C. RAUCH.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED FEB. 3, 1912.

1,054,615.

Patented Feb. 25, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

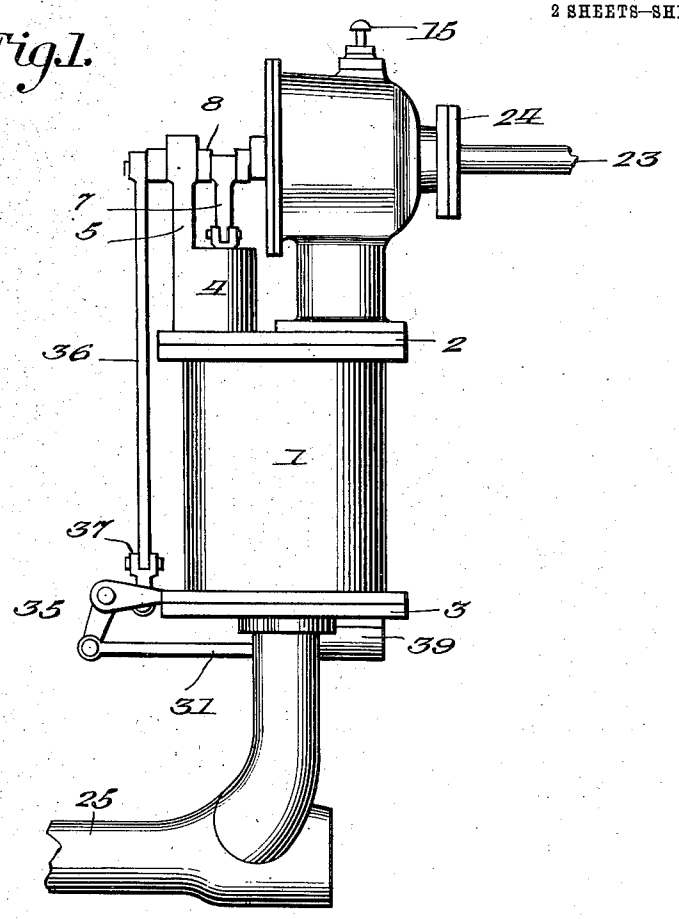
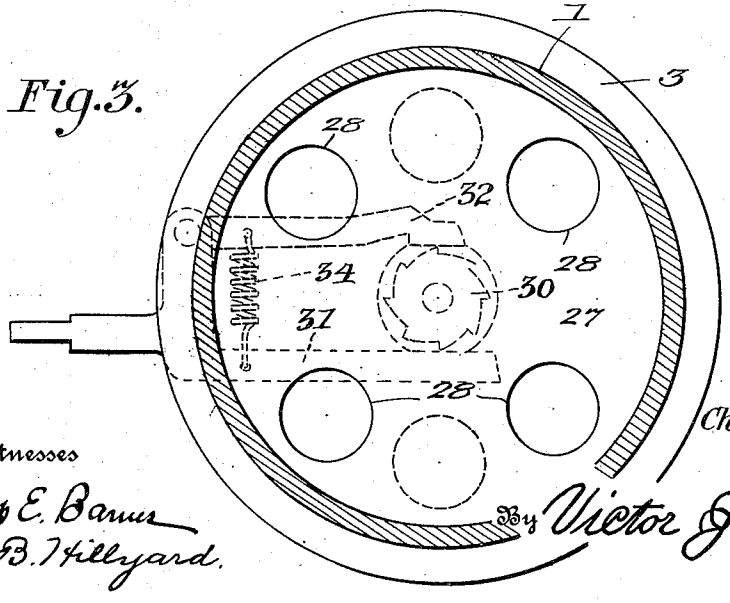


Fig. 3.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

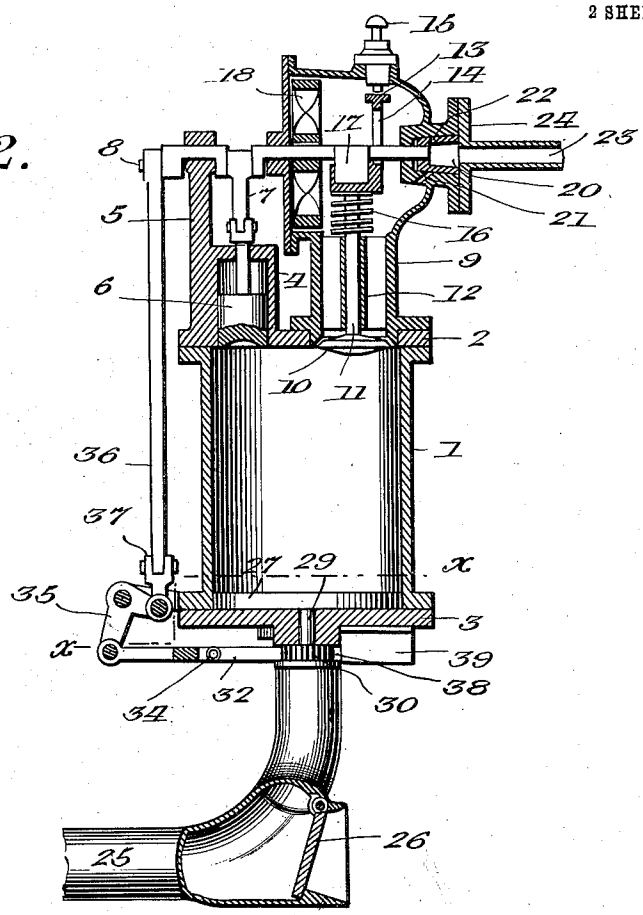
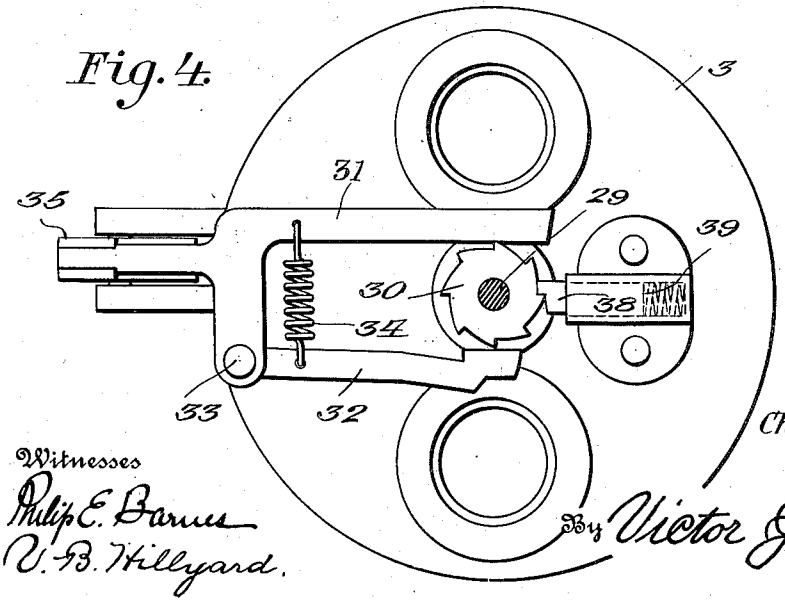


Fig. 4.



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INTERNAL-COMBUSTION ENGINE.

1,054,615. Specification of Letters Patent. Patented Feb. 25, 1913.

Application filed February 3, 1912. Serial No. 675,221.

To all whom it may concern:

Be it known that I, CHARLES RAUCH, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

The invention has for its object the utilization of the products of combustion as means for propelling water, air or land vehicles either directly or indirectly.

The invention provides an engine embodying an explosion chamber, means for supplying a gaseous mixture thereto, the same being ignited, and means for utilizing the burnt gases for developing power for driving the machine to be operated.

The invention consists of the novel features, details of construction and combination of parts, which hereinafter will be more particularly set forth, illustrated in the accompanying drawings, and pointed out in the appended claims.

Referring to the drawings, forming a part of the specification, Figure 1 is a view in elevation of an engine embodying the invention. Fig. 2 is a vertical central section thereof. Fig. 3 is a horizontal section on the line x—x of Fig. 2 showing the parts on a larger scale. Fig. 4 is a view of the engine, as seen from the lower or bottom side on the same scale as Fig. 3.

Corresponding and like parts are referred to in the following description, and indicated in all the views of the drawings, by the same reference characters.

The explosion cylinder 1 has outer flanges at its ends to which are bolted or otherwise secured end pieces 2 and 3. A cylinder 4 is formed with or otherwise fitted to the end piece 2 and has an upright forming a standard 5. A piston 6 is arranged to operate in the cylinder 4 and its rod is connected by means of a pitman 7 with the crank portion of a crank shaft 8. A casing 9 is bolted or otherwise secured to the end piece 2 and comprises a lower tubular portion and an upper enlarged chamber. The crank shaft 8 is mounted in the standard 5 and in opposite portions of the enlarged part of the casing 9. A downwardly opening valve 10 closes against a seat formed at the lower end of the casing 9 and its stem 11 operates in a guide 12 formed in the lower portion of the casing 9. An arm 13 is formed with or attached to the stem 11 and has a slot 14 through which the crank shaft 8 passes. The arm 13 is adapted to close an electric circuit for igniting the explosive mixture in the cylinder 1. A set nut 15 is threaded into the casing 9 and is electrically insulated therefrom and forms one terminal of the circuit which is closed by means of the arm 13, said circuit including a spark plug fitted to the cylinder 1. A helical spring 16 of the expansible type normally exerts a pressure to hold the valve 10 seated, said valve being unseated by means of a cam 17 forming a part of the crank shaft 8 or applied thereto in any manner. A rotary fan 18 is secured to the crank shaft 8 to rotate therewith and also constitutes a fly wheel, the same being provided with a heavy rim. A valve chamber 19 is located at one side of the casing 9 in line with the crank shaft 8 and receives a hollow valve 20 which is connected with the crank shaft 8 so as to rotate therewith. The valve chamber 19 has a port 21 opening into the casing 9 and the valve 20 has a port 22 which is adapted to register with the port 21. The interior of the valve chamber 19 is made slightly tapering and the valve 20 correspondingly tapers to insure and maintain a close joint between the parts. A pipe 23 connects with the cap plate 24 which closes the outer end of the valve chamber 19, said pipe 23 connecting with a tank or other reservoir containing gasolene or like liquid fuel.

When the crank shaft 8 is in motion the fan 18 forces air into the casing 9 and during a point in each revolution of the crank shaft the ports 22 and 21 register, thereby permitting liquid fuel to discharge into the casing 9 and mix with the air supplied to said casing by means of the fan 18. The gaseous mixture thus produced is admitted into the cylinder 1 at the proper time by the unseating of the valve 10 which is effected by means of the cam 17. After the cylinder 1 has received a charge the valve 10 closes, said gaseous mixture being exploded by a closing of the circuit through the contact of the arm 13 with the set screw 15. As the explosion occurs the piston 6 is driven upwardly into the cylinder 4 and since said

piston is connected with the crank shaft 8 the latter is driven. The products of combustion resulting from the explosion of the gaseous mixture in the cylinder 1 are utilized in a manner presently to be described for developing power which is utilized for driving the vehicle or craft to be propelled.

One or more tubes 25 has connection with the end piece 3 and communicates with the explosion cylinder through an opening formed in said end piece. The tube 25 has an approximate horizontal arrangement and is connected with the explosion cylinder by means of a branch. A check valve 26 closes the front end of the tube 25 and opens inwardly. When the burnt gases resulting from combustion rush into the tube 25 the check valve 26 closes and said burnt gases escaping from the rear of the tube 25 tend to drive the tube 25 forwardly. When the engine is adapted for propelling water craft the tube 25 is submerged and is filled with water. When the burnt gases enter the tube 25 the check valve 26 closes and the water contained in said tube is forcibly expelled therefrom and is utilized to drive the craft forwardly in a manner well understood. During the intervals between the explosions the check valve 26 opens and admits of the tube 25 filling with water.

For controlling the discharge of the products of combustion from the explosion cylinder 1 a rotary valve 27 is located in the lower portion thereof upon the lower piece 3 and has one or more openings 28 to register with the tube or tubes 25. The rotary valve 27 has a stem 29 which is mounted in the end piece 3, said stem being provided at its lower end with a ratchet wheel 30. A dog 32 is adapted to coöperate with the teeth of the ratchet wheel 30. The dog is pivotally connected at 33 and is drawn inward by means of a contractile spring 34 whose ends are attached to a guide 31 and the dog 32. A bell crank 35 has one member connected with the guide 31, its other member being connected to a crank portion of the crank shaft 8 by means of a rod 36 and a link 37. The rotary valve is prevented from turning backward by means of a detent 38 which is mounted in a casing 39. As the guide 31 moves inwardly the ratchet wheel 30 is held stationary by engagement of the dog 38 with a tooth thereof and as said guide moves outwardly the ratchet wheel is turned by engagement of the dog 32 with a tooth thereof. The guide 31 rides on the teeth of the ratchet wheel in both directions and supports the dog 32. The valve 27 is turned after each explosion to permit the products of combustion to pass from the cylinder 1 into the tube or tubes 25.

The valve 27 and adjunctive parts are essential when the engine is adapted for marine purposes but when the engine is adapted for propelling air craft or land vehicles the valve 27 and adjunctive parts may be dispensed with, the products of combustion from the cylinder 1 passing into the tube or tubes 25. For propelling air craft the tube or tubes 25 may be connected with tubes not shown arranged beneath the air planes and having narrow slots or small openings in their rear portion for compressing or condensing the air under and in the rear of the air planes so as to sustain the machine and propel the same. For driving land vehicles the products of combustion may be utilized for circulating water from a tank through the tube or tubes 25, said water operating upon a turbine engine which is arranged to propel the vehicle. It is to be understood that the water discharged from the turbine is returned to a tank to be again utilized in a cycle of operation.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention what is claimed as new, is:—

1. In combination an explosion cylinder, a casing connected therewith and having air and fuel inlets, a valve for closing the fuel inlet, a fan for supplying the casing with air to form a gaseous mixture with the fuel, a second valve for controlling the communication between the casing and the explosion cylinder, a crank shaft adapted to operate the fan and the two valves, the one admitting fuel into the casing and the other admitting the gaseous mixture from the casing into the explosion cylinder, and means actuated by the force of the explosion for operating said shaft.

2. In combination, an explosion cylinder, a valve, a casing having communication with the explosion cylinder, a shaft having a cam for actuating the said valve, an arm extending from the stem of the said valve, and a set screw supported by the said casing and electrically insulated therefrom, the said arm and set screw forming terminals of the ignition circuit.

3. In combination, an explosion cylinder, a casing having communication therewith and having a valve chamber provided with a port, a valve for controlling communication between the casing and explosion cylinder, a shaft extending through the casing, a valve

rotatable with said shaft and having a port to register with the port of the valve chamber, a fan secured to the shaft, and a cam connected with the said shaft and adapted to operate the valve for controlling communication between the casing and explosion cylinder.

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

CHARLES RAUCH.

Witnesses:
JOHN RONJSK,
FRIEDERICH KAISER.