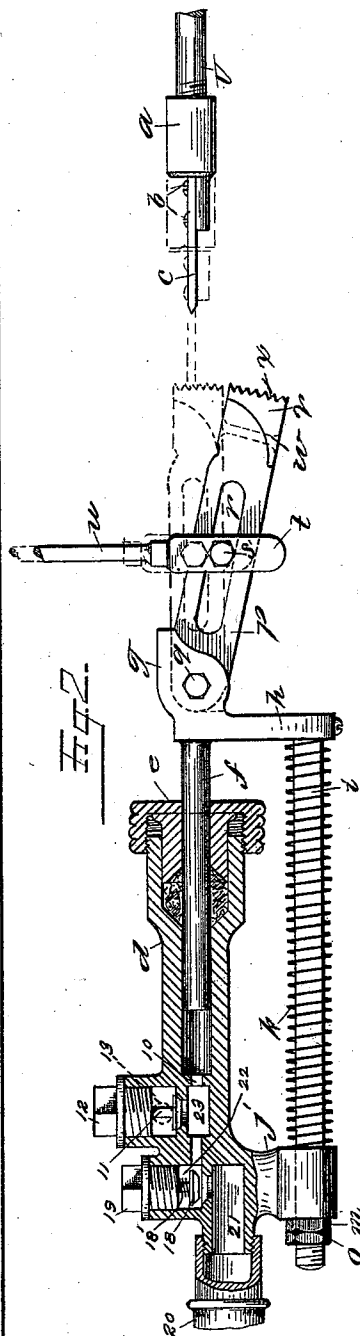
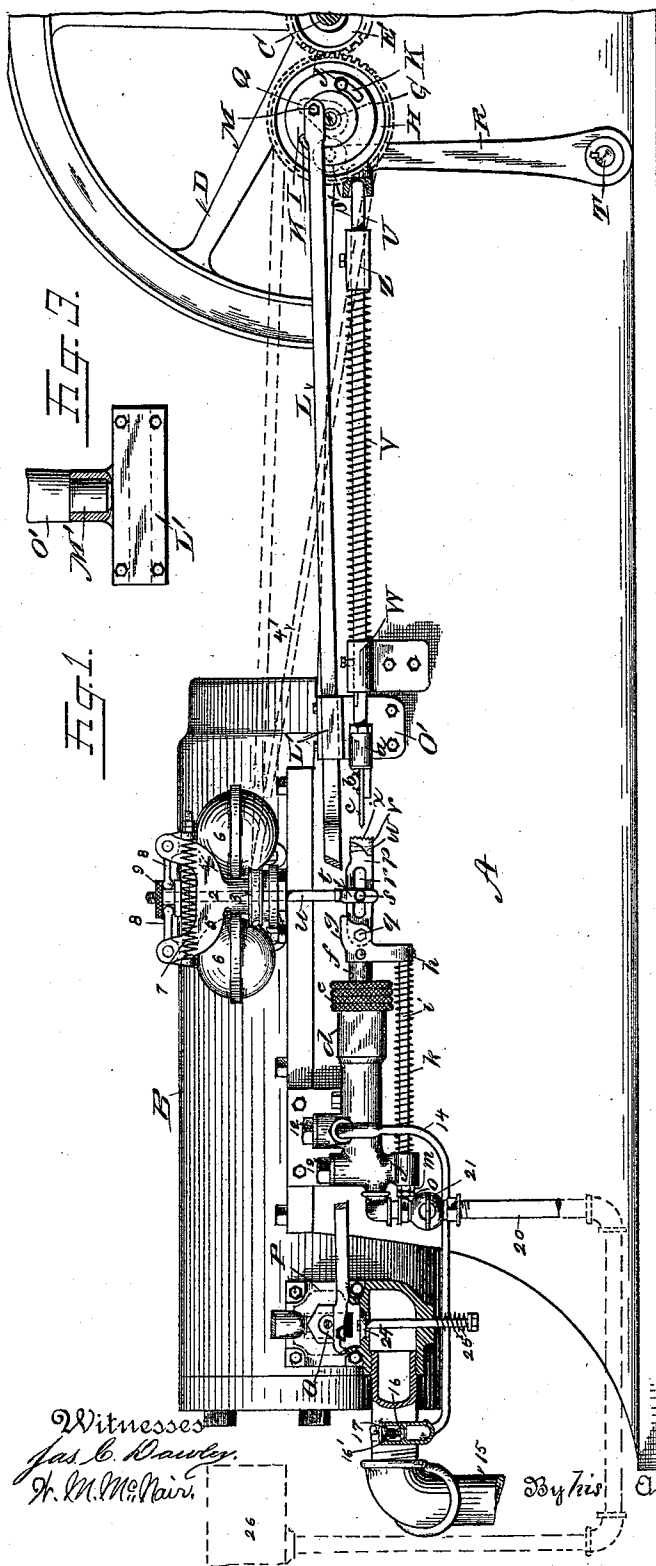


(No Model.)

H. VOLL.
GAS ENGINE.

No. 527,635.

Patented Oct. 16, 1894.



Witnesses
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By this

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UNITED STATES PATENT OFFICE.

HENRY VOLL, OF SPRINGFIELD, OHIO, ASSIGNOR TO JOHN FOOS, OF SAME PLACE.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 527,635, dated October 16, 1894.

Application filed February 10, 1894. Serial No. 499,715. (No model.)

To all whom it may concern:

Be it known that I, HENRY VOLL, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have
5 invented certain new and useful Improvements in Gas-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and
10 useful improvements in gas engines, and the particular feature of such engines that constitutes the subject of this invention is the device for regulating the quantity of the explosive agent or ingredient which is to be
15 mixed with atmospheric air to form the charge. This regulating device performs also, incidentally, the function of forcing the explosive ingredient into the air which forms the remainder of the charge, and in this sense
20 this device is in the nature of a pump, one stroke of its piston acting to assist in raising the inlet valve and the other stroke operating to eject or force out the gasoline or gas taken in during the out-stroke. Combined
25 with this piston is a hit-and-miss device consisting of a rod which strikes a blow to operate the said piston in one direction, and of a pivoted piece operated by a governor so as to move in and out of line with the striking bar,
30 according to the speed of the engine, whereby when the speed is excessive the piston will not be actuated during one or more cycles of operation, whereby the explosive ingredient will not be taken in during the time of such
35 excessive speed.

In the accompanying drawings on which like reference letters and figures indicate corresponding parts: Figure 1, represents a side elevation of a gas engine with some of the
40 parts broken away, embodying my invention; Fig. 2, a detail partial section and partial elevation, on a larger scale, of the admission device with its adjuncts; Fig. 3, a detail partial plan and partial sectional view of the guide
45 for the valve rod.

The letter A designates the base or bed of the engine, preferably consisting of a casting, and to which the cylinder B is secured, and in bearings supported by which the main
50 shaft C is mounted, which shaft carries a fly wheel D and a pinion E. There is nothing

peculiar about these parts, nor indeed about the engine generally, the improvements relating to the special features hereinafter named. A shaft G is also mounted on the
55 bed, and this shaft carries a gear wheel H meshing with the pinion E, thus giving rotation to the shaft G. A disk I is fitted to the shaft G and secured to the gear wheel H by bolts J which fit slots K so as to adjust the
60 plate I to give the proper throw to the pitman L which connects with a wrist-pin M carried by the plate I. This pitman, through a crank O, operates the movable electrode within a casing P, the movable electrode having a reciprocating rotary motion. No claim
65 is made to this feature and hence it is not more fully illustrated. The fixed electrode is not shown. The pitman L is guided by a sleeve L' adapted to vibrate with the movement of the pitman by being pivoted on a
70 stud M' projecting from the bracket O' secured to the base A. The shaft G is also provided with a cam Q, shown in dotted lines and arranged to actuate an arm R which carries a roller S and is keyed to a rock-shaft T, the farther and unseen end of which is connected with mechanism to operate the exhaust valve. These features are not illustrated because not necessary to an understanding of the features hereinafter claimed.

Into the arm R is socketed a rod U which is reciprocated rearwardly through the arm, the roller, and the cam, and forwardly by the spiral spring V which encircles it and presses
85 against the guides W and Z. This rod has screwed onto it a head *a*, to which is fastened, by screws *b*, a plate *c*. This is the hit-device of the hit-and-miss mechanism.

Referring to the explosive admission device the letter *d* designates the cylinder, having a stuffing box *e* at one end, through which passes a piston *f*, having a head *g*, provided with an arm *h* to which latter is secured a rod *i*, which is guided at the other end by a
90 bracket *j* extending from the casting forming the cylinder. A spiral spring *k* encircles the rod *i* and by pressing against the arm *h* and the bracket *j* operates to effect the outstroke of the piston *f*. A jam nut *m* and a lock nut
95 *o* limit the out-stroke. The other member of the hit-and-miss device consists of a vibrat-
100

ing or swinging piece *p*, pivoted to the head *g* by a bolt *q* and having a slot *r* in which to place the pin *s* of the link *t*, attached to the governor shaft *u*. This pivoted piece is preferably made of brass and it has attached to it a shoe *v* made of steel, a bolt or rivet *w* forming the connection. Serrations *x* formed in the shoe *v* receive the plate *c* of the reciprocating member of the hit-and-miss device.

On the governor shaft *u* is mounted a rotating head 2, carrying a pulley 3, which receives a belt 4 driven by a pulley (not shown, being behind the gear wheel H) on the shaft G. Any means of giving motion to the governor head will answer. The head carries arms 5 in which are pivoted governor balls 6, interconnected by suitable spiral springs 7 and having projections 8 which fit into the groove of a fixed collar 9, on the governor shaft *u*. Thus when the governor is rotated there is a slight rise and fall of the shaft *u* due to the variations in the speed. The depth of the shoe *v* is sufficient to insure the contact of the reciprocating member with the vibrating member of the hit-and-miss device within the range of normal variations in the position of the governor shaft, but when the engine endeavors to "run away," as when the load is lightened, or for any cause, and the governor shaft is abnormally depressed by the centrifugal action of the governor balls, then the pivoted piece *p* will descend out of the path of the plate *c*. Thus under these conditions, the admission device or pump will not be actuated, and hence the engine will be deprived of the explosive ingredient until it comes down to a speed within normal limits.

Referring again to the cylinder *d* it will be seen that it has an orifice 10, and a valve 11 limited in its upward movement by a screw plug 12, while an orifice 13 communicates with a pipe 14 which leads to the air pipe 15. This pipe has a valve 16 which seats by a spring 16' against the return of the oil or gas after it passes to the orifice 17 by which it is introduced into the air pipe 15. Another valve 18 is provided in the cylinder *d* and is limited in its upward movement by a screw plug 19. An oil or gas supply pipe 20 connects with the cylinder *d* and has a cut-off 21. When the oil or gas passes from the pipe 20 it enters a passage 21, then passes by the valve 18 into a passage 22 whence it reaches a chamber 23 under the valve 11. The air pipe 15 connects with the casing P of the inlet valve, and a check valve 24, normally held down by a spring 25, acts to prevent the return of the explosive compound into the pipe 15 after it reaches the upper part of the casing P.

The pipe 20, when used to supply gasoline, leads to a suitable tank, which is suggested

by the dotted lines 26 in the drawings, and it is preferred that the tank should occupy such a position as that the lowest level of the oil would be five or six inches above the valve 18. The spring 18' of this valve is just sufficient to keep the oil from lifting it, and is also sufficient to prevent the gas from lifting it. When, however, the piston *f* makes its out-stroke its suction, (as it is commonly called) is sufficient to lift the valve 18 and draw the gasoline into the chamber 23 and the interior of the cylinder. When the piston makes its in-stroke it forces this gasoline into the orifice 13, first lifting the valve 11, and thence into the pipe 14, from which it is finally forced, past the valve 16, through the orifice 17 and into the air pipe 15, whence it passes into the cylinder, already mixed with the air, the suction of the engine piston drawing in the charge on its out-stroke. When gas is used the same operation is performed. Thus the function of the piston *f* is to unseat the valve 18 and then to force the explosive ingredient into the air pipe where it mixes and commingles with the air to constitute the proper compound.

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

1. In a gas engine, the combination with a cylinder and two valves, a supply pipe communicating with the cylinder through one of said valves and a discharge pipe communicating with the cylinder through the other of said valves, an air pipe into which the discharge pipe enters and a casing and valve permitting and cutting off communication between the air pipe and the main cylinder, a piston in the first named cylinder and a spring to force it outward, of a slotted piece pivoted to the piston, a governor whose shaft connects with said piece through said slot, and a reciprocating rod having a striking plate and actuated from the engine shaft.

2. In a gas engine, the combination with a cylinder having two valves, a supply pipe communicating with the cylinder through one of them, a discharge pipe communicating through the cylinder with the other, a piston working in the cylinder, a spring actuated rod connected with the piston, a piece pivoted to the piston and having a slot, a governor having a reciprocating shaft connected to the pivoted piece through said slot and a reciprocating rod adapted to strike the pivoted piece or not according to its position.

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

HENRY VOLL.

Witnesses:

OLIVER H. MILLER,
WARREN M. MCNAIR.