

P. S. TICE.  
METHOD OF FURNISHING EXPLOSIVE MIXTURE TO INTERNAL COMBUSTION ENGINES.  
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1,348,066.

Patented July 27, 1920.

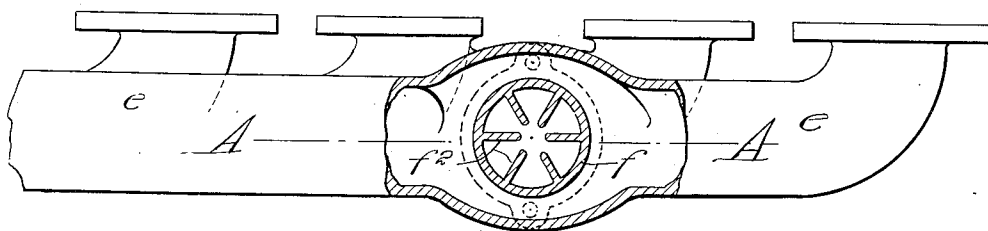
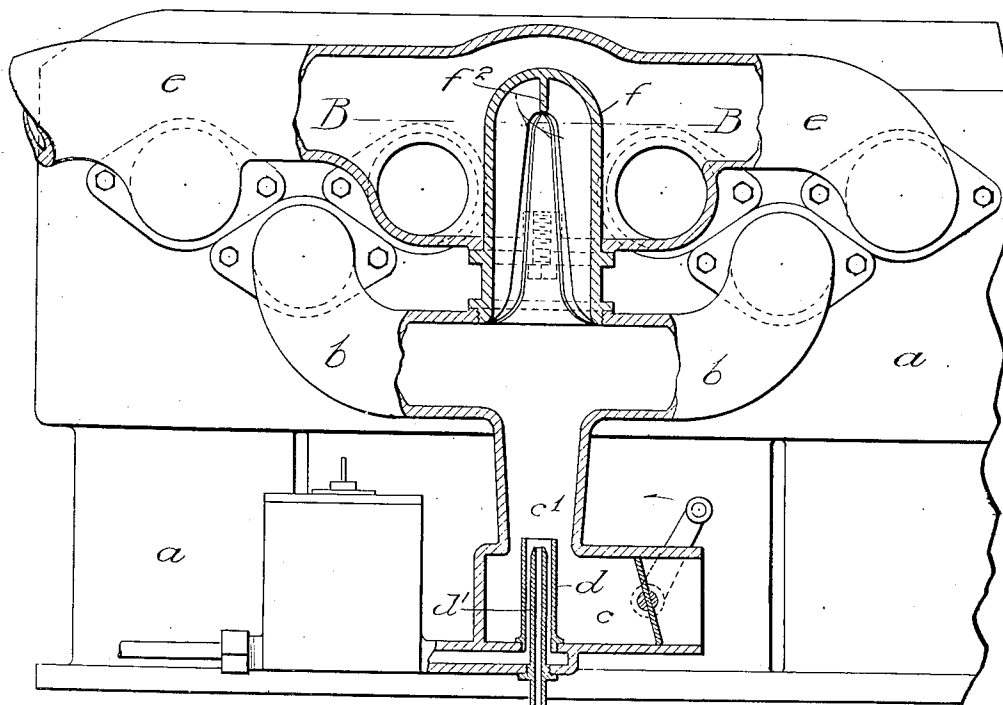


*Fig. 2.*

*Fig. 1.*



Witness:

*W. H. H. H.*

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Att'y.

# UNITED STATES PATENT OFFICE.

PERCIVAL S. TICE, OF DETROIT, MICHIGAN.

## METHOD OF FURNISHING EXPLOSIVE MIXTURE TO INTERNAL-COMBUSTION ENGINES.

1,348,066.

Specification of Letters Patent.

Patented July 27, 1920.

Continuation of application Serial No. 199,349, filed October 23, 1917, which was a division of application No. 101,457, filed June 3, 1916. This application filed May 26, 1919. Serial No. 300,006.

*To all whom it may concern:*

Be it known that I, PERCIVAL S. TICE, a citizen of the United States, having residence in the city of Detroit, county of Wayne, and State of Michigan, have invented certain new and useful Improvements in Methods of Furnishing Explosive Mixture to Internal-Combustion Engines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This application is a continuation of my application, Serial No. 199,349, filed October 23, 1917, and covering subject matter divided out of my application, Serial No. 101,457, which was filed June 3, 1916.

The purpose of this invention is to provide an improved method of furnishing explosive mixture to internal combustion engines. It consists in the method or process described consisting of the several steps and means set out in the specifications and illustrated in the drawings, as indicated in the claims.

In the drawings:  
Figure 1 is an elevation of a portion of an internal combustion engine having a plurality of cylinders, the parts being broken away in part on the line, A—A, in Fig. 2, and shown in sections to illustrate the internal construction.

Fig. 2 is a detail plan view showing mainly the exhaust manifold, the same being broken away in part on the line B—B, on Fig. 1.

*a, a*, indicate the cylinders of an internal combustion engine. *b, b*, indicate the branches of the pipe containing the passages leading to the engine intake and referred to in the claims as the engine intake passage. *c'* is a contracted portion of the atmosphere inlet passage, *c*, and leads to the intake manifold. *d*, is a liquid fuel discharge nozzle or terminal of a liquid fuel inlet pipe which is adapted to constitute a spraying nozzle for spraying or dispersing the hydrocarbon fuel discharged from it, said nozzle being provided for this purpose with a co-axially-situated minor air inlet pipe, *d'*. The spraying nozzle which has both the interior and the exterior elements,—that is, the nozzle, *d*, and the co-axially-situated minor air inlet pipe, *d'*,—is positioned with its discharge end extending into the contracted portion, *c'*, of the main atmosphere inlet passage, *c*. *e* is the exhaust manifold; this is located directly above the intake manifold

in the construction shown. *f* is a casting forming a chamber closed at its upper end and open at its lower end, and said casting fitting into the intake manifold, *b*, so that its interior is open to the interior of said manifold, and is axially in line with the contracted portion, *c'*, of the atmosphere inlet, *c*. The casting, *f*, extends upward into the exhaust manifold, *e*, and is provided with radially-inwardly-extending ribs, *f*<sup>2</sup>.

The operation of the above described construction is as follows:

When the engine is operated, air is drawn through the main atmosphere inlet, *c*, and at the same time through the minor air inlet, *d'*, and the gasoline is intermixed with the air drawn in through the minor air inlet, *d'*, and the mixture is projected vertically upward and because of its inertia it continues in the direction of its discharge across the air passage, *c*, into the interior of the casting *f*, and is caused to strike against the interior surface of said casting and the ribs, *f*<sup>2</sup>, in a very finely divided form or mist, so that it is immediately vaporized and the particles thus do not come into a spheroidal state. The vapor expands and flows into the manifold, *b, b*, and is mixed with the incoming air, and gives up its latent heat in part to the air, so that it is condensed into a mist which remains suspended in the air and is readily re-evaporated in the cylinders.

Because the amount of liquid discharged through the nozzle, *d*, is proportional to the quantity of air passing, and because the liquid is projected into the chamber inclosed by the casting, *f*, and is immediately vaporized therein, the amount of vapor issuing from the interior of said casting in the passing air will be proportional to such air, so that the air will be heated to about the same degree under all conditions of working of the engine.

The insensible heat of the issuing vapor is largely used to heat the spraying liquid entering the chamber in the casting, *f*, against the current of issuing vapor.

I claim:

1. The method of furnishing an explosive mixture to an internal combustion engine which consists in first producing by the suction of the engine a rich mixture of liquid fuel and air at substantially normal temperature by aspiration; and next heating such rich mixture to the vaporizing point

of the liquid fuel particles, and finally, thoroughly intermixing such vaporized mixture with an additional quantity of air at a lower temperature.

- 5 2. The method of supplying an explosive mixture to an internal combustion engine, which consists in drawing in by the suction of the engine a charge of hydrocarbon fuel and a limited charge of air at substantially  
10 normal temperature in such juxtaposition thereto as to cause intermixture of the hydrocarbon fuel and such limited air supply; next, continuing the suction of the engine upon the rich mixture, and thereby causing  
15 it to be injected into a chamber heated above the vaporizing point of the hydrocarbon; next, engaging it on its emergence from the heated chamber in and by an air current also drawn in by the suction of the engine  
20 at a lower temperature.

3. The method of supplying an explosive

hydrocarbon mixture to an internal combustion engine, which consists in drawing in by the suction of the engine, a liquid hydrocarbon supply, and simultaneously and  
25 contiguously by the same suction drawing in a limited air supply at substantially normal temperature for mixture with said hydrocarbon liquid supply; next, causing said mixture to be injected, by the momentum of  
30 the in-drawing movement into a chamber heated above the vaporizing point of the hydrocarbon, and to be discharged from said chamber by the same path by which it entered into a greater air current drawn in  
35 by the suction of the engine, for admixture with the air thereof.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 16th day of May, 1919.

PERCIVAL S. TICE.