May 29, 1934. J. B. FISHER ET AL 1,960,775

MANIFOLD STRUCTURE

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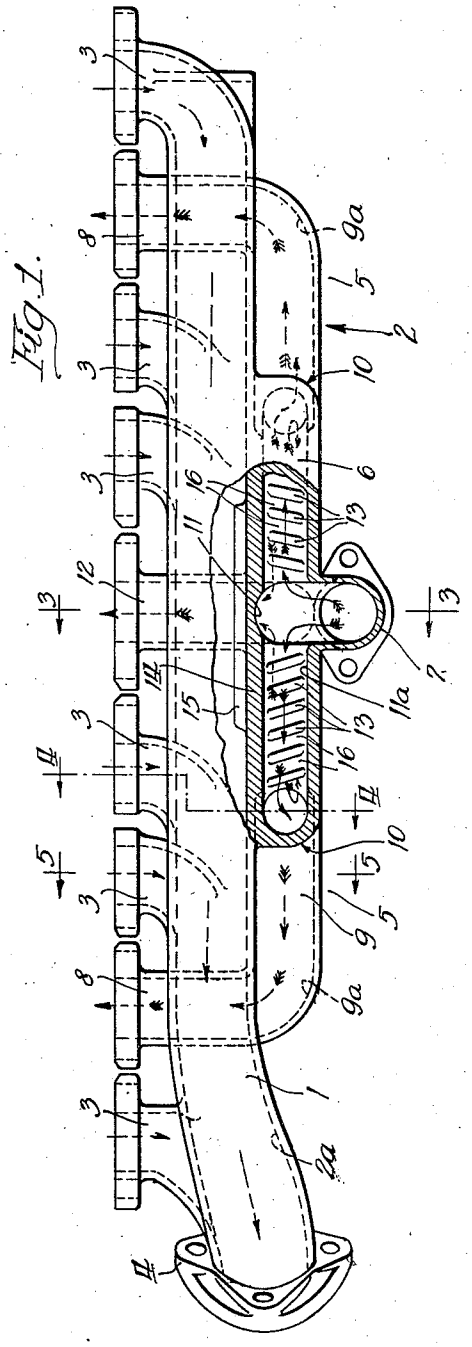


Fig. 1.

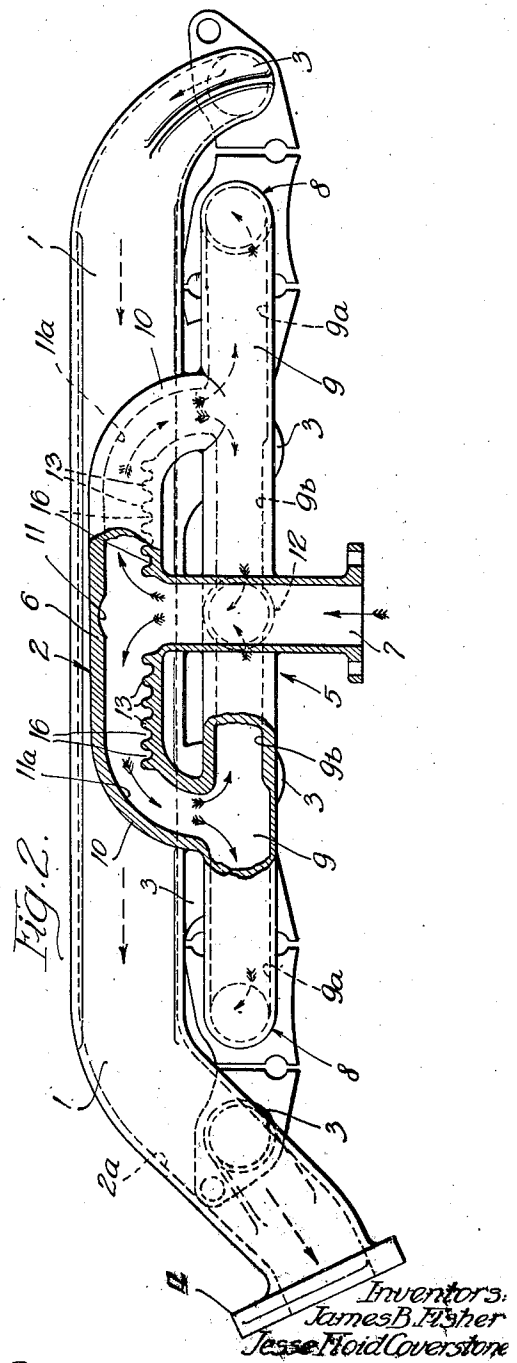


Fig. 2.

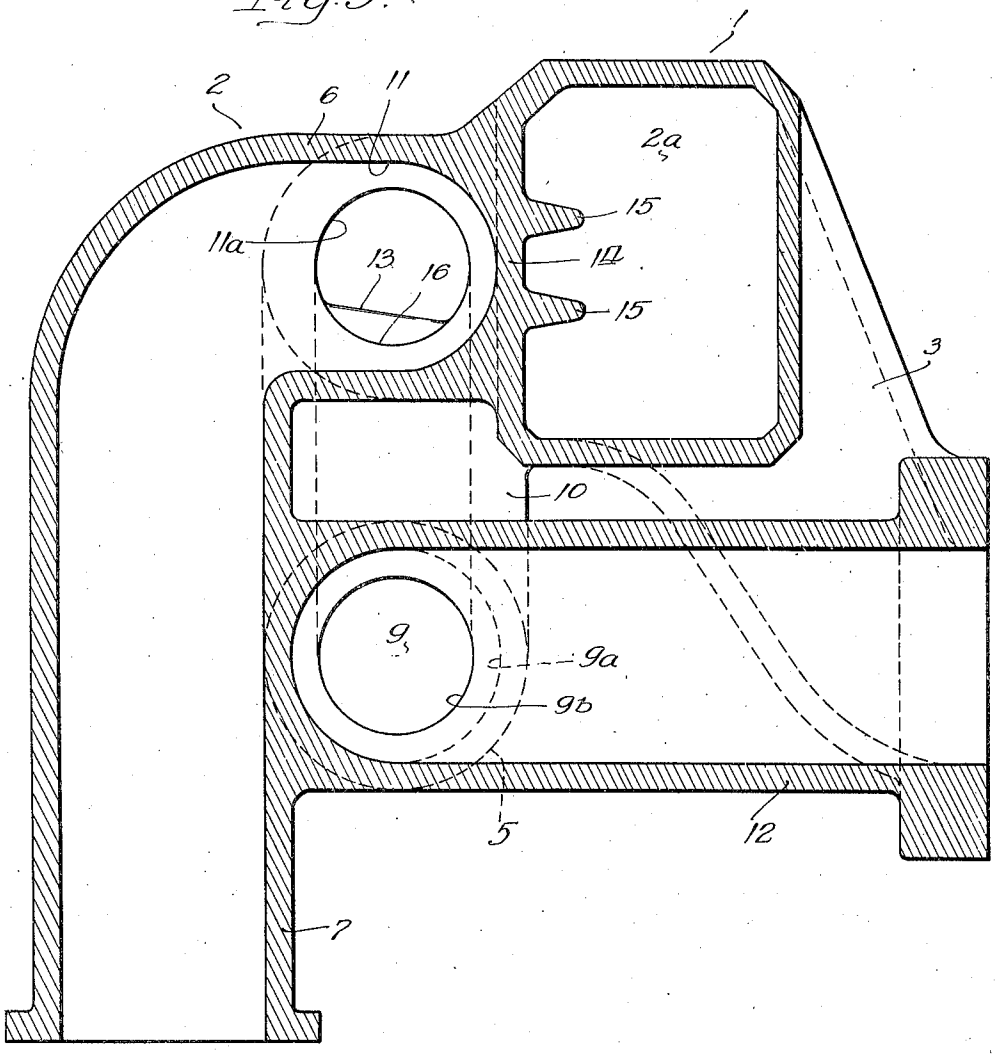
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Fig. 3.



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Fig. 5.

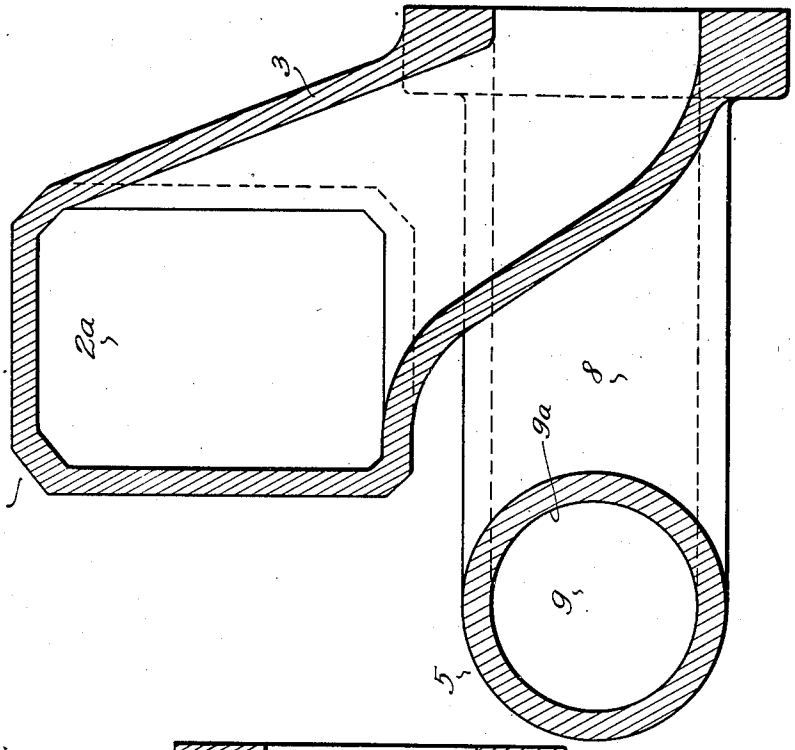
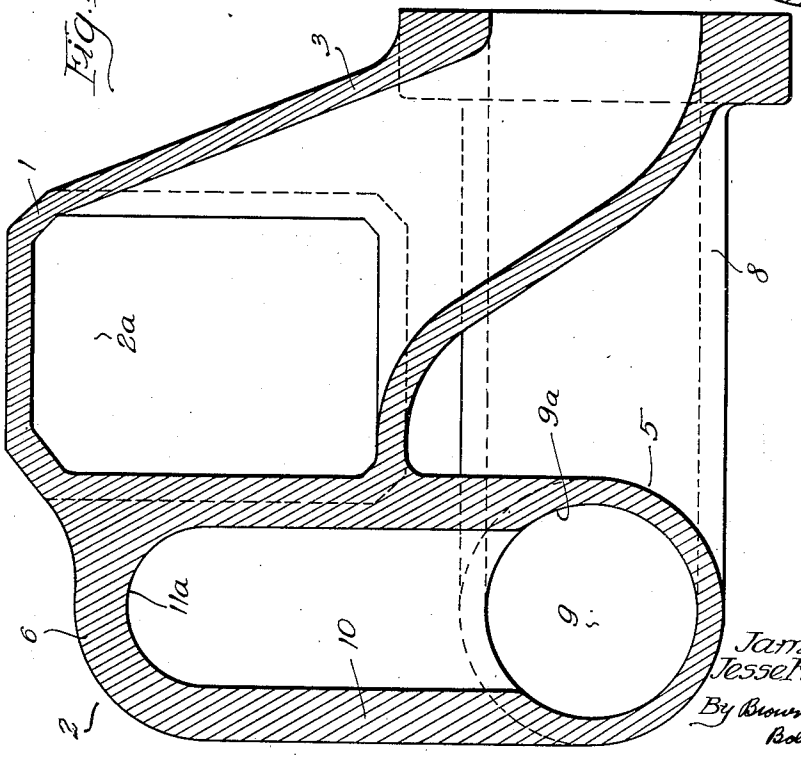


Fig. 4.



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UNITED STATES PATENT OFFICE

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MANIFOLD STRUCTURE

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Application March 20, 1930, Serial No. 437,328

7 Claims. (Cl. 123—122)

This invention relates to manifolds, and more particularly to a manifold structure comprising an exhaust manifold and an intake manifold related and constructed in a novel manner.

Our invention has to do with means for preventing undesirable accumulation of liquid fuel in the intake manifold, while assuring vaporizing of such liquid fuel as may accumulate in the intake manifold by heat derived from the exhaust manifold. A further object of our invention is to assure uniform delivery of the fuel mixture to the outlet ports of the intake manifold. Further objects and advantages of our invention will appear from the detailed description.

In the drawings:

Figure 1 is a plan view of a manifold structure in accordance with our invention, partly broken away and in section;

Figure 2 is an elevation of a manifold structure in accordance with our invention, viewed from the outer side, partly broken away and in section;

Figure 3 is a section taken substantially on line 3—3 of Figure 1;

Figure 4 is a section taken substantially on line 4—4 of Figure 1; and

Figure 5 is a section taken substantially on line 5—5 of Figure 1.

In the form of our invention illustrated, by way of example, the structure comprises an exhaust manifold 1 and an intake manifold 2 cast integrally with the exhaust manifold. The exhaust manifold defines an exhaust passage 2*a*, and is provided with arms 3 defining ports opening into the exhaust passage, these arms being provided with flanges for bolting to the engine block in a known manner. The exhaust manifold 1 is open at one end, at which end it is provided with a suitable flange 4 for securement to the end of an exhaust pipe or conduit.

The intake manifold 2 comprises a lower main body portion 5 and an upper portion 6 from which extends an inlet stack 7, this stack opening into portion 6 midway between the ends thereof. The stack 7 is adapted to be connected to a carburetor, or other suitable means, for supplying a suitable fuel mixture to the intake manifold in a known manner.

Main portion 5 of the intake manifold is provided, at each end thereof, with an arm 8 defining an outlet passage 9. The upper portion 6 is provided, at each end thereof, with an arm 10 integrally connected to the main portion 5 and opening into passage 9. Portion 6 is provided with a passage 11, extending from each side of the stack 7, and establishing communication between the main portion of the intake manifold and the supplemental upper portion 6 thereof.

As will be noted more clearly from Figures 1 and 2, main portion 5 is further provided with a central arm 12 opening into passage 9 centrally thereof and defining a central outlet. The arms 8 and 12 have suitable flanges at their outer ends for bolting to the engine block in a known manner.

Referring more particularly to Figures 1 and 2, the upper horizontal portion 6 of the intake manifold is provided with a plurality of ribs 13 extending across the lower portion of passage 11. There are a plurality of these ribs at each side of the stack 7, and, as will be noted more clearly from Figure 1, the ribs are inclined across passage 11 toward the inner side wall 14 of portion 6 and in the direction of flow of the fuel mixture through the intake manifold from the stack 7. The wall 14 is common to both upper portion 6 of the intake manifold and the exhaust manifold and is preferably provided, on its inner face, with ribs 15 projecting into and extending longitudinally of the exhaust manifold. These ribs serve to conduct the heat from the hot exhaust gases flowing thereover to the wall 14, and a portion of the exhaust gases flows over the inner face of wall 14 in direct contact therewith. In this manner the upper portion 6, particularly the inner wall 14 thereof, of the intake manifold is effectively heated from the hot exhaust gases flowing through the exhaust manifold.

Any liquid fuel entrained in the fuel mixture passing upwardly through the stack 7 will be deposited in the pockets 16 between the ribs 13 upon change in direction of flow of the fuel mixture as it passes out of the upper end of the stack. Also, any liquid fuel which condenses upon the walls defining passage 11 will travel downwardly along such walls into the pockets 16. The liquid fuel which enters the passage 11 is thus trapped in the pockets 16 between the ribs 13 and is retained in portion 6 of the intake manifold so as to be vaporized by the fuel mixture flowing through passage 11. This flow of the fuel mixture also acts to direct the liquid fuel in the pockets 16 toward the wall 14, which is the hottest portion of the intake manifold. The liquid fuel is thus effectively vaporized by heat derived from the exhaust manifold, and the vaporized fuel becomes intermixed with the fuel mixture flowing through the intake manifold and travels therewith to the engine cylinders. A further important advantage of the ribs 13 is that

they act to prevent the liquid fuel from passing downwardly into the main body portion 5 of the intake manifold and accumulating upon the lower wall thereof. An intake manifold constructed in the manner illustrated and described has the advantage of trapping and retaining the liquid fuel, in the manner above set forth, and may be used to advantage either with the exhaust manifold so as to be heated thereby, or separately from the exhaust manifold, though we preferably dispose the intake manifold in proximity to the exhaust manifold in the manner illustrated.

Referring more particularly to Figure 2, it will be noted that portions 11A of passage 11 of the supplemental portion 6 of the intake manifold are restricted relative to end portions 9A of passage 9 of the main body portion 5 and which extend from the arms 8 to arms 10. It will further be noted that portions 9B of passage 9 which extend between arms 10 and arm 12 are restricted relative to the outer portions 9A of passage 9. Preferably portions 11A of passage 11 and portions 9B of passage 9 each have a cross area equal to about 60 per cent of the cross area of portions 9A of passage 9. We find that this proportioning of the passages causes rapid flow of the fuel mixture through all of the passages and eliminates stagnant areas, thus improving distribution. With passages of uniform cross area the central port defined by arm 12 is apt to receive a too rich fuel mixture when the engine is operating at low speed. This difficulty is avoided by restricting portions of the passages in the manner illustrated and described.

The manifold structure illustrated and described is intended for use with a six cylinder internal combustion engine. In the drawings, the flow of the exhaust gases is indicated by the unfeathered arrows, the flow of the fuel mixture being indicated by the feathered arrows.

What we claim is:

1. In a manifold structure, an exhaust manifold, an intake manifold comprising a substantially horizontal portion having an inner wall in proximity to the exhaust manifold, and spaced ribs extending across the lower portion of said horizontal portion of the intake manifold, said ribs being inclined toward said inner wall and in the direction of flow of fuel mixture through said horizontal portion of the intake manifold.

2. In a manifold structure, an exhaust manifold, an intake manifold comprising a substantially horizontal portion formed integrally with the adjacent portion of the exhaust manifold, there being a common wall between the horizontal portion of the intake manifold and the exhaust manifold, and spaced ribs extending across the lower portion of said horizontal portion of the intake manifold, said ribs being inclined toward said wall and in the direction of flow of fuel mixture through said horizontal portion of said intake manifold.

3. In a manifold structure, an exhaust manifold, an intake manifold comprising a substantially horizontal portion and a stack opening into such portion intermediate the ends thereof, one side wall of said horizontal portion being in proximity to the exhaust manifold to be heated therefrom, and spaced ribs extending across the lower portion of the horizontal portion of the intake manifold and at opposite sides of the stack, said ribs being inclined toward the side wall and in the direction of flow of fuel mixture through said intake manifold.

4. In a manifold structure, an intake manifold provided with a substantially horizontal fuel mixture passage, and spaced ribs extending across the lower portion of said passage and inclined toward one side thereof and in the direction of flow of fuel mixture through the passage.

5. In a manifold structure, an intake manifold provided with a substantially horizontal fuel mixture passage having an outlet opening at each end, a stack opening into the passage from below and between the ends thereof, and spaced ribs extending across the lower portion of the passage and at opposite sides of the stack, said ribs being disposed between the stack and said outlet openings.

6. In a manifold structure, an intake manifold comprising a main portion provided with a passage and with a central outlet and end outlets opening into said passage, a supplemental portion having a passage opening at its ends into the passage of the main portion and between the central and the end outlets thereof, and a stack opening into the supplemental portion, said passages being provided with restrictions between the stack and the ends of said supplemental portion and between the ends of the supplemental portion and said central outlet of the main portion.

7. In a manifold structure, an exhaust manifold, an intake manifold comprising a substantially horizontal portion having a wall thereof in heat conducting relation to the exhaust manifold, and spaced ribs extending across said horizontal portion of the intake manifold and inclined toward said wall and in the direction of flow of fuel mixture through the horizontal portion of said intake manifold.

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