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F. HENRIOD-SCHWEIZER.

PETROLEUM MOTOR.

No. 555,373. Patented Feb. 25, 1896.

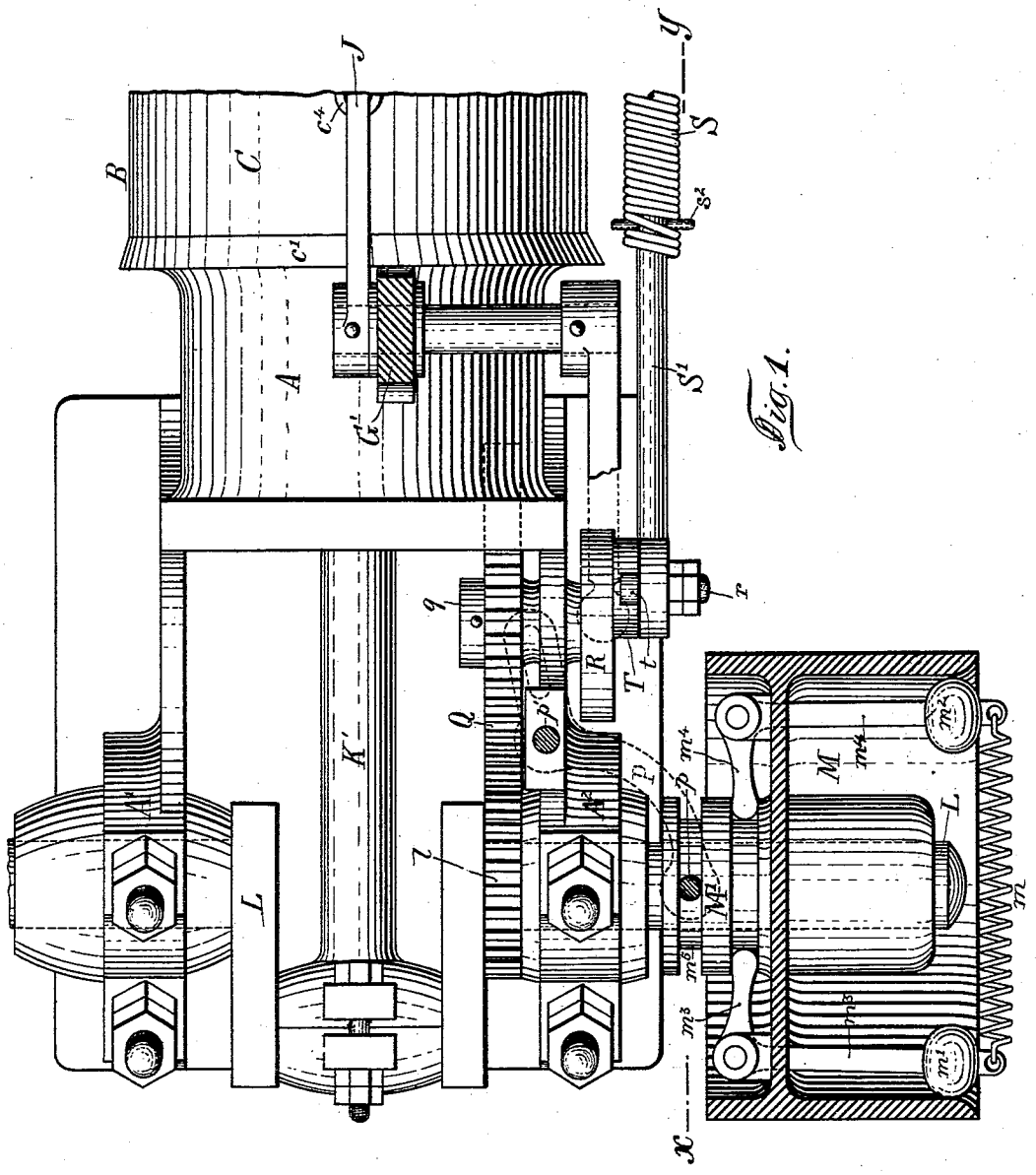

Fig. 1.

Witnesses.
Thos. A. Snow
Robert Bonnett

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Fritz Henriod-Schweizer.
By James L. Norris
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(No Model.) 5 Sheets—Sheet 2.

F. HENRIOD-SCHWEIZER.

PETROLEUM MOTOR.

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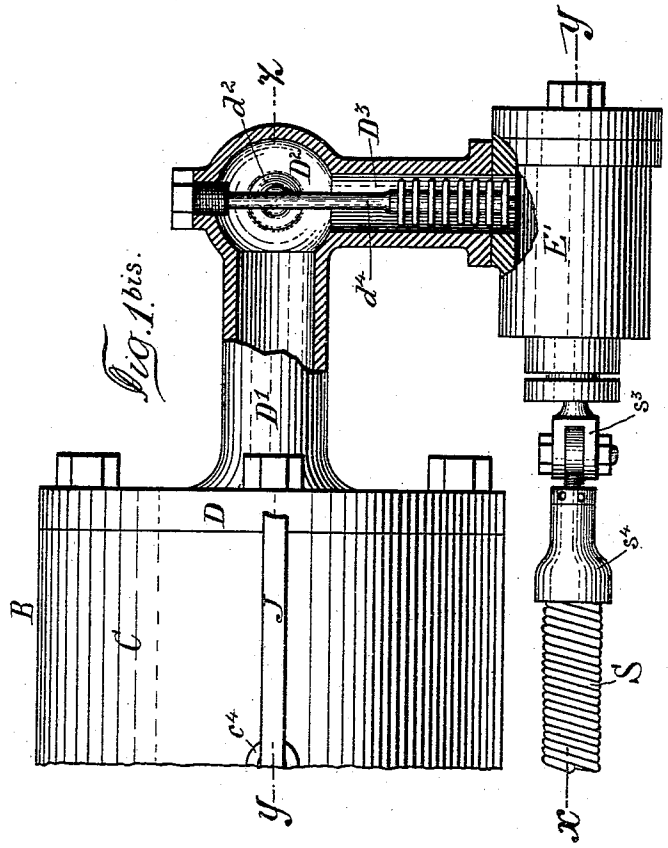

Witnesses.
Thos. A. Brown
Robert Everett.

Inventor.
Fritz Henriod-Schweizer.
By James L. Norris.
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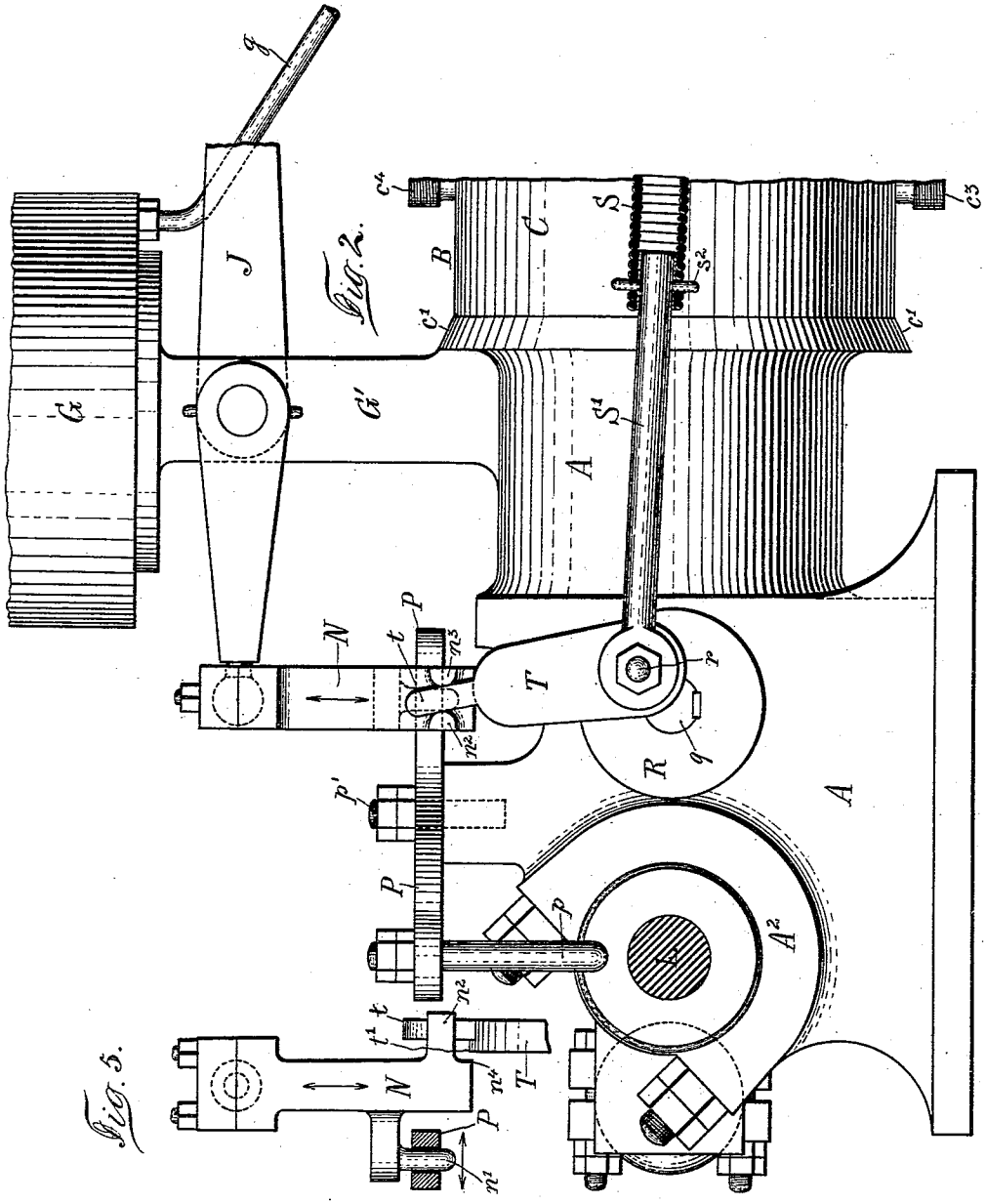
(No Model.) 5 Sheets—Sheet 3.

F. HENRIOD-SCHWEIZER.

PETROLEUM MOTOR.

No. 555,373. Patented Feb. 25, 1896.



Witnesses.
Thos. A. Grun
Robert Everett.

Inventor.
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By James L. Norris.
Atty.

(No Model.) 5 Sheets—Sheet 4.

F. HENRIOD-SCHWEIZER.

PETROLEUM MOTOR.

No. 555,373. Patented Feb. 25, 1896.

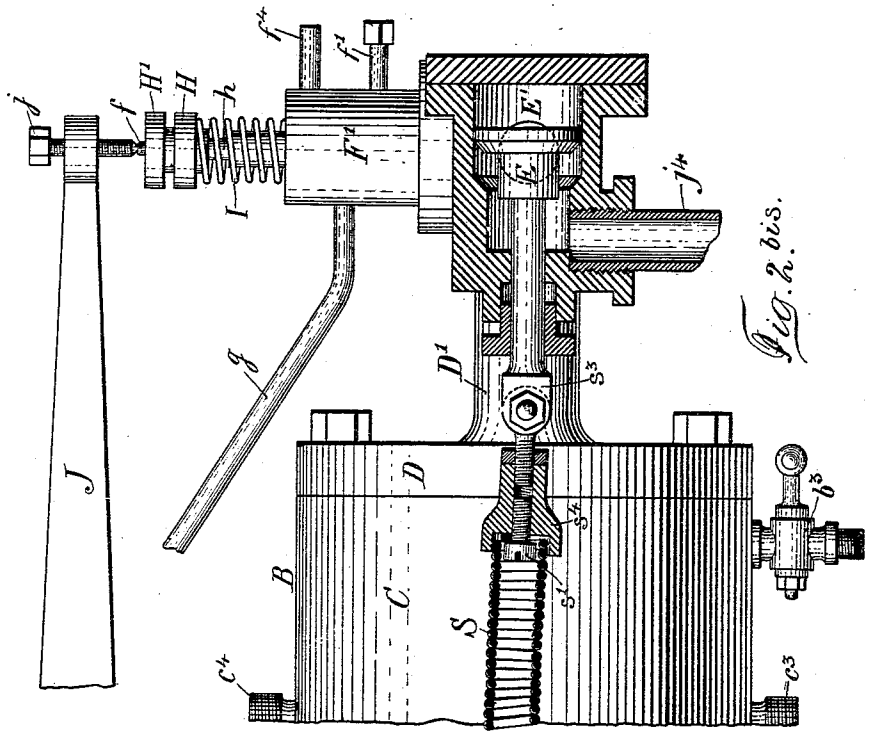

Fig. 2 bis.

Witnesses.
Thos. A. Green
Robt Everett.

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Atty.

(No Model.) 5 Sheets—Sheet 5.

F. HENRIOD-SCHWEIZER.

PETROLEUM MOTOR.

No. 555,373. Patented Feb. 25, 1896.

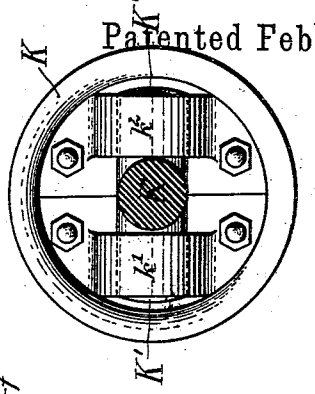

Fig. 4.

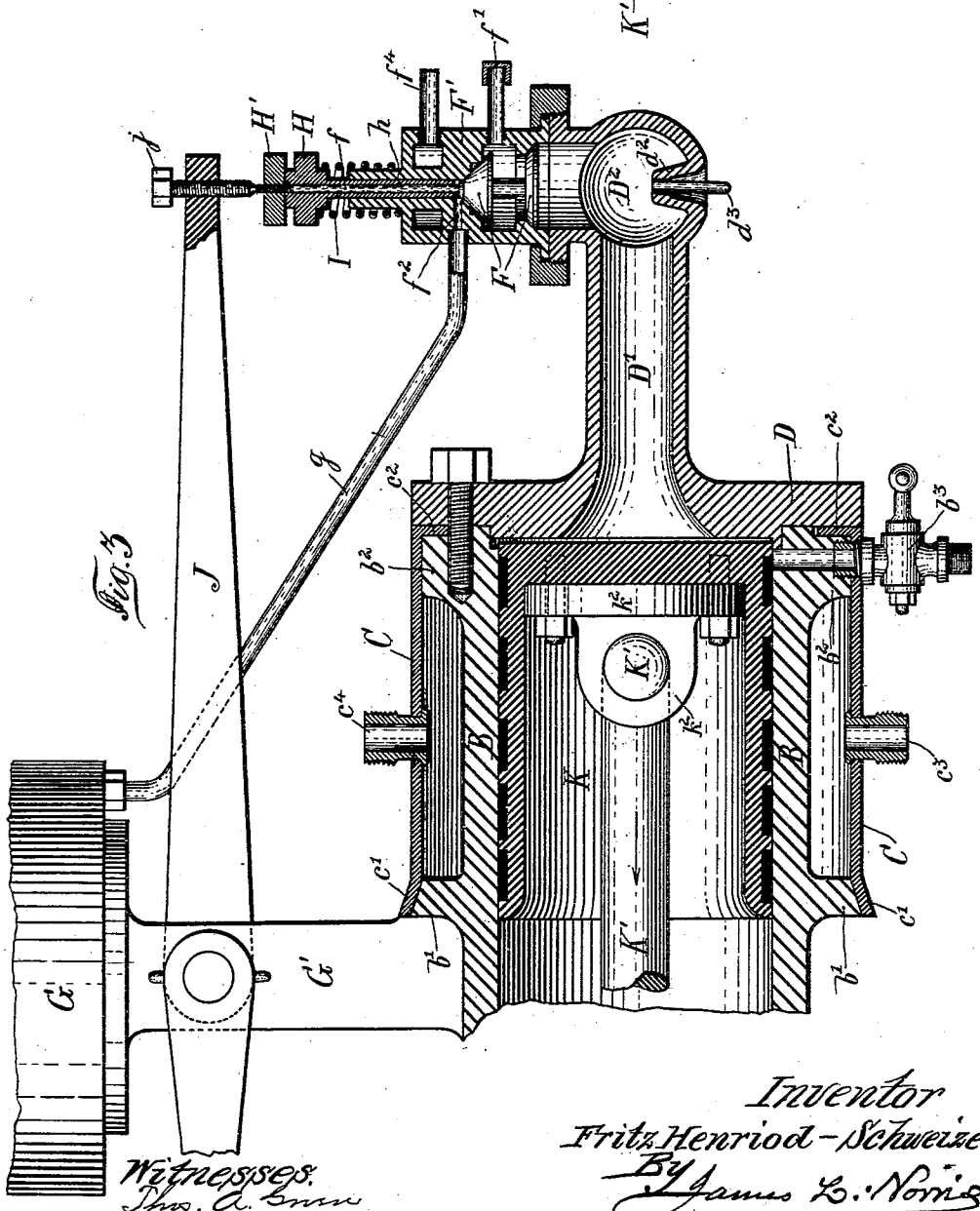

Fig. 3.

Witnesses.
Thos. A. Snow
Robt Everett

Inventor
Fritz Henriod-Schweizer.
By James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

FRITZ HENRIOD-SCHWEIZER, OF HAUTERIVE, SWITZERLAND.

PETROLEUM-MOTOR.

SPECIFICATION forming part of Letters Patent No. 555,373, dated February 25, 1896.

Application filed July 24, 1895. Serial No. 557,048. (No model.)

To all whom it may concern:

Be it known that I, FRITZ HENRIOD-SCHWEIZER, of Hauterive, canton of Neufchâtel, Switzerland, have invented certain new and useful Improvements in Petroleum-Motors, of which the following is a specification.

My improved motor differs essentially from the similar motors constructed up to now by its great simplicity of construction, a combination of valves and regulating devices giving an automatical and very precise regulating and an improved automatical inflammation device.

In the accompanying drawings, Figures 1 and 1^{bis} are a plan view of the whole motor with parts in section. Figs. 2 and 2^{bis} are an elevation of the motor with section on the line $x\ y$ of Figs. 1 and 1^{bis}. Fig. 3 is an elevation of part of the motor with section on the line $y\ z$ of Fig. 1^{bis}. Fig. 4 shows separately the connection of the piston and its rod. Fig. 5 shows the piece N, seen from the left side in Fig. 2.

A is the framing of the motor which forms one body with the cylinder B, the flanges b' and b^2 of which are formed so as to act as supports for the outer mantle of sheet-iron C. The latter has a conical part c' fitted upon the flange b', and a rim c^2 clasped between the flange b^2 and the cover D. The mantle thus formed is provided with an inlet-tube c^3 for cold water and with an outlet-tube c^4. The cylinder B is moreover provided with a cock b^3 for the removal from time to time of any dirty lubricating-oil that may accumulate therein.

The cover D is provided with a central tube D′ ending in a chamber D^2, connected by means of a tube D^3 with the box E′ of the escapement-valve E. Over the chamber D^2 there is provided a chamber F′, having an air-hole f^4 and containing a double valve F. The chamber F′ is provided with a tube f', which is used only when the motor is to work as gas-motor instead of working as petroleum-motor, and which is shown in the drawings as being stopped.

Over the upper cone of the valve F a side canal f^2 is provided for the introduction of the petroleum contained in a tank G, connected with said canal f^2 by means of a tube g. At the point where said canal issues into the axial hole of the chamber F′ the rod of the valve is provided with an adjustable circular groove which is filled with petroleum, and the contents of which represent the quantity of petroleum introduced into the motor for each explosion. Said circular groove is formed by a tube h surrounding the rod f of valve F, and leaving the latter bare on a length which may be regulated at will.

Over the head H of the tube h there is provided on the upper screw-threaded portion of the rod a nut H′. In screwing the latter one brings the lower end of the tube h nearer the cylindrical shoulder provided on the top of the valve, and in so doing the said circular groove is reduced. In unscrewing said nut H one enables the spring I to disjoin the lower end of the tube h from the said cylindrical shoulder of the valve, and in so doing one widens the said circular groove.

The metallic spiral spring I tends to keep the valve F closed, and a lever J, acted upon by means of the centrifugal regulator, as will be described below, is provided at its end with a screw j intended to press upon the rod f of the valve F in order to open the latter.

The lower part of the chamber D^2 is provided with an inner projection d^2, in which an incandescence tube d^3 is screwed, which is intended to start the motor and which is heated by means of any suitable lamp whatever.

In the tube D^3 there is provided a rod d^4 intended to become incandescent and to be kept incandescent by the explosion gas escaping from the cylinder B through the canal F^2 and the valve E′.

The piston K is connected by means of two brackets k' and k^2 with the lateral studs formed by the T-shaped end of the rod K′. The brackets k' and k^2 are secured to the piston K by means of bolts, which do not run through the bottom of the piston, so that the latter is not traversed by any bolt whatever, which is a great advantage with regard to its tightness. The rod K′ is connected as usual to a crank-shaft bearing upon brackets A′ and A^2 forming part of the framing A. Said crank-shaft L bears a centrifugal regulator M, the balls m' and m^2 of which are connected to one another by means of a spring m and act upon the socket M′ by means of their bent levers m^3 and m^4. The vertical

pin p of a crank-lever P is engaged in the neck m^5 of the socket M', said bent lever P turning horizontally on a pivot p' secured to the framing A.

The above-mentioned lever J is vertically pivoted on the support G' of the tank G, and is provided at its front end with a piece N suspended to said lever J and free to play up or down with said end and to oscillate laterally, so as to follow the motions of the crank-lever P, in an opening of which the piece N engages its projection n'. (See Fig. 5.)

The crank-shaft L is provided with a pinion l gearing into a wheel Q secured on an intermediate shaft q located in a bracket forming part of the framing A. Said shaft q bears a disk R provided with a crank-pin r. The latter is connected by means of an extensible connecting-rod S' with the escapement-valve E, and is also provided with a lever T, the free end t of which is engaged between two projections n^2 and n^3 of the piece N. The projections n^2 and n^3 are long enough to prevent the portion t of lever T from escaping them, even when the regulator M causes the piece N to oscillate laterally.

As is to be seen in Fig. 5, the lever T is provided with a shoulder t', which will be placed under the lower edge n^4 of the piece N when the latter assumes certain positions. The lever T will then lift the piece N and this will cause the lever J to lower the valve F once at every rotation of the disk R, but when the piece N is kept in the position shown in Fig. 5 by means of the regulator M the ascending motions of the lever T will take place without having the shoulder t' of said lever T meeting the edge n^4 of piece N, and therefore without having the lever J opening the valve F.

The rod of the valve E is composed of a spiral spring S, the spirals of which are usually pressed against one another, and one of their extremities is connected by means of a screw s' with a piece s^4, hinged to the head s^3 of the fixed part of the rod of the valve E. The other extremity of the spring S is connected with the rod S' by means of a pin s^2, and the rod S' is connected with the crank-pin r.

The object of the extensibility of the connecting-rod S' is to prevent the noise usually caused by the working of the escapement-valve. It is evident that owing to such extensibility the crank-pin r is enabled to continue its stroke after the escapement-valve is already closed, the spiral spring being then bent by the further motion of the pin r, and this will cause the said valve to be pressed on its seat and so prevent its vibrations.

The described motor works as follows: The motor being out of gear and the parts in the position indicated in Figs. 1 and 2 of the drawings, the shoulder t' of the lever T is placed over the edge n^4 of the piece N, and both valves are closed. If one rotates the arbor L, for instance by hand, the connecting-rod S' will keep the valve E closed by bending the spring S, and the lever T will open the valve F by means of the piece N and of the lever J, and during the sucking action of the piston the air is exhausted through the tube f^4, and the drop of petroleum contained in the circular groove of the valve F falls into the chamber D^2 and becomes gasified, the chamber D^2 being heated by means of a suitable lamp. (Not shown.) During the compressing action of the piston the compressed gas penetrates into the heated pipe d^3, and when the piston reaches the end of its stroke the explosion takes place and acts upon the said piston for producing the working of the motor. On its backward motion the piston then drives the gas produced by the explosion back into the box E' of the valve E, this valve E having been opened by the connecting-rod S' acting by compression, and consequently like a rigid connecting-rod. Then the valve E is closed again by the action of the connecting-rod S', and the same working takes place again.

The rod d^4 becoming red hot after a small number of explosions, it will then supply the pipe d^3, the heating of which may then be interrupted.

The oscillations of the balls m' and m^2 of the regulator M will regulate the admission of the petroleum according to the resistance of the motor.

In order to use the motor with lighting-gas, one has only to suppress the tank G and the pipe g and to connect the tube f' with the gas-supply pipe.

Having thus described my invention, I claim—

1. In a gas or petroleum motor, a cover D provided with a central tube D', a chamber D^2 provided with a projection d^2 with inflammation-pipe d^3 and a tube D^3 connecting the chamber D^2 with the box E' of the escapement-valve E and containing a rod d^4 disposed so as to be made and kept incandescent by means of the escaping gases.

2. In a gas or petroleum motor, a double valve F the rod f of which is surrounded by a pipe h intended to form around the rod a circular groove and means for adjusting said pipe to vary the width of said groove, substantially as described.

3. In a gas or petroleum motor, a centrifugal regulator M in combination with an oscillating lever P and with a double-armed lever J one arm of which is adapted to act upon the double valve F, the other arm bearing a piece N acted upon by means of the oscillating lever P so as to be brought in or out of reach of a lever T provided on the main shaft of the motor.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRITZ HENRIOD-SCHWEIZER.

Witnesses:

ELMER SCHNEIDER,

TH. TRUER.