

No. 859,940.

PATENTED JULY 16, 1907.

J. GUNTHER.  
INTERNAL COMBUSTION ENGINE.  
APPLICATION FILED NOV. 15, 1905.

FIG. I.

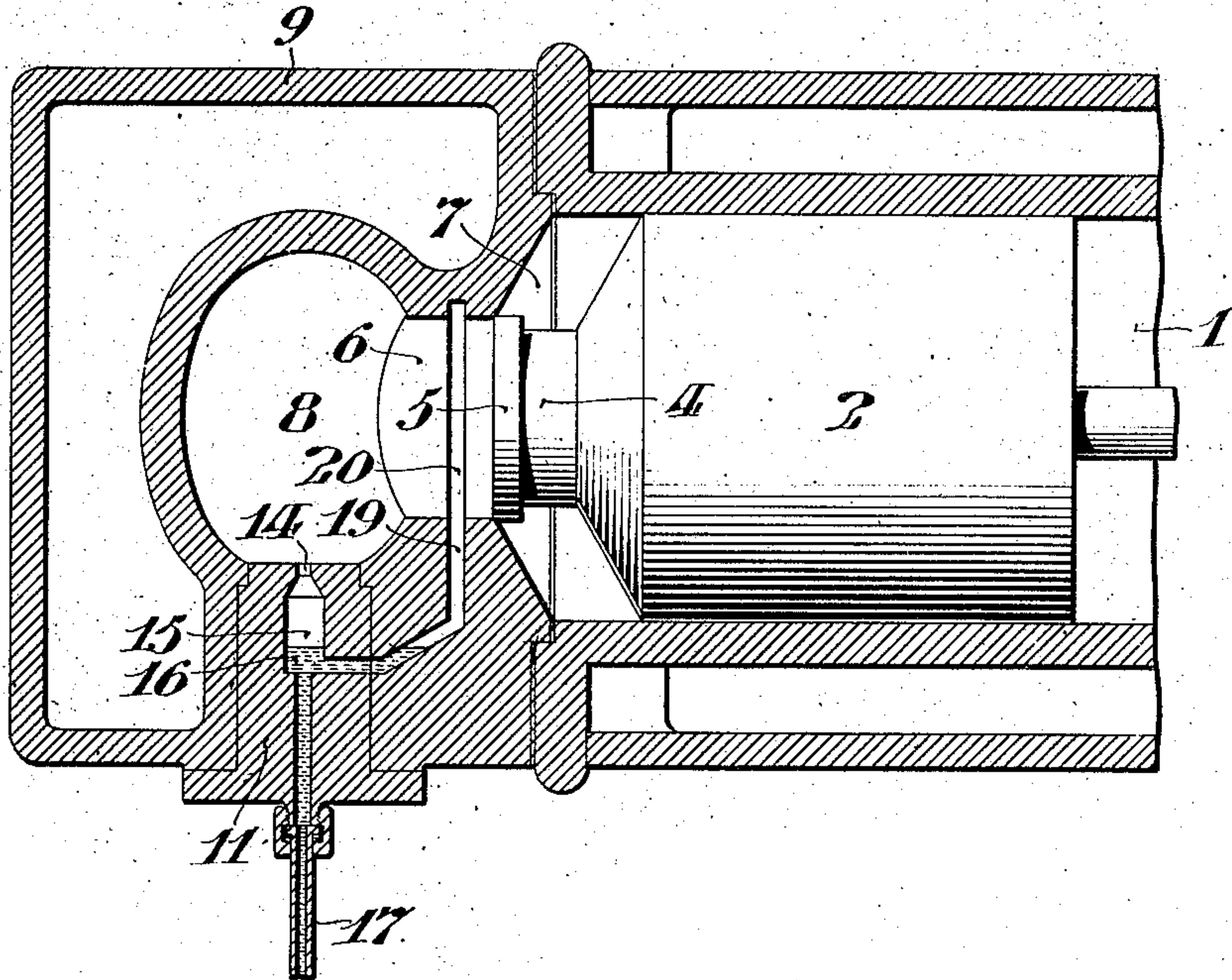
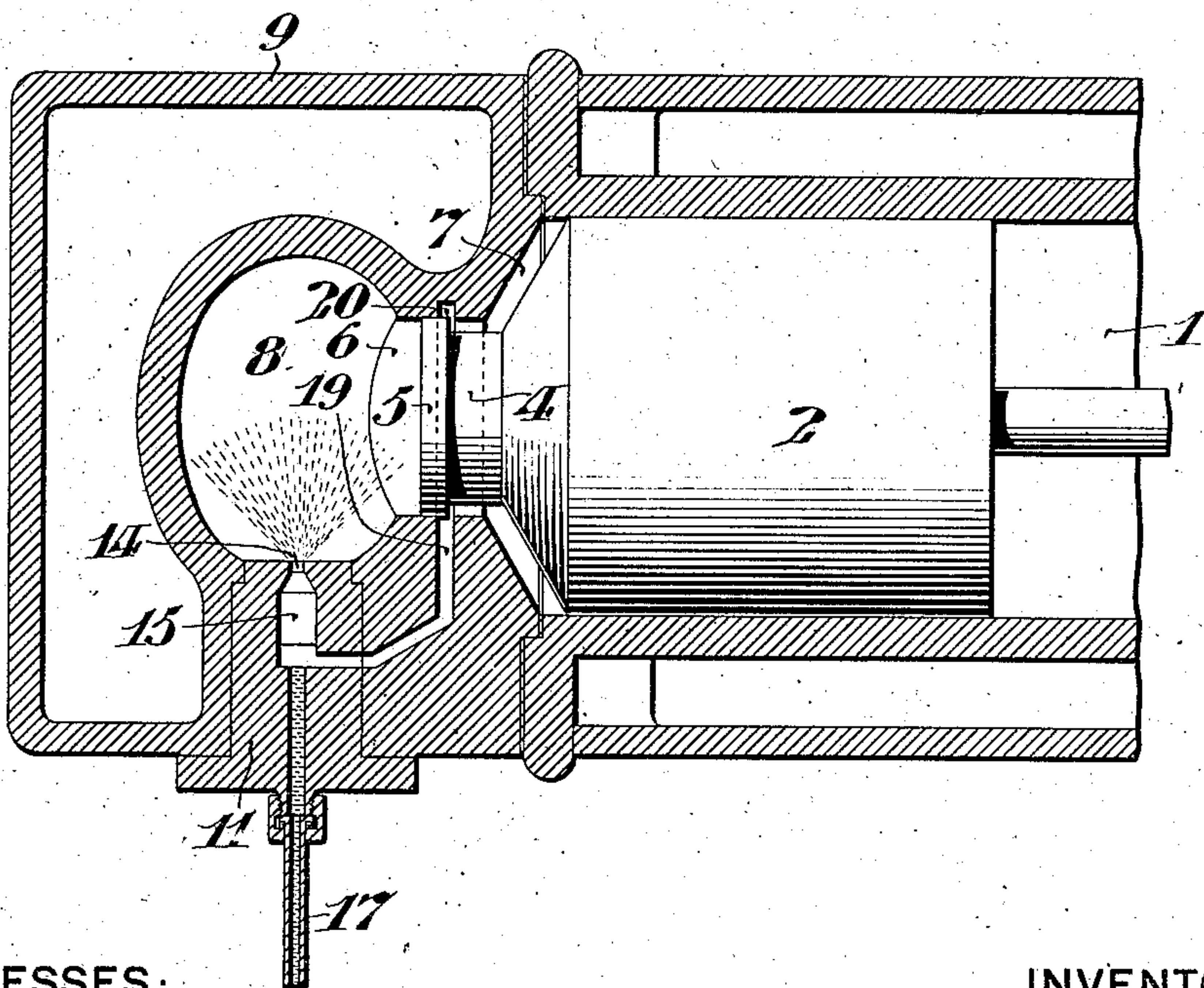


FIG. II.



WITNESSES:

*Clifton C. Hallowell*  
*John C. Burzner.*

INVENTOR:

*JACOB GUNTHER,*  
*By Paige, Paul & Kelly*  
*Atty.*



# UNITED STATES PATENT OFFICE.

JACOB GUNTHER, OF COLOGNE, GERMANY, ASSIGNOR TO THE OTTO GAS ENGINE WORKS,  
OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## INTERNAL-COMBUSTION ENGINE.

No. 859,940.

Specification of Letters Patent.

Patented July 16, 1907.

Application filed November 15, 1905. Serial No. 287,459.

*To all whom it may concern:*

Be it known that I, JACOB GUNTHER, of Cologne, Germany, have invented certain new and useful Improvements in Internal-Combustion Engines, whereof the following is a specification, reference being had to the accompanying drawings.

My improvements relate particularly to engines of the type in which a charge of liquid fuel is atomized at the termination of the outward stroke of the engine piston by the action of a plunger connected with said piston. Ordinarily, engines of this class are so constructed and arranged that the atomizing pressure rises gradually in correspondence with the movement of the piston toward the end of the stroke, so that the velocity of the air used in atomizing the liquid gradually rises from zero to maximum during the atomizing operation. The effect of such an arrangement is that only the last portion of the fuel charge is properly atomized; that which is first discharged being insufficiently comminuted by the low pressure air blast.

It is the object of my invention to so construct and arrange a device of the character contemplated that the atomizing operation does not begin until a charge of air is available at such high pressure as to instantly attain the proper degree of comminution of the fuel.

As hereinafter described my invention comprises a plunger carried by the engine piston and fitted in an auxiliary cylinder at the end of the engine cylinder so that when said plunger enters said auxiliary cylinder, toward the end of the stroke of the piston, it excludes a space in the main cylinder from a space in the auxiliary cylinder, and air is compressed in the end of the engine cylinder to a degree efficient for instantaneous atomization, and then, by the traverse of said plunger, a port is uncovered establishing communication between the charge of fuel to be atomized and said highly compressed air; so that the fuel is projected atomized, into the atomizing chamber at a substantially uniform pressure throughout the atomizing operation.

My invention comprises the various novel features of construction and arrangement hereinafter more definitely specified.

In the drawings, Figure I, is a sectional view of a portion of an engine showing a convenient embodiment of my invention, the engine piston and connected atomizer plunger being at the beginning of the stroke of the latter. Fig. II, shows the mechanism indicated in Fig. I, but with the atomizer plunger at that position in its stroke where the air is admitted to atomize fuel.

In said figures, 1, is the engine cylinder in which the engine piston 2, reciprocates and said piston carries the atomizer plunger 4, having the head 5, fitted to the

atomizer cylinder 6, which connects the space 7, in the cylinder 1, with the atomizer chamber 8, conveniently formed in the hollow cylinder head 9. Said chamber 8, is provided with the removable plug 11, containing the atomizer nozzle 14, at the apex of the fuel charge pocket 15, to which liquid fuel 16, is introduced through the pipe 17. Said pocket 15, is connected by the passage way 19, with the annular port 20, in the atomizer cylinder 6.

It is to be understood that the arrangement above described is such that when the plunger 4, reaches the position shown in Fig. I, the space in the atomizer chamber 8, is separated from the space 7, in the cylinder 1, by the head 5, of the plunger 4, and the air contained in said space 7, is compressed until, by the traverse of the plunger toward the left in the drawings, the port 20, is uncovered as shown in Fig. II, and the air compressed in said space 7, being thus admitted through said port 20, to the pocket 15, projects the fuel charge, atomized, into the chamber 8.

It may be noted that the operation above described is such that the atomizing operation does not begin until the air in the space 7, is at such a pressure as to deliver the fuel through the nozzle 14, in properly comminuted condition.

I do not desire to limit myself to the precise construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention.

I claim:

1. In an internal combustion engine, the combination with an engine cylinder; of an atomizer cylinder connected with said engine cylinder; a liquid fuel pocket connected with said atomizer cylinder through an atomizer nozzle; a port in said cylinder leading to said pocket; a piston arranged to reciprocate in said engine cylinder; and, an atomizer plunger, carried by said piston, arranged to cover and uncover said port during its traverse, substantially as set forth.

2. In an internal combustion engine, the combination with an atomizer cylinder; of a liquid fuel pocket connected with said cylinder through an atomizer nozzle; a port in said cylinder leading to said pocket; an engine cylinder connected with said atomizer cylinder; a piston arranged to reciprocate in said engine cylinder; and, means carried by said piston, arranged to admit compressed air through said port to said pocket and thereby atomize the fuel charge from said pocket, substantially as set forth.

3. In an internal combustion engine, the combination with an atomizer cylinder; of a liquid fuel pocket connected with said cylinder through an atomizer nozzle; a port in said cylinder connected with said pocket; an engine cylinder connected with said atomizer cylinder; a piston arranged to reciprocate in said engine cylinder; and, means arranged to admit compressed air through said port to said pocket and thereby atomize the fuel charge from

said pocket, comprising a plunger, carried by said piston, and a head on said plunger fitted to said atomizer cylinder, substantially as set forth.

4. In an internal combustion engine, the combination  
5 with an atomizer cylinder; of a liquid fuel pocket connected with said cylinder through an atomizer nozzle; a  
port in said cylinder leading to said pocket; an engine  
cylinder connected with said atomizer cylinder; a piston  
arranged to reciprocate in said engine cylinder; and,  
10 means carried by said piston arranged to compress and

admit air through said port to said pocket and thereby atomize the fuel charge from said pocket, substantially as set forth.

In testimony whereof, I have hereunto signed my name at Cologne, Germany this 26th day of October 1905.

JACOB GUNTHER.

Witnesses:

Mrs. H. J. DUNLAP,  
LOUIS VANDORY.