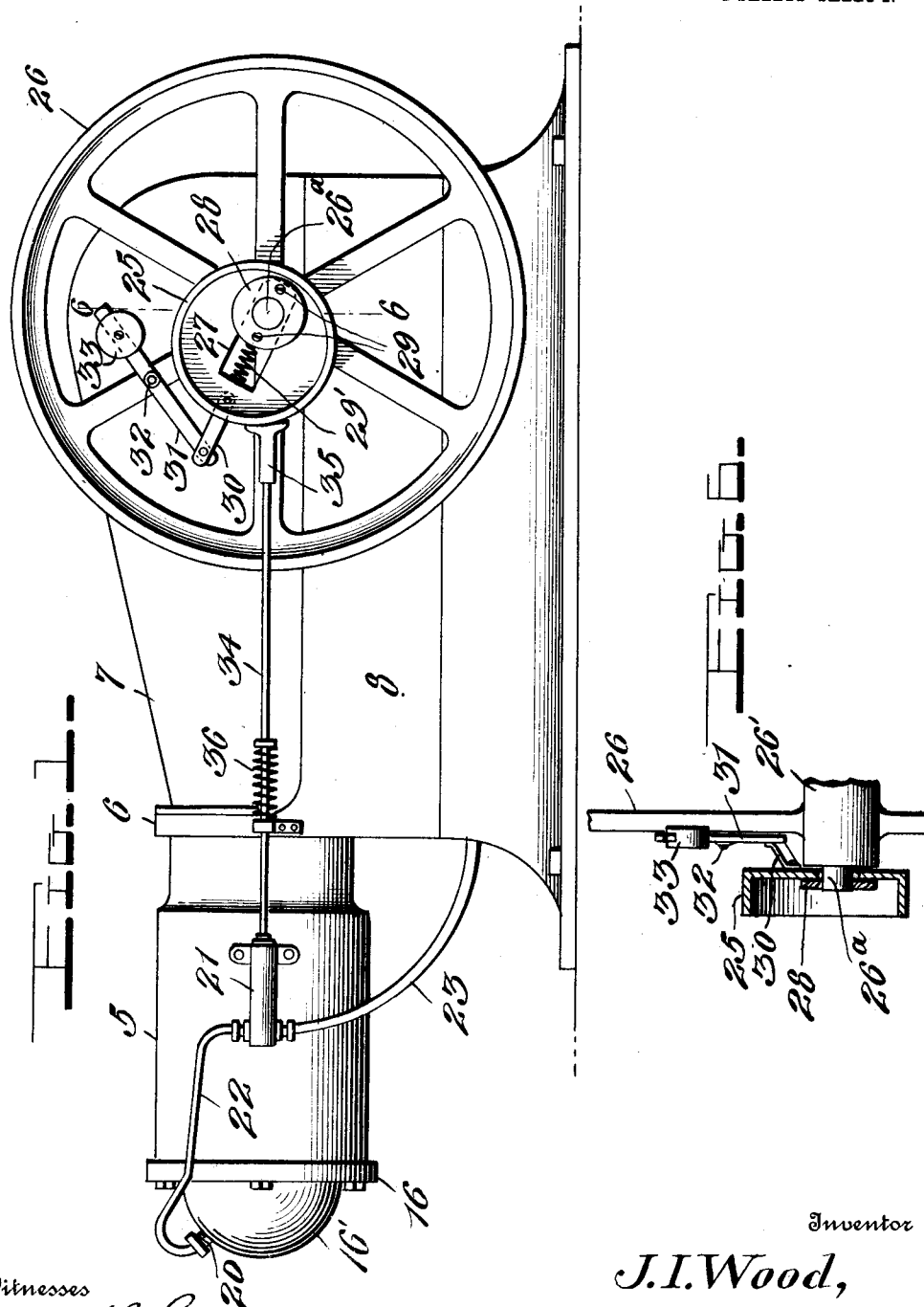


J. I. WOOD.
INTERNAL COMBUSTION ENGINE.
APPLICATION FILED NOV. 23, 1910.

1,051,977.

Patented Feb. 4, 1913.

2 SHEETS—SHEET 1.



Witnesses

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Inventor

J. I. Wood,

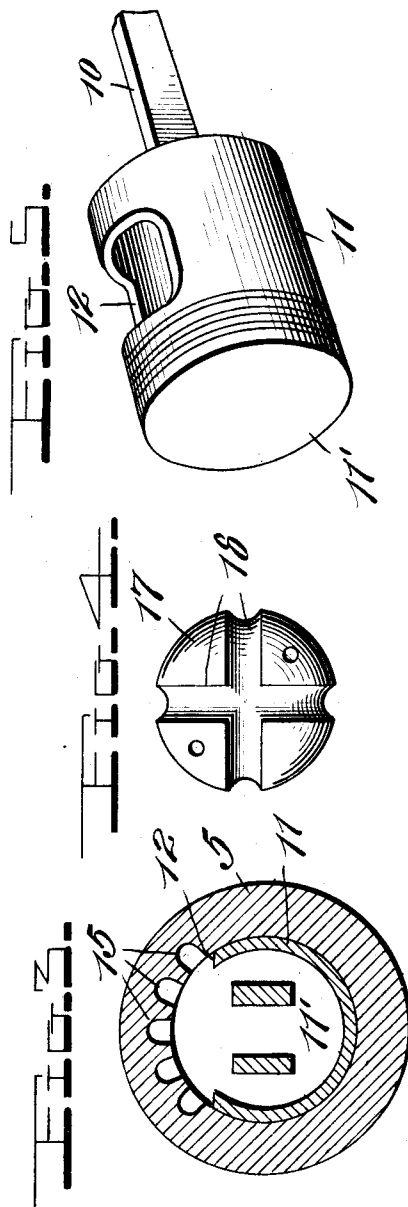
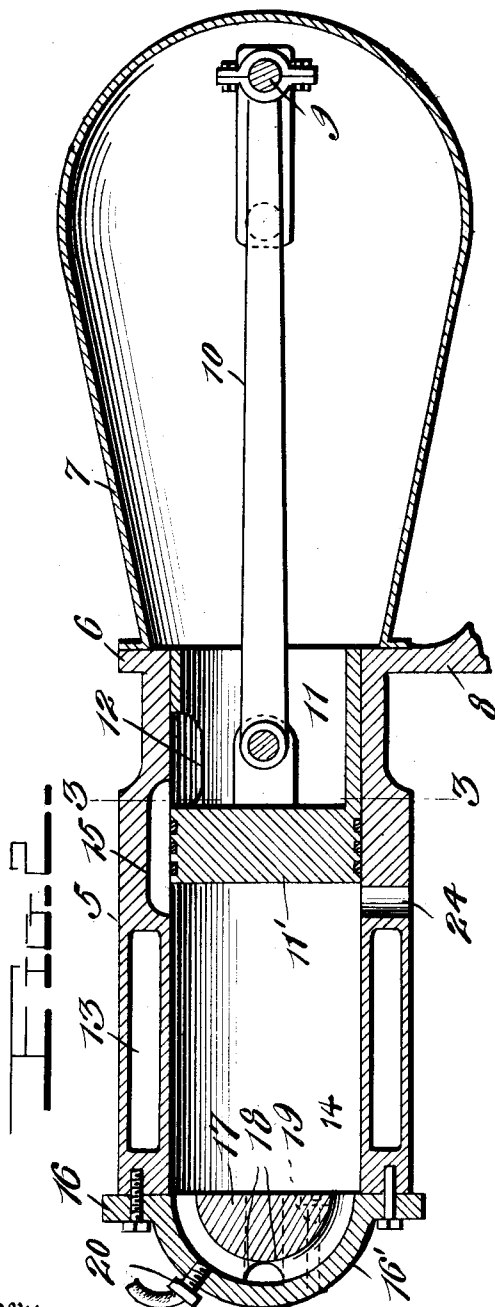
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Witnesses

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UNITED STATES PATENT OFFICE.

JAMES I. WOOD, OF DENVER, COLORADO, ASSIGNOR TO THE SIMPLE OIL ENGINE COMPANY, A CORPORATION OF COLORADO.

INTERNAL-COMBUSTION ENGINE.

1,051,977.

Specification of Letters Patent.

Patented Feb. 4, 1913.

Application filed November 23, 1910. Serial No. 593,926.

To all whom it may concern:

Be it known that I, JAMES I. WOOD, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to improvements in internal combustion engines and has for its primary object to improve the construction and increase the efficiency of an engine of the type shown and described without materially increasing the cost of manufacture.

Another object of the invention resides in the provision of means for quickly supplying air in volume for admixture with vaporized oil to produce the explosive charge.

20 A further object of the invention is to provide a head for the piston cylinder provided with oppositely disposed semi-circular explosion chambers, and means for automatically regulating the supply of oil to said chambers in accordance with the speed of the engine.

With the above and other objects in view, the invention consists of the novel features of construction and the combination and arrangement of parts hereinafter fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of an internal combustion engine embodying my improvements; Fig. 2 is a longitudinal section of the same; Fig. 3 is a section taken on the line 3—3 of Fig. 2; Fig. 4 is an elevation of the removable element arranged in the cylinder head and provided with the explosion chambers; Fig. 5 is a detail perspective view of the piston; and Fig. 6 is a section taken on the line 6—6 of Fig. 1.

Referring in detail to the accompanying drawings 5 designates the cylinder of my improved engine, upon one end of which an annular flange 6 is formed to which the end of the crank-case 7 is suitably secured. The crank case and the cylinder are supported upon an engine bed 8 upon which the crank shaft 9 is also mounted. The piston rod 10 is connected with the crank shaft in the usual manner, and the outer end of said piston is arranged in and connected to a semi-tubular piston 11. The greater portion of 55 the piston is of tubular form, the solid por-

tion 11' thereof being provided with suitable packing rings for engagement with the walls of the cylinder 5. The tubular portion of the piston is longitudinally cut away, as shown at 12, such cut away portion being disposed approximately centrally between the ends of the piston. A passage is thus formed through the piston from one end thereof to the cylinder wall. The reason for this peculiar construction of the piston will more fully hereinafter appear.

The cylinder 5 is provided with a water jacket 13 which surrounds a compression chamber 14 of the cylinder into which the air and gases are admitted to be compressed and exploded. The cylinder wall in its upper portion and adjacent to the inner end thereof is formed with a plurality of longitudinal ports 15 which are arranged in parallelism and communicate throughout their entire length with the interior of the cylinder. The cut away portion 12 of the piston is adapted to co-act with these longitudinal ports or passages to admit air in volume into the compression chamber in advance of the piston on the outward stroke thereof. Upon the outer end of the cylinder 5, a head 16 is removably arranged. This head comprises a substantially hemi-spherical body portion 16' upon which the flange 16 is formed which abuts against the end of the cylinder and through which the attaching bolts extend. A hemi-spherical member 17 is adapted to be arranged in the concavo-convex body portion 16' of the cylinder head and is provided in its periphery with the semi-circular explosion chambers 18. These chambers extend at right angles and intersect each other. The member 17 is secured in the head by means of the screws 19 and may be thus conveniently removed for cleaning the explosion chambers.

Oil is supplied to the inlet 20, which is provided in the cylinder head 16, by a force pump 21 mounted upon one side of the cylinder 5 and having a discharge pipe 22 connecting the same with the oil inlet. A supply pipe 23 connects the pump with an oil tank or other source of supply.

As thus far described, the operation of the engine is substantially as follows: Upon the reciprocation of the piston air, entering through an admission valve of the usual type, not shown, is slightly compressed in the crank case 7 and upon the out stroke of the

piston 11 this air flows into the tubular portion of said piston and through the cut away portion 12 thereof and the longitudinal ports 15 in the cylinder wall, into the compression chamber 14. When the engine is first started, the cylinder head 16 is heated in any preferred manner and the oil which is admitted to the explosion chambers 18 of the member 17 is thus vaporized in said chambers. This vaporized oil is mixed with the air which is admitted to the compression chamber in the manner above described, thereby producing an admixture of the air and gas to effect the ignition of the charge upon the completion of the full compression stroke of the piston. The charge is ignited by the heat which is retained in the explosion chambers. It will be understood that the exterior heating of the cylinder head 16 is unnecessary after the first charge has been exploded, as the head is reheated with each explosion, the flame extending into the explosion chambers 18 to thoroughly heat the element 17. Thus, in the further operation of the engine, the oil which is admitted to the explosion chambers will be quickly vaporized, such vapor entering the compression chamber for admixture with the air therein. The piston cylinder 5 is provided with a suitable exhaust port 24 from which the burnt gases are exhausted upon each return stroke of the piston.

From the above it will be observed that air is very quickly admitted into the compression chamber and in sufficient volume to provide a thorough admixture of the same with the entire volume of vapor which is in the compression chamber. Thus, liability of failure to explode the charge is, to a great extent, eliminated. The water jacketed portion of the piston cylinder is, of course, provided with suitable inlet and outlet openings whereby the jacket may be filled or emptied.

In order to regulate and control the supply of oil to the explosion chambers 18 in the cylinder head, in accordance with the varying speed of the engine, I provide the mechanism illustrated in Figs. 1 and 6 of the drawings. In the attainment of this end, a movable eccentric disk 25 is arranged upon the hub 26 of one of the engine fly wheels 26 which are fixed to the crank shaft 9. The eccentric disk 25 is provided with a slot 27 and is slidable upon the reduced portion 26^a of the fly wheel hub. A retaining plate 28 is arranged upon the face of the disk 25 and extends across the slot 27. Suitable screws or bolts 29 rigidly secure this plate to the hub of the fly wheel and extend through the slot or opening 27 in the eccentric disk. The plate 28 serves as a guide for the disk in its sliding movement.

The disk 28 is normally held yieldingly in eccentric relation to the crank shaft by

means of a coil spring 29 which is arranged between the fly wheel hub and the end of the slot 27. A link 30 is pivoted at one end to the eccentric disk 25 adjacent to its edge, said link extending outwardly from the disk and having its other end pivotally connected to an arm 31 which is pivoted intermediate of its ends, as shown at 32, upon one of the spokes of the fly wheel 26. A weight 33 is secured upon the other end of this pivoted arm and normally acts to throw the disk inwardly toward the crank shaft through centrifugal force in the rotation of the fly wheel. A pump rod 34 is mounted in a bearing upon the bed of the engine and is provided upon its end with a shoe 35 which engages upon the periphery of the eccentric disk 25 and is yieldingly held in contact therewith by means of a coil spring 36 which is arranged between the rod bearing and a collar on said rod. In this manner, the feed of the oil from the force pump to the explosion chambers is automatically varied. When the engine is traveling at a high speed the centrifugal force throws the weight 33 outwardly, thereby moving the eccentric disk inwardly toward the crank shaft and thus decreasing the stroke of the pump rod, thereby lessening the quantity of oil which is supplied to the explosion chambers. Any decrease in speed of the engine will proportionately decrease the extent of movement of the weighted end of the arm 31 and thus permit the spring 29 to force the eccentric disk 25 farther from the crank shaft center, thus increasing the stroke of the force pump rod 34.

From the foregoing it is thought that the construction and operation of my improved engine will be readily understood.

While I have specifically shown and described the preferred construction and arrangement of the various elements it will be understood that the invention is susceptible of considerable modification without departing from the essential feature or sacrificing any of the advantages thereof.

Having thus described the invention what is claimed is:

1. In an explosive engine, the combination of a cylinder, a removable concavo-convex head arranged on one end of the cylinder, a hemi-spherical element arranged in said head, means for rigidly securing said element in the head, said element having grooves providing with said cylinder-head a plurality of chambers extending at right angles to each other and opening into the cylinder, means for supplying oil to said chambers, and a piston to reciprocate in said cylinder.

2. In an explosion engine, the combination of a cylinder, a concavo-convex head removably secured to one end of the cylinder, a removable peripherally-grooved element ar-

5 ranged in said head, the grooves of said element opening into the cylinder, said head being provided with an oil supply port opening into the grooves of said element, and means for supplying oil through said port into said grooves.

10 3. In an explosion engine, a cylinder and piston, a cylinder-head having a concave internal recess, a block having a convex face removably secured in said recess, and transverse curved vaporizing and igniting passages, the walls of which are constituted by opposed surfaces of said head and block, said passages opening at their ends directly into said cylinder, and means for supplying liquid fuel to said transverse passages.

15 4. In an explosion engine, a cylinder and piston, a cylinder-head having an internal recess, a solid hemispherical block removably secured in said recess and provided with transverse peripheral vaporizing and igniting passages, and means for supplying liquid fuel to said passages.

20 5. In an explosion engine, a cylinder and

piston, a cylinder-head having an internal recess, a block of width equal to the internal diameter of the cylinder removably secured in said recess, and provided with separate, intersecting vaporizing and igniting passages extending from one side of the cylinder to the other, and means for supplying liquid fuel to said passages.

6. In an explosion engine, a cylinder and piston, a cylinder-head having therein a hemispherical block provided on its periphery with a plurality of narrow transverse crossed vaporizing and igniting passages opening at their ends directly into said cylinder, and means for supplying liquid fuel to said passages.

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

JAMES I. WOOD.

Witnesses:

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WALTER C. HECKENDORF,
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