seating to the hollow shell D, which shell may be of any suitable material and is nicely adapted to form a water-jacket about the cylinder C. Another advantage of having this jacket D is that it prevents a cracking of the cylinder whenever the water surrounding the same freezes. The thin outer sheet D would crack before the thick cylindrical portion C, so that the ice would be permitted to expand, and thus this jacket D, as understood, could be more quickly and readily replaced than could the cylinder C, which when cracked would of course become worthless.

Reciprocating within the cylinder C is an ordinary piston-head E, which piston-head is provided with an ear *e*, to which a piston-rod F is movably attached. This piston-head reciprocates within the cylinder, which cylinder is provided with a series of corrugations or escape-ways 5, which extend partly into the cylinder C and are primarily confined within the neck B.

Working within the lower cylindrical housing A are two disks H H, which disks are connected by means of a stub I, through which stub is secured a piston-rod F, the side view of these disks being shown in Fig. 2. Extending from the center of each disk is a main shaft K, which extends through an opening within the housing A and upon which are suitable driving-pulleys. Entering the lower housing A is an inlet-pipe 10, which pipe connects with the valve-housing 11, within the upper portion of which is a valve-seating 12, adapted to give a seating to a valve 13, which is provided with a stem 14, provided with a spring 15, which normally tends to keep this valve 13 in a closed position.

Extending from the valve-housing proper, 11, is an upwardly-extending neck portion 17, provided with the perforation 16, terminating in a chamber 18, into which chamber extends a suitable pipe 19. This chamber 18 is further provided with a drip-opening 20, closed by a valve 21, as is shown. It is within this chamber 18 that the fuel, which may comprise any suitable liquid, such as gasolene or any suitable chemicals, is deposited. This valve 21 is an ordinary drip-valve arranged to allow a certain quantity of oil to enter the chamber 16 whenever there is a suction from below. This valve 21 is provided with a threaded stem 22, which stem screws through a center 23 of an ordinary bow-spring 24, so that this valve can be given a very delicate adjustment, so that the disturbance of the air equilibrium within the perforated chamber will readily draw down this valve to permit the introduction of the quantity of oil necessary for a proper explosion. It is of

course understood that a coil-spring could be used or that any other suitable drip-valve could be employed without departing from the spirit of my invention.

Extending from the cylinder C is an exit-port 30, which is surrounded by a housing 31, from which extends an exhaust-pipe 32. Working loosely through the piston-head E is a valve-stem 40, which valve-stem passes through the valve-opening 30 and out through the housing 31, being provided with a head 41, between which and the housing 31 is interposed a spring 42. At a suitable distance this stem is further provided with a valve 43, adapted to close the valve-opening 30. This port 30 is normally closed by means of the valve 43, which by means of the rod 40 is normally carried upward, this rod 40 being actuated by means of the spring 42. Positioned within the upper end of this cylinder C is an igniter, which comprises, essentially, a dish or cup 50, having a projecting stem 51, which stem is in connection with an ordinary electrode 52. Surrounding this stem is a sleeve of insulating material 53, which in turn is surrounded by a sleeve of conducting material 54, which is iron or brass and which sleeve extends from without into the cylindrical portion C. Loosely working around this conducting-sleeve 54 is an igniter 55, provided with disks having one or more outwardly-extending stems 56 and a continuing stem 57, which stem 57 extends into the dish 50, while the stem 56 projects beyond. This collar 55 loosely reciprocates upon the sleeve 54, to which is secured an ordinary electrode 58 in connection with a suitable battery. Within this cup 30 is placed a suitable quantity of mercury, and it is into this mercury that the stem 57 extends.

When all the working parts have been properly constructed, the operation of my engine will be as follows: The fuel, which may comprise a gas or vapor, is permitted to enter the lower casing A, filling the space between the disks H, from which it would extend into the neck portion B, and from thence passing, by virtue of the corrugation 5, into the cylinder C. As the main shaft K was revolved in starting the engine, the piston E would pass forward, extending beyond the corrugations, so as to close the cylinder C or the neck portion B and compress the vapor or gas within this cylinder, the piston-rod readily sliding over the stem 40. Now as the piston moved forward it would finally engage the projecting leg 56 of the igniter and promptly by virtue of the battery-neck create a spark within this cylinder, which would immediately expand the gas within the cylinder and drive the piston E forward, which an instant or so before the full stroke had been reached would encounter the projecting head 1 upon the lower end of the rod 40 and carry this rod against its spring 42, opening the port 30, out of which the dead and exploded vapors would be permitted to escape. The same instant, however, that this port 30 had been permitted to open the corrugation would have been passed, so that as the old vapors left new vapors were instantly introduced through the corrugation. The forward movement of the piston E would, however, escape the head 1 in its backward movement, so that the spring 42 would promptly close its port 30, so that the new gas would not have been permitted to escape. In its forward movement the piston E creates a vacuum within the housing A, and this vacuum draws down the valve 13 against its spring 15, so that a suitable amount of gas which would have collected within the chamber 18 and 16 would be sucked or drawn into the chamber B, where it would of course be collected. This entry of gas would of course continue to fill the chamber A and also the piston until at the end of its stroke, when the piston, returning, would no longer act to create a vacuum, so that the spring 18 would promptly close its valve-seating 12. In its return after the explosion described the cylinder E would continue to compress the vapors within the cylinder and housing until the corrugations had been reached. This compressed vapor would promptly rush into the explosive chamber or cylinder proper, C, as described. In the use of the mercury a high brilliant spark is obtained, which invariably ignites the gas.

It is of course understood that the cylinder C can be duplicated and extend in an opposite direction from the main housing A, so that the engine would be made duplex, in which instance of course the pistons would be alternately actuated, as described. The piston is of course only actuated in one direction during the explosion.

The device is noticeable because of its extreme simplicity.

Now, having thus described my said invention, what I claim as new, and desire to secure by United States Letters Patent, is—

In a gas-engine, the combination with an incasing shell, comprising the lower housing, *a*, the upper cylindrical section, C, and the intermediate section, B, said intermediate section being provided with the grooves, 5, 5, of the valved supply-chamber, 11, communicating with said chamber, *a*, the valve-seating, 30, within said upper cylinder, the housing, 31, covering said valve-seating, the escape-pipe, 32, extending from said housing, the rod, 40 working through said housing, 31, the valve, 34, secured to said rod and working into said seating 30, the spring, 42, to force said rod, 40, normally into an upward direction, the supporting-shaft, K, the disks, H, secured to said shaft, the crank-pin, I, securing said disks, H, H, the pitman, F, secured to said crank-pin, I, and the piston, E, said piston, E, being of a length less than the length of said grooves, 5, and reciprocating within said intermediate portion, B, and cylinder, C,

said rod, 40, working loosely through said piston, E, in one direction and actuating said rod, 40, in an opposite direction, said piston being secured to and actuated by said pitman-rod, F, in combination with a suitable igniter secured within said chamber, C, as and for the purpose set forth.

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

HOWARD K. CLOVER.

Witnesses:
ELMER G. STARR,
GEO. W. SUES.