

(No Model.)

5 Sheets—Sheet 1.

P. H. IRGENS.
GAS OR PETROLEUM ENGINE.

No. 505,767.

Patented Sept. 26, 1893.

Fig. 1.

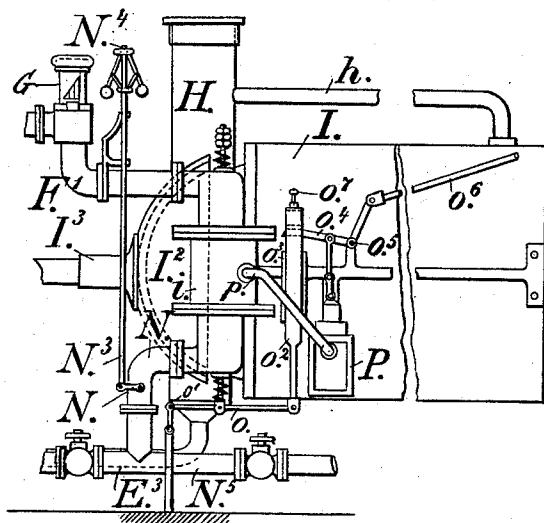
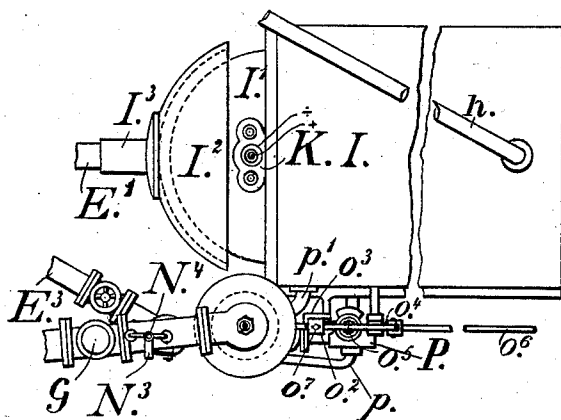


Fig. 2.



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Fig. 3.

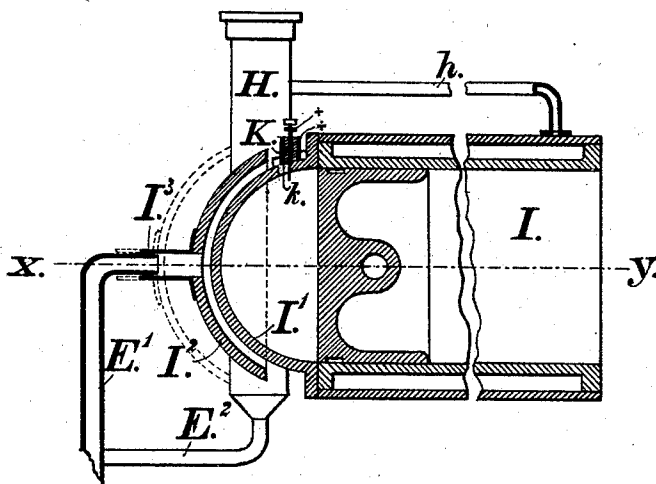
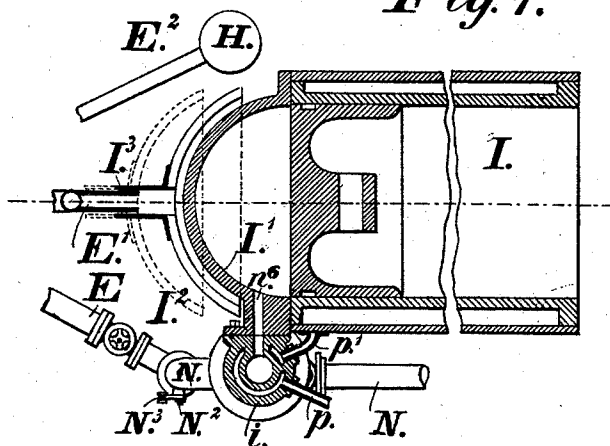


Fig. 4.



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Fig. 5.

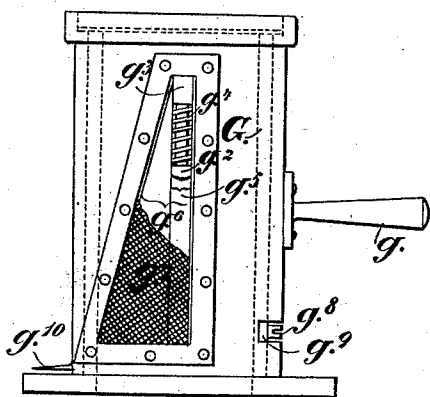


Fig. 7.

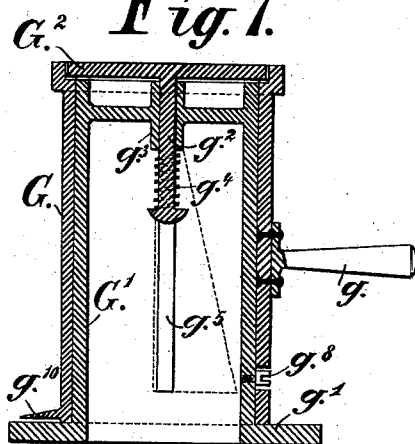


Fig. 6.

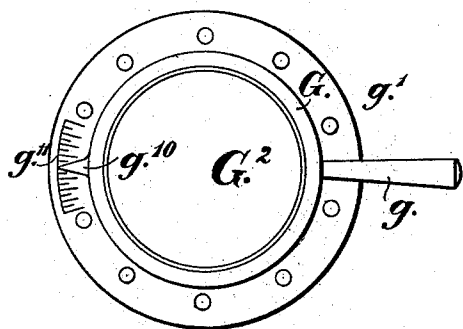
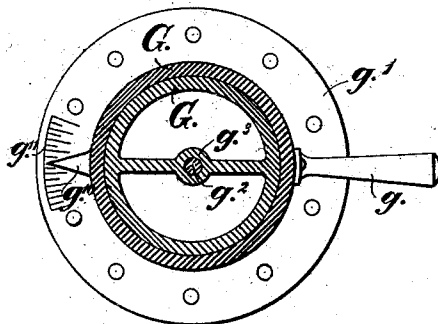


Fig. 8.



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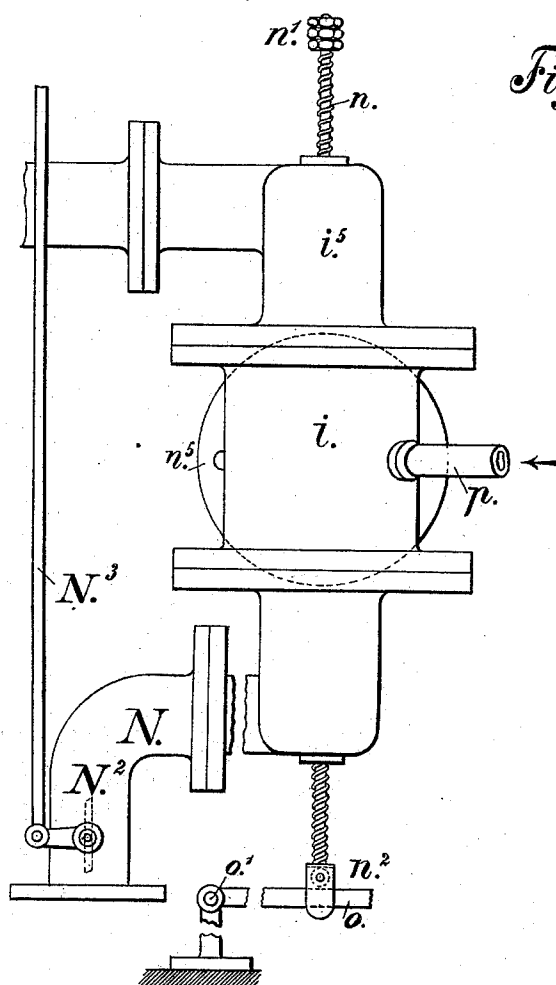


Fig. 9.

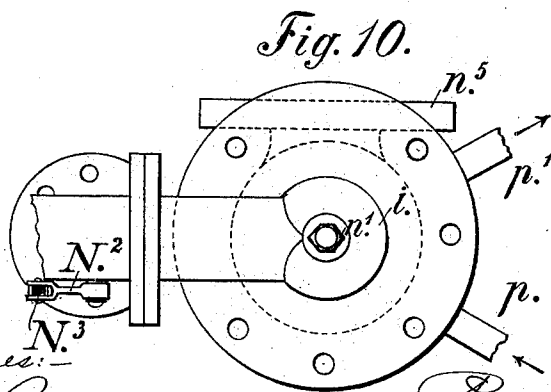


Fig. 10.

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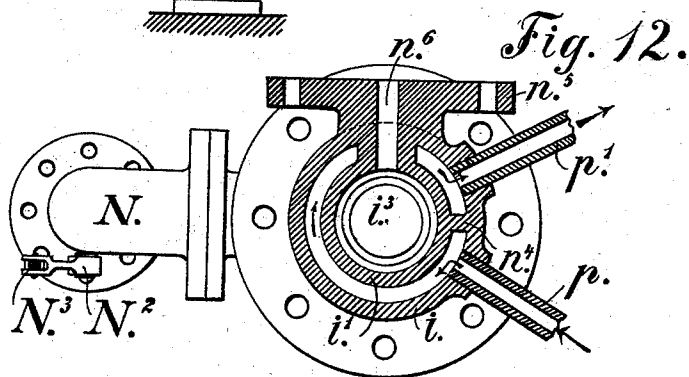
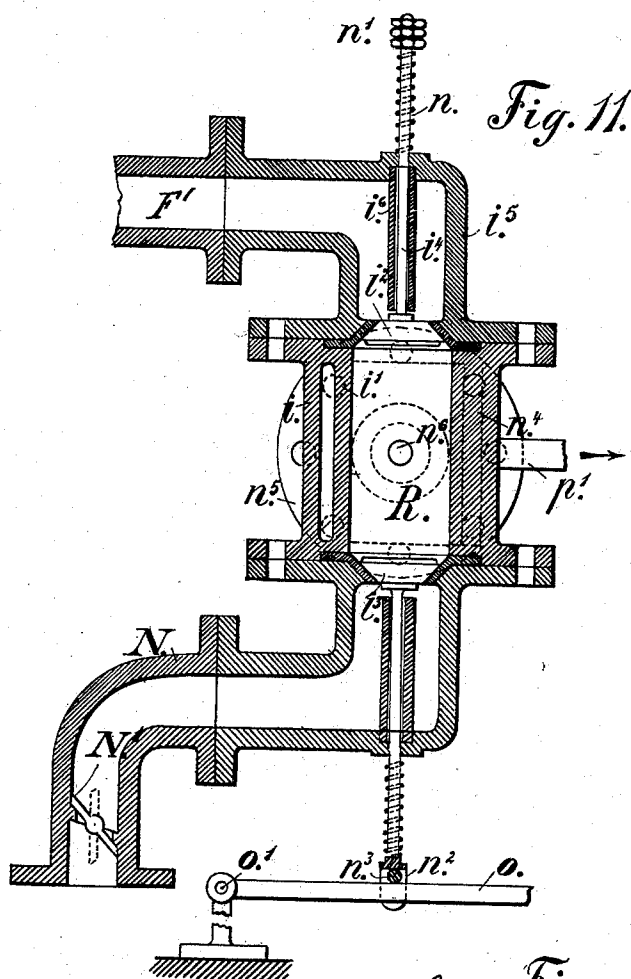
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Patented Sept. 26, 1893.



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UNITED STATES PATENT OFFICE.

PAUL HENNING IRGENS, OF CHRISTIANIA, NORWAY.

GAS OR PETROLEUM ENGINE.

SPECIFICATION forming part of Letters Patent No. 505,767, dated September 26, 1893.

Application filed July 30, 1891. Serial No. 401,136. (No model.)

To all whom it may concern:

Be it known that I, PAUL HENNING IRGENS, a subject of the King of Sweden and Norway, and a resident of Christiania, Norway, have invented certain new and useful Improvements in Gas and Petroleum-Gas Engines, of which the following is a specification.

This invention relates to gas or petroleum engines or motors. The said motor is especially constructed for the use of petroleum or other gas produced from light volatile liquids but any other gas which can be ignited by an electric spark may be used. The motor is characterized by its extraordinary simplicity and solidity of construction. The motion of the piston is communicated to the main-shaft in the usual manner.

The invention is represented in the accompanying drawings in which—

Figure 1 is a side elevation of a motor and a combined adjustable air-inlet and safety valve constructed according to this invention. Fig. 2 is a plan of the same. Fig. 3 is a longitudinal section thereof. Fig. 4 is a horizontal section on the line xy of Fig. 3. Fig. 5 is a side elevation of a combined adjustable air-inlet and safety valve, hereinafter described. Fig. 6 is a plan of the same. Fig. 7 is a vertical section thereof. Fig. 8 is a horizontal section of Fig. 7. Fig. 9 is a side elevation of a combined inlet and exhaust valve. Fig. 10 is a plan of the same. Fig. 11 is a vertical section thereof. Fig. 12 is a horizontal section of Fig. 11.

Like letters of reference indicate corresponding parts throughout the several figures of the drawings.

The motor consists of the cylinder I, which is surrounded with a water jacket or air space and open at one end and at the other end provided with a round conical or other shaped cover I' firmly connected with the cylinder. At a short distance from the said cover is arranged a hood I² of corresponding shape which may be moved nearer to or farther from the cover as shown in dotted lines in Figs. 3 and 4. The said hood I² is provided at its center with an opening communicating with a short pipe I³ which can be displaced backward and forward on the pipe E' for the admission of air to the gas apparatus. The air, which is received into the gas apparatus, passes between the said cover I' and the hood

I². The cover I' is heated by the explosions in the cylinder so that the air in passing between the said cover and the hood on its way to the gas apparatus, also becomes heated to a greater or less extent according, as the said hood is moved nearer to or farther from the heated cover.

The motor receives the driving gas through a pipe F', with which a combined air-inlet and safety-valve is connected. This valve consists of a cylindrical casing G arranged to be turned by the handle g upon an inner cylindrical casing G', which is provided below with a flange g' , by means of which it is connected with the pipe F'. The upper openings of the casings G and G' are covered by a safety valve G² having a spindle g^2 sliding in a guide g^3 in the end of the casing G', the said valve being held down by the spiral spring g^4 . The inner casing G' has two diametrically opposite rectangular openings g^5 and the outer cylinder has two diametrically opposite triangular openings g^6 covered with gauze-wire or a perforated plate g^7 ; these openings being of the same height as the openings in the inner casing. By turning the outer casing the openings in the inner casing are covered or uncovered more or less, according to the quantity of air to be admitted with the gas. The outer casing is held in position upon the inner casing by means of a screw g^8 , which is screwed into the said inner casing and slides in a slot g^9 in the said outer casing. A hand or pointer g^{10} secured to the outer casing is moved across the graduated scale g^{11} by turning the said outer casing thereby indicating the extent to which the inner opening is covered, and also the quantity of air admitted.

In case of accident to the motor, the happening of which is a possibility from various causes, the safety valve G² will be moved upward against the tension of the spring g^4 , permitting the escape of the excess of pressure of the carbureted air in the motor.

The electric spark device K is fixed on the cylinder cover I' the terminal points k being arranged in the inside of the cylinder. The electric current may be obtained from an electric battery and the spark produced by any suitable make and break device actuated from the main shaft. On the side of the cylinder cover is arranged the combined gas inlet and

exhaust-valve. This valve consists of a casing *i* with an automatic valve *i*² for the gas inlet and another valve *i*³ for the exhaust which is operated by a lever arrangement from the main shaft. Both valves are opened inward. The spindle *i*⁴ of the gas valve is continued through the top part *i*⁵ and is guided in a pipe *i*⁶ screwed into the said top part. The valve is held against its seat by the spring *n*, placed on the said spindle, the tension of which may be regulated by the nuts *n*'. The exhaust-valve *i*³ with its spindle is arranged in the same manner as above described, with the exception that the tension of the spring is constant, and that the spindle ends in a fork *n*² in which is arranged a small roller *n*³ which glides on the lever *o* pivoted at *o*'. This lever has motion communicated to it from a sliding piece *o*², which is moved up and down in the guides *o*³ by a bell crank lever being connected to a rod *o*⁶ which is operated from the main shaft of the engine. The said bell-crank lever also drives the pump *P* for the cooling water which is forced through the pipe *p* into the valve-casing. For regulating the movement of the exhaust valve, the sliding piece *o*² is provided with a block, which may be operated by a screw *o*⁷ against which block the said bell-crank lever *o*⁴ strikes. When the said block is moved down by the screw *o*⁷, the motion of the exhaust-valve is lessened as the sliding piece *o*² and also the lever *o* and the valve is raised higher and if the block is moved up the result is reversed. The valve consists of an inner and outer casing *i* and *i*' with a rib or partition *n*⁴ connecting the said casings, the space between them forming the water jacket, and the inlet being through the pipe *p* from the pump, and the outlet through the pipe *p*' to the water-space around the cylinder, from which the water passes through the pipe *h* to the reservoir *H*. The valve is connected with the cylinder cover *I*' by means of the flanges *n*⁵. The inside of the valve *R* communicates with the cylinder through the passage *n*⁶ and through this passage the inlet of the gas to the said cylinder, and the outlet of the exhaust therefrom is effected.

In the pipe *N* which forms a continuation of the outlet for the exhaust, is arranged a throttle valve *N*' which receives its motion through the lever *N*² and rod *N*³, from the governor *N*⁴, which is driven from the main shaft. This throttle valve is so arranged as to regulate the working of the engine; thus, when the engine goes too fast it contracts or entirely covers the outlet, by which little or no exhaust can escape. The engine then uses a smaller quantity of gas for the next stroke so that a slight explosion only is effected, which will be followed by a slower working of the engine.

The pipe for the outlet of the exhaust is in communication with a pipe *E*³ to the heating space of the gas apparatus and by a pipe *N*⁵ with the atmosphere both pipes being furnished with cocks so that the exhaust may be

caused to pass through the one or the other pipe as desired.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a petroleum or other gas engine or motor a cylinder provided at one end with a round conical or similar shaped cover connected to the said cylinder and an adjustable hood arranged at a short distance from the said cover a combined valve for gas inlet and exhaust connected to the said cylinder cover and a valve in the exhaust pipe for controlling the operation of the engine, the said valve being worked from a governor by means of a lever arrangement, the ignition of the gas taking place within the cylinder cover by means of an electric spark, and a water jacket or air space, surrounding the cylinder, the inlet and exhaust valve being also provided with a water jacket or air space.

2. In a petroleum or other gas engine or motor, the combination with the motor-cylinder, of a cover secured thereto and a hood corresponding in shape to said cover and adjustable to and away therefrom, in order that the air passing between the hood and the cover may be heated by the explosions in the motor-cylinder, substantially as described.

3. In a petroleum or other gas engine or motor, the combination with a cylinder and a cover therefor, of an inner and an outer casing with a water-jacket or air space between them, an automatically operated inlet valve, an outlet or exhaust valve, and a lever connected with the main shaft of the engine or motor at one end, and at the other end engaging the outlet or exhaust valve, substantially as described.

4. In a petroleum or other gas engine or motor, the combination with a cylinder of an air valve consisting of two concentric cylinders having open ends, the outer cylinder provided with a handle by which it may be turned on the inner one, a lift or safety valve covering the upper end of said cylinders, the inner of said cylinders provided with two diametrically opposite rectangular openings and the outer cylinder provided with two diametrically opposite triangular openings or perforations triangularly arranged so that the vertical sides of the triangles are parallel with the vertical sides of the rectangular openings, whereby by turning the outer cylinder the hypotenuse of the triangle covers the inner opening, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 20th day of February, 1891.

PAUL HENNING IRGENS.

Witnesses:

F. ECKERSBERG,
OSCAR WINGE.