No. 717,000. Patented Dec. 30, 1902.

C. E. HENRIOD.

INTERNAL COMBUSTION ENGINE OR MOTOR.

(Application filed Nov. 9, 1898.)

(No Model.)

Fig. 1a.

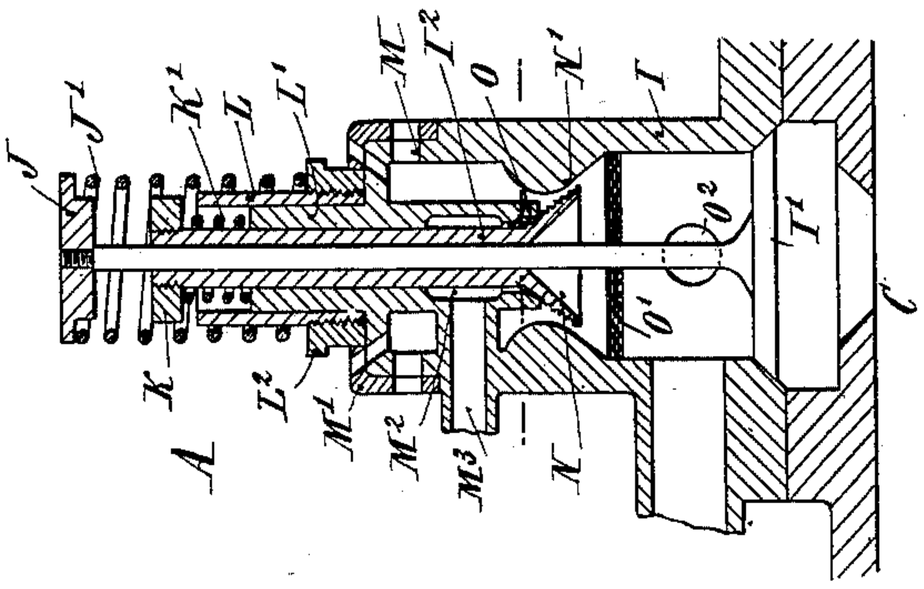


Fig. 1b.

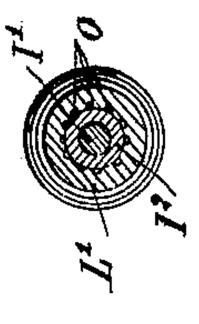
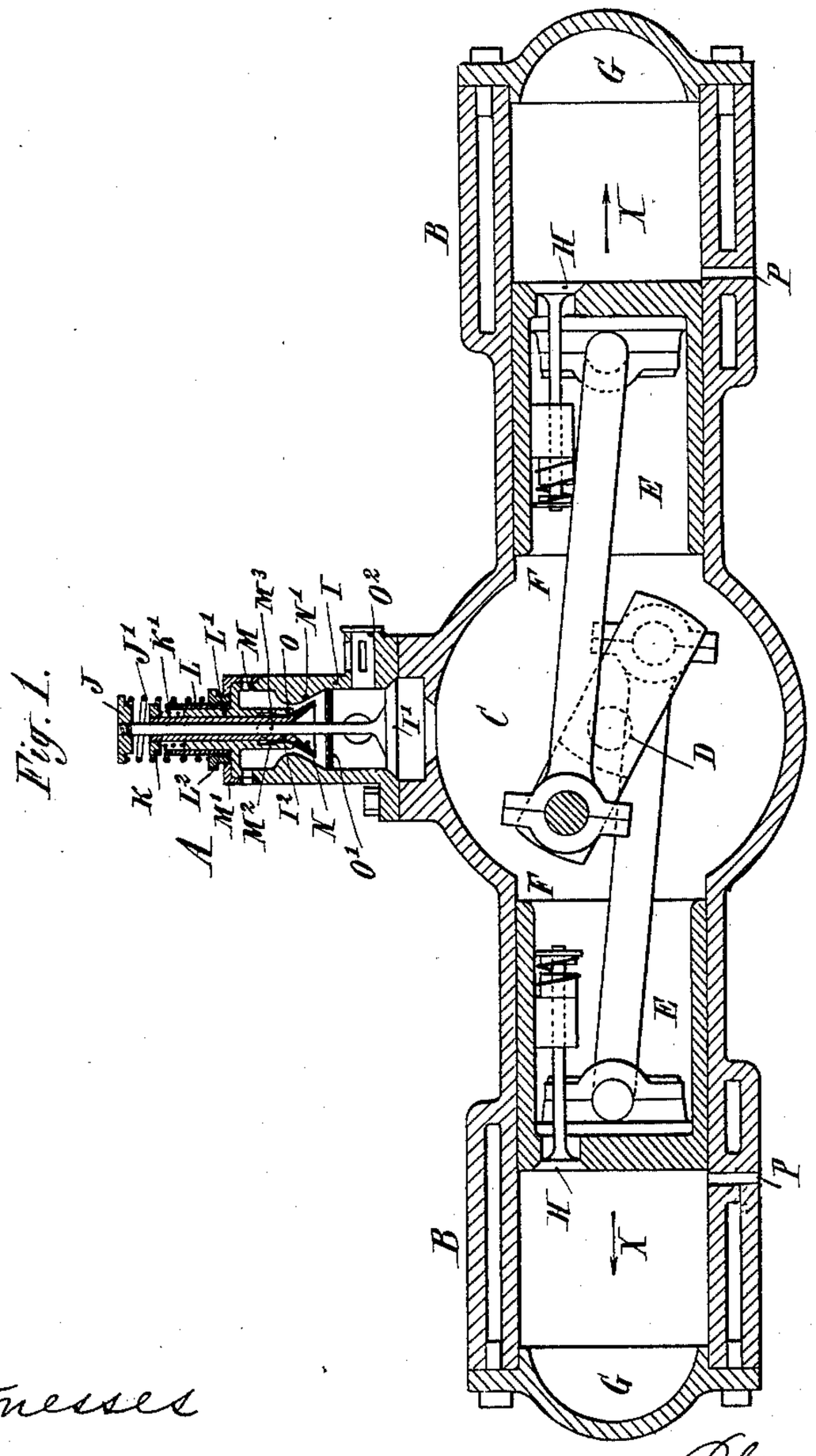


Fig. 1.



Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES EDOUARD HENRIOD, OF NEUILLY-SUR-SEINE, FRANCE.

INTERNAL-COMBUSTION ENGINE OR MOTOR.

SPECIFICATION forming part of Letters Patent No. 717,000, dated December 30, 1902.

Application filed November 9, 1898. Serial No. 695,971. (No model.)

To all whom it may concern:

Be it known that I, CHARLES EDOUARD HENRIOD, a citizen of the Republic of Switzerland, residing at Neuilly-sur-Seine, in the Republic of France, have invented certain new and useful Improvements in or Relating to Internal-Combustion Engines or Motors, (for which applications for Letters Patent have been made in Great Britain, No. 22,161, dated October 21, 1898, and in France, No. 279,199, dated June 25, 1898,) of which the following is a specification.

The internal-combustion engine or motor, in which oil, petroleum, or essence of petroleum or gas is employed, forming the subject of this invention is chiefly characterized by the construction of its valve-gear, whereby the formation of explosive mixture, regulation of its intensity, and its regulated admission to the motor-cylinders, whatever be their number, are simultaneously effected.

In the accompanying drawings a motor constructed according to this invention is illustrated.

Figure 1 shows by way of example a motor with two cylinders arranged opposite each other in sectional elevation. Fig. 2 is a modified construction of the admission device of Fig. 1. Fig. 1^a is a vertical sectional view of the admission device and showing the parts on an enlarged scale. Fig. 1^b is a horizontal section on the dotted line of Fig. 1^a.

Whatever be the type of the motor a single admission device serves for both cylinders, and it is obvious that said single admission device could be applied to a motor with one or more cylinders, its dimensions being correspondingly modified.

On examining the motor illustrated in Fig. 1 it will be seen that the cylinders B are secured to a casing C, in which rotates the crank-shaft D and on which is mounted the admission device A.

E represents the two driving-pistons, which draw in at the sides F the mixture admitted into the casing C and allow it to pass into the explosion-chamber G through valves H, with which said pistons are provided and which complete the whole admission device of the motor coöperating with the main part A, already referred to.

The admission device A, mounted on the casing C, for supplying the explosive mixture to the latter chiefly comprises a chest or valve-box I, containing a valve I′, through which the mixture passes into the casing C, and a valve I^2, through which the petroleum, essence of petroleum, oil, or gas is introduced. A spring J′, controlled by a nut J, holds the valve I′ applied to its seat. The same function for the valve I^2 is fulfilled by a spring K′, controlled by a nut K. A tube L, mounted loosely on a socket L′, forming the upper end of the chest I, is combined with a nut L^2, which is screwed upon a threaded portion of the tube L, so that by turning the nut L^2 or the tube L in one or the other direction the distance between the upper end of the tube L and the nut K may be varied, and consequently the opening stroke of the valve I^2 will be varied. The chest I comprises an air-inlet M, provided with a regulating-ring M′ and a chamber M^2 for the admission of petroleum essence, oil, or gas, said chamber being closed by the valve I^2, the cone of which is extended beyond its seat at N, so as to coöperate with the narrowed portion N′ in the interior of the corresponding portion of the chest I. Hydrocarbon can be admitted to chamber M^2 through passage M^3. The conical extension N of the valve I^2, the surface of which corresponds to the narrowed portion N′, is provided with grooves and effects, in coöperation with the corresponding surface of the narrow portion N′, the division and thorough mixture of the petroleum, essence of petroleum, oil, or gas from the chamber M^2, passing through grooves or flutes O, with which the lower end of said chamber is provided, and of the air entering through the inlet M. This mingling is completed by a sieve or netting O′, interposed in the chest I between the valves I′ and I^2, and the intensity or richness of said mixture can be regulated before its passage through the valve I′ by means of another, also adjustable, air-inlet O^2 in the chest I above said valve I′ and corresponding to the chamber of the chest.

The working of the admission device according to this invention is as follows: Assuming the motor to be working, the mixture is drawn in by the front surfaces of the pistons moving in the directions indicated by the arrows X until the pistons arrive at the

ends of the cylinders. The pistons E are then driven inward toward the casing C by the explosion of the mixture, which by a previous operation had been introduced into the cylinders. The combustion-gases begin to escape as soon as the pistons have uncovered the corresponding exhaust-ports P. During this movement of the pistons the mixture drawn in by them is compressed into the chamber C, the result of which is that when the pressure in the explosion-chambers G has, owing to the exhaust-ports being opened, become smaller than that of the compressed mixture in the chamber C said mixture forces back, owing to this difference of pressure, the valves H, with which the pistons are provided, as already stated, and passes through them to the other side of the pistons, where it is ready for compression and ignition, as before, on the return stroke of the motor. In this way a driving explosion takes place at each revolution and in each of the cylinders B.

The formation and the distribution of the mixture are effected as follows: At the moment when the valve I′ acts its nut J strikes the nut K of the valve I^2 for the admission of the combustible fluid, which allows a sufficient quantity to pass through the grooves or flutes O, said fluid passing along the extension N of the valve I^2, between said extension and the narrow passage N′, where it is divided and thoroughly mingled with the air entering through the adjustable air-inlet M. This mixture passing through the sieves or reticulate material O′ arrives in the chamber above the valve I′, where its richness is regulated by means of the air-inlet O^2 before admitting it into the chamber C, common to the cylinders B. In these conditions the admission of the combustible fluid is regulated according to the power to be developed by means of the nut L^2, by means of which the tube L can be adjusted as to height relatively to the nut K, with which the nut J of the valve I′ comes in contact, in order, as already stated, to cause the valve I^2 to act.

The valve-gear described and illustrated in Fig. 1 may be modified, as shown in Fig. 2, without departing from the spirit of the invention. In this construction the spindle of the valve I′ does not pass through that of the valve I^2, to which it is connected by a helical spring I^3, sufficiently strong to insure the combined working of said valves I′ and I^2, as already explained. It will be understood on examining this arrangement that when the valve I′ descends under the influence of suction it carries with it the valve I^2, by means of the spring I^3, connecting these two valves, which while remaining connected in this manner can at the same time work independently of one another, the working or play of the valve I′ being a constant one, while that of the valve I^2 can be regulated within desired limits by means of a set-screw I^4, passing through its outer head I^5, acted upon by a spring I^6.

Similarly to the construction in Fig. 1 the device illustrated in Fig. 2 comprises adjustable air-inlets M M and inner passages or reduced portions N N′, coöperating with the valves I′ I^2 for the purpose of regulating the richness of the explosive mixture and of thoroughly mingling it before supplying it to the motor.

I claim—

The combination with a casing, provided with air and fuel admission openings and a mixing-chamber, of two valves arranged one above the other with the mixing-chamber between them, one of the valves controlling the admission of fuel to the mixing-chamber, and the other valve controlling the escape of the mixture of fuel and air from the mixing-chamber, a spindle on the last-mentioned valve, a hollow spindle on the fuel-controlling valve through which the first spindle loosely passes, an adjustable abutment on the casing, an abutment on said hollow spindle adapted to strike against the abutment on the casing to limit the downward movement of the hollow spindle, and an abutment on the spindle of the mixture-controlling valve arranged above the abutment on the spindle of the fuel-controlling valve, all arranged for coöperation as and for the purpose specified.

In witness whereof I hereto set my hand in the presence of the two subscribing witnesses.

CHARLES EDOUARD HENRIOD.

Witnesses:
LOUIS SULLIGIR,
J. ALLISON BOWEN.