

No. 799,856.

PATENTED SEPT. 19, 1905.

C. LEMALE.
INTERNAL COMBUSTION TURBO MOTOR.
APPLICATION FILED OCT. 21, 1904.

Fig. 1.

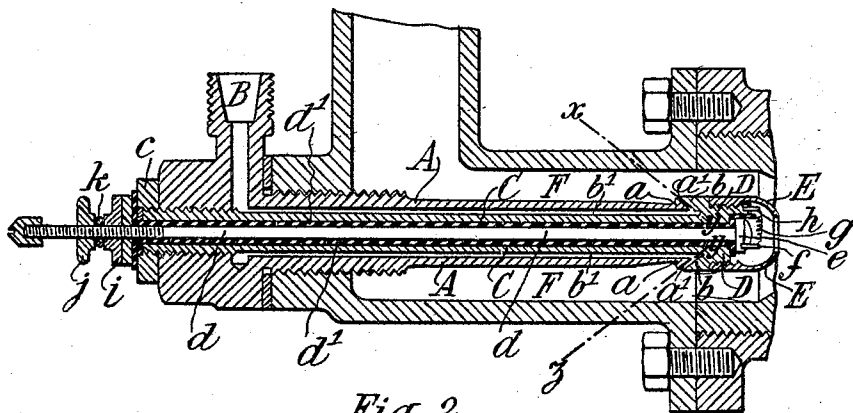
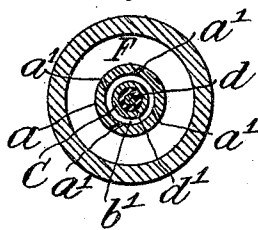


Fig. 2.



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CHARLES LEMALE, OF PARIS, FRANCE.

INTERNAL-COMBUSTION TURBO-MOTOR.

No. 799,856.

Specification of Letters Patent.

Patented Sept. 19, 1905.

Application filed October 21, 1904. Serial No. 229,381.

To all whom it may concern:

Be it known that I, CHARLES LEMALE, a citizen of the Republic of France, residing in Paris, France, have invented certain new and useful Improvements in Internal-Combustion Turbo-Motors, of which the following is a specification.

This invention consists of certain improvements which have been made in the liquid-combustible atomizer and in the igniting means of the type of turbo-motor described in the specification of my British Patent No. 6,422, dated March 19, 1903.

The improved atomizer is characterized by the special arrangement of delivery-passages for the petrol, spirit, alcohol, or other liquid combustible employed, these passages communicating with the central annular conduit and being helically formed or disposed upon a truncated cone, the generatrix of which makes an acute angle with the direction of flow of the spirit in the central conduit. The result of this arrangement is that the liquid combustible is projected in an opposite direction to that of the current of air which it is to carburet, and it, moreover, receives a gyratory motion. These two effects produce a very complete atomization of the liquid combustible, and an absolutely homogeneous and perfect combustible mixture is consequently obtained. Further, as the sparking ignition is not quite satisfactory, in that the porcelain cracks in consequence of the high temperatures existing in the chamber, I have combined with the said atomizer an electrocatalytic igniting arrangement which gives every satisfaction and withstands the high temperature of the combustion-chamber.

In order to enable the invention to be well understood, I will describe same, by way of example, with reference to the annexed drawings.

Figure 1 is a longitudinal section of the atomizer fitted in the air-conduit. Fig. 2 is a section on the broken line *x y z*.

The atomizer is composed of a metal tube A, provided with a union or neck B for the admission of the liquid combustible and terminating at one extremity in a tapered or truncated conical end *a*, on which are formed helicoidal grooves *a'*, extending across the conical face of the end *a*. Within the said tube A is screwed a tube C, comprising a head D, having a conical hollow or recess *b*, which bears or fits against the tapered end *a* of the tube A, closing the space between the end *a* and

the head D except for the grooves *a'*, which form passages from the inner annular conduit *b'* to the outer space F. (See Fig. 2.) The tube C is secured in position by a nut *c* and is hollow for its entire length. A rod *d* of conducting metal passes through the tube C and is fitted in a tube or sheath *d'*, of ebonite, fiber, or other insulating material. The rod *d* ends in a head *e*, in which is fitted a small rod or pin *f*, to which is fixed a platinum spiral *g*, attached, on the other hand, to another pin *h*, fitted in the head D of the tube C. The said rod *d* is screwed at the end opposite to the head *e* and is provided with a nut *i* and jam-nut *j*, forming a terminal between which the electric wire *k*, conveying the current, is secured. Further, in order to guard the igniter against the great heat of the chamber and the residues of the combustion or other impurities the atomizer carries a protecting-cap E, screwed to its end.

As will be readily understood, the action of this atomizer is most simple. The liquid combustible entering by the union B passes into the annular conduit comprised between the tubes A and C and into the annular conduit *b'*, from whence it flows through the helicoidal grooves *a'* and is thus separated into threads or streams. These streams of liquid receive a gyratory motion from the helicoidal grooves and open out to form a cone or conical layer of liquid particles, which are taken up by the air circulating in the conduit F, into which the atomizer is screwed. A very efficient atomization and a perfect mixture are thus obtained not only because the liquid is distributed in very fine drops in the air, but also, owing to the currents of air and combustible being oppositely directed, the shock due to their meeting each other further increasing the atomization and homogeneous distribution of the particles of combustible liquid in the air. To effect the ignition, it suffices to pass the current. This passes by the terminal *i j*, rod *d*, and pin *f* into the spiral *g* and returns by the rod *h* and the body of the atomizer. The spiral is raised to incandescence, and when the ignition of the mixture has once been effected the current can be cut off, as the mixture continues to ignite in consequence of the high temperature of the combustion-chamber.

What I claim, and desire to secure by Letters Patent, is—

1. A combined atomizer and igniter forming a lighting-candle and designed especially

for the feeding and igniting of continuous-combustion turbo-motors, comprising a tubular device adapted to be introduced into the air-tube and to receive combustible liquid at its outer end and to discharge the same at its inner end in atomized form into the surrounding air-channel, and having at its extreme inner end an exposed wire adapted to be maintained incandescent so as to ignite continuously the combustible mixture formed in the space around the tubular device.

2. A combined hydrocarbon-atomizer and electric lighting-candle designed specially for feeding and lighting turbo-motors operating with continuous combustion, comprising in combination a hollow tube C having a head D with a hollow conical rear face, an outer tube A screwed upon and surrounding said central tube C and forming an annular space between the two tubes for the passage of the combustible liquid to the head D, said tube A having a conical end *a* on which are helicoidal grooves *a'* and which bears against the conical rear face of the head D, whereby the grooves *a'* constitute helicoidal canals through which escape jets of combustible liquid, a spiral of platinum on the head D and electrically connected thereto, and a central rod *d* of conducting material connected to said spiral and passing through the tube C.

3. A combined hydrocarbon-atomizer and electric lighting-candle designed specially for feeding and ignition of turbo-motors operating with continuous combustion, comprising in combination a central hollow tube C provided with a head D having a hollow conical face, an outer tube A screwed on said central tube and forming between it and the central tube an annular space for the passage of the combustible liquid to the head D, said tube A having a conical end *a* on which are formed helicoidal grooves *a'* and which bears against the hollow face of the head D so as to form helicoidal canals through which are discharged jets of combustible liquid, a rod *d* of conduct-

ing material passing longitudinally through the tube C and insulated therefrom by a shell of insulating material *d'*, a spiral of platinum fixed at one end to the head *e* of said rod, and at its other end to a pin *h* fitted in the head D of the tube C, a nut *i* and a jam-nut *j* screwed on the rod *d* to hold the same in position, and a cap E protecting the platinum spiral and having at its center an opening sufficient to permit the gaseous mixture under pressure to come into contact with said spiral.

4. A combined hydrocarbon-atomizer and electric lighting-candle designed specially for feeding and igniting turbo-motors operating with continuous combustion, comprising in combination a central hollow tube C having a head D presenting a hollow conical face, an outer tube A screwed upon said central tube and forming between itself and the central tube an annular space for the passage of the combustible liquid to the head D, said tube A carrying a branch B through which the combustible liquid is admitted under pressure to said annular space, an air-tube into the interior of which the tube A is screwed concentrically, a rod *d* of conducting material passing longitudinally through the tube C and insulated therefrom by a sheath *d'* of insulating material, a spiral of platinum connected at one end to the head *e* of said conducting-rod and at the other end to a pin *h* engaged in the head D of the central tube, a nut *i* and a jam-nut *j* on the conducting-rod *d* for fastening the same in position, and a cap E protecting said spiral and having at its center an opening suitable for permitting the fuel under pressure to come into contact with the said spiral.

In witness whereof I have hereunto signed my name, this 11th day of October, 1904, in the presence of two subscribing witnesses.

CHARLES LEMALE.

Witnesses:

JULES ARMENGAUD, Jeune,
RENI ARMENGAUD.