Nov. 15, 1938. F. WEINBERG 2,136,719

INTERNAL COMBUSTION ENGINE

Original Filed June 7, 1923

Fig. 1.

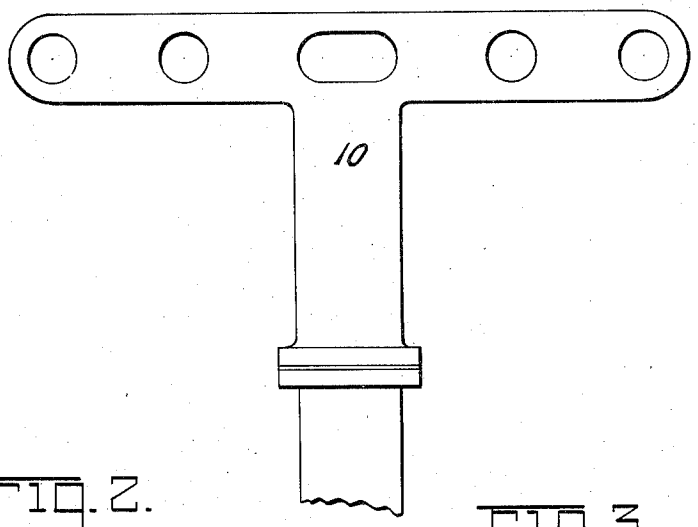


Fig. 2.

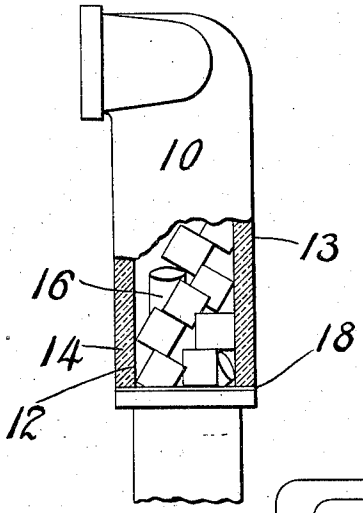


Fig. 3.

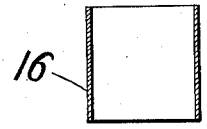


Fig. 4.

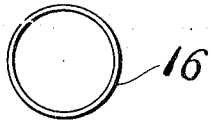
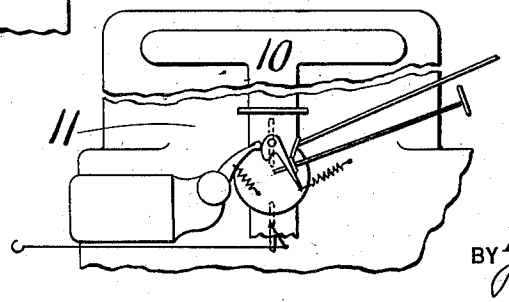


Fig. 5



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UNITED STATES PATENT OFFICE

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INTERNAL COMBUSTION ENGINE

Frederick Weinberg, Detroit, Mich.

Original application June 7, 1928, Serial No. 283,566. Divided and this application December 7, 1933, Serial No. 701,296

4 Claims. (Cl. 123—141)

My invention relates to improvements in internal combustion engines and particularly to improvements in the fuel supply system whereby a cold dense charge of fuel is delivered to the engine combustion chambers.

An object is to provide fuel supply apparatus for an internal combustion engine which will deliver a relatively cold dense fuel mixture thereto, which will cause a fine mist of the liquid fuel and insure delivery of the fuel in a nebulous state to the combustion chamber of the engine and which will produce a more thorough and uniform mixture of the fuel charge.

This application is a division of my copending application Ser. No. 283,566, filed June 7, 1928, since issued as Patent No. 1,939,614. In such parent application I have described and claimed a process and apparatus for obtaining an unusually high compression of the fuel charge determined by the auto-ignition point of the fuel rather than by the anti-knock point thereof. The cold carburetion injection system here shown and claimed, and which depends for its functioning on the development of low temperatures due to the evaporation of the fuel was shown and described in the application from which said patent resulted. This cold carburetion system is particularly useful in a high compression engine whereon the compression is determined by the auto ignition point, though adaptable for use with an engine depending on ordinary compression pressures determined by the anti-knock point.

Production of droplets of liquid fuel with the consequent lowering of temperature occurs in an ordinary internal combustion engine fuel system but to a very minor degree. My improvement is intended to prevent this and create a very fine mist so that a relatively cold charge is delivered to the engine.

Since the beginning of the art of internal combustion engines, which employed carburettors, the fuel charge was delivered from the carburettor to the combustion chambers through a metallic pipe which was heated by the surrounding air. Throughout the last two decades it has been the practice to provide means and mechanism for further heating the fuel delivery pipe and the intake manifold, thereby preheating the fuel charge passing therethrough. This procedure is in exactly the opposite direction from that I have here illustrated and shown. My object is to obtain a cold fuel mixture and preserve its low temperature until it is delivered into the combustion chamber.

Through my improvement I am able to obtain an increase in power for an engine of given size. By reason of the greater density of the charge and correspondingly greater volumetric efficiency a better fuel economy, through a more thorough mixing of the fuel charge, results in a fine mist and a material decrease in the internal cooling necessary to be applied to the engine because of the internal cooling effect of such charge. I am therefore able to use fuel having a lower flash point which in and by itself affords me opportunity to further drive up the compression ratio.

Other objects and advantages of my invention will more fully appear from the following description, appended claims, and accompanying drawing, wherein:

Figure 1 is a diagrammatic elevation of an intake manifold embodying my invention,

Figure 2 is a fragmentary elevation of the intake manifold shown in Figure 1 partly broken away to show the interior thereof,

Figure 3 is a cross section through one of the tubular members deposited in the interior of the intake manifold,

Figure 4 is an end elevation of the tubular member shown in Figure 3, and

Figure 5 is a diagrammatic elevation of an internal combustion engine provided with my improved manifold.

The improvement as shown is suitable for a six cylinder engine 11 but obviously it is adaptable to an engine having any number of cylinders. Accordingly, in my invention the wall of the manifold 10 is so constructed as to protect the interior thereof from the heat of the outer surrounding air. It may be as here shown a double wall 12 and 13 filled with asbestos 14 or some other heat resisting medium such as non-circulated air of atmospheric or sub-atmospheric pressure. The manifold might even be wrapped with a suitable heat insulating material.

The interior of the manifold 10 is filled with a plurality of small cylindrical tubes 16. These tubes have diameters equal to their lengths so that when they are deposited loosely within the manifold they fall at random as shown. A screen 18 is arranged at one end to support the tubes and a screen, not shown, is arranged at the opposite end of the manifold to hold the tubes in place prior to the tubes being secured together as a mass.

As the tubes are deposited in the manifold, falling at random therein, it will be evident that with manifolds of the same size different arrangements of the tubes will result and different

resistances to the flow of fuel therethrough would result.

I can overcome this difficulty by applying a measured blast of air to the intake end of the manifold while shaking the manifold until the air passing through at a predetermined pressure is the same in all cases and is equal to the maximum amount of air flow required by the engine with which the manifold is to be used. It is then my intention to secure the tubes together as a mass in this position. This can be accomplished either by baking or fritting them together, by immersing them in a metallic or electrolytic bath and depositing metal thereon to secure them together, or they may be electrically welded or fused together by direct application of an electric current.

After being secured together, the tubes within the manifold provide a labyrinth of tortuous passageways with a multiplicity of exposed surfaces over which the fuel mixture must pass in its travel through the manifold.

My improved apparatus functions in the following manner to deliver a cold dense charge of thoroughly mixed fuel to the combustion chambers of the engine: The fuel particles entering the manifold and comprising droplets will impinge on the walls of the tubes or cylinders covering them internally as well as externally and will be spread by surface tension. The air stream flowing through the manifold will pick up the spread fluid in fine globules and as these are forced to travel in random fashion through the labyrinth of cylinders the process is repeated and a very intense mixing takes place. In the absence of the tubes this result would not occur and it has been heretofore necessary to heat the manifold to avoid condensation of fuel.

The additional mixing will offset the temperature rising as the mixture nears the hot engine valves and walls. The extreme cold set up in the mixture is thus used to keep it dense and prevent its undue expanding. The protecting wall of the manifold at the same time prevents exterior heat from entering the mixture. The air as it forces its way through the cylinders in a zigzag fashion is continuously freed from fuel globules whose mass and therefore inertia is still greater than that of the air particles so that a mixture as finely divided as possible enters the cylinders which results in the advantages enumerated.

What I claim:

1. A fuel mixture intake for an internal combustion engine, having a portion provided with a heat insulated wall and filled with a multiplicity of small tubes arranged irregularly therein.

2. A fuel feed intake for an internal combustion engine having a portion filled with a multiplicity of small tubes of substantially equal dimensions, axially and radially.

3. An air and fuel mixture conducting manifold for an internal combustion engine having heat insulation and containing a number of tubes disposed at random, said tubes coacting thermally with said heat insulation of said manifold to maintain the heat drop of the fuel during conduction through said manifold.

4. In a fuel conducting system for an internal combustion engine, an intake manifold having a portion filled with small tubes deposited irregularly therein providing a labyrinth of tortuous passageways therethrough.

FREDERICK WEINBERG.