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ENGINE MANIFOLD

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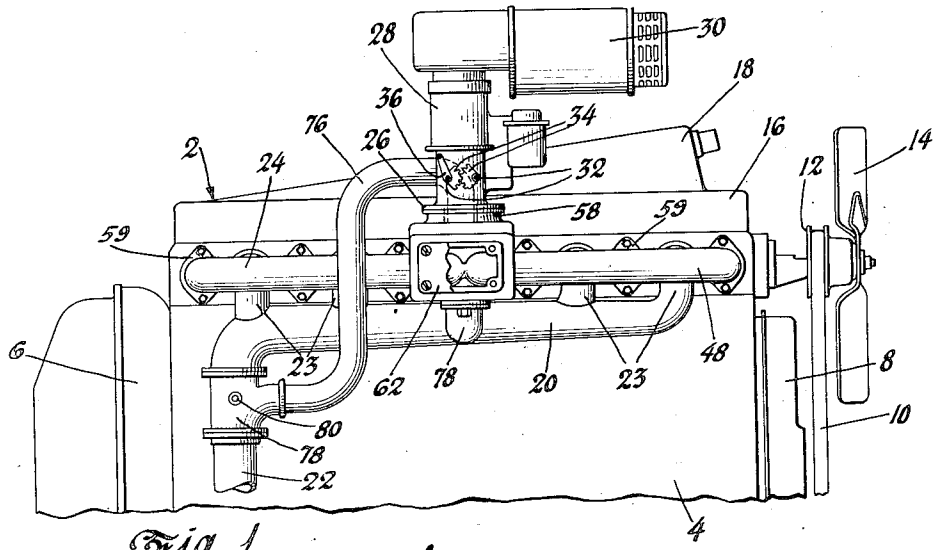


Fig. 1

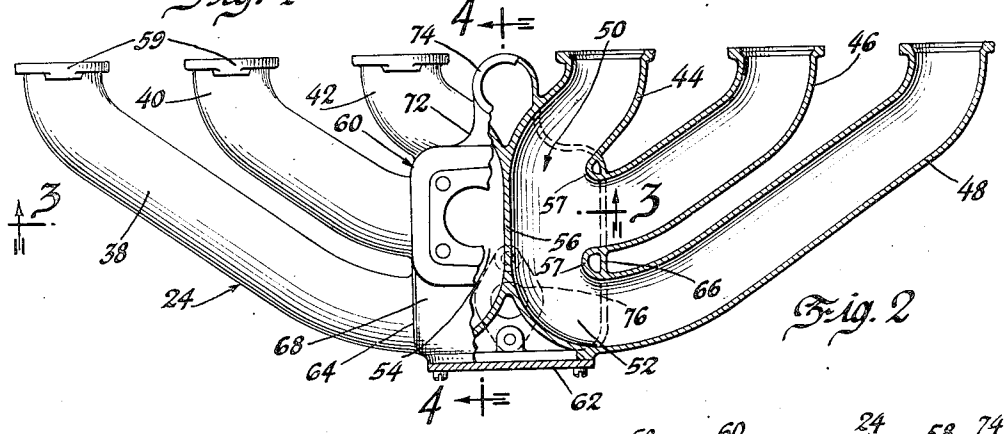


Fig. 2

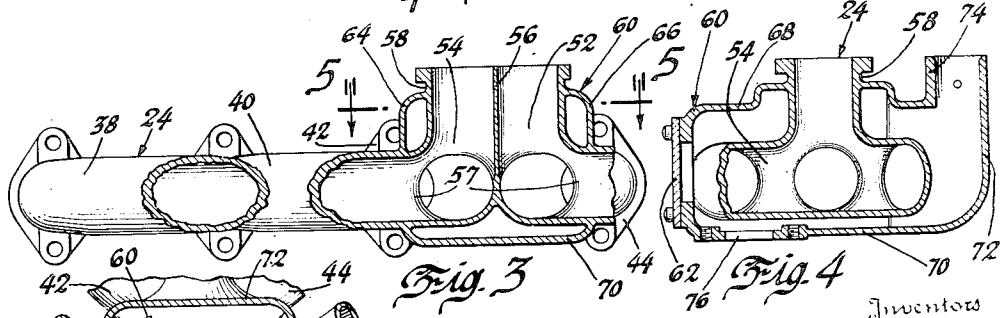


Fig. 3

Fig. 4

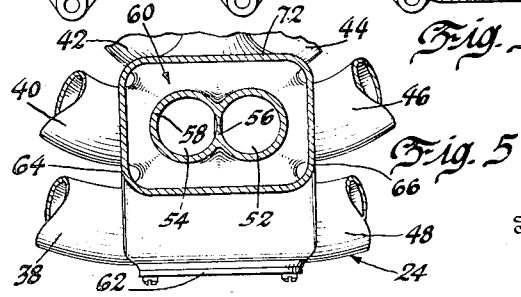


Fig. 5

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ENGINE MANIFOLD

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6 Claims. (Cl. 123—52)

This invention relates to manifolds for use on multi-cylinder internal combustion engines.

In experimenting with manifolds and the distribution of gaseous fuel to the combustion chambers of multi-cylinder internal combustion engines we found that an air stream, or a liquid fuel laden air stream, cannot be divided without producing very objectionable turbulence. It was found that the direction of flow of the air stream as a whole can be diverted or changed from one arm of a manifold to another without producing objectionable turbulence, but the trouble arises when a single liquid fuel laden air stream is required to furnish two or more arms of a manifold at the same time. Regardless of the smoothness of the air stream entering the manifold, this attempt to divide the stream produces an excessive amount of turbulence. The turbulence thus caused produces what may be called a small hurricane in the manifold and spatters the sides with liquid fuel which ordinarily would go to the firing chamber and thereby causes irregularities in distribution and consequent unevenness in the discharge stroke. In a four-cylinder engine there is no problem of manifold distribution because the entire fuel air stream is at all times being directed toward but one cylinder and there is substantially no overlap, or simultaneous demand upon the air stream by more than one cylinder.

In an engine of six or more cylinders there is a definite overlap because the interval between successive firings is much closer. It is therefore desirable to have a manifold which will cause a diversion of the air stream as a whole and which will substantially at no time cause the air stream to split or divide between two or more arms of the manifold. A very small amount of overlap has been found to be unobjectionable and our experiments also have proved that the results are independent of the cross-sectional shape of the manifold and it is likewise of substantially no consequence what kind of surface (flat, round, etc.) the air stream strikes, just so long as the air stream is diverted as a whole. It is essential to good distribution, however, that the air stream be diverted into a manifold arm which has an internal area as large as or greater than the internal area of the conduit or pipe which delivers the air stream to the manifold. It is also preferable to have all corners and parts rounded to reduce turbulence and resistance.

It is therefore the object of the invention to construct an intake manifold which will give exceptionally good distribution, will avoid turbulence and will readily lend itself to production. The object of the invention is accomplished by making in a single casting a manifold which has a plurality of individual arms. On the drawing the invention is shown as having six arms each of which supplies one cylinder of a six-cylinder internal combustion engine. The manifold is separated into two sections by a wall or partition passing through its center. The wall divides the manifold into two sets of three arms each and each half of the manifold therefore supplies three cylinders of its six-cylinder engine. Rounded bends and corners are provided in each arm to give a low resistance to the air flow and a heater box or hot spot surrounds the meeting place of the arms at the partition. The meeting place of the arms defines a chamber having the partition or wall therein and around which the hot spot is located. A neck or riser extends from the chamber to the carburetor, the partition continuing into the neck so that a duplex or multiple-jet carburetor is necessitated with the manifold.

The manifold of the invention is illustrated as applied to a six cylinder engine but is equally applicable to an engine having a greater number of cylinders.

Figure 1 is a side elevational view of an internal combustion engine showing the manifold applied.

Figure 2 is a plan view of the manifold with parts shown in section better to illustrate the construction.

Figure 3 is a section on the line 3—3 of Figure 2.

Figure 4 is a section on the line 4—4 of Figure 2.

Figure 5 is a section on the line 5—5 of Figure 3.

Referring to the drawing, the numeral 2 indicates an internal combustion engine as a whole. The engine has the engine block 4 having the clutch housing 6 at its rear end and the timing gear cover 8 at its front end. The engine drives the usual belt 10 running on a pulley 12 to drive the fan 14. The head of the engine is indicated at 16 and a portion of the water circulating system at 18. The exhaust manifold is shown at 20 delivering into the exhaust pipe 22. The exhaust manifold 20 has four exhaust arms 23, the two end arms or the two middle arms being Siamesed. The novel intake manifold of the invention is shown at 24 and is connected at 26 to the carburetor 28 having the air cleaner 30 associated therewith. The carburetor is of the dual type necessitating two throttles, the shafts of which are indicated at 32. Suitable intermeshing segments 34 secured to the shafts are operated from a lever 36 which has a suitable connection (not shown) leading to any suitable point to operate the throttles. Except for the details of the intake manifold the parts so far described are conventional and per se form no part of the invention.

The intake manifold 24 is shown in detail in Figures 2 to 5 inclusive. The manifold comprises the individual arms 38, 40, 42, 44, 46 and 48

which meet at a common place to form a chamber 50 divided into two parts 52 and 54 by means of a partition or wall 56. The arms are rounded where they curve and the corners at 57 are rounded to reduce resistance and avoid tubulence. A neck 58 extends upwardly from the chamber, the partition 56 continuing up into the neck. The carburetor 28 is attached to the neck 58 as shown at 26 in Figure 1. The carburetor is of the dual type, one half delivering to each chamber 52 and 54. Flanges 59 on the ends of the arms serve to attach the manifold to the engine block.

By referring to Figure 2 it will be noted that the arms 44, 46 and 48 will receive their supply of fuel mixture from the part 52 of the chamber 50 while the arms 38, 40 and 42 will receive their carburetted fuel from the chamber part 54. The two chambers 52 and 54 are completely separated by the partition 56 so that there will be no intermingling of the gaseous fuel mixture from the two halves of the carburetor.

The chamber 58 is surrounded by a heater or hot spot indicated as a whole at 60. The heater comprises the front wall 62—which is removable and closes an opening in the heater end—the side walls 64 and 66, the top wall 68, and the bottom wall 70. The rear wall 72 is continued upward into the neck 74 and serves as an opening for the exit of the exhaust gases coming from the manifold 20. The exhaust gases enter at the opening 76 in the bottom and are delivered from an elbow 78 connected to the exhaust manifold 20. To the neck 74 there is attached the outlet pipe 76 (Figure 1) which is secured to a T 78 between the end of the exhaust manifold 20 and the exhaust tube 22. The rapid passage of exhaust gases into the tube 22 will draw exhaust gases from the tube 76 and cause a flow of hot gases through the heater. A suitable valve may be applied to any point such as at the T 78 so that the flow of the gases through the heater and the pipe 76 may be regulated. The numeral 80 in Figure 1 indicates a suitable connection for the mounting of a control valve.

While the manifold has been shown applied to a down draft type of carburetor, it is equally well adapted for an up draft carburetor. In the up draft type the necks 58 and 74 will be at the bottom of the manifold instead of the top. In case of the up draft manifold the gas will then enter the bottom at the neck 74 and leave either by a second neck or an opening such as 76 which will now be at the top. In other words, by inverting the manifold shown on the drawing it may be applied to an up draft carburetor.

We claim:

1. In a manifold for multi-cylinder internal combustion engines a partition dividing said manifold into substantially symmetrical halves, a wall at the bottom of the partition on both sides thereof, a plurality of individual arms on said manifold, one arm for each cylinder, the outer ends of all the arms being in a straight line, all of the arms lying in the same horizontal plane and having their axes diverging from the manifold in a fan shaped manner, each of said arms connected with one of said halves, said partition equally dividing said arms into two groups, the flow of gaseous fuel in each group being always in the same direction and over the said wall to decrease turbulence.

2. In a manifold for multi-cylinder internal combustion engines, a plurality of individual arms, one arm for each cylinder, said arms having a common meeting place forming a chamber, all of the arms lying in the same horizontal plane and having their axes diverging from the chamber in a fan shaped arrangement, a partition in said chamber dividing said arms into two equal groups, a wall in the chamber at the end of the partition on both sides thereof, each of said arms connected with said wall at one side of the partition, the flow of gaseous fuel in each group being always in the same direction and over said wall to decrease turbulence.

3. In a manifold for multi-cylinder internal combustion engines, a plurality of individual arms, one arm for each cylinder, said arms having a common meeting place forming a chamber, all of the arms lying in the same horizontal plane and having their axes diverging from the chamber in a fan shaped arrangement, a partition in said chamber dividing said arms into two equal groups, a wall in the chamber at the end of the partition on both sides thereof, each of said arms connected with said wall at one side of the partition, the flow of gaseous fuel in each group being always in the same direction and over said wall to decrease turbulence.

4. In a manifold for multi-cylinder internal combustion engines, a neck extending upwardly from said manifold and shaped at its end for the attachment of a carburetor, a chamber at the bottom of said neck, a wall dividing said neck and chamber into two portions, and arms extending from each chamber portion to the engine, the outer ends of all the arms being aligned, all of the arms lying in the same horizontal plane and having their axes diverging from the chamber in a fan shaped manner, all of said arms taking fuel from the respective chamber portion without affecting the withdrawal of fuel by the remaining arms of the said portion.

5. In a manifold for multi-cylinder internal combustion engines, a chamber, a partition in said chamber dividing it into two equal portions, a wall in the chamber at the end of the partition on both sides thereof, a plurality of individual arms equal to the number of cylinders to be fed, each arm extending separately from the chamber to the motor, all the arms lying in the same horizontal plane and having their axes slightly diverging in a fan shaped manner, half of the arms joining with one side of the chamber and the other half with the remaining side, means for introducing fuel to the center of both halves of the chamber, whereby the flow of fuel to any one cylinder will be from the center of a given side of the chamber through one individual arm to the motor, no part of the path being common to the path to any other cylinder.

6. In a manifold for multi-cylinder internal combustion engines, a central chamber having a partition which divides it into two equal portions, a plurality of individual arms all lying in the same horizontal plane and extending substantially radially from the chamber, half of the arms joining with one portion of the chamber and the remainder with the other portion, whereby the path of fluid travel from the center of the chamber portion will be practically a straight line to the end of the arms at motor juncture.

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