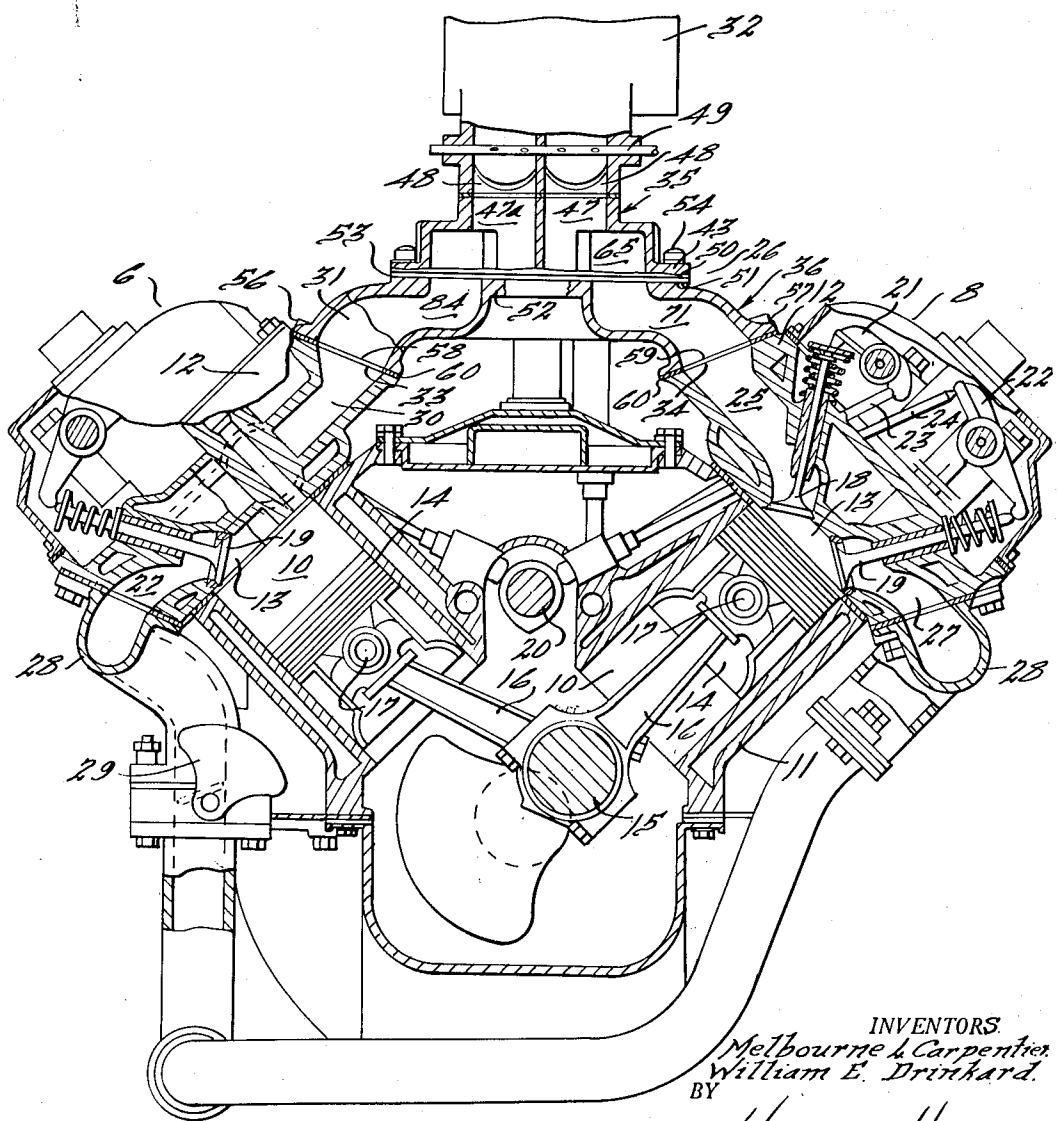
Nov. 1, 1955 W. E. DRINKARD ET AL 2,722,203

INTAKE MANIFOLD FOR V-ENGINES

Filed Aug. 22, 1952 4 Sheets-Sheet 1

Fig. 1.



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Fig. 3.

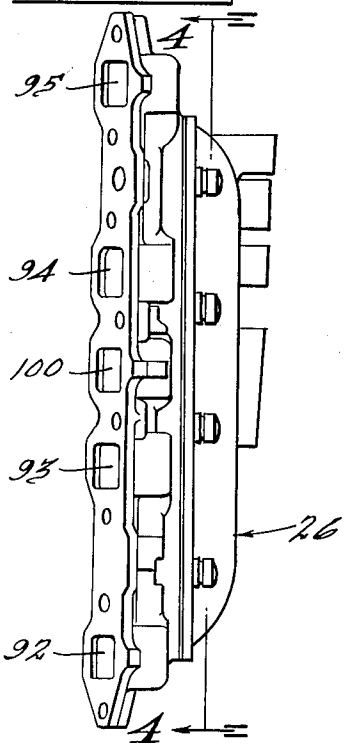
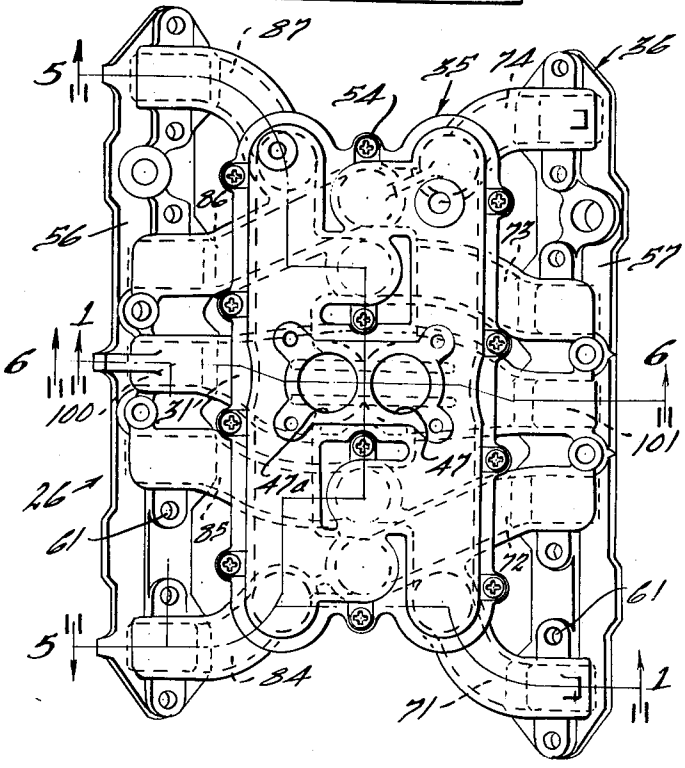


Fig. 2.



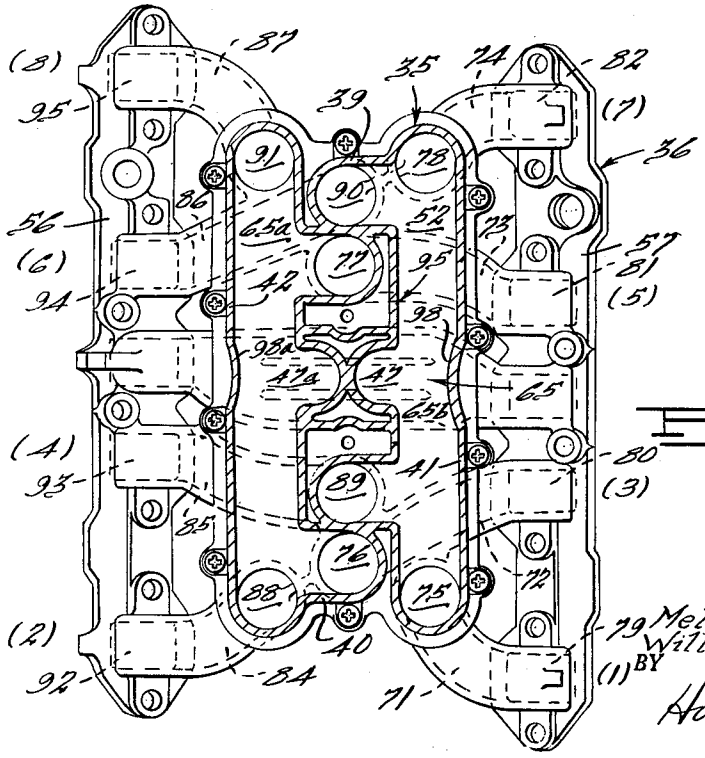


Fig. 4.

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INTAKE MANIFOLD FOR V-ENGINES

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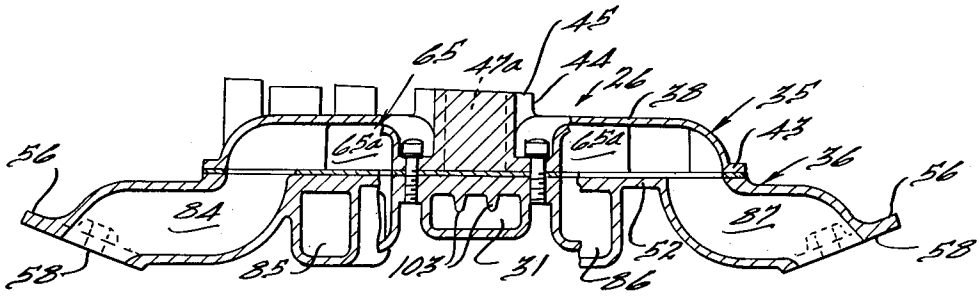


Fig. 5.

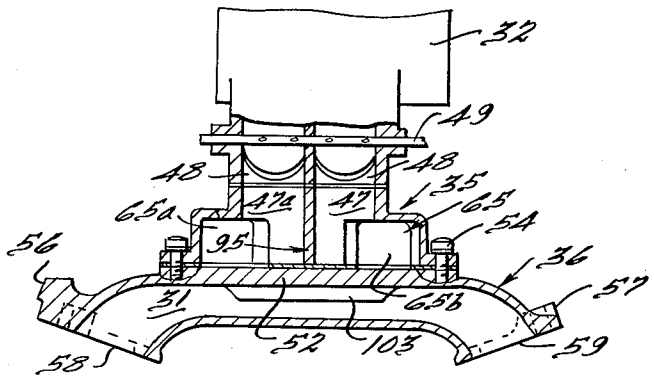


Fig. 6.

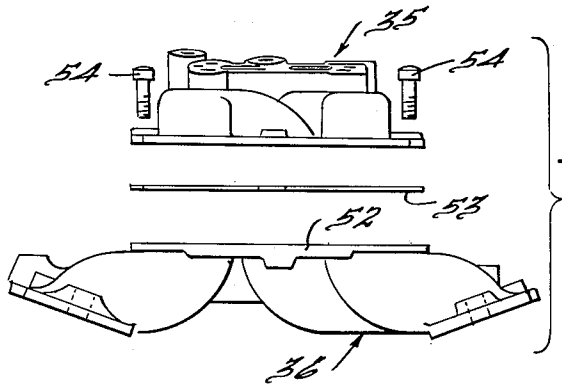


Fig. 7.

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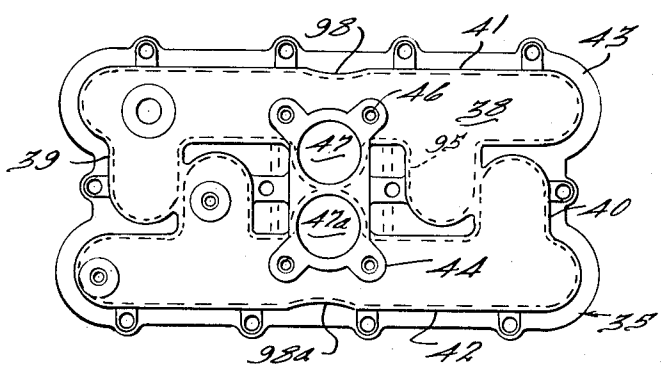


Fig. 8.

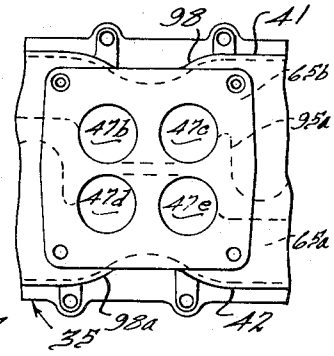


Fig. 11.

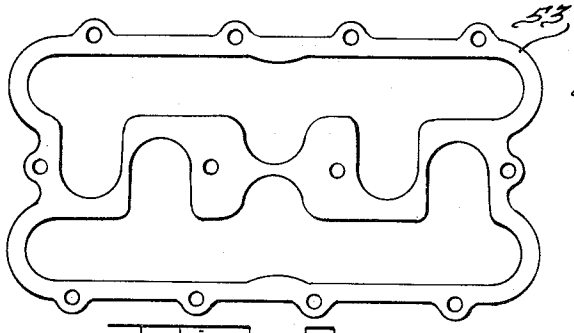


Fig. 9.

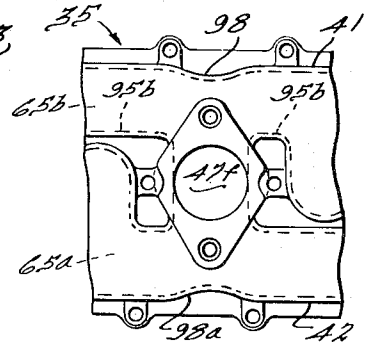


Fig. 12.

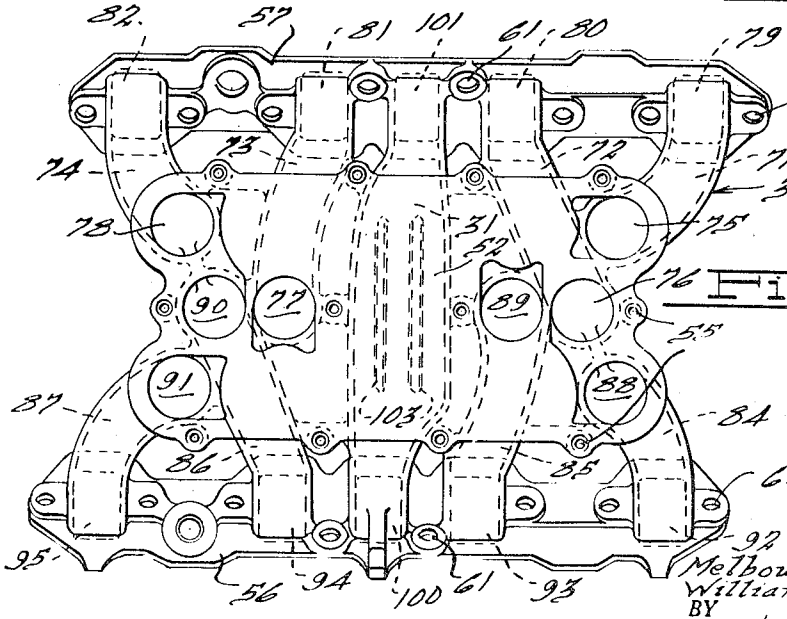


Fig. 10.

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United States Patent Office 2,722,203 Patented Nov. 1, 1955

2,722,203

INTAKE MANIFOLD FOR V-ENGINES

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Application August 22, 1952, Serial No. 305,818

13 Claims. (Cl. 123—52)

This invention relates to intake manifold structures for engines of the type having a pair of cylinder banks arranged at an angle to each other and especially for V–8 engines.

Our invention has particular application to improving the intake manifolding of a V–8 engine of current manufacture which is fed by a dual-barreled carburetor and wherein each barrel of the carburetor serves manifold structure arranged to feed two inner cylinders of one bank of the engine and two outer or end cylinders of the other bank of the engine.

Manifold structures for engines of the aforesaid type have been difficult and costly to make because they have necessitated the use of complex patterns requiring multi-layered cores which are difficult to support to produce them. Moreover, the problems faced in using such patterns in preparing the casting molds, are such that only a few foundaries have the expert personnel and equipment necessary to cope with the situation and could handle the castings of these manifolds.

The principal object of our invention is to overcome the foregoing problems and difficulties and provide a satisfactory intake manifold structure that may be made using simple patterns which do not require specialized handling, and that may be cast by any foundry.

In our copending application Serial No. 283,198, now Patent No. 2,686,506, granted August 17, 1954, we have shown a form of bipartite manifold for V–8 engines in which the fuel-air, i. e., gas conduits still follow a complex pattern involving intertwined portions but can be produced without core or casting difficulties and in which the assembled structure is capable of easy assembly and has the rigidity and efficiency of an integral manifold.

We have discovered that the problem may be still further simplified and a manifold of adequate efficiency and rigidity obtained by an entirely different approach and which even makes feasible the die casting of at least one section of the manifold.

Hence another object is to provide an intake manifold structure of bipartite character wherein at least one section requires no coring and may be made by sand or die casting, and the other section has a simple pattern structure facilitating easy casting.

In accordance with our invention, the manifold is made in two sections, an upper one and a lower one. The upper section is made to provide with the top of the lower section, an elongated distribution chamber in which the fuel-air mixture is received through suitable riser means from the carburetor means. The mixture is then directed downwardly through short risers in the top wall of the lower section to independent conduits which connect with the intake passageways of the engine. The risers are so located that the conduits do not have to entwine with each other in connecting with the intake passages of the engine, but generally speaking, are made to lie in a common plane immediately below the distribution chamber. Moreover, the arrangement

makes possible a satisfactory suction action on the carburetor means.

Our invention, moreover, lends itself to application where one or a multiplicity of carburetors are required, it being only necessary to interchange top sections.

A further object is, therefore, to provide a manifold construction which may be changed from a single carburetor or barrel installation to a multiple or barrel installation by merely using a different top section, the bottom section being common to all applications.

Further objects and advantages of our invention will be more apparent as this specification progresses, reference being had to the accompanying drawings in which:

Figure 1 is an end elevational view partly in section of an 8-cylinder V-type overhead valve engine embodying the multi-section manifold of our invention, the section through the manifold being taken approximately at **1—1** of Figure 2;

Figure 2 is a plan view of the assembled manifold of our invention;

Figure 3 is a side elevational view of the assembled manifold of Figure 2;

Figure 4 is a plan view of the assembled manifold of Figure 2 with the top section partly in section to show the conduit inlets, the section being taken at **4—4** of Figure 3;

Figure 5 is a sectional development taken in elevation at **5—5** of Figure 2 showing all the conduits serving one bank of cylinders;

Figure 6 is a sectional elevation of the assembled manifold of our invention taken at **6—6** of Figure 2 and showing the distribution chamber being fed by a dual carburetor seated over the manifold riser passages;

Figure 7 is an exploded end elevational view of the manifold of our invention;

Figure 8 is a top plan view of the upper section of the manifold of our invention;

Figure 9 is a plan view of a sealing gasket used between the sections of the manifold shown in Figure 7;

Figure 10 is a top plan view of the manifold of our invention with the top section removed to show the lower section alone and its riser passages and conduits;

Figure 11 is a plan view of part of the upper section of our manifold arranged for feeding by a four-barrel carburetor, the remainder being otherwise the same as Figure 8; and

Figure 12 is a plan view of part of a further modification of the upper section of Figure 8 for feeding by a single-barrel carburetor.

Referring now to the drawings wherein similar numerals are used to designate similar parts of the multi-sectioned manifold structure of our invention, we have illustrated our invention as applied to a V-8 engine of current manufacture, which comprises, as seen in Figure 1, angularly-arranged banks **6**, **8** of cylinders **10** provided in cylinder blocks **11**. Secured to each cylinder block is a cylinder head generally designated by the numeral **12** which is provided with hemispherical combustion chambesr **13** for each cylinder.

Each cylinder is provided with a reciprocatory piston **14** for actuation by a crankshaft **15** through a connecting rod **16** and wrist pin **17**.

The combustion cavities **13** of each bank are each provided with a single inlet valve **18** and a single exhaust valve **19** arranged transversely of the longitudinal axis of the engine at a substantially wide angle to each other, for instance 60°, and on a great arc of the spherical segment forming the combustion chamber.

The inlet and exhaust valves of both banks are operated from a single camshaft **20** located above the crankshaft **15**, by rocker arms **21** and **22** respectively, and push rods **23** and **24** respectively. All the inlet valves are in a com-

mon longitudinal plane and the same is true of the exhaust valves.

As seen in Figure 1, the cylinder heads **12** are provided with inlet or intake passages **25** leading to the valves **18** and which connect with gas-conducting passages hereinafter referred to, of the manifold of our invention, the latter being generally designated by the numeral **26**. The heads **12** are likewise provided with exhaust passages **27** leading from the valves **19** to the exhaust manifold **28** that conducts the exhaust gases from the engine.

In Figure 1, the left hand exhaust manifold structure is provided with a thermostatically controlled heat valve **29** which when closed while the engine is running, permits the exhaust gases of the cylinder bank **6** to be directed through a passage **30** across the so-called hot spot portion or passage **31** (Figures 5 and 6) of the intake manifold **26** in juxtaposition to the intake system so as to facilitate preheating of the gas or fuel-air mixture being conducted from the carburetor means **32** illustrated in Figures 1 and 6 as a dual-barrel downdraft carburetor, positioned on the intake manifold **26**, to the cylinders **10** by way of the inlet valves **18**.

The manifold **26** of our invention extends longitudinally of the engine intermediate the cylinder banks **6** and **8** and is seated on the cylinder heads **12** of the respective banks at **33, 34** respectively, as seen in Figure 1.

In securing the above-described features, the manifold **26** is concurrently made of bipartite character comprising, as seen in Figures 1 and 7 inclusive, an upper section (Figure 8) generally designated by the numeral **35** and a lower somewhat larger section (Figure 9) generally designated by the numeral **36**.

As will be evident from Figures 5, 6, and 8, the upper section is of simple design, requires no core work on the pattern, and may be either sand cast or die cast. It comprises a generally rectangular dish-like or cover-like member recessed on the under side and formed by wall structure that includes (see Figures 5 and 8) a top wall **38**, and an L-shaped peripheral wall intersecting the top wall **38**, that includes end portions **39, 40** side portions **41, 42** and a continuous mounting flange portion **43**.

Rising from the top wall **38** of the section **35** is a mounting pad **44** having a finished face **45** for receiving the carburetor means **32**. This pad is by preference located generally centrally, both longitudinally and transversely of the top section **35**, and has threaded holes **46** for receiving screws (not shown) which secure the carburetor means in place. The pad **44** includes vertical riser passages **47, 47a** which coincide with the carburetor barrels **48** of the dual-barreled carburetor shown from which the gas or fuel-air mixture may be delivered to the risers **47** under control of bladed throttle member **49** located in the barrels **48** and adapted to assume any condition from fully open to fully closed throttle, and which passages **47, 47a** open into the recessed portion of the section **35** for delivering fuel-air mixture thereto.

As evident from the drawings, the number of risers will vary with the number of carburetor barrels feeding the chamber, two being shown in Figure 8 for use by a dual carburetor or two single-barrel carburetors, one appearing in Figure 11 for use by a single-barrel carburetor, and four showing in Figure 12 for use with a single four-barrel carburetor having paired throttle blades.

The mounting flange **43** of the upper section has a generally horizontal finished or machined lower face **50**, and the lower section **36** has a complementary or matching finished or machined face **51** forming part of the upper or top wall **52** of this section. In securing the two sections together, these finished faces **50, 51** are brought into face-to-face relationship with an intervening sealing gasket **53** and are clamped by the screws **54** which enter the threaded holes **55** of the lower section **36** (Figure 10).

The lower section **36** has opposite longitudinally extending converging mounting flanges **56, 57** provided with the inclined finished or machined under faces **58, 59** which coincide with the mounting faces **33, 34** respectively, of the cylinder heads when seating the manifold. It will be observed from Figure 2 that the mounting flanges **56, 57** are somewhat longitudinally offset with respect to each other and symmetrically relative to the riser openings **47, 47a**.

The manifold is bolted in position with intervening sealing gaskets **60** by bolts (not shown) which pass through the mounting holes **61** of the section **36** into threaded holes (not shown) of the cylinder heads.

The top wall **52** of the lower section **36** provides with the recess-forming wall structure of the upper section **35**, an enclosed distribution chamber **65** for receiving the air-fuel mixture from the carburetor means **32** through the risers **47, 47a**.

From this chamber **65** the air-fuel mixture is conducted to the intake passages **25** of the cylinders **1, 3, 5, 7**, of the right bank of cylinders of Figure 1 (the cylinder numerals being designated in Figure 4 by the circled numbers) by conduits **71, 72, 73**, and **74** which have by preference circular inlet apertures or short risers **75, 76, 77** and **78** respectively, opening into the distribution chamber **65** through the top wall **52** of the upper section and rectangular outlet apertures **79, 80, 81, 82** in the mounting flange **57**.

Similarly, and in symmetrical manner, the intake passages **25** (not shown) of the cylinders **2, 4, 6, 8**, of the left cylinder bank in Figure 1, connect with the distribution chamber **65** by conduits **84, 85, 86**, and **87** which by preference have circular inlet apertures or short risers **88, 89, 90**, and **91** respectively, opening through the wall **52** into the chamber **65** and have rectangular outlet apertures **92, 93, 94, 95** respectively, in the flange mounting portion **56**.

The conduits **71, 72, 73, 74, 84, 85, 86**, and **87** are preferably of rectangular section and have suitable wall portions forming them which intersect with the top wall **52** and one or the other of the mounting flanges **56, 57**. Insofar as these conduits overlap the top wall **52**, the latter wall provides in part one wall of the conduits.

It will be observed that the conduits are independent of each in plan and do not intertwine with each other. Moreover, they may, generally speaking, be said to be in the same plane in elevation.

Moreover, it will be noted that by preference, the two intermediate conduits **72, 73** of one bank and **85, 86** of the other bank extend to the apertures **76, 77, 89**, and **90** aligned on the central longitudinal axis of the manifold, while the other conduits extend to apertures **75, 78, 88, 91** located in the respective corners of the top wall **52** and section **35**.

By dividing the distribution chamber **65** into two longitudinal compartments **65a, 65b** by means of an upstanding zigzag wall structure **95** extending longitudinally of the manifold and preferably forming part of the top section **35** wall structure, it is possible to avoid having succeeding cylinders in the firing order (for example 1, 8, 4, 3, 6, 5, 7, 2) from drawing from the same compartment or where multiple-barrel carburetors are employed, from the same barrel or pair of barrels.

In this connection, it will be seen from Figures 2 and 4 that the wall structure **95** extends toward the risers **47, 47a** from the end walls **39, 40** so as to divide the chamber **65** into a left compartment **65a** extending between the apertures **88** and **91** and having lateral wings extending to the apertures **76** and **77** and immediately below the riser **47a** and into a right compartment **65b** extending between the apertures **75** and **78** and having lateral wings to the apertures **89** and **90** which overlap those of the left compartment going to the apertures **76** and **77** respectively, and having a lateral wing extending to immediately below the riser **47**. It will be noted that portions of the wall structure **95** form semi-circular wall portions at the apertures and risers.

If two single carburetors are used instead of a single

dual-barrel carburetor, the structure is similar to that of Figures 2 and 4 but the spacing between the risers **47** and **47a** is greater. Where a four-barrel carburetor or four single carburetors are employed, the zigzag partition wall **95a** as seen in Figure 11, is continuous as in the case of the dual-barrel arrangement. Moreover, it is preferred to have two barrels respectively communicate with the risers **47b** and **47c** of the compartment **65a** and two respectively with the risers **47d** and **47e** of the compartment **65b** of the distribution chamber **65**.

When a single-barrel carburetor is employed, the zigzag wall structure **95b** will, as seen in Figure 12, stop at the opposite sides of the riser **47f** so as to permit the right and left compartments **65a** and **65b** to each connect with each other and with the single riser **47f**.

In order to maintain a substantially uniform section in the compartment passages adjacent the risers, the side walls **41** and **42** are preferably slightly bowed or concave at **98, 98a** adjacent the risers **47, 47a**.

Preheating of the air-fuel mixture in the distribution chamber is provided for by an exhaust gas crossover conduit or passage **31** which, as best seen in Figures 1, 2, 4, and 6 extends between the mounting portions **56, 57** of the lower section **36** immediately below the risers **47, 47a** and has a portion of its wall structure provided by the top wall **52** of the section **36**. This passage connects with the exhaust passages **30** of the cylinder heads **6** and **8** which in turn connect with the exhaust manifold structure.

The conduit **31** preferably has its greatest width in the portion of its length below the section **35** and then narrows or necks down at its opposite transverse ends and terminates in an aperture **100** in the flange **56**, and an aperture **101** in the flange **57**.

To provide greater heat distribution to the floor or top wall **52** of the chamber **65**, a plurality of spaced-apart generally parallel heating fins or ribs **103** are provided in the wide section of the conduit **30** immediately below the section **35** and extend longitudinally of the conduit **30**.

From the foregoing description of the manifold structure of our invention, it will be apparent that we have provided a compact manifold of a bipartite construction wherein at least one section is a simple sand casting or preferably a die casting, and the other is a sand casting of simple design having no complicated core structure and in which any core portions have ample support and may be easily handled by any foundry. Moreover, by interchanging top sections, the manifold may easily be changed from a single carburetor or barrel installation to a multiple carburetor or barrel one. On actual test, these manifolds have provided good power and torque outputs.

Although the invention has been particularly illustrated as applied to a V–8 engine, it will be understood that the principles and features embodied in our invention may be applied by those skilled in the art, to other engines not of V design, for example, one having opposed cylinders, and to engines having a greater or lesser number of cylinders, all without departing from the letter or spirit of our invention.

We claim:

1. An intake manifold for an engine having opposite cylinder banks, the cylinder heads of which engine are provided with air-fuel intake passages, said manifold comprising opposite side portions for mounting the manifold on the engine, and a central portion integrally connecting said side portions, said central portion having wall structure including a floor wall providing an air-fuel distribution chamber, and having further wall structure providing a plurality of air-fuel conduits for conducting air-fuel mixture from said chamber to said intake passages, said first mentioned wall structure having aperture means through which to introduce said mixture into said chamber and each of said conduits having a terminal opening in said floor wall and having a terminal opening coincident with an intake passage in a side mounting portion.

2. An intake manifold for an engine having opposite cylinder banks, the cylinder heads of which engine are provided with air-fuel intake passages, said manifold comprising a lower section and an upper separable section, said lower section including a top wall portion for seating said upper section and having opposite side portions for mounting the manifold on the engine, said upper section including wall structure providing with said top wall of said lower section an air-fuel distribution chamber, and having aperture means through which to introduce air-fuel mixture into said chamber, and said lower section including a plurality of conduit means for connecting said chamber with said intake passages, said conduit means having terminal openings in a mounting portion and in said top wall portion.

3. An intake manifold for an engine having opposite cylinder banks, the cylinder heads of which engine are provided with air-fuel intake passages, said manifold comprising a lower section and an upper separable section, said lower section including a top wall portion extending generally horizontally intermediate the cylinder banks for seating said upper section, and including side portions on opposite sides of said top wall portion for mounting the manifold on the engine, said upper section including wall structure providing with said top wall of said lower section an air fuel distribution chamber, and including riser means for introducing air-fuel mixture into said chamber; there being a vertical zigzag wall portion in said chamber extending longitudinally from opposite ends thereof dividing said chamber into two compartments having lateral wings; said lower section having a plurality of apertures in said top wall thereof, one each located substantially at the ends of each of said compartments and at the outer ends of some of said wings, and said lower section including wall structure providing individual air-fuel conduits extending from each said apertures for connecting with said intake passages, each conduit having a terminal opening in a mounting portion.

4. An intake manifold for an engine having opposite cylinder banks, the cylinder heads of which engine are provided with air-fuel intake passages, said manifold comprising a lower section and an upper separable section, said lower section including a top wall portion extending generally horizontally intermediate the cylinder banks for seating said upper section, and including side portions on opposite sides of said top wall portion for mounting the manifold on the engine, said upper section including wall structure providing with said top wall of said lower section an air-fuel distribution chamber, and including riser means generally centrally of said wall structure of said upper section for introducing air-fuel mixture into said chamber and said wall structure of said upper section including zigzag vertical wall portions extending from said riser to the opposite ends of said chamber and dividing said chamber into a pair of longitudinally extending compartments having overlapping wings, there being a plurality of apertures in said top wall of said lower section, one being located substantially at each end of said compartments and at the outer end of each overlapping wing and said lower section having air-fuel conduits extending from said apertures to said mounting portions and having terminal openings in the latter for connecting with said intake passages.

5. An intake manifold for an engine having opposite cylinder banks, the cylinder heads of which engine are provided with air-fuel intake passages, said manifold comprising a lower section and an upper separable section, said lower section including a top wall portion extending generally horizontally intermediate the cylinder banks for seating said upper section, and including side portions on opposite sides of said wall portion for mounting the manifold on the engine, said upper section including wall structure providing with said top wall of

said lower section an air-fuel distribution chamber, and including riser means generally centrally of said wall structure of said upper section for introducing air-fuel mixture into said chamber, and said wall structure of said upper section including a zigzag vertical wall extending oppositely from each side of said riser means to the ends of said chamber so as to divide said chamber into a pair of longitudinally extending compartments, each having an elongated passageway and a pair of side wings, the wings of the passageways overlapping each other; there being a plurality of apertures in said top wall of said lower section, one being located substantially adjacent each end of said elongated passageways and at the outer end of each overlapping wing, and said lower section having non-overlapping air-fuel conduits extending laterally of the manifold from said apertures to said mounting portions and having terminal openings in the latter for connecting with said intake passages.

6. An intake manifold for an engine having two V-arranged banks of four cylinders each and the cylinder heads of which are provided with air-fuel intake passages, said manifold comprising a lower section and an upper separable section seated on said lower section, said lower section including a top wall portion extending generally horizontally intermediate the cylinder banks for seating said upper section, and including side portions on opposite sides of said wall portion for mounting the manifold on the engine, said upper section including wall structure providing with said top wall of said lower section an air-fuel distribution chamber, and including riser means generally centrally of said wall structure for introducing air-fuel mixture into said chamber, and said wall structure including a zigzag vertical wall extending divergently from each side of said riser means to the ends of said chamber dividing said chamber into a pair of longitudinally extending compartments, each having an elongated passageway and a pair of side wings, the wings of the passageways overlapping each other; there being a plurality of apertures in said top wall of said lower section, one being located substantially adjacent each end of said elongated passageways and at the outer end of each overlapping wing, and said lower section having non-overlapping air-fuel conduits extending laterally of the manifold from said apertures to said mounting portions and having terminal openings in the latter for connecting with said intake passages, and each compartment having the conduits from its passageway apertures extending to one cylinder bank and having the conduits from its wing apertures extending to the other cylinder bank.

7. An intake manifold for an engine having two V-arranged banks of four cylinders each and the cylinder heads of which are provided with air-fuel intake passages, said manifold comprising a lower section and an upper separable section seated on said lower section, said lower section including a top wall portion extending generally horizontally intermediate the cylinder banks for seating said upper section, and including side portions on opposite sides of said wall portion for mounting the manifold on the engine, said upper section including wall structure providing with said top wall of said lower section an air-fuel distribution chamber, and including riser means generally centrally of said wall structure for introducing air-fuel mixture into said chamber, and said wall structure including a zigzag vertical wall extending divergently from each side of said riser means to the ends of said chamber so as to divide said chamber into a pair of longitudinally extending compartments, each having an elongated passageway and a pair of side wings, the wings of the passageways overlapping each other; there being a plurality of apertures in said top wall of said lower section one being located substantially adjacent each end of said elongated passageways and at the outer end of each overlapping wing, and said lower section having non-overlapping air-fuel conduits extending laterally of the manifold from said apertures to said mounting portions and having terminal openings in the latter for connecting with said intake passages, and each compartment having the conduits from its passageway apertures extending to one cylinder bank and having the conduits from its wing apertures extending to the other cylinder bank and all the conduits being in a lower plane than said compartments.

8. An intake manifold as claimed in claim 2 wherein said conduit means are in substantially the same plane.

9. An intake manifold as claimed in claim 7 wherein the said compartments do not open into each other.

10. An intake manifold as claimed in claim 7 wherein the said compartments open into each other at said riser means.

11. An intake manifold as claimed in claim 7 wherein the said riser means comprises a pair of risers, one connecting with each compartment and wherein said compartments do not open into each other.

12. An intake manifold as claimed in claim 7 wherein the said riser means comprises a single riser opening into each compartment.

13. An intake manifold as claimed in claim 7 wherein the said riser means comprises four single risers two serving each compartment.

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