No. 804,332. PATENTED NOV. 14, 1905.

C. J. & V. E. MOODY.

GAS ENGINE.

APPLICATION FILED SEPT. 3, 1904.

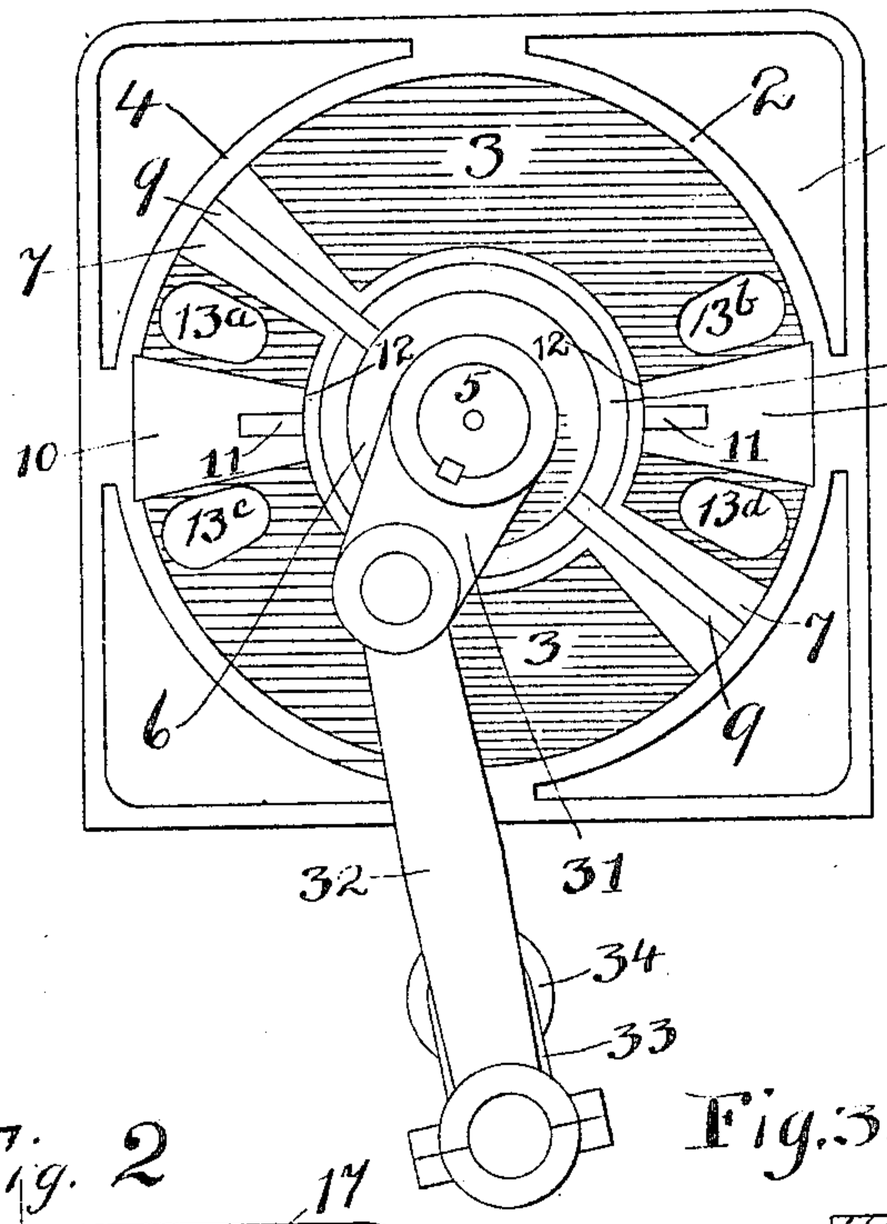
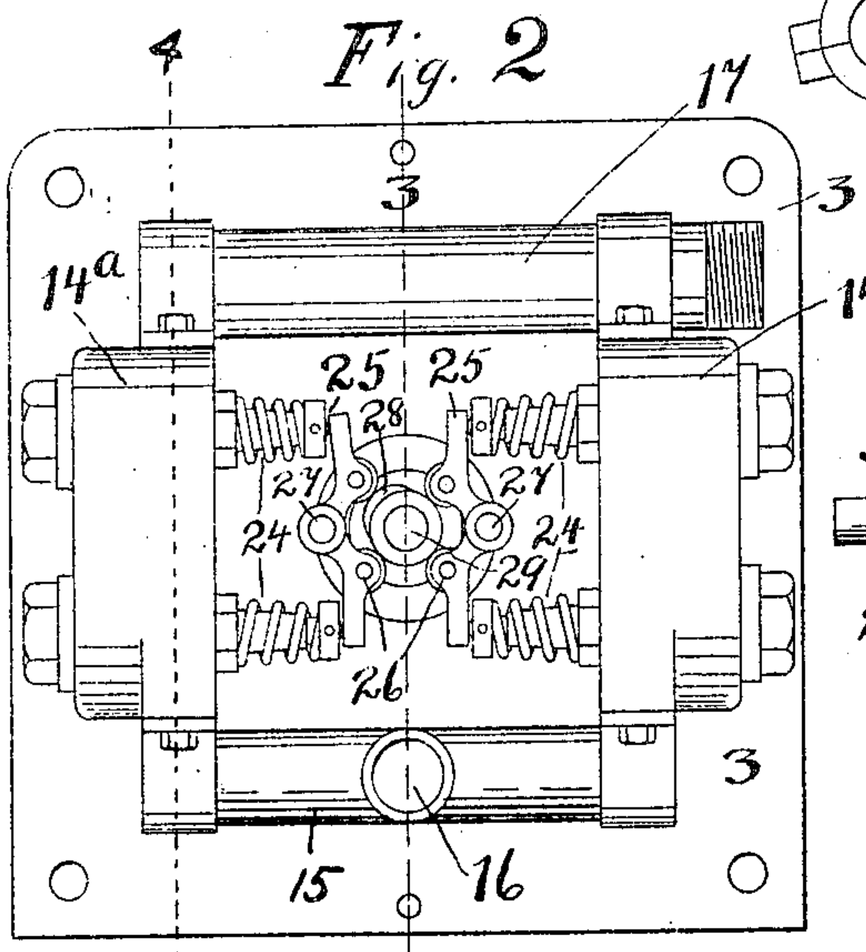


Fig. 1.

Fig. 3.

Fig. 2



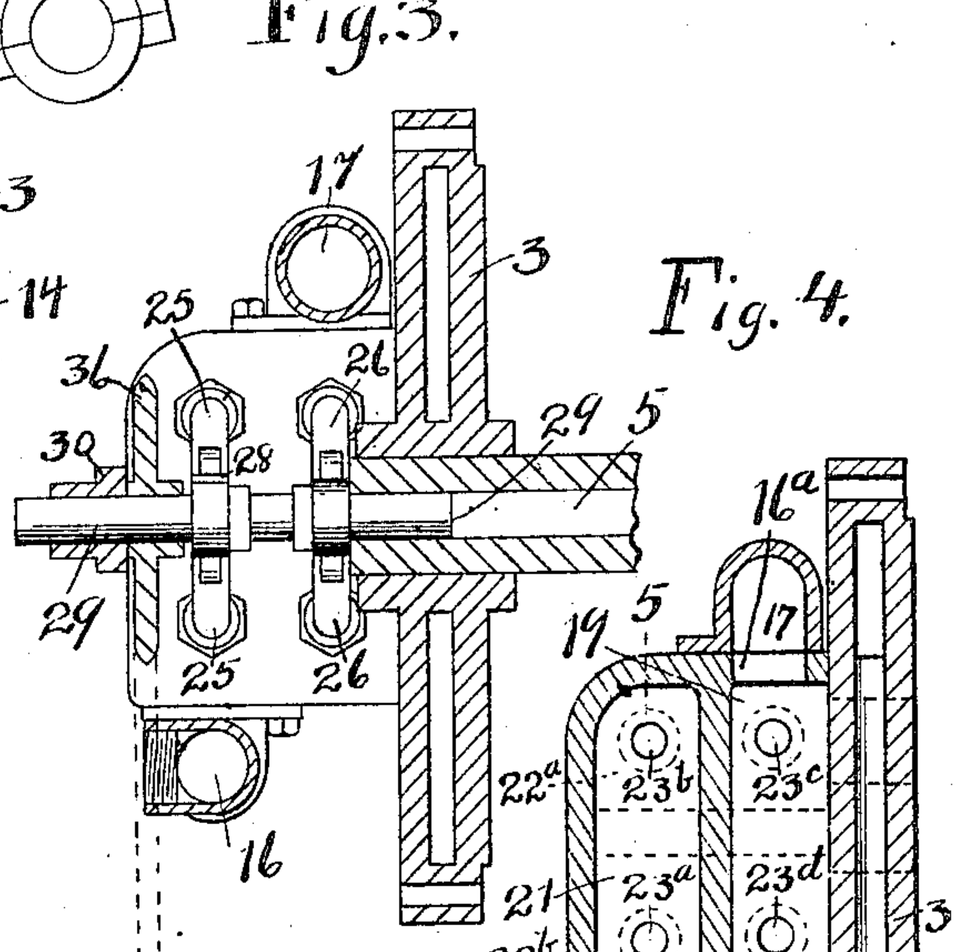


Fig. 4.

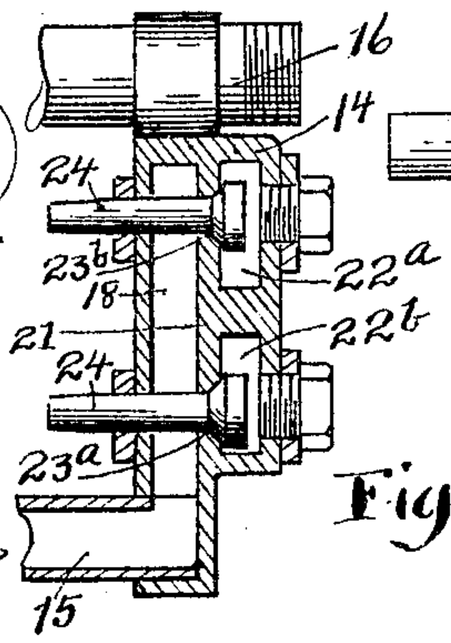


Fig. 5.

WITNESSES:
William P. Bond
Pauline Beckmann

INVENTORS
Charles J. Moody &
BY Victor E. Moody.
Banning & Banning
ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES J. MOODY AND VICTOR E. MOODY, OF ELGIN, ILLINOIS.

GAS-ENGINE.

No. 804,332. Specification of Letters Patent. Patented Nov. 14, 1905.

Application filed September 3, 1904. Serial No. 223,234.

To all whom it may concern:

Be it known that we, CHARLES J. MOODY, a citizen of the United States, and VICTOR E. MOODY, a subject of the King of Sweden and Norway, both residing at Elgin, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification.

The engine of this invention is intended to combine within itself compactness and perfection of operation without sacrifice of power and at the same time simplicity of construction and arrangement. The engine is intended to dispense with a multiplicity of cylinders and a duplication of piston-rods and at the same time provide means for preventing a dead-center.

Another object of the invention is to bring the driven shaft in close proximity to the motor-cylinder and to provide for a rotation of the driven shaft by an oscillating movement of the pistons.

Another object of the invention is to dispense with the multiplicity of intake and exhaust ports by the arrangement of a series of valves for permitting the several ports to act alternately for the purpose of intake and exhaustion.

The invention consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is an elevation showing the interior arrangement of the drum-cylinder; Fig. 2, a side elevation of the outer wall of the cylinder and valve mechanism; Fig. 3, a section taken on line 3 3 of Fig. 2 looking in the direction of the arrow; Fig. 4, a view taken on line 4 4 of Fig. 2 looking in the direction of the arrow; and Fig. 5, a sectional view of the valve-chambers, taken at right angles to the section of Fig. 4 on line 5 5 thereof.

The engine is constructed to have an outer casing 1 of suitable size and shape having therein a drum-cylinder 2, having straight end walls 3 and curved side walls 4, and within the drum-cylinder is a shaft 5, having mounted thereon a cylinder-drum 6, provided with two blades 7. The drum is fitted with a packing-ring 8 and the blades with packing-strips 9, the packing ring and strips adapted to abut against the end walls of the cylinder to form a perfect contact therewith and prevent the escape of pressure on opposite sides of the cylinder, and inwardly projecting from the curved walls are flanges 10, provided with packing-strips 11, and the inner faces 12 of the flanges are curved to conform to the curvature of the drum, so that as the drum rocks back and forth a continuous packing will be presented at all points where it is necessary to prevent the escape of pressure. The flanges, which extend entirely across the drum-cylinder, divide the cylinder into two chambers, each of which is provided with two ports 13^a, 13^b, 13^c, and 13^d. The cylinder is provided on its exterior with two valve-casings 14 and 14^a, each of which is provided at its lower outer edge with an intake port or passage 15, the two intake-passages for the two valve-casings being connected with a common supply-pipe 16 for supplying hydrocarbon fuel to the engine, and each of the casings is provided at its inner upper edge with an exhaust-passage 16^a, the two exhaust-passages being likewise connected by a common exhaust-pipe 17. The intake-port leads to a chamber 18, and the exhaust-port leads to a chamber 19, the two chambers being separated from one another by a cross-wall 20. The intake and exhaust chambers are separated from the remainder of the casing by a cross-wall 21 at right angles to the cross-wall 20, which separates the aforesaid chambers from two inwardly-extending passages 22^a and 22^b in each of the valve-casings, which lead, respectively, to the ports 13^a, 13^b, 13^c, and 13^d, there being one passage for each port. The wall 21 is provided with two ports 23^a and 23^b and two ports 23^c and 23^d, the two former leading from the chamber 18 and the two latter from the chamber 19. The ports 23^a and 23^d lead to the passage 22^b, and the ports 23^b and 23^c lead to the passage 22^a. Each of the ports is controlled by means of a spring-valve 24, and the valves are adapted to be operated by means of an outer pair of arms 25 and an inner pair of arms 26, the arms being provided with rollers 26 and mounted at their centers on pivots 27, and the rollers are adapted to be contacted by cams 28, mounted upon a shaft 29, which shaft is loosely journaled at one end into the shaft 5 and at the other end within a suitable journal-bearing 30, so that the shaft 29 may be given a continuous rotation while the shaft 5 rocks or oscillates back and forth. It will be understood that each of the valve-casings is constructed in the manner heretofore described, so that to each of the ports in the cylinder leads a passage controlled by two valves, one of which valves opens communication with

the fuel-intake port and the other with the exhaust-port, which arrangement enables the ports in the cylinder to serve both as intake and exhaust ports at the proper time.

The shaft 5 is provided at the end opposite to that into which the shaft 29 is inserted with an arm 31, pivotally connected with a link 32, which in turn is pivoted to a crank 33 on the main driving-shaft 34, and the length of the arms 31 and 32 is such that a swinging or rocking movement of the arm 31 will impart a continuous rotation to the shaft 34. The shaft has thereon a pinion 35, which is connected, by means of a chain, with a gear-wheel 36 on the shaft 29, which gear-wheel is preferably twice the diameter of the pinion, so that it will require two revolutions of the main driving-shaft to impart one revolution to the small shaft 29, which actuates the valves.

In operation with the parts in the position shown in Fig. 1 the valves will stand as follows: The valves controlling the supply of fuel to the port 13^a will be open to allow fuel to be sucked in as the blade 7 swings around. The valve establishing communication between the port 13^b and the exhaust-port will be open to allow the products of combustion to be driven out by the swing of the blade. Both valves communicating with port 13^d will be closed preparatory to an explosion, and the valves controlling the port 13^d will both be closed preparatory to compression of the charge in that portion of the cylinder. With the parts in this position an explosion will at the same time, by means of the different ports, compress the charge already in one portion of the cylinder, suck in a new charge into another portion of the cylinder, and drive out the products of combustion in the remaining portion of the cylinder. The explosion will produce a semirevolution or oscillation of the drum-piston, and the compression of the charge in one portion of the cylinder will produce a cushioning effect which prevents the blades from striking the flanges or abutments and greatly increases the ease and smoothness of operation. The cushioning effect of the compressed charge on the blades is not, however, the only safeguard against the striking of the blades on the abutments, for the reason that the crank and arm are properly proportioned to limit the swing of the blades by the revolution of the main power-shaft. For every oscillation of the drum-piston there will be an explosion in one of the sections of the cylinder, the explosions alternating and being properly timed and ignited by any usual and well-known means.

It will be seen from the above description that the engine is one which is so arranged that the ports leading to the cylinder serve the double function of intake and exhaust ports at the proper time, providing an extremely simple and easy method of successively accomplishing the four steps of suction, compression, explosion, and exhaustion, so that as an explosion takes place in one portion of the cylinder charges will be drawn in and compressed in other portions preparatory to explosion. This arrangement enables the oscillating or rocking shaft to be extremely short and for a single cylinder to occupy the space of two or more cylinders of the ordinary type, which is a feature of marked importance in the art to which the present invention relates. At the same time the arrangement of the crank and arm is one which prevents a dead-center without the duplication of cylinders, which is likewise another feature of importance in the art. Although the invention has been described with considerable particularity as to details and mechanical arrangement, it is obvious that the position and operation of the valves may be changed or modified without departing from the spirit of the invention.

The engine has been described as operating by means of hydrocarbon; but it is plain that it may be employed with steam, compressed air, or other power without any material change or modification.

What we claim as new, and desire to secure by Letters Patent, is—

1. In a hydrocarbon-engine, the combination of a drum-cylinder, inwardly-extending abutments dividing the cylinder into chambers, a piston provided with blades extending into the chambers, a rocking or oscillating shaft on which the piston is mounted, a main rotating shaft and a connection between the rocking or oscillating shaft and the rotating shaft for transforming the rocking or oscillating movement into a rotary movement, supply and exhaust passages leading to the cylinder-chambers, valves controlling the supply and exhaust passages, a short rotary stud-shaft entered into and pivoted within the end of the oscillating shaft and cams on the rotary shaft for successively operating the valves controlling the supply and exhaust passages, substantially as described.

2. In a hydrocarbon-engine, the combination of a drum-cylinder, inwardly-extending abutments dividing the cylinder into chambers, a piston provided with blades extending to the chambers, a rocking or oscillating shaft on which the piston is mounted, a main rotating shaft and a connection between the rocking or oscillating shaft and the rotating shaft for transforming the rocking or oscillating movement into a rotary movement, supply and exhaust passages leading to the cylinder-chambers, valves controlling the supply and exhaust passages having valve-stems inwardly projecting toward the oscillating shaft, rocking arms pivoted between the valves and adapted to alternately actuate companion valves, a short stud-shaft rotatably mounted within the end of the oscillating shaft and provided with a cam adapted to move the

rocking arms to actuate the valves controlling the supply and exhaust passages, substantially as described.

3. In a hydrocarbon-engine, the combination of a drum-cylinder, a rocking or oscillating shaft extending through the drum-cylinder, abutments extending from the walls of the drum-cylinder dividing said cylinder into two chambers, a swinging or oscillating piston provided with two blades one extending into each of the chambers and contacting the walls thereof, two ports leading to each of the chambers on opposite sides of the blade therein, a valve-casing provided with intake and exhaust ports leading to each of the cylinder-ports, valves in the valve-casing adapted to establish communication between the cylinder-ports and either the intake or exhaust ports, a rotary stud-shaft pivotally mounted in the end of the oscillating shaft, and a cam on the rotary stud-shaft for actuating the valves, and means for transforming the oscillating movement of the oscillating shaft into a rotary movement and imparting a rotary movement to the stud-shaft, substantially as described.

4. In a hydrocarbon-engine, the combination of a drum-cylinder divided into two chambers, an oscillating shaft therein, an oscillating piston provided with blades on the oscillating shaft, two supply and exhaust passages in each side of the piston-blade therein, two valve-casings provided with supply and exhaust passages leading to the supply and exhaust ports, four valves in each of the valve-casings controlling the supply and exhaust passages therein and provided with valve-stems inwardly projecting toward the oscillating shaft, a main rotary shaft actuated by the oscillating shaft, a stud rotary shaft entered into the end of the oscillating shaft and adapted to be rotated by the main rotary shaft, four rocking arms pivoted between the inwardly-projecting valve-stems and each adapted to actuate a pair of valves, and cams on the stud-shaft adapted to move the rocking arms and successively compress the valve-stems and open the valves, substantially as described.

CHARLES J. MOODY.
VICTOR E. MOODY.

Witnesses:
SAMUEL W. BANNING,
PAULINE BECKMAN.