

No. 610,682.

Patented Sept. 13, 1898.

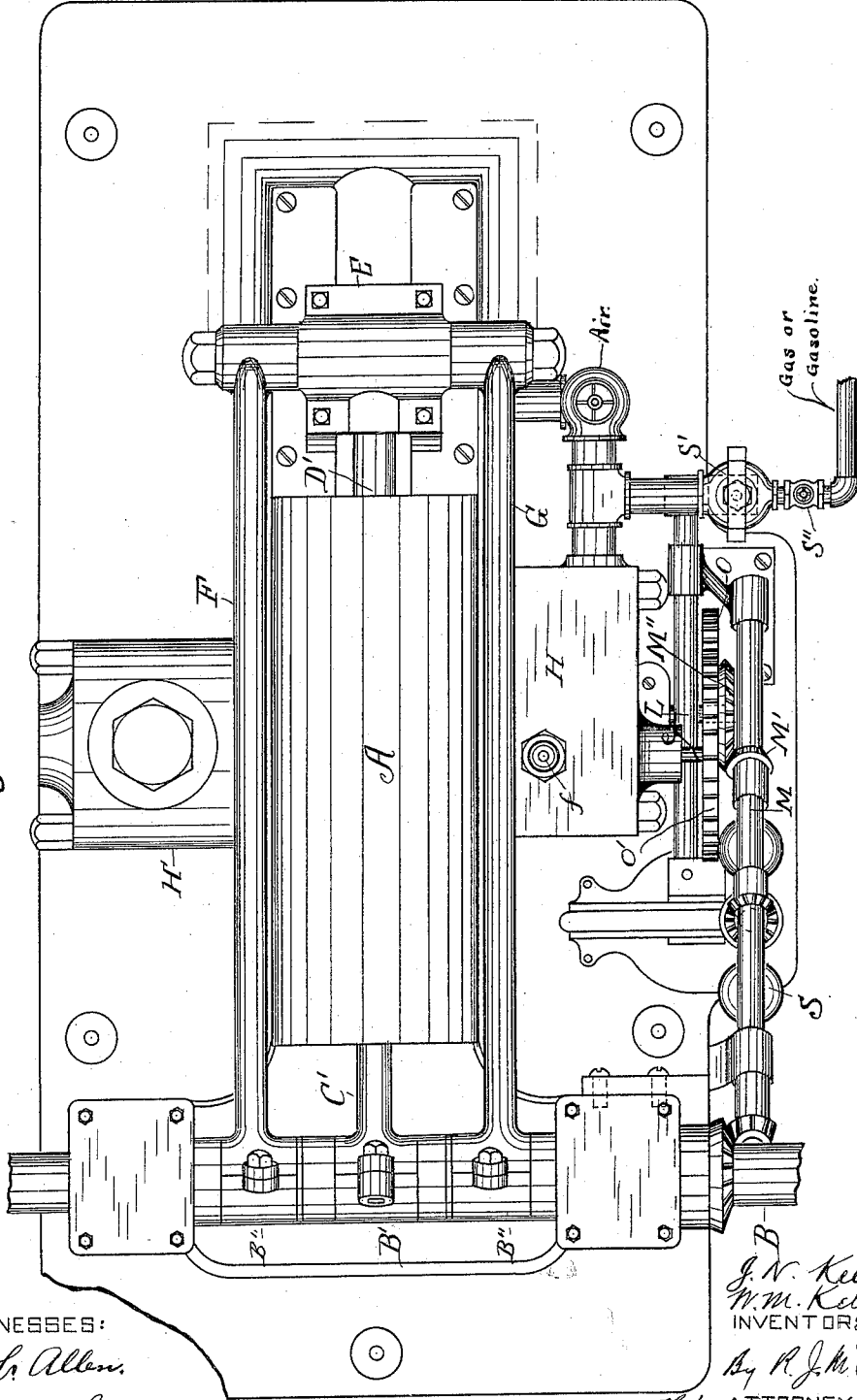
J. N. KELLY & W. M. KELCH.
GAS ENGINE.

(Application filed Mar. 31, 1897.)

(No Model.)

3 Sheets—Sheet 1.

Fig 1.



WITNESSES:

L. L. Allen.
Wm. Whitney

J. N. Kelly,
W. M. Kelch,
INVENTORS.

By R. J. McCarty
ATTORNEY.

UNITED STATES PATENT OFFICE.

JOSEPH N. KELLY AND WALLACE M. KELCH, OF DAYTON, OHIO.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 610,682, dated September 13, 1898.

Application filed March 31, 1897. Serial No. 630,065. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH N. KELLY and WALLACE M. KELCH, citizens of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Gas-Engines; and we do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The object of the invention is to provide certain valve mechanism, hereinafter described, by means of which both movements of the valves are positive in contradistinction to a spring movement in one direction and by means of which the valve-openings may be regulated to a nicety.

In a detailed description of our invention reference is made to the accompanying drawings, of which—

Figure 1 is a plan view of our improved gas-engine. Fig. 2 is a side elevation. Fig. 3 is a transverse section taken at a point in the front of the gearing and valves. The casings of the latter are broken to show the valves and igniter. Fig. 4 is a longitudinal section through the casing of the admission-valve, showing said valve and its actuating mechanism. Fig. 5 is a section through a part of the combustion-chamber, showing in elevation the electrodes. Fig. 6 is an enlarged side elevation of the cam detached from the rotary electrode. Fig. 7 is an enlarged sectional elevation of the upright electrode, showing the casing thereof in section. Fig. 8 is an elevation of modified means for operating the electrodes.

Similar letters of reference indicate corresponding parts throughout the specification.

A designates the power-generating cylinder, having its ends open.

B is a compound crank-shaft, the cranks B' B'' being projected in diametrically opposite directions from crank B'.

C and D designate, respectively, two pistons movable in opposite directions by the power created from the explosions. The rod C' of the first-named piston is connected di-

rectly to crank B', while the rod D' of piston D is connected to cranks B'' from the other end of said cylinder through a cross-head E and two parallel connecting-rods F and G, which are connected to the cross-head and extend on each side of the cylinder, as is clearly shown in Fig. 1. The pistons as shown in dotted lines, Fig. 2, are moving outwardly and occupy positions about midway of their outward stroke. The cranks B' B'' are shown in their lower positions. When the said outward stroke is completed, the said cranks will lie approximately in a horizontal plane, the crank B' being at all times in a diametrically opposite position.

H H' designate, respectively, casings on opposite sides of the cylinder, the former of which incloses the admission-valve I and the electrodes *e* and *f*. The latter—to wit, H'—incloses the exhaust-valve I'.

K K' designate, respectively, inlet and outlet ports between the cylinder and said valves.

L designates a cam-shaft driven through bevel-gears M'' and M', the latter being on the inclined shaft M, which is driven from the crank-shaft.

N N' designate two disks having cam-grooves *n n*, substantially as shown in Fig. 4. These cams control the movements of the admission and exhaust valves. The mechanism operating in connection therewith is identically the same in each case and consists of bars *a a*, which are pivotally connected to projections or lugs *a' a'* on the valve-cases and have their opposite ends inclosing the stems of said valves. At an intermediate point on each of said bars an antifric-tion-pin *c* projects to enter the grooves *n n*. In the rotation of the disks the valves are accordingly opened and closed. As shown in Fig. 4, the valve is held open when the pointed end of the groove *n* reaches the upper position.

b b are fixed collars on the valve-stems, inclosing the upper sides of the pivotal bars, and *b' b'* are loose collars or washers lying between the said bars and coil-springs *d d*, which admits of the compression of said springs as the bars are moved to their lower positions. These springs take up any looseness that may occur from constant wear of the parts, and said springs also compensate for any overthrow of the cams. In addition

to the above the said springs and collars enable an adjustment of the valves to regulate their opening-space as may be desired. As shown in Fig. 4, the cams are set to produce
 5 a one-half-inch opening of the valves. In order to produce a less opening, the collars *b* may be set proportionately closer to the valves. This will allow the levers or pivotal bars *a* to act on the valve-stems through said
 10 collars at a point later in the stroke of said levers, thereby insuring less opening of the valves.

O designates a spur-gear on the cam-shaft L, meshing with a similar gear O' on the horizontal shaft of electrode *e*, projecting into the combustion-chamber P. The latter chamber communicates with the mixing-chamber P' through the admission-valve. The electrode *e* is therefore constantly rotated while the engine is at work. A wiper-spark is made through means of a wiper or cam *e'*, that rotates with the electrode *e* below and in line with the point of the vertically-reciprocating electrode *f*. When contact is made, the latter electrode yields by compressing the coil-spring *g*, which surrounds it and is inclosed between a cap *h* and a washer *h'* above the holder *h''*. The pressure of the said spring is regulated by turning the washer *h'*.

30 It will be seen from the foregoing description that a spark will be made that will only vary in its occurrence according to the variation in the speed of the engine. The devices shown in Fig. 8 will impart an intermittent movement to the lower electrode. These devices consist of an eccentric Q, that may be mounted on the cam-shaft L, a yoke Q', surrounding the periphery of said eccentric, a rack R, having a flexible connection
 40 R' with said yoke, and a supporting-guide R'', attachable to the case of the valve. *r* designates a pinion geared to said rack and running loose on the shaft of electrode *e*. *r'* is a disk fixed to said pinion and carrying on its
 45 outer face a pawl *r''*, the said pawl being in contact with a pawl-slot in the shaft of electrode *e* and held therein by a spring *s*, secured to said disk. Upon the upward movement of the rack by the action of the eccentric motion is imparted to shaft of electrode
 50 *e*, which makes one revolution to each movement of the rack. On the downward move-

ment of said rack the pinion is carried one revolution in opposite direction, or back to its starting-point, the pawl being disengaged
 55 while moving in this direction, thereby allowing said electrode to remain stationary. The governor S controls the admission of gas or gasolene by means of a governor-valve S', the gas or gasolene being first admitted
 60 through a valve S''. The admission of air is regulated through valve S³.

The operation of the engine is as follows: Upon the outward movement of the pistons a charge of gas or mixture is taken into the
 65 exploding-chamber and cylinder. On the return stroke this mixture is compressed by said pistons. Upon reaching the inmost limit of their stroke an explosion takes place, which forces the pistons in an outward direction,
 70 thereby transmitting motion to the crank-shaft through the short connection C', moving over and outward, while connections F' and G move under and inward, as shown in Fig. 2 by the arrows. The pistons after
 75 reaching the limit of their outward movement return toward the middle of the cylinder, and upon said return movement the burned gases are thrown out through port K' and valve I'.
 80

We claim as our invention—

In a gas-engine, the combination with the power-cylinder, and pistons, of puppet-valves located on opposite sides of said cylinder to admit and discharge thereto and therefrom,
 85 pivotal bars connected to the stems of said valves and controlling the movements of the valves in both directions, cams to actuate said pivotal bars, adjusting-collars *b* on the valve-stems by means of which the stroke of
 90 the pivotal bars may be regulated to vary the valve-opening, a compensating spring inclosing each of said valve-stems, and a loose and a fixed collar inclosing the ends of each of said springs, whereby any lost motion in
 95 the movement of the pivotal bars is avoided, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

JOSEPH N. KELLY.
 WALLACE M. KELCH.

Witnesses:

R. J. MCCARTY,
 L. L. ALLEN.