Jan. 21, 1930. V. LINK 1,744,319

INTERNAL COMBUSTION ENGINE

Filed Dec. 18, 1926 2 Sheets-Sheet 1

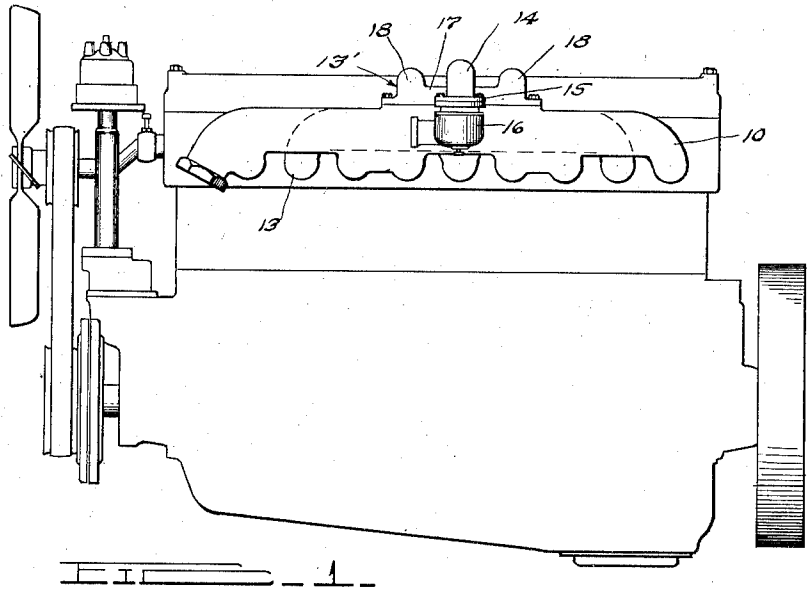


FIG. 1

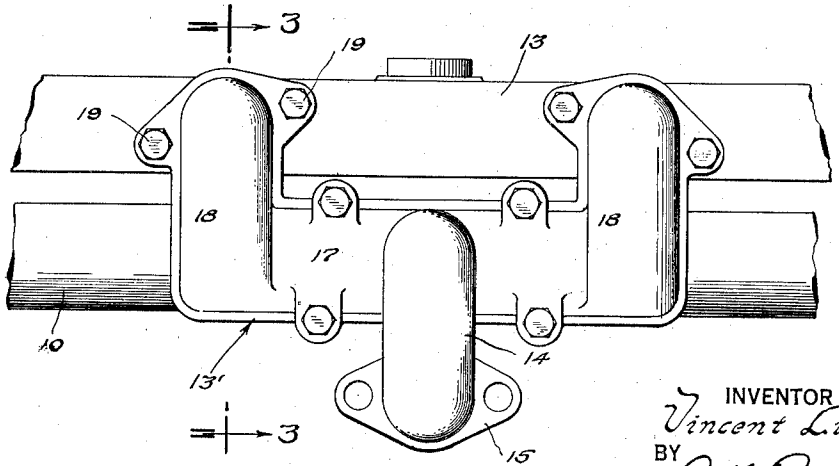


FIG. 2

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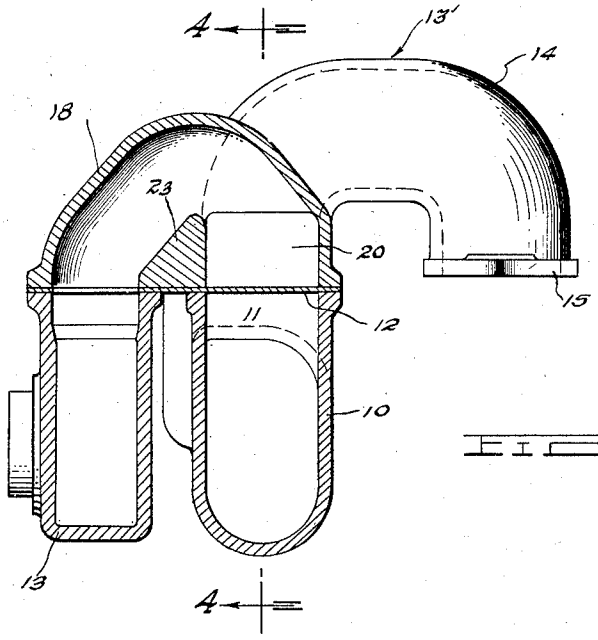


Fig. 3.

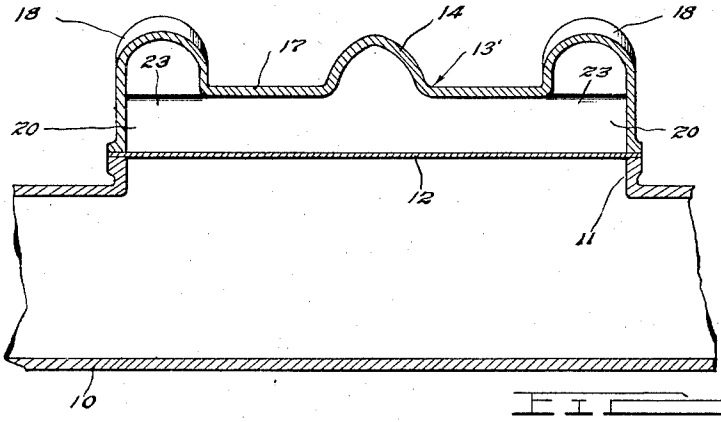


Fig. 4.

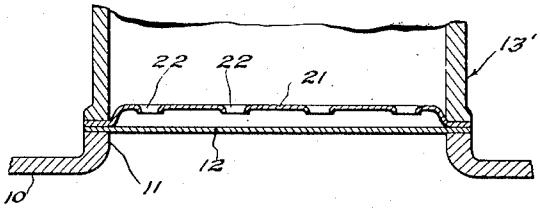


Fig. 5.

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UNITED STATES PATENT OFFICE

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INTERNAL-COMBUSTION ENGINE

Application filed December 18, 1926. Serial No. 155,612.

This invention relates to internal combustion engines and particularly to manifold constructions therefor, the principal object being to provide a construction in which the combustible mixture may be readily vaporized and distributed equally to the various cylinders of the engine.

Another object is to provide a manifold construction for internal combustion engines in which the combustible mixture from the carburetor will be directed into a pocket heated by the exhaust gases where the unvaporized particles of fuel will be separated out and will thereafter be vaporized by the heat in said pocket.

Another object is to provide a manifold construction for internal combustion engines in which the combustible mixture from the carburetor will be directed into a pocket where the direction of its flow will be changed and thereby deposit the liquid fuel particles carried thereby into the pocket and will thereafter continue free of said liquid particles, the pocket being heated by the exhaust gases whereby such liquid particles as are deposited therein will be heated and vaporized and thereafter returned to the combustible mixture stream.

Another object is to provide a manifolding construction for an internal combustion engine in which a pocket in the intake manifold is formed above and in contact with the exhaust manifold, the combustible mixture from the carburetor being directed into said pocket and deflected therein whereby to deposit liquid fuel particles carried by the mixture stream in said pocket, said pocket serving as a reservoir for holding such particles until such time as they are boiled off and vaporized by the heat transmitted thereto from the exhaust manifold.

Another object is to provide a manifolding construction for an internal combustion engine in which the exhaust manifold is provided with an opening in the upper surface thereof, such opening being closed by a thin metal sheet, the intake manifold being formed to provide a pocket closed at the bottom by said sheet, and being formed to deflect the liquid fuel particles in the combustible mixture into contact with said sheet whereby the heat transmitted from the exhaust gases through said sheet will transform such liquid fuel particles into a gas.

Another object is to provide a manifolding construction for an internal combustion engine in which the exhaust manifold is provided with an opening in its upper wall closed by a relatively thin sheet metal plate, the intake manifold being formed to provide a pocket which is closed at its bottom by said plate, and being further formed to direct the combustible mixture from the carburetor downwardly into said pocket and then upwardly therefrom whereby the liquid fuel particles carried by said combustible mixture will be deflected out of said mixture stream and will be collected in said pocket where the heat from the exhaust gases transmitted through said plate will cause vaporization of said particles and return them to the mixture stream.

A further object is to provide a manifold construction for internal combustion engines in which a pocket is formed in the intake manifold having a highly heated bottom surface, the mixture stream from the carburetor being directed downwardly into said pocket and then upwardly away from the same, a perforated plate being provided in the bottom of said pocket, spaced upwardly from said bottom surface, whereby the bulk of the mixture passing through said pocket will not come into direct contact with the highly heated bottom surface thereof, the change of direction of flow of the combustible mixture causing the liquid fuel particles carried thereby to be thrown out of the mixture stream and to be deposited on said perforated plate through which said particles may drain and come in direct contact with the highly heated surface therebelow, whereby they will be vaporized and returned through said perforated plate into the mixture stream.

The above being among the objects of the present invention, the same consists of certain features of construction and combinations of parts as to be hereinafter described with reference to the accompanying drawings, and then claimed, having the above and other objects in view.

In the accompanying drawings which illustrate a suitable embodiment of the present invention and in which like numerals refer to like parts throughout the several different views,

Figure 1 is a side elevation of an internal combustion engine in which a suitable embodiment of the present invention is incorporated.

Figure 2 is a plan view of the central portion of the intake and exhaust manifold shown mounted on the engine in Figure 1.

Figure 3 is a sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a view corresponding to a fragment of the view shown in Figure 4 illustrating a slightly modified form of construction thereof.

In manifold designs for internal combustion engines the result invariably sought to be obtained is an equal distribution of the combustible mixture to the various cylinders. It is generally accepted that this may be obtained if sufficient heat is applied to the combustible mixture stream to entirely vaporize all particles of liquid fuel carried thereby. The heating of the combustible mixture to a sufficiently high temperature to accomplish this result is objectionable for the reason that the volumetric efficiency of the engine is impaired thereby, and because such high heating of the combustible mixture causes detonation of the same in the engine cylinders which it is almost impossible to control. For this reason it is usually attempted to separate out and vaporize by the application of heat only those particles of liquid fuel which are carried along by the mixture stream. Various and widely different constructions have been suggested and built with this end in view, but the results have not generally been satisfactory for one reason or another. In addition the majority of such constructions proposed have been so complicated in design that their use is prohibitory for that reason. The present invention provides an exceedingly simple design in which this result may be obtained to a substantially full degree.

As illustrative of the present invention I show in the accompanying drawings an embodiment in which an exhaust manifold 10, which for the most part is of conventional construction, is employed. The uper wall of the exhaust manifold 10 is provided with a central opening 11, of substantial size, closed by a relatively thin metallic plate 12. The intake manifold, for ease of construction, is formed of two main parts, a lower or distributor portion 13 and an upper or heater portion 13′. The heater portion 13′ of intake manifold is provided with an outwardly projecting inverted U-shaped duct portion 14 terminating at its outer end in a flange 15 to which the carburetor 16 is secured. The inner end of the portion 14 opens downwardly into the elongated portion 17 which is an inverted U-section and which overlies the opening 11 in the exhaust manifold 10, the plate 12 closing the lower face thereof. A duct 18 extends upwardly from each end of the portion 17 and turns inwardly and then downwardly and is secured to the upper face of the lower intake portion 13 by screws 19, the interior of the portion 17 thus being connected with the interior of the lower intake manifold portion 13. The ducts 18 are thus made to pass over the baffle 23 positioned on the plate 12 above the inner edge of the opening 11 in the exhaust manifold 10, and projecting upwardly from the upper face thereof. This baffle 23 has the effect of forming a pocket or reservoir 20 directly above the plate 12.

In operation, the combustible mixture from the carburetor 16 passes upwardly into the portion 14 and then downwardly into the longitudinally extending portion 17 and pocket 20 where it passes to the end thereof and upwardly over the baffle 23 through the duct 18 into the lower intake manifold portion 13 where it is distributed to the various cylinders of the engine. It will thus be apparent that the direction of flow of the combustible mixture from the carburetor is rapidly changed in passing through the pocket 20, which change of direction of flow causes the unvaporized fuel particles being carried by the combustible mixture stream to be thrown out and deposited in the pocket 20. The heat from the exhaust gases in the exhaust manifold 10 heats the plate 12 to a relatively high temperature and the liquid fuel particles thus thrown out of the combustible mixture stream are deposited upon the highly heated surface which causes the same to be rapidly vaporized and thrown back into the mixture stream as a gas. The result is that all the combustible mixture which enters the lower intake manifold portion 13 is completely vaporized and free of any liquid fuel particles which tend to cause unequal distribution in the conventional form of manifold constructions. It will be noted that the plate 12 is the only highly heated surface which the combustible mixture comes in contact with, and it is of insufficient area to heat the entire combustible mixture stream to a temperature that is objectionable because of the reason heretofore stated. If it is desired to control the heating effect of the plate 12, and reduce the effect thereof in hot weather, an insulating gasket (not shown) having a restricted opening, may be interposed between the plate 12 and the upper intake manifold portion, thereby reducing the effective area with which the combustible mixture may come in contact.

A very desirable construction for transmitting the minimum of heat to the combustible

mixture without losing the ability of completely vaporizing the unvaporized fuel particles is shown in Figure 5, which is a modification of the structure shown in Figure 4. In this modification an inverted dish-shaped metal plate 21 is positioned over the plate 12, it being separated therefrom except around its margin by a substantial space. Openings 22 are provided in the plate 21 for allowing the liquid fuel particles deposited thereon to drip through and to come in contact with the highly heated plate 12. The plate 21 which in itself is not heated, prevents the combustible mixture from coming into direct contact with the plate 12 and thereby prevents an appreciable transfer of heat thereto, but it does not prevent the liquid fuel particles from coming in contact with the highly heated plate 12, and thereby retains the highly desirable result which consequently follows.

Formal changes may be made in the specific embodiment of the invention described without departing from the spirit and substance of the broad invention, the scope of which is commensurate with the appended claims.

What I claim is:—

1. In combination with an internal combustion engine, an intake manifold and an exhaust manifold, a detachable thin metal plate common to the upper surface of said exhaust manifold and a lower surface of said intake manifold, an elongated reservoir formed in said intake manifold above said plate, a perforated plate overlying said first-mentioned plate having an offset portion in spaced relation therewith provided with a plurality of openings therein, means for directing the combustible mixture into said intake manifold downwardly into said pocket against said perforated plate, and means for conducting the combustible mixture from said reservoir upwardly therefrom adjacent the ends thereof.

2. In combination with an internal combustion engine, an exhaust manifold, an intake manifold formed of independent upper and lower members, said lower member being positioned adjacent to the side of said exhaust manifold and said upper member having an elongated portion overlying a portion of said exhaust manifold, a carburetor, a detachable thin horizontally positioned plate separating said upper member and exhaust manifold, a duct in said upper member leading from said carburetor directing the fuel mixture against said plate, and a second duct in said upper member directing the fuel mixture into said lower member.

3. In combination with an internal combustion engine, an exhaust manifold, an intake manifold formed of independent upper and lower sections, said upper section having a curved portion formed to receive a carburetor thereon, a thin horizontally positioned plate separating said upper section and exhaust manifold, a duct in the curved portion of said upper member leading from said carburetor directing the fuel mixture against said plate, a baffle in said upper section for directing the fuel mixture upwardly and then downwardly into said lower section, and ducts leading from said lower section for directing the fuel mixture into the engine cylinders.

4. In combination with an internal combustion engine, an intake manifold and an exhaust manifold, said intake manifold provided with a reservoir, the bottom of which is in contact with said exhaust manifold, and a perforated plate in said intake manifold covering said reservoir having an offset portion spaced from the bottom wall to permit the liquid fuel particles to flow into said reservoir to be heated by the exhaust gases.

5. In combination with an internal combustion engine, an exhaust manifold, an intake manifold adjacent to the side of said exhaust manifold having a portion intermediate its ends overlying said exhaust manifold to provide a pocket with a lower wall common to both manifolds, and a perforated plate spaced from the bottom wall of said pocket for separating out the unvaporized particles of fuel carried by the combustible mixture passing through said intake manifold and depositing said particles of fuel into said pocket.

6. In combination with an internal combustion engine, an exhaust manifold, an intake manifold having a distributing portion adjacent to the side of said exhaust manifold and a heating portion overlying said exhaust manifold, said heating portion being formed to provide a pocket having a wall common to both manifolds, and a perforated plate in said heating portion spaced from said pocket wall, the combustible mixture from the carburetor being directed downwardly into the center of said pocket, the vaporized particles of fuel being conducted upwardly from the ends of said pocket and distributed to the several cylinders of the engine and the unvaporized particles of fuel being deposited beneath said plate.

Signed by me at Detroit, Michigan, this 15th day of December, 1926.

VINCENT LINK.