No. 683,125. Patented Sept. 24, 1901.

L. LAURENT & E. CLERGET.

VAPORIZING DEVICE FOR EXPLOSIVE ENGINES.

(Application filed Mar. 16, 1900.)

(No Model.)

FIG. 1

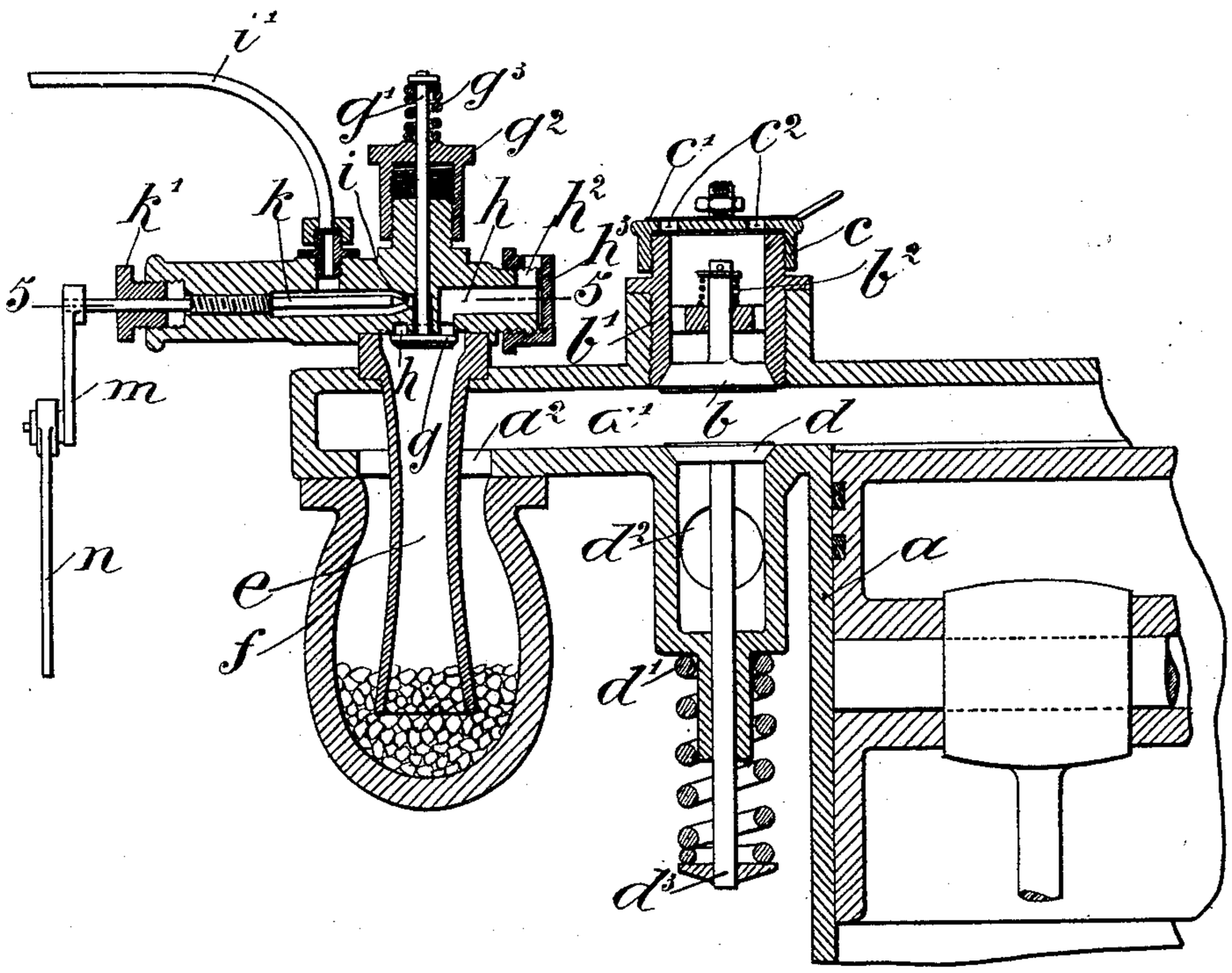


FIG. 3

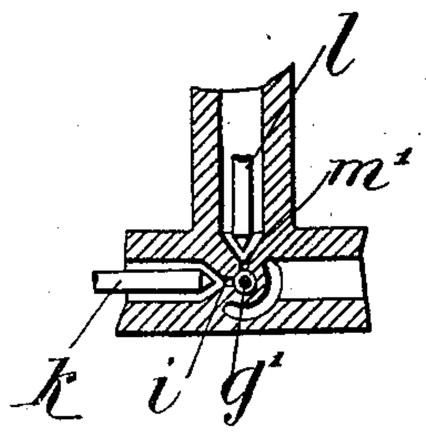
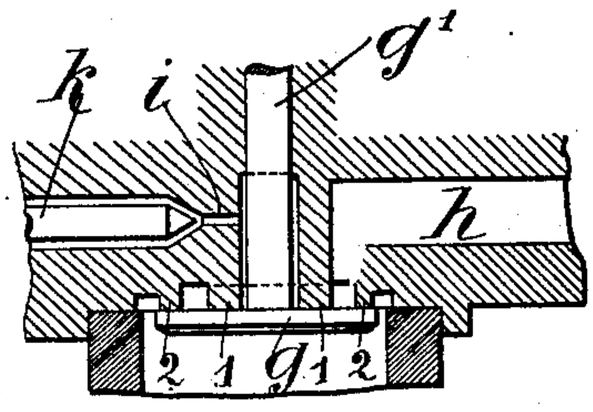


FIG. 2



Witnesses:
C. A. Duffy.
J. M. Howard.

Inventors:
Léon Laurent and
Eugène Clerget.
By Cagwin & Cagwin
Asso. Attys.

UNITED STATES PATENT OFFICE.

LÉON LAURENT AND EUGÉNE CLERGET, OF DIJON, FRANCE.

VAPORIZING DEVICE FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 683,125, dated September 24, 1901.

Application filed March 16, 1900. Serial No. 8,977. (No model.)

To all whom it may concern:

Be it known that we, LÉON LAURENT and EUGÉNE CLERGET, engineers, residing at Dijon, in the Republic of France, have invented Improvements in Vaporizing Devices for Explosive-Engines; and we do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement.

Our invention relates to a vaporizing device for explosive-engines which can be adapted to all kinds of explosion-motors driven by gas or liquid hydrocarbons of any density, the said motors working in four periods to two turns of the crank—viz,. first, suction of the explosive mixture; second, compression of the said mixture; third, explosion, and, fourth, escape.

To make our invention thoroughly understood, we annex hereto, solely as an example, drawings, in which—

Figure 1 represents a sectional elevation of a distributer according to our system adapted to an explosion-motor. Fig. 2 represents a detail of Fig. 1. Fig. 3 is a horizontal section following the line 5 5 in Fig. 1.

The air is drawn into the cylinder *a* through the valve *b*, while the burned gases are expelled through the valve *d*. The point of a screw *k* presses against an opening *i*. At the outer end of the screw is a handle *m*, which can be turned by hand, but which it is preferable to connect with the speed-regulator of the motor by means of the rod *n*. The liquid hydrocarbon enters through the tube *i'*, which comes from a vessel on a slightly-higher level than the opening *i* in order that the flow may take place naturally in consequence of the difference in the levels. The regulator of the motor, working as we shall describe hereinafter, turns the screw *k*, which approaches or recedes from the opening *i*, according to the direction in which it is turned, and consequently permits of the flow of liquid being regulated in order according to the requirements of the motor—that is to say, to produce more or less powerful explosive mixtures, according to the power required.

Another arrangement identical with the latter consists of the pointed screw *l*, by means of which the opening *m'*, which communicates with the space around the spindle *g'* (see Fig. 3) and with a water-reservoir, can be closed to a greater or less extent. The screw *l* is also operated by the regulator so as to open the opening *m'* more or less, but can equally well be turned by hand. The hydrocarbon and the water enter through the holes *i* and *m'* in quantities depending upon the position of the screws *k* and *l* and have to pass a valve *g*, (see Figs. 1 and 2,) which rests upon a seat with two concentric circular zones, the zone 1 close to the valve-spindle and the zone 2 outside the former. At the beginning of the zone 1 the guide-hole of the valve-spindle is enlarged in order to allow of the passage of the combustible liquid and the water, which flow through the opening *i*. Between the two zones 1 and 2 is an inlet-conduit *h* for air from the outside, the passage of air through this conduit being regulated by means of a screw-nozzle h^3, into which an opening is bored laterally, which can be placed more or less opposite the opening h^2 at the outer end of the conduit. The valve *g* is held constantly pressed against its double seat 1 and 2 by an exterior spring g^3, which is wound around the spindle *g'* and forces it upward. The tension of this spring is easily regulated by screwing or unscrewing the cap g^2, placed over the guide of the spindle *g'*. When the motor is at the period of suction of explosive mixture, the valve *g* descends and gives simultaneous passage to the liquid hydrocarbon entering through the opening *i*, the water entering through the opening *m'*, and the air entering through the conduit *h*. During the periods of compression, explosion, and escape the valve *g* closes completely the openings through which the said fluids and air enter. The device we have described is therefore perfectly automatic, because it acts at the right moment under the sole influence of the piston-motor itself. From the valve *g* the mixture of hydrocarbon, water, and air enters the interior of a tube *e*, made of metal or some refractory substance, hanging in the middle of an oval or round metal receptacle *f* and ending a certain distance above the bottom of the latter. This tube reaches into a certain quantity of fragments of some refractory material or metal which fills part of the receptacle. At

the top, where the receptacle is connected with the motor through the conduit a', the tube e leaves a certain annular space a^2, through which the receptacle communicates with the cylinder of the motor.

Method of working: When it is desired to put the motor in action, the exterior of the receptacle f and the metal or refractory fragments which the receptacle contains are heated to a sufficient degree by means of a suitable heating apparatus and the tube e will become hot through radiation. Then the motor is turned by hand and carries out successively its four actions—suction, compression, explosion, and escape. During the period of suction the following effects are produced: The valve g sinks and lets pass the regulated quantities of hydrocarbon entering through the opening i, of water entering through the opening m', and of air for combustion sucked in through the conduit h. These fluids pass through the tube e and the spaces between the fragments which cover the bottom of the receptacle f. The temperature of the tube and fragments being high, the liquids become heated and evaporate in passing the hot sides of the receptacle f in order to go to the cylinder a through the conduit a'. Also during the period of suction the valve b is opened, and the air sucked in through the holes $c^2 c^2$ comes into contact with the hot fluids and forms with them the explosive mixture, which therefore consists, in consequence of the gases which have entered the composition under the influence of the temperature, of hydrcarbons, oxid of carbon, and hydrogen, and therefore differs from the explosive mixtures employed hitherto. During the period of compression the valves b and g are closed and the mixture is in the chambers e and f, where it is heated sufficiently to ignite on contact with their heated walls and causes the explosion of the mixture by giving impulsion to the piston-motor. During the period of escape all organs of distribution are at rest and only the escape-valve d is raised to give passage to the burned gases which escape through the opening d^2.

The actions we have described are repeated successively during the rotation of the motor, and in consequence of the successive explosions and compressions the tube e, the fragments, and the receptacle f retain the temperature required to cause the evaporation of the hydrocarbon and the ignition of the mixture. After a few revolutions of the motor the exterior source of heat, which has served for the preliminary heating of the receptacle f, can therefore be removed.

From the foregoing it will easily be seen that with this system of distribution adapted to any kind of motor working in four periods and the distribution of the liquid hydrocarbon and of the water the evaporation and the ignition of the explosive mixture take place absolutely automatically.

By taking away the contents of the receptacle f, the fragments of metal or refractory material hereinbefore mentioned, and suppressing the function of the pointed screw l, which admits the water, it is possible to employ the pointed screw k exclusively, which admits the liquid hydrocarbon alone. The latter flows through the pipe i and is distributed automatically by the valve g. In this case the tube e and the vessel f alone effect the reduction to gaseous form of the hydrocarbon admitted without intermediary. With this arrangement the working takes place under the same conditions as described.

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

1. In an explosion-motor, the combination with a tube made of a metallic or refractory substance, of a metallic vessel, a body of fragments of metallic or refractory substance placed within said vessel, the outlet of said tube being located within said body, and means for supplying hydrocarbon, water and air to said tube.

2. In an explosion-motor, the combination with a tube made of a metallic or refractory substance, of a heated metallic vessel into which said tube extends, a valve at the outer end of said tube, a seat with two concentric zones upon which said valve rests an air-inlet in communication with one of said zones, an inlet for hydrocarbon and an inlet for water communicating with the other zone, and means for regulating the flow through said openings.

3. In an explosion-motor, the combination with a tube made of metallic or refractory substance, of a heated metallic vessel into which said tube extends, a valve at the outer end of said tube, a seat with two concentric zones upon which said valve rests, an air-inlet communicating with the outer zone, an inlet for hydrocarbon and an inlet for water communicating the inner zone around the spindle of the valve, and means for regulating the flow through said inlets.

Signed at Dijon, France, this 2d day of March, 1900.

LÉON LAURENT.
EUGÉNE CLERGET.

Witnesses:
L. BORAMÉ,
A. JULIEN.