

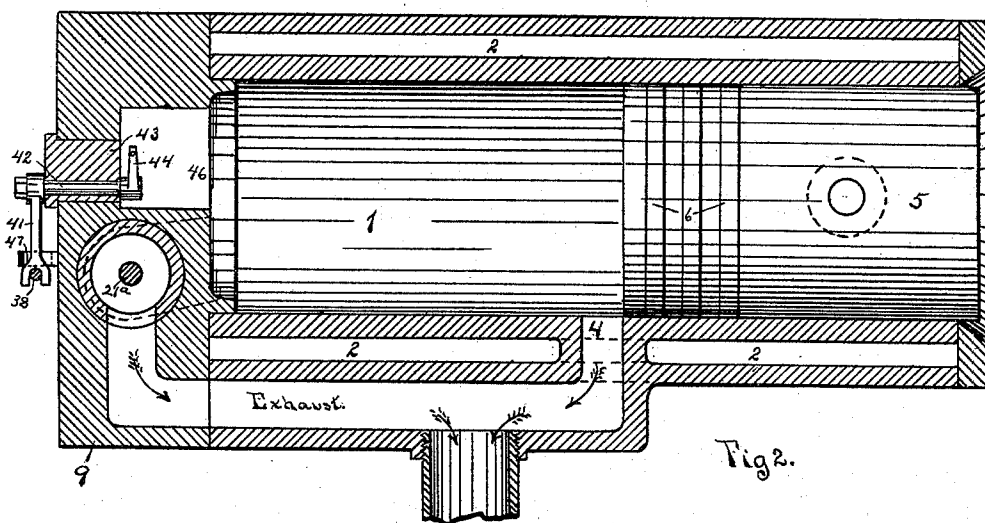
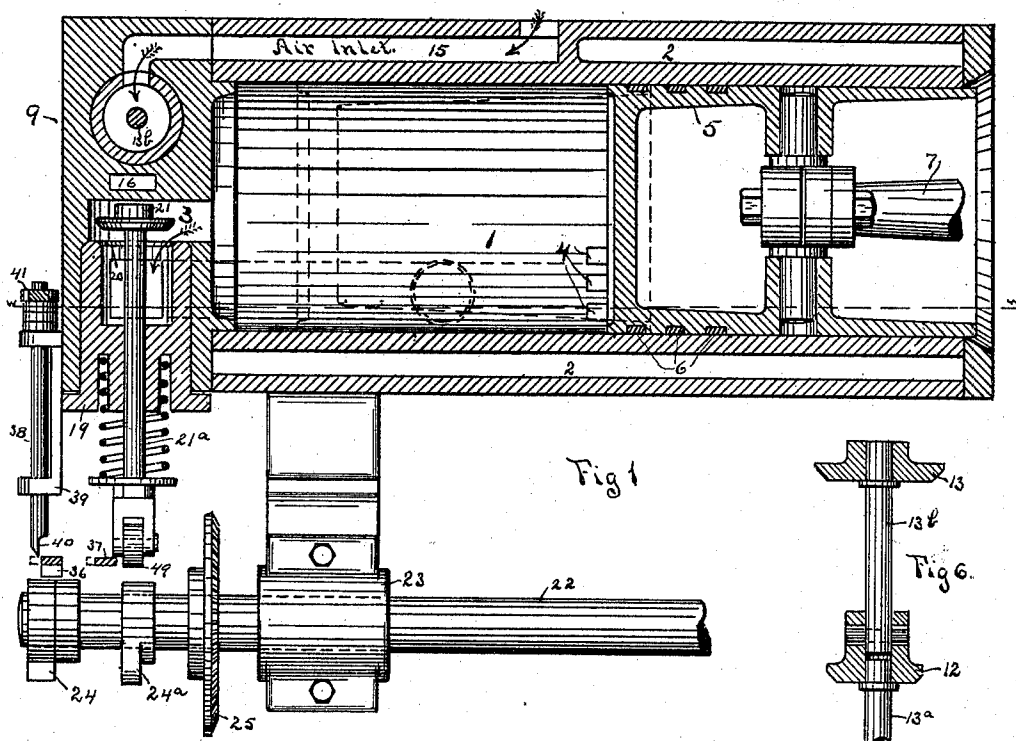
(No Model.)

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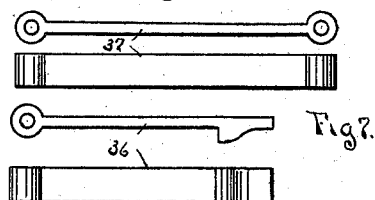
J. O. BROWN.
GAS ENGINE.

No. 584,622.

Patented June 15, 1897.



Witnesses:
 C. J. Longenecker.
 A. J. Fiorini



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(No Model.)

2 Sheets—Sheet 2.

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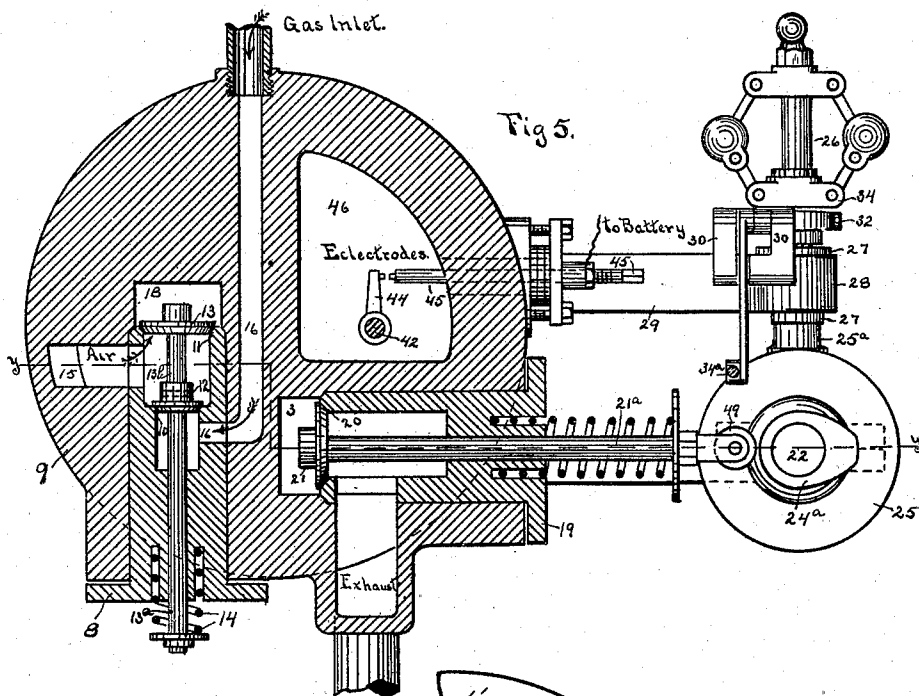


Fig. 5.

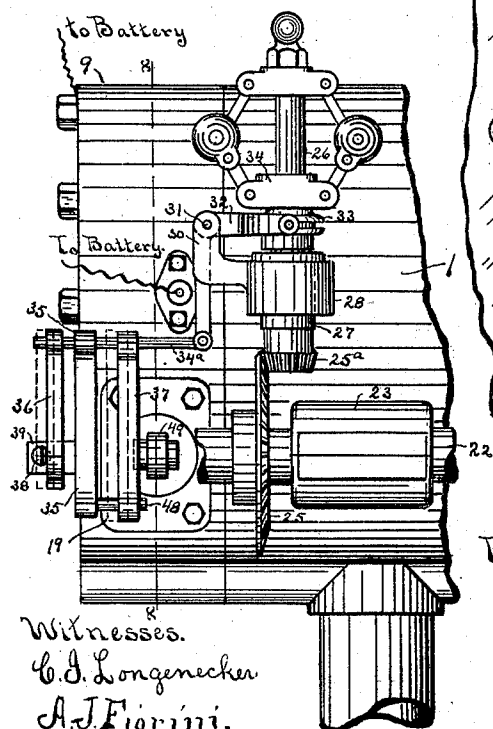


Fig. 3.

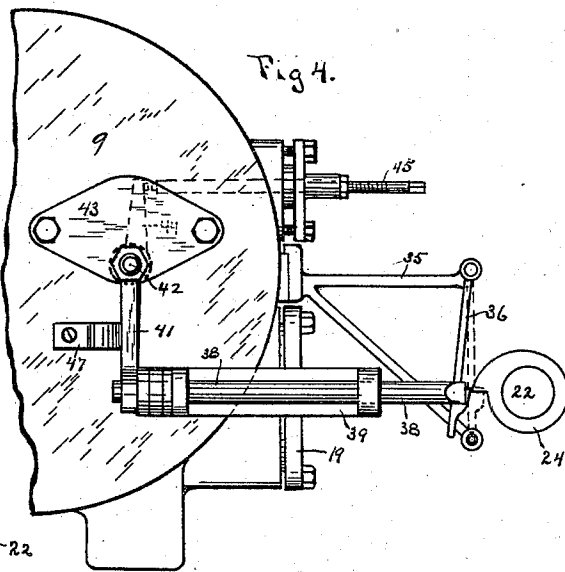


Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN O. BROWN, OF DAYTON, OHIO, ASSIGNOR TO ALLIE M. BROWN, OF
SAME PLACE.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 584,622, dated June 15, 1897.

Application filed October 24, 1895. Serial No. 566,688. (No model.)

To all whom it may concern:

Be it known that I, JOHN O. BROWN, of Dayton, county of Montgomery, State of Ohio, have invented a new and useful Improvement in Gas-Engines; and I 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 figures of reference marked thereon, which form a part of this specification.

My invention relates to new and useful improvements in gas-engines.

The main desideratum in engines of this class is the obtainment of a maximum degree of efficiency, and this is the object of the present invention.

The invention has reference, therefore, to certain means to be hereinafter specified for regulating or controlling the exhaust-valve in order to prevent gas from entering the cylinder when not necessary and to avoid the work of unnecessary compression in the cylinder.

The said invention has a further reference to means for preventing a contact of the igniter or electrodes at times when there is no gas in the cylinder to be ignited. The fly-wheel and crank-shaft being common features and having no connection with the invention have been omitted from the accompanying drawings, of which—

Figure 1 is a central longitudinal section on the line *yy* of Fig. 5. Fig. 2 is a longitudinal section of the cylinder on the line *ww* of Fig. 1. Fig. 3 is a side elevation of the cylinder-head and a portion of the cylinder adjacent thereto. Fig. 4 is a front elevation of the cylinder-head, a part thereof broken away. Fig. 5 is a vertical section through the cylinder-head on the line *xx* of Fig. 3. Fig. 6 is a sectional view of the connected stems of the gas and air valves. Fig. 7 is a detached detailed view of shifting bars.

In the following specification similar reference-characters will designate corresponding parts as illustrated in the several views.

1 in Figs. 1, 2, and 3 designates the engine-

cylinder. 2 is a water-jacket surrounding the said cylinder which has inlet and outlet passages of well-known construction.

3 and 4 designate, respectively, main and auxiliary exhaust-ports communicating with the cylinder-chamber.

5 designates the piston, which is provided with a series of packing-rings 6. The said piston, as will be readily understood, acts as a valve in connection with the auxiliary exhaust-port 4 and has its rod 7 connected in the usual manner to a crank-shaft. (Not shown.)

Referring to Fig. 5, 8 designates a bushing which is inserted in the cylinder-head 9 and provides seats 10 and 11 for gas and mixture valves 12 and 13, respectively. These valves differ in their diameters substantially as appears in the drawings and are indirectly controlled by the position of the exhaust-valve—that is, these valves are always closed while the exhaust-valve is held open by the cam 24^a, owing to the fact that no suction can be created in the cylinder to raise said valves during this period. When the exhaust-valve is permitted to close by the action of said cam through the operation of the governor, the said valves 12 and 13 will open under the suction created by the piston. It will therefore be understood that as long as the exhaust-valve is maintained open the inlet-valves 12 and 13 cannot take in a charge. When the exhaust-valve is closed, the suction created by the piston opens valve 13 and therewith valve 12, both of said valves being on loosely-connected stems 13^a and 13^b, as shown in Fig. 6. This connection of the stems allows an expansion of the metal without interfering with an accurate position of the valves and allows said valves to seat properly under the action of a spring 14, which incloses the lower end of the stem.

15 and 16 designate inlet-passages for air and gas. These passages communicate with the gas and mixture valves 12 and 13, and the mixed product is passed to the cylinder through the mixing-port 18.

19 designates a bushing or valve-casing which provides a seat 20 for an exhaust-valve 21, that controls the main exhaust-port 3.

22 designates a lateral shaft which is mounted in a bearing 23, depending from the cylinder. This shaft is commonly driven from the crank-shaft by means of intervening spiral gears, which it has not been deemed necessary to illustrate.

24 and 24^a designate cams rigidly mounted on said shaft. These cams will be again referred to hereinafter.

25 is a bevel-gear rigidly set on said shaft 22 and intermeshing with a smaller bevel-gear 25^a, rigid on the lower end of a governor-shaft 26. The latter shaft is inclosed in a bronze sleeve 27, that is mounted in a bearing 28 in the outer end of a bracket 29, that projects from the cylinder.

30 designates integral arms projecting from the bracket 29 and upon which a bell-crank lever has its fulcrum at 31. The upper or horizontal arms 32 of the said lever inclose a grooved collar 33, which is an integral part of the lower fulcrum-piece 34 of the governor, and said lever is turned upon its fulcrum by the action of said governor in a well-known manner.

34^a designates a horizontal rod attached to the bell-crank lever, and which is therefore subjected to a sliding reciprocating movement. This rod 34^a is supported and guided in a bracket 35, which is attached to the cylinder-head.

36 and 37 designate, respectively, shifting bars that operate in connection with the igniting devices and the exhaust-valve. The former of these bars—to wit, 36—is rigidly mounted on the reciprocable rod 34^a against independent lateral movement, but it may oscillate upon said rod 34^a in a short arc, under the action of the cam 24, in executing its function, which is to cause “a hit and miss” of the igniter through the igniter-rod 38. The cam 24 always makes contact with the lower end of the bar 36, and when the position of said bar is between the cam and the igniter-rod 38 the latter is actuated thereby. (See the dotted lines in Fig. 1.) The igniter-rod 38 is slidably mounted in a bracket 39, that is attached to the front of the cylinder-head. The lower end of said igniter-rod is reduced in diameter, as shown in Fig. 1, at 40 to provide space for bar 36 to move in without coming in contact with the rod 38 when said bar 36 is borne upward by the cam 24, thereby avoiding a needless contact of the electrodes. Fig. 1 shows the bar 36 in a position to prevent an actuation of the igniter-rod 38.

It will be understood that the bars 36 and 37 move simultaneously in the same direction.

41 is a bifurcated lever, the lower end of which incloses the igniter-rod 38, and is subject to movement thereby. This lever 41 is also attached rigidly to an igniter-shaft 42, journaled in a bearing 43 in the head of the cylinder. On the inner end of said shaft 42 the movable electrode 44 is rigidly mounted

adjacent to the insulated electrode 45 within the ignition-chamber 46, that communicates with the cylinder, Figs. 2 and 5.

47 is a curved plate or spring attached to the cylinder-head and exerting a pressure on the lever 41, that normally keeps the platinum points of the electrodes free from contact. The shifting bar 37 is also rigidly mounted on the rod 34^a and is guided at its lower end, under the movement of said rod 34^a, by a pin 48, that projects from the lower arm of the bracket 35.

From the foregoing description it will be seen that the movement of bars 36 and 37 to the positions shown in full lines in Fig. 1 is effected by the governor as the speed thereof is increased under the fluctuating conditions of the work the engine is required to do.

The bar 37 in this position is supporting the exhaust-valve 21 in a raised position and thus allows an escape of the burned gas from the cylinder, which avoids a continuous and unnecessary compression of the same. The antifriction-roller 49 on the end of the stem 21^a makes a slight contact with the cam 24^a as the latter revolves and raises the stem 21^a from said bar 37.

When the governor is free to move by reason of the cam 24^a raising the valve-stem 21^a, the shifting bar 37 will be moved from its supporting position without friction and the exhaust-valve 21 be thereby allowed to seat. At the same time the said bar 37 is thus moved the bar 36 is also moved under the lowest point of the igniter-rod 38 and contact is made between the electrodes by the cam 24. The exhaust-valve 21 is held open for the escape of the burned gases upon every other stroke of the piston, and a useless compression in the cylinder is thus avoided.

It will be noted from the foregoing description that when the work of the engine decreases from the full capacity of said engine the speed of the governor will be accelerated. This will actuate the bell-crank lever, which will move the rod 34^a and likewise the shifting bars 36 and 37, the former from between the igniter-rod 38 and the latter bar to a position to hold up the exhaust-valve. During this period in which the exhaust-valve is held open the gas and mixture valves 12 and 13 are closed, and during the period in which said exhaust-valve is allowed to close the inlet-valves are opened to admit a charge to the cylinder, as hereinbefore specified. The compression in the cylinder and the contact of the electrodes will during this period be prevented.

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

1. In a gas-engine, the combination with a cylinder, its piston, and a governor, of an exhaust-valve controlled by said governor, a gas and a mixture valve mounted on stems that are flexibly connected so that they may

be moved simultaneously to admit mixture to the cylinder, the said admission-valves being opened by suction created in the cylinder during the period in which the exhaust-valve is permitted to close by the governor, whereby means are provided for dispensing with an auxiliary shaft and cam for operating said admission-valves, substantially as herein shown and described.

2. In a gas-engine, the combination with electrodes, a governor and a bell-crank lever operated thereby, of a horizontally-reciprocating rod connected to the lower arm of said lever, an igniter-rod, an oscillating shifting bar connected to said reciprocating rod and adapted to be shifted in and out of a position to come in contact with said igniter-rod, and a cam by means of which said shifting bar is oscillated when shifted into a position, substantially as described.

3. In a gas-engine, the combination with an exhaust-valve, a governor and a bell-crank lever operated by said governor, of a horizontally-reciprocating rod connected to the lower arm of said lever, downwardly-projecting shifting bars 36 and 37 mounted on said reciprocating rod and subjected to a common movement thereby, an igniter-rod adapted to be periodically supported by one of said bars, and the exhaust-valve adapted to be periodically supported by the other of said bars, and cams mounted on a common shaft and adapted to actuate said bars, substantially as described.

In testimony whereof I have hereunto set my hand this 21st day of October, 1895.

JOHN O. BROWN.

Witnesses:

R. J. MCCARTY,

IRVING LONGENECKER.