C. RADIGUER.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED FEB. 1, 1915.

1,205,480. Patented Nov. 21, 1916.

Fig. 1.

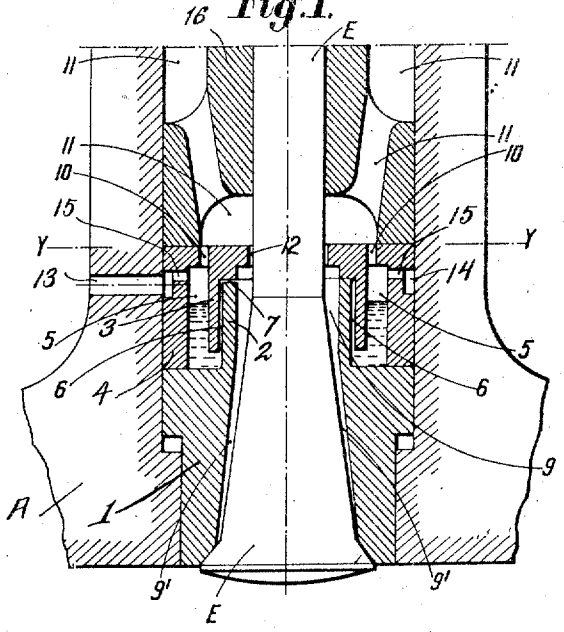
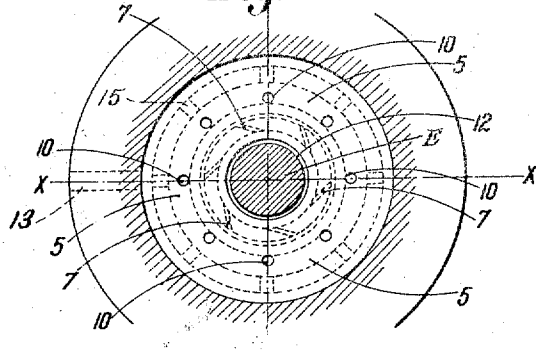


Fig. 2.



Witnesses
P. C. Scheuermann
V. J. Houghton

Inventor
Charles Radiguer
by Fenwick Goldsmith & Mills
Attys

UNITED STATES PATENT OFFICE.

CHARLES RADIGUER, OF ST. DENIS, FRANCE, ASSIGNOR TO THE SOCIÉTÉ ANONYME DES ÉTABLISSEMENTS DELAUNAY-BELLEVILLE, OF ST. DENIS, FRANCE, A CORPORATION OF FRANCE.

INTERNAL-COMBUSTION ENGINE.

1,205,480. Specification of Letters Patent. Patented Nov. 21, 1916.

Application filed February 1, 1915. Serial No. 5,558.

To all whom it may concern:

Be it known that I, CHARLES RADIGUER, a citizen of the French Republic, residing at St. Denis, Department of the Seine, in France, have invented certain new and useful Improvements in or Relating to Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to atomizers or injectors for internal combustion engines and has for its object to provide an atomizer of the type shown in the British Patent, No. 6,497, of March 15, 1913, so modified as to adapt the same for use in engines of the Bellem type in which carburation is effected in a rarefied atmosphere. Engines of this type operate on the four-cycle principle, the opening of the main air admisison valve being retarded so that during the first portion of the suction stroke, a partial vacuum is produced in the cylinder. During this period, the fuel is drawn into the cylinder, atomized, and vaporized under the action of the vacuum, so that the carburation effected is far superior to that which is obtained by the use of the ordinary carbureters. The injection of the fuel in this type of engine is effected by atomizers similar to those used in Diesel engines, the fuel being conducted into the cylinder and atomized by a current of air, but the air is not compressed, it being merely air at atmospheric pressure drawn into the cylinder, due to the creation of the partial vacuum therein.

An atomizer of the same general type as that herein disclosed constitutes the subject-matter of the above-mentioned patent, but it is designed especially for use in Diesel engines. The differences between the present atomizer and that shown in the aforesaid British patent which adapt the present atomizer for use in engines of the type described above will be apparent from the following description.

The improved atomizer is illustrated in the accompanying drawing, in which:—

Figure 1 is a vertical section, taken on the line X—X of Fig. 2; and Fig. 2 is a horizontal section, taken on the line Y—Y of Fig. 1.

The parts of the atomizer are housed in a casing A which may either be a portion of the engine cylinder or a separate portion applied thereto. Mounted in the casing A is a sleeve 1 having an annular portion 2 projecting toward the rear of the atomizer. This annular portion 2 telescopes into a corresponding annular portion 3 formed on a sleeve 4 and fits loosely therein to provide an annular fuel passage 6. This fuel passage 6 communicates with an annular fuel reservoir 5 formed in the sleeve 4. Fuel is supplied to the reservoir 5 through a fuel passage 13, an annular duct 14 formed in the sleeve 4, and a plurality of radial passages 15 placing said annular duct 14 in communication with the reservoir 5. Air is supplied to the atomizer through passages 11 formed in another sleeve 16, a portion of such air being conducted to the fuel reservoir 5 through passages 10 formed in the upper portion of the sleeve 4. Co-axially disposed with respect to the sleeves 16, 4 and 1 and capable of sliding therein, is a valve E. It will be noted that the valve fits loosely in the upper part of the sleeve 4, so as to provide an annular passage 12, through which a portion of the air admitted through the passages 11 can pass to the mixing chamber hereinafter referred to. This mixing chamber is formed by spacing the projecting annular portion 3 of the sleeve 1 a short distance from the surface of the valve 6, so as to form an annular space 9 to which air is admitted through the annular passage 12 and to which fuel is admitted from the fuel reservoir 5 by a plurality of tangential passages 7 placing the annular fuel passage 6 in communication with such space 9.

It will be noted that the walls of the opening in the lower portion of the sleeve 1 diverge toward the outlet of the atomizer and are in quite close proximity with the surface of the lower portion of the valve E. This lower portion of the valve tapers and diverges toward the outlet of the atomizer in such a manner as to form a narrow and relatively long annular chamber 9′ which converges toward the outlet. The extremital portion of the valve E is more divergent than the tapering portion above referred to and seats upon an adjacent portion of the sleeve 1, as clearly shown in the drawing.

When the valve of the atomizer is opened by the suction in the engine cylinder, air

passes through the passages 11 and part of the air passes into the fuel reservoir 5, where it acts upon a quantity of fuel held in reserve and forces it through the tangential passages 7 into the annular space 9. Fuel may be supplied to the reservoir 5 in any suitable manner to replace that which is forced from the reservoir by the action of the air. The fuel injected into the space 9 through the tangential passages 7 meets with an annular column of air passing through the passage 12, and hence a thorough atomization of the fuel is effected. The combined air and atomized fuel takes a spiral course toward the outlet, and in passing through the diverging space 9^x, become intimately mixed. Upon reaching the diverging outlet, the carbureted air issues into the engine cylinder in the form of a diverging or expanded jet.

It will now be noted that although the valve E opens toward the engine cylinder, none of the atomizing and mixing qualities of the apparatus are sacrificed, as the sleeve 1 is so formed as to permit the valve to open outwardly and yet to coöperate with the surface of the tapering portion of the valve in such a manner as to effect thorough carburation of the air before the latter reaches the outlet of the atomizer.

I am aware that atomizers have been provided in which the extremital portion constitutes a valve proper that opens toward the engine cylinder, but this feature, in combination with the tapering portion of the valve and the sleeve 1 so constructed as to coöperate with the tapering portion of the valve to permit the valve to open and to effect thorough carburation of the air before the outlet is reached, is thought to be new.

Therefore, what I claim is:—

A fuel atomizer comprising a casing, a valve positioned therein and having a relatively long tapering portion diverging toward the outlet of the atomizer and having a relatively short and more divergent extremital portion, the inner wall of the casing adjacent said tapering portion of the valve being in close proximity with the surface of such tapering portion and forming therewith a narrow chamber converging toward the outlet, and that portion of the casing adjacent the extremital portion of the valve forming a valve seat upon which said extremital portion of the valve may seat, and means to supply fuel to said chamber.

In testimony whereof I affix my signature, in presence of two witnesses.

C. RADIGUER.

Witnesses:

HENRI COHEN,

DE WITT C. POOLE, JR.