Aug. 5, 1941. G. O. MOYER ET AL 2,251,371

HOMOGENIZER

Filed July 2, 1940

Fig. 1

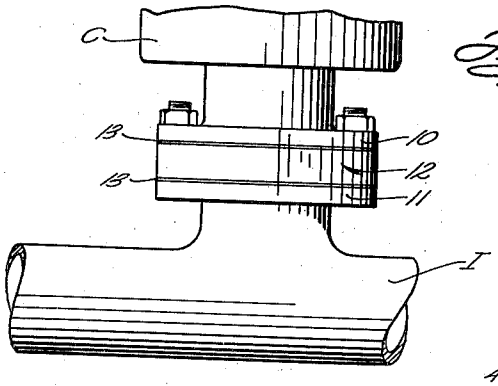


Fig. 2

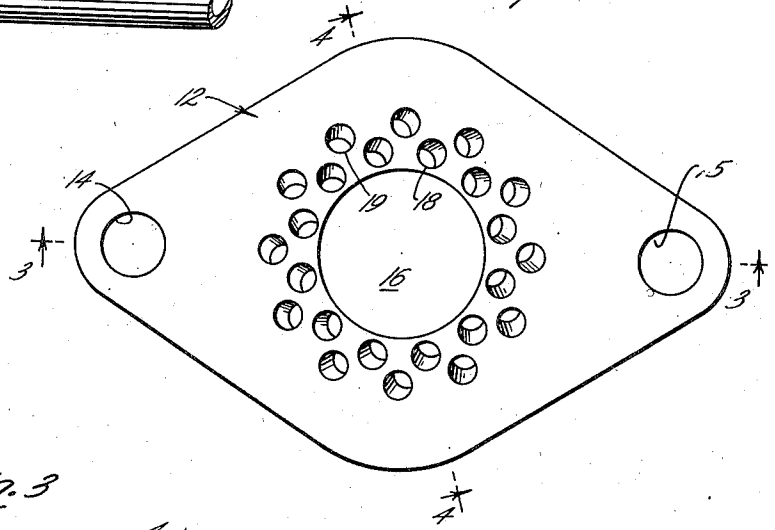


Fig. 3

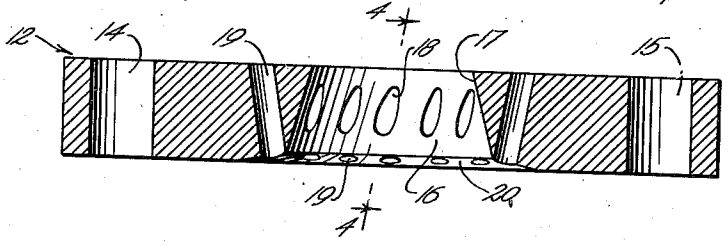
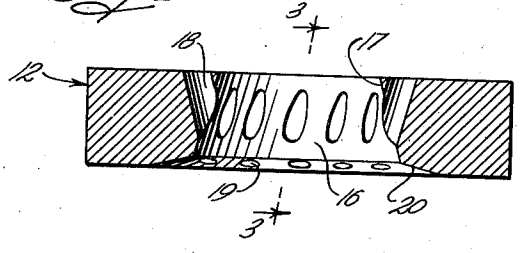


Fig. 4



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HOMOGENIZER

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4 Claims. (Cl. 48—180)

This invention relates to improvements in homogenizers for use with internal combustion engines.

An object of the invention is to provide a homogenizer that may be attached to or incorporated in the intake manifold of an internal combustion engine or a portion of the carburetor leading thereto and which has a plurality of passages so arranged as to create a vortex in the flow into or through the intake manifold so as to create a more even distribution or mixture of fuel and air in the manifold prior to its being taken into the cylinders of the engine.

More specifically, an object of the invention is to provide a simple form of homogenizer having no moving parts and which will effectively create the desired vortex or whirling to bring about a greater homogeneity between air and fuel and which has the advantage of offering such little resistance to the flow of fuel and air that the top speed of the engine is not reduced by its use.

It has heretofore been proposed to use rotating fans and the like at the entrance to the intake manifold to bring about the desired homogeneity. Such constructions, while advantageous at ordinary speeds, almost invariably have the disadvantage that they cause the maximum speed of the engine to drop when the throttle is in wide open position. The present construction has the advantage of having no moving parts to wear or get out of order and the resistance present is so slight that no drop in the maximum speed of the engine is ordinarily noticeable.

With the foregoing and other objects in view, which will be made manifest in the following detailed description and specifically pointed out in the appended claims, reference is had to the accompanying drawing for an illustrative embodiment of the invention, wherein:

Figure 1 is a partial view in side elevation illustrating a portion of an intake manifold of an internal combustion engine and a down-draft carburetor leading thereto, the homogenizer being illustrated as having been installed;

Fig. 2 is a top plan view of the homogenizer embodying the present invention;

Fig. 3 is a vertical section taken substantially upon the line 3—3 upon Figs. 2 and 4; and

Fig. 4 is a sectional view taken substantially upon the line 4—4 upon Figs. 2 and 3.

Referring to the accompanying drawing wherein similar reference characters designate similar parts throughout, I indicates the intake manifold of an internal combustion engine to which fuel and air are supplied from a carburetor or other mixing device indicated at C. The carburetor illustrated is a portion of a conventional type of down-draft carburetor used for mixing gasoline and air but it will be readily understood that the present invention may be used in conjunction with up-draft carburetors if so desired and in conjunction with mixing devices such as are employed for mixing natural gas with air or other forms of fuel.

In the construction illustrated the carburetor C and the manifold I have companion flanges 10 and 11 and the homogenizer generally designated at 12 is shaped to fit between these companion flanges. Usually gaskets 13 are interposed between the flanges and the homogenizer to prevent leakage.

The homogenizer consists of a flat plate of suitable thickness preferably equipped with bolt holes 14 and 15 to receive the bolts that connect the companion flanges 10 and 11. Formed in this plate there is a relatively large central aperture 16 conically shaped so that its walls 17 diverge rearwardly or in the direction of flow from the carburetor C to the manifold I. Around this large aperture 16 there are arranged two series or sets of perforations, the perforations of the inner set being indicated at 18 and those of the outer set at 19. If desired additional series or sets of perforations may be formed in the plate in addition to the two series or sets shown. The perforations of both sets are radially and tangentially inclined, or in other words, the axes of the perforations converge toward the central axis through the large aperture 16 while at the same time they are tangentially or circumferentially directed so that flow through the perforations will be directed toward the center of the manifold and in a circumferential direction thus creating a vortex. The degree of inclination of the perforations will vary under differing circumstances. However, a typical inclination is such that the perforations of both sets are inclined radially at about 10° to the vertical. They are also inclined tangentially at approximately 15° to the vertical.

The rear ends of the perforations 18 terminate on the rearwardly divergent walls 17 of aperture 16 while the rear ends of the perforations 19 terminate adjacent the rear of aperture 16 on a slightly beveled area indicated at 20. The entrances to the perforations 18 and 19 are arranged to receive minor portions of the flow of fuel from the passage leading from the carburetor or like mixing device to the manifold I and to direct such portions inwardly of the walls of

the passage and inwardly of the walls of the manifold passage in the formation of the vortex as above described. The plate being sealed by the gaskets 13 effectively prevents the admission of any outside air above or below the plate or in other words, at the entrance to the manifold.

During operation of the engine the major portion of the fuel and air mixed by the carburetor C is drawn through the rearwardly expanding or enlarging aperture 16. The forward edge of this aperture acts somewhat as a slightly restricted throat and as the flow progresses through the aperture it progresses through a constantly enlarging or expanding conduit formed by the rearwardly diverging walls 17. A type of Venturi action is thus created in aperture 16 which assists in the drawing of fuel and air through the perforations 18. The fuel and air that is drawn through the perforations 18 and 19 is directed thereby so as to create a vortex or whirling in the manifold, thus promoting greater homogeneity between the fuel and air and an even distribution.

We find that it is quite important to have a decided divergence of the walls 17 for if these walls are shaped so as to be parallel or substantially so, the advantages of the present homogenizer are largely lost. The main function of the outer set of perforations 19 is to assist in conducting the necessary volume of flow. They assist the perforations 18 in producing the vortex. However, the vortex is largely created by the inner set of perforations which terminate on the rearwardly diverging walls 17.

We find that in the use of this form of homogenizer that not only is a thorough mixture of fuel and air accomplished, but that in addition there is no noticeable decrease in the maximum speed of the engine when the homogenizer is used.

It will be appreciated from the above description that the construction is very simple in operation, that it is simple to manufacture and install, and that as it has no moving parts there is nothing to wear or get out of order.

Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

We claim:

1. A homogenizer adapted to be placed in the line of flow to the intake manifold of an internal combustion engine from a carburetor or like mixing device comprising a plate-like body having a relatively large central aperture formed therein through which the major portion of the flow to the manifold takes place and tangentially inclined passages formed in said body around said central aperture terminating on the side walls of said aperture and arranged to receive portions of flow from the carburetor or like mixing device and direct them with relation to the major portion of flow passing through said aperture in such a manner as to create a vortex therein.

2. A homogenizer adapted to be placed in the line of flow to the intake manifold of an internal combustion engine from a carburetor or like mixing device comprising a plate-like body having a relatively large central aperture formed therein through which the major portion of the flow to the manifold takes place and tangentially inclined passages formed in said body around said central aperture terminating on the side walls of said aperture and arranged to receive portions of flow from the carburetor or like mixing device and direct them with relation to the major portion of flow passing through said aperture in such a manner as to create a vortex therein, the aperture having its side walls diverging in the direction of flow.

3. A homogenizer adapted to be placed in the line of flow to an intake manifold of an internal combustion engine from a carburetor or like mixing device comprising a plate-like body having a large central aperture formed therein through which the major portion of the flow to the manifold takes place, said plate being perforated around said central aperture, some of the perforations having entrances on one side of the plate and terminating on the side walls of the aperture, other perforations extending through the plate from side to side around said aperture, said perforations being inwardly and tangentially inclined and arranged to receive portions of the flow from the carburetor or like mixing device and direct them inwardly and tangentially with relation to the major portion of flow so as to create a vortex therein.

4. A homogenizer adapted to be placed in the line of flow to an intake manifold of an internal combustion engine from a carburetor or like mixture device comprising a plate-like body having a large central aperture formed therein through which the major portion of the flow to the manifold takes place, said plate being perforated around said central aperture, some of the perforations having entrances on one side of the plate and terminating on the side walls of the aperture, other perforations extending through the plate from side to side around said aperture, said perforations being inwardly and tangentially inclined and arranged to receive portions of the flow from the carburetor or like mixing device and direct them inwardly and tangentially with relation to the major portion of flow so as to create a vortex therein, the walls of the central aperture being divergent in the direction of flow

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