No. 617,372. Patented Jan. 10, 1899.

E. E. TRUSCOTT.

EXPLOSIVE ENGINE.

(Application filed Feb. 25, 1898.)

(No Model.) 2 Sheets—Sheet 1.

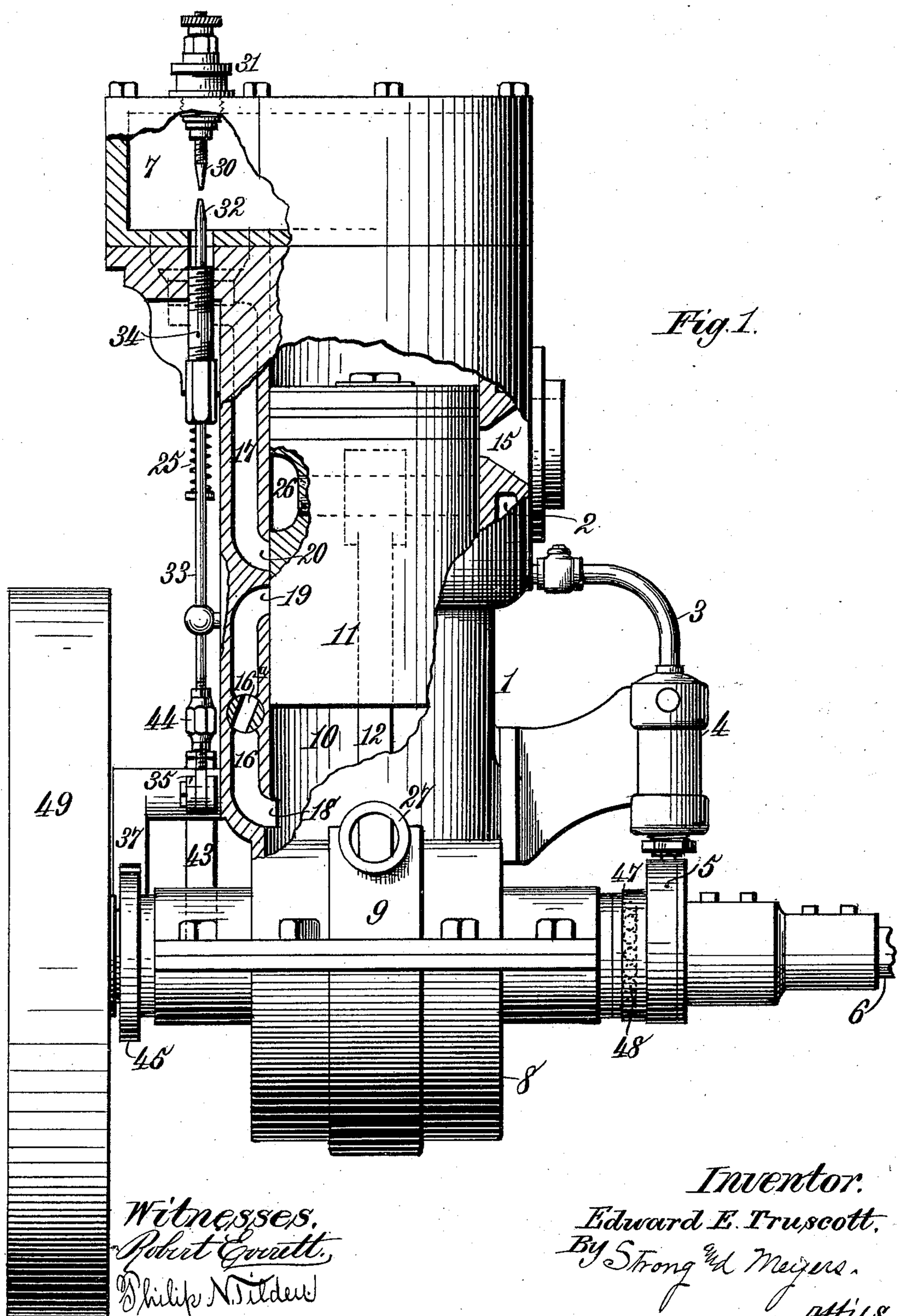

Fig. 1.

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Fig. 2.

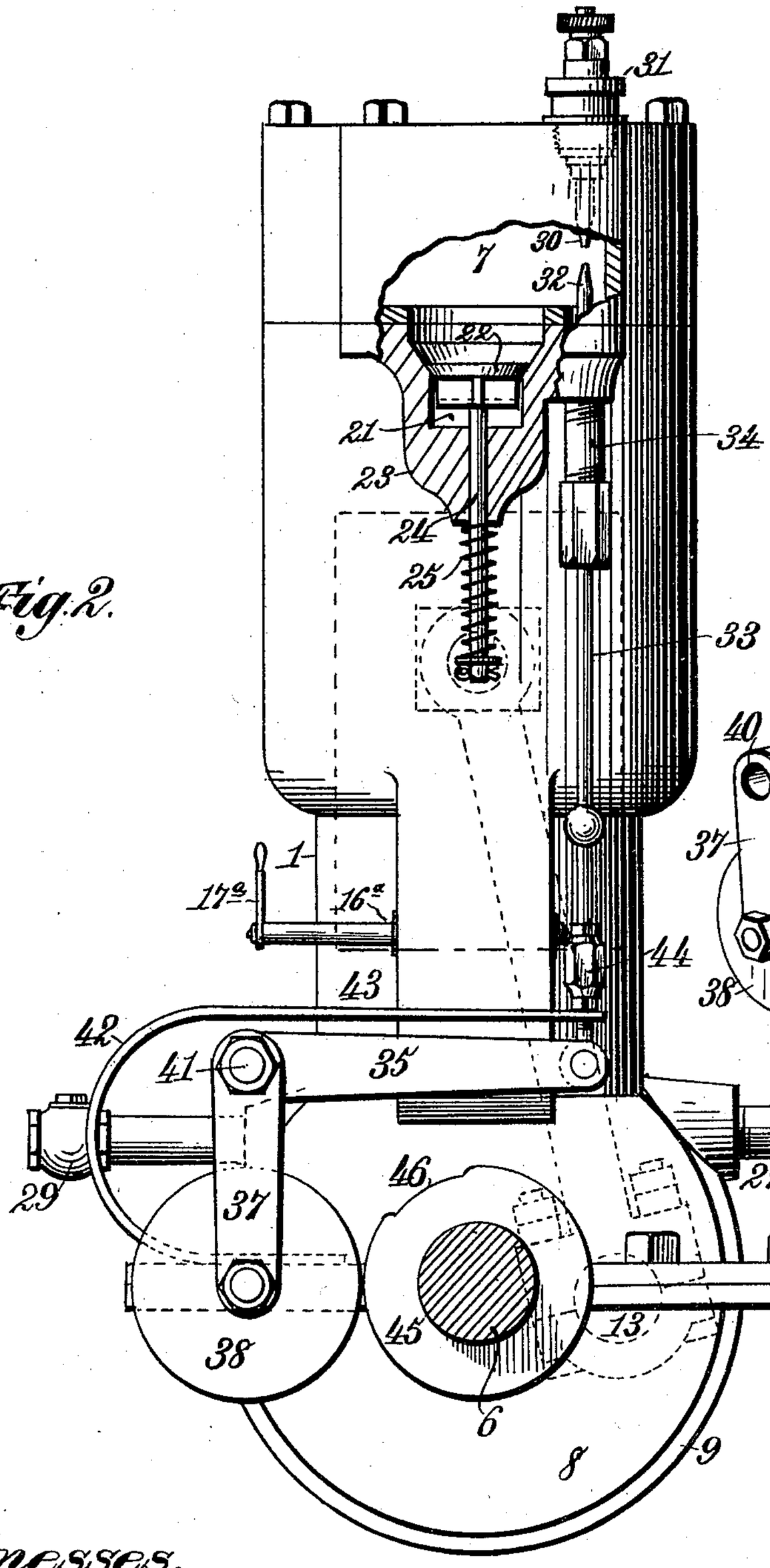
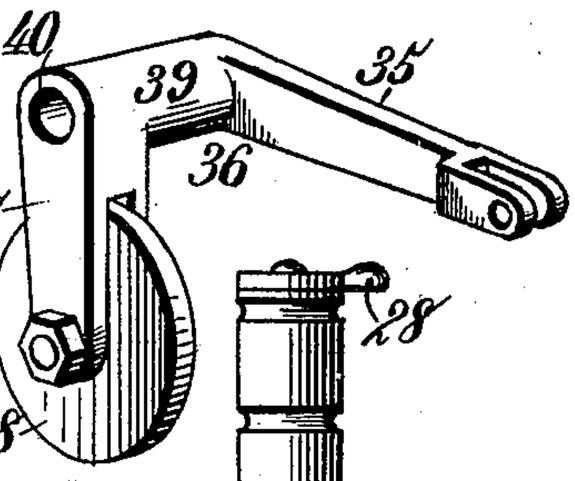


Fig. 3.



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UNITED STATES PATENT OFFICE.

EDWARD E. TRUSCOTT, OF ST. JOSEPH, MICHIGAN.

EXPLOSIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 617,372, dated January 10, 1899.

Application filed February 25, 1898. Serial No. 671,570. (No model.)

To all whom it may concern:

Be it known that I, EDWARD E. TRUSCOTT, a citizen of the United States, residing at St. Joseph, in the county of Berrien and State of Michigan, have invented certain new and useful Improvements in Explosive-Engines; and I do hereby 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.

My invention relates to an improved gas-engine designed more particularly for use as a marine motor.

A principal object of my invention relates to an improvement in the means for controlling the admission of the explosive mixture to the combustion-chamber.

Other objects of the invention relate to certain details of construction and operation of parts whereby the said object above outlined is accomplished and whereby I am enabled to provide an engine which shall be simple in operation, compact in form, and relatively cheap to manufacture.

In the accompanying drawings, illustrating my invention, Figure 1 is a side elevation, partly in section, of an engine constructed according to my invention. Fig. 2 is a front elevation, also partly in section, of the same; and Fig. 3 is a perspective view of a detail.

The reference-numeral 1 indicates the casing of the engine, the walls of which are constructed hollow in the upper portion to provide a water-jacket 2, which is supplied with water from a pipe 3, leading from a pump 4, the piston of which is operated from an eccentric 5 on the coupling-sleeve 5^a. Said casing 1 is enlarged in its upper portion to provide an ignition or combustion chamber 7 and at its lower portion is provided with a circular enlargement affording a mixing-chamber 8. This mixing-chamber 8 is further provided in its central part with an annular enlargement 9, which forms a working-way for the revolution of the crank-shaft. Intermediate the combustion and mixing chambers the casing is formed cylindrical to provide the cylinder 10. The piston 11 forms the division between these two chambers.

The numeral 12 indicates the piston-rod, connected at its upper end in the piston 11 and at its lower end to the crank-arm 13 of the drive-shaft 6.

In the cylinder-casing at one side is provided an exhaust-port 15 and at the opposite side the passages 16 17, affording communication at stated intervals, as presently explained, between the mixing and combustion chambers. The passage 16 communicates at its upper and lower end, respectively, with the interior of the cylinder 10 through the medium of ports 18 and 19, the port 18 being located just above the mixing-chamber 8 and the port 19 centrally of the cylinder 10. At its lower end the passage 17 communicates with the interior of the cylinder through the medium of a port 20 and at its upper end with a valve-chamber 21, which communicates with the combustion-chamber 7. In the valve-chamber 21 is seated a valve 22. Said valve-chamber is formed in a casting 23, integral with casing 1, and through an opening in said casting extends a vertically-movable rod 24, the upper end of which is connected to the bottom of the valve 22. On the lower end of said rod is secured a coiled spring 15, the upper end of which bears against the under side of the casting 23. The valve 22 is designed to be unseated against the resistance of spring 25 by the pressure of the explosive gas, as will be presently explained.

On the side of the piston 11, adjacent to the passages 16 and 17, is formed a recessed portion or pocket 26. It will be noticed that the ports 19 and 20 are in close proximity, and the diameter of the pocket 26 is such that it will cover or span these ports when moved opposite thereto in the operation of the piston.

The numeral 27 indicates the air-inlet to the mixing-chamber, having within it a suitable check-valve and being controlled by a slide or cut-off 28, which can be adjusted by hand to control the amount of air to be drawn into the mixing-chamber by the suction produced by the reciprocation of the piston 11 in the cylinder 10.

The numeral 29 indicates the inlet for the gaseous vapor, in which inlet, as usual, is located an ordinary check-valve. From the inlet 29 a pipe will in practice extend to a tank containing the gasolene or other hydrocarbon from which the vapor is to be drawn.

In the passage 16 is provided a turn-plug 16ª, operated by a suitable handle 17ª. By means of this turn-plug I am enabled to control the amount of mixed air and gas to be delivered through said passage 16 to the combustion-chamber.

The means for producing the electrical spark will now be described with reference more particularly to Figs. 2 and 3.

The numeral 30 indicates what I will term a "plug" and constitutes one of the contact-points of the electrical igniting mechanism. Said plug is vertically adjustable in a packing-box 31.

The numeral 32 designates the opposite contact-point, which I will term the "igniter." Said igniter is secured on the upper end of a rod 33, and said rod and igniter have a reciprocating movement in a packing-box 34. At its lower end the rod 33 is secured to the outer bifurcated end of the long arm 35 of a bell-crank lever 36. (Shown in Fig. 3.) In the bifurcated end of the short arm 37 of the bell-crank lever is rotatably secured a roller 38. The arms 35, and 37 extend at right angles to each other and are respectively secured on opposite ends of a cylindrical boss 39, which affords a bearing 40 for a bolt 41, by means of which said lever is fulcrumed on the casting of the machine. Secured at one end to the casing of the engine is a curved leaf-spring 42, a long arm 43 of which extends parallel with the arm 35 and at its outer end is adjustably secured on the lower portion of rod 33 by means of a thumb-nut 44. Formed integral with the hub of a fly-wheel 49, secured on one end of drive-shaft 6, is a cam-wheel 45, having a recessed portion 46. Said wheel 45 is in constant contact with the periphery of the roller 38, and as it is revolved by the shaft 14 said roller will sink into the recess 46, and as the cam 43 of spring 42 presses constantly upward against the thumb-nut 44 on rod 33 said rod 33 will at this period be raised and the igniter 32 brought in contact with the plug 30. The cam-wheel 45 continuing to revolve, the roller 38 will ride out of the recess 46, thereby causing the arm 35 of the bell-crank lever to lower, and thereby draw rod 33, which will be operated to separate the two contact-points and produce the spark which causes the explosion of the gas. The contact-points are of course connected with a source of current-supply. (Not shown.)

The cam 5 operating the piston of pump 4 is preferably formed integral with a coupling-sleeve 5ª, connecting the drive-shaft 6 with the propeller-shaft 6ª, and at one side is provided with an annular flange 47, affording a raceway for antifriction-balls 48, interposed between said flange and the sleeve-bearings of the drive-shaft, which are designed to compensate for the thrust or vibrations produced by the propeller on the outer end of shaft 6ª.

The operation of the engine described is as follows: The fly-wheel is first revolved by hand to draw in the initial supply of the explosive mixture. As the piston rises air is drawn in at the inlet 27, and vapor is similarly drawn or sucked in at the inlet 29, the air and gas entering the mixing-chamber 8 simultaneously and being thoroughly mixed therein by the revolutions of the crank in said mixing-chamber. As the piston descends the gas in the mixing-chamber is compressed more and more until the pocket 26 spans the ports 19 and 20, when a direct outlet for its escape is afforded. The gas now rushes through the passage 16, pocket 26, and passage 17 into the valve-chamber 21, and unseating by its pressure the valve 22 enters the combustion-chamber 7. As the piston ascends it again compresses the gas until the igniter 32 is caused by the cam-wheel 45 to break contact with the plug 32, when the spark thus made will ignite the gas, the resultant explosion driving the piston downward to repeat the operation just described, the products of combustion passing out at the exhaust-port 15. The adjustment of the igniting mechanism is such that the igniter 32 will contact with the plug 30 just before the piston reaches the limit of its upward stroke and will break contact therewith at the completion of said upward stroke to form the spark.

By constructing the ports 16 and 17 in vertical alinement in the casing and by providing the ports 19 and 20 closely adjacent to each other and adapted to be spanned by the pocket 26 I provide a direct outlet for the escape of the gas from the mixing to the combustion chamber and thus secure simplicity in construction and operation.

The pump 4 is continuously operated by the cam 5 to supply cold water to the water-jacket 2.

While I have described an engine specifically designed for use as a marine motor, it is obvious that by slight changes in construction the same could be made equally applicable to any of the uses to which gas-engines are put without in any manner departing from the spirit of my invention.

Having thus fully described my invention, what I claim is—

1. In a gas-engine the combination with a casing affording a mixing and a combustion chamber and intermediate said chambers a cylinder, of a valve-chamber communicating with said combustion-chamber, a valve seated in said valve-chamber, passages formed in said casing communicating at their outer ends with said mixing and valve chambers, respectively, and at their inner ends terminating in adjacent ports in the wall of said cylinder, and a piston in said cylinder having a pocket adapted to span said ports and to form therewith and with said passages a direct communication between said mixing and valve chambers, substantially as described.

2. In a gas-engine, the combination with a casing affording a mixing and a combustion chamber and intermediate said chambers a

cylinder, of a valve-chamber communicating with said combustion-chamber, a spring-controlled valve seated in said valve-chamber, passages formed in said casing in vertical alinement and communicating at their outer ends with said mixing and valve chambers, respectively, and at their inner ends terminating in adjacent ports in the wall of said cylinder, and a piston in said cylinder having a pocket adapted to span said ports and to form therewith and with said passage a direct communication between said mixing and valve chambers, substantially as described.

3. In a gas-engine, the combination with a casing affording a mixing and a combustion chamber and intermediate said chambers a cylinder, of a valve-chamber communicating with said combustion-chamber, a valve seated in said valve-chamber, passages formed in said casing communicating at their outer ends with said mixing and valve chambers, respectively, and at their inner ends terminating in adjacent ports in the wall of said cylinder, a turn-plug in the lower end of said passages for controlling the quantity of mixed air and gas passing through said passage and a piston in said cylinder having a pocket adapted to span said ports and to form therewith and with said passages a direct communication between said mixing and valve chambers, substantially as described.

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

EDWARD E. TRUSCOTT.

Witnesses:
FRANK L. PIXLEY,
LOUIS S. SCHULZ.