

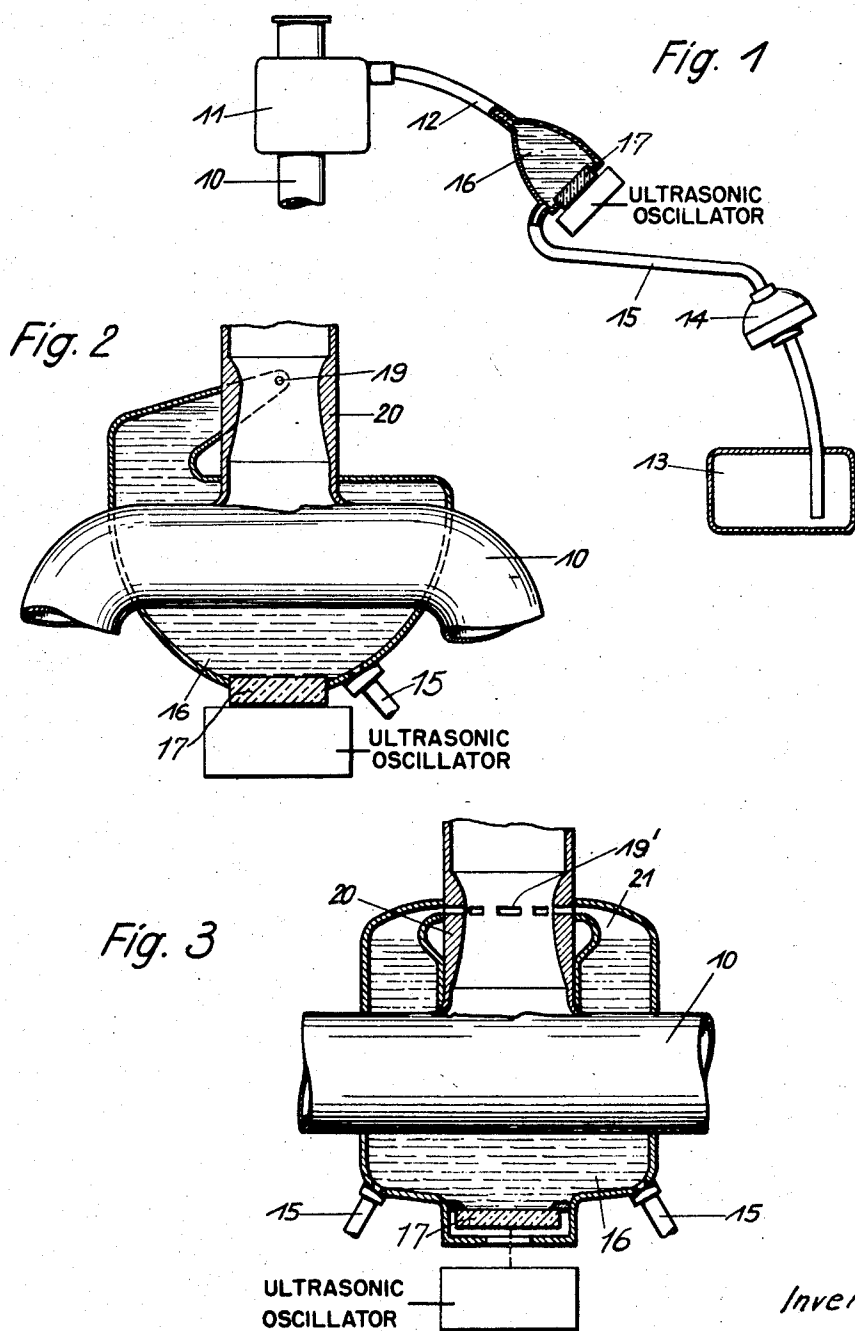
Jan. 31, 1956

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2,732,835

DEVICE FOR OPERATING INTERNAL COMBUSTION ENGINES

Filed Jan. 31, 1952



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DEVICE FOR OPERATING INTERNAL COMBUSTION ENGINES

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Application January 31, 1952, Serial No. 269,154

Claims priority, application Germany January 31, 1951

4 Claims. (Cl. 123-119)

The present invention relates to a method and device for operating internal combustion engines by using high-frequency sound vibrations, particularly ultrasonic vibrations producing an atomization of the fuel already before it enters the combustion chamber. By these vibrations the fuel can be disintegrated much more efficiently, and thereby appropriately prepared for combustion.

An object of the present invention is a forward development of this method for obtaining a still higher rate of fuel atomization. Another object of the present invention relates to an efficient device which is as simple as possible so that the high-frequency vibrations react effectively on the fuel.

Accordingly it is an essential characteristic of the present invention that a certain quantity of liquid fuel filling an intermediate chamber wholly or in part, ahead of the mixing device, is exposed to high-frequency vibrations and is thereby partly atomized, whereupon fuel fog admixed with the combustion air will be admitted to the engine. According to another characteristic of the invention the accumulator or intermediate chamber is directly superposed over the mixing station, such as a carburetor, so that the fuel atomized by the high-frequency vibrations is immediately drawn into the carburetor from the intermediate chamber, e. g. by means of the suction created by combustion air flowing into the engine through contracted passages or passing by jet like orifices, as is well known in the art.

According to another characteristic of the present invention it is appropriate to expose at the same time also the combustion air or the mixture flowing through the carburetor, to the high-frequency oscillations, particularly by leading the intake manifold through the intermediate chamber containing the fuel which is pre-stored and subjected therein to the ultrasonic vibrations.

The exposing of the fuel to sound vibrations can be effected in any appropriate way, e. g. by means of a quartz arranged at the bottom of the intermediate chamber and made to oscillate with high frequency by electricity.

Further objects and advantages of the present invention will be obvious from the following description when taken in connection with the drawing which shows for purposes of illustration only several embodiments, and wherein:

Figure 1 is a schematic arrangement illustrating in principle the design of an apparatus for the method of operating an internal combustion engine in accordance with the present invention, and

Figures 2 and 3 are two examples of design of the invention in which the intake manifold of the engine is led through the pre-stored fuel.

In Figure 1 reference numeral 10 designates the intake manifold of the engine with the carburetor 11 to which the fuel is admitted through a pipe 12 which is filled during operation of the engine. In this case the fuel is drawn from the main fuel tank 13 by a fuel feed pump

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14, and conducted by way of a pipe 15 to a space 16 emitting oscillations, in which the fuel is pre-stored, and exposed to the ultrasonic vibrations by an ultra sound emitting substance, e. g., a quartz 17 made to oscillate at high-frequency by electricity. On account of this sound emission part of the fuel in the chamber 16 is atomized, and the fuel fog is admitted to the carburetor 11 through the pipe 12, which is substantially completely filled during operation of the engine, e. g. by the vacuum produced in the engine. Depending upon the energy with which the quartz 17 is made to oscillate, a more or less high amount of fuel can be atomized. By means of an appropriate irradiation of the fuel by ultrasonic waves, the fuel may be atomized to the extent that the individual particles thereof are broken up to approximately molecular size.

In the examples of design as illustrated in Figures 2 and 3 the intake manifold 10 is conducted through the reservoir or space 16 emitting oscillations in which the pre-stored fuel is exposed to high-frequency oscillations originating in the ultra-sound emitting substance 17. The sound emitting substance 17 (e. g. a quartz) may be, for example, at the bottom of the reservoir 16.

In Figure 2 the reservoir or space 16 emitting oscillations communicates with the intake manifold by a nozzle 19; this nozzle 19 appropriately discharges into the intake manifold within a venturi tube 20 in the way usual with carburetors.

Instead of a nozzle 19 two or several nozzles may be provided for. Figure 3 illustrates an arrangement in which the reservoir or space 16 emitting oscillations discharges into the intake manifold 10 through a practically ring-shaped opening 19'.

By exposing the fuel within the reservoir 16 to ultrasonic vibrations it is atomized partly; thereby the fuel fog thus obtained accumulates above the fuel level within the upper part 21 of the reservoir 16 wholly or in part filled with fuel, and can be exhausted from it directly through the disintegrating nozzles 19 and 19' by the combustion air passing by nozzles 19 and 19'. While flowing through the intake manifold 10 to the cylinders of the engine, the mixture thus produced is exposed again to sound vibrations originating in the sound emitting substance 17 and transmitted through the medium of the fuel 16 and the walls of the intake manifold 10 so as to guarantee a disintegrating of the fuel into its smallest particles, and a most thorough intermixture of fuel and air.

What I claim is:

1. The apparatus for subjecting the fuel for internal combustion engine to acoustic vibrations comprising a fuel line, an inlet line between said fuel line and said engine, an intermediate chamber between said fuel line and said inlet line, means in said intermediate chamber for subjecting the fuel to high frequency acoustic waves, and an air suction opening leading into said inlet line from said chamber, a portion of said inlet line passing through said intermediate chamber intermediate said air-suction opening and the internal combustion engine whereby the walls of said inlet line are also subjected to said high frequency acoustic wave.

2. The apparatus for subjecting the fuel for internal combustion engines to supersonic vibrations comprising a fuel line, an inlet line, a constricted passage between said fuel line and said inlet line, a reservoir in said fuel line ahead of its termination in said inlet line, high frequency acoustic oscillation producing means for subjecting the fuel in said reservoir to high frequency acoustic oscillations, an air suction opening leading into said inlet line from said reservoir, and means for passing at least a portion of said inlet line intermediate said air-suction open-

ing and the internal combustion engine through said reservoir for subjecting the walls of said inlet line to said acoustic oscillations.

3. The apparatus according to claim 2 wherein said constricted passage is formed by a plurality of annular atomizer nozzles discharging into said inlet line.

4. The apparatus according to claim 2 wherein said constricted passage between said reservoir and said inlet line is located at the highest point of said reservoir, and said means for producing high frequency acoustic oscillations is located at the lowest point thereof.

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