Feb. 14, 1956 C. A. CHAYNE 2,734,497

CYLINDER BLOCK

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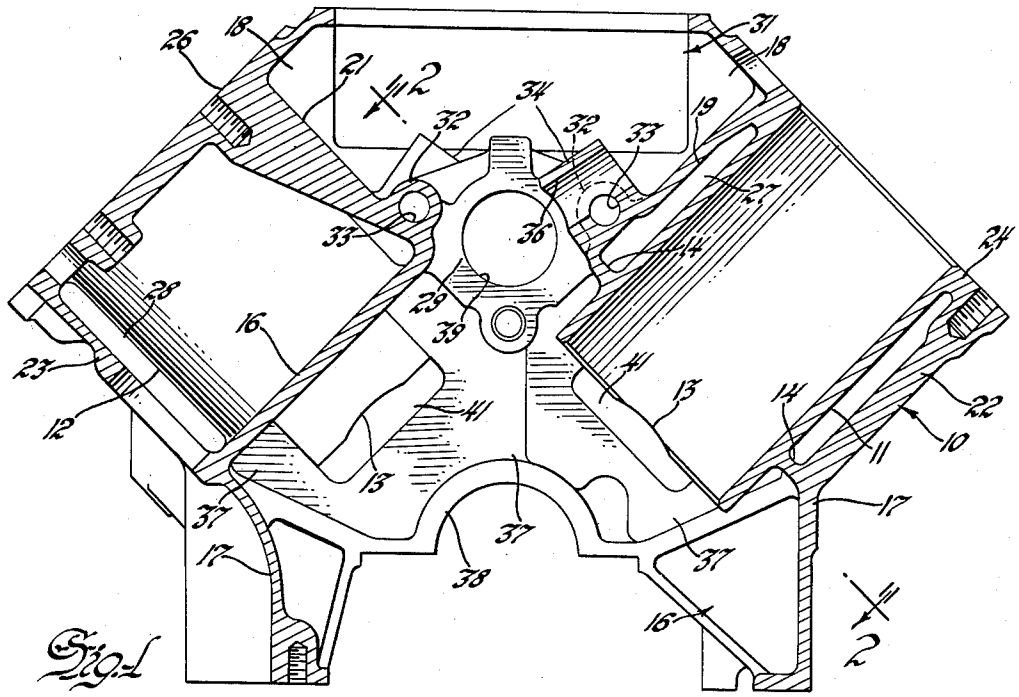


Fig. 1

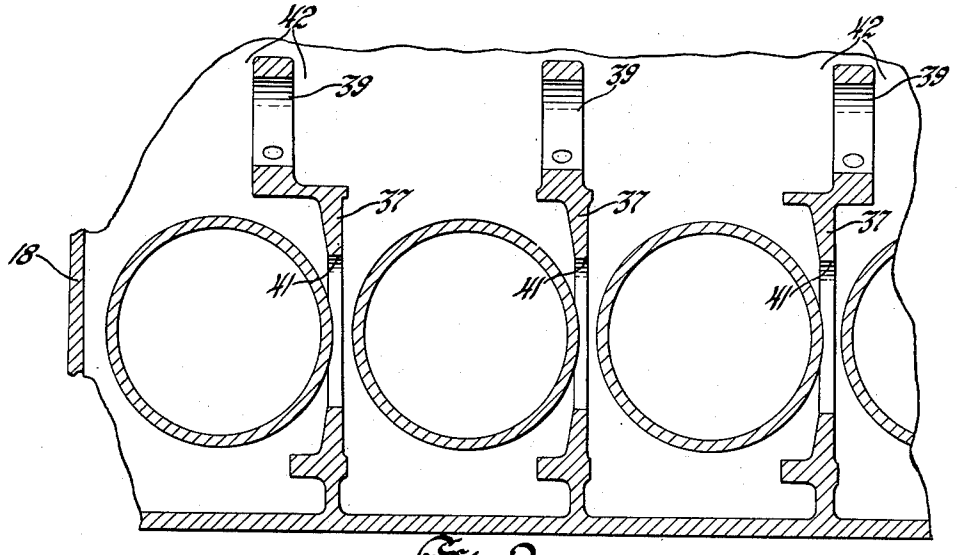


Fig. 2

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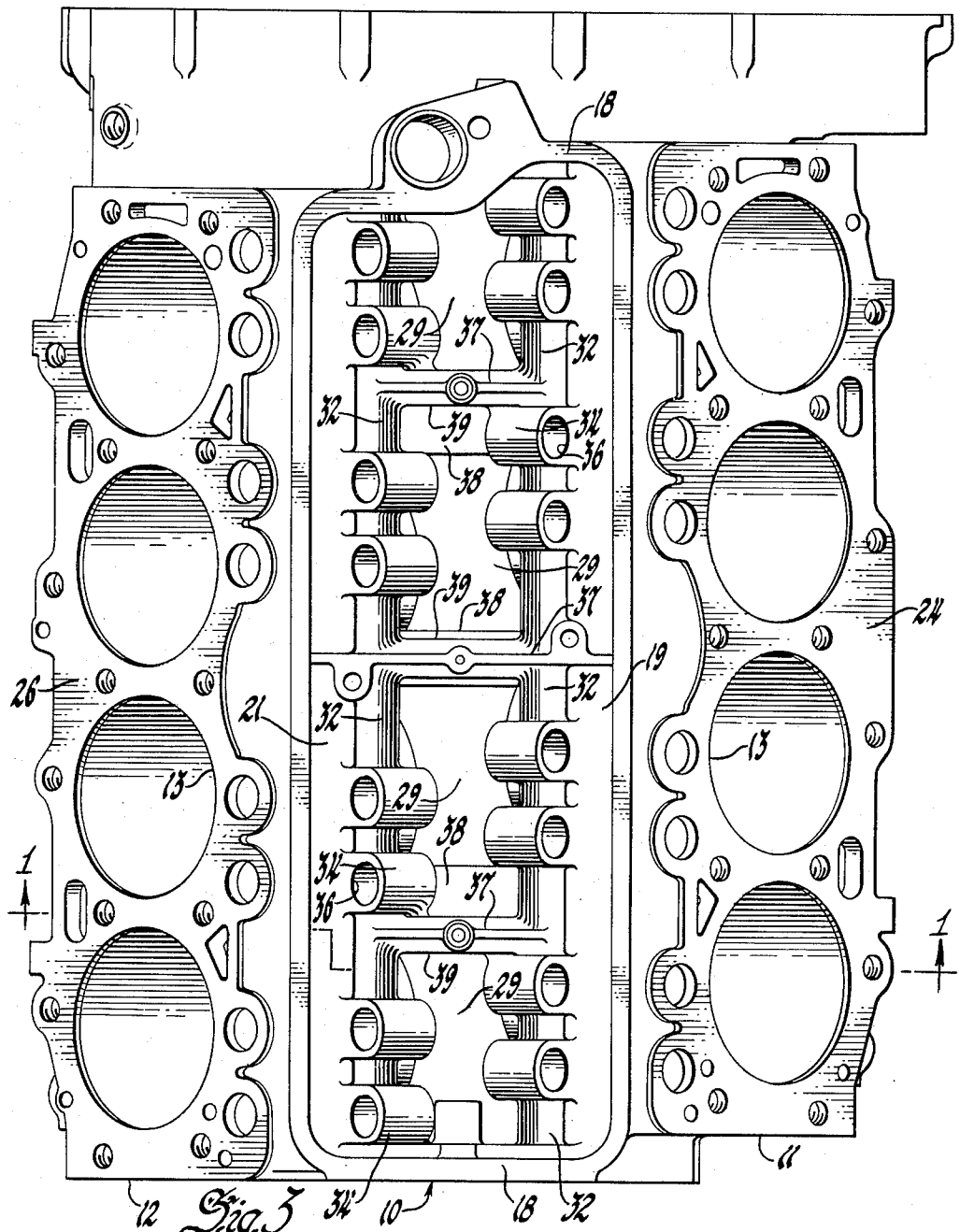


Fig. 3

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CYLINDER BLOCK

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11 Claims. (Cl. 123—195)

This invention relates to engines and has particular relation to improvements in engine block construction especially applicable for use in V-type engines for automotive and other uses.

It has been customary heretofore in the construction of V-type engines to cast one piece blocks having water jacketed cylinders arranged in rows of cylinders disposed obliquely with respect to an intermediate plane through the axis of rotation of the engine. In forming such rows of cylinders it has been customary to extend the water jacket means employed to the lower ends of the cylinders so that the adjacent sidewalls of the jackets of each bank of cylinders can be formed integrally across the space between the banks, thus providing both longitudinal and transversely disposed support means between the opposed banks of cylinders and the oppositely disposed end walls of the block.

This practice is objectionable because it tends to unnecessarily increase the weight of the block, provides more water jacket space within the block for cooling the cylinders than is necessary, makes a block which is difficult to cast, and tends to cause distortion of the lower ends of the cylinders due to the inequality in the conduction of heat from different parts of the lower ends.

It is now proposed to avoid these objections by terminating the water jacket means considerably above the inner ends of the cylinders, by eliminating the parts of the adjacent sidewalls of the banks of cylinders which heretofore have projected across between the cylinder banks, by providing reenforcing means on the lower edges of the sidewalls, and by extending transversely disposed walls across the crankcase and between the inner ends of the cylinders and between the reenforcing means on the lower edges of the sidewalls. These walls are provided with openings in which the spaced lower ends of the cylinders may project and which provide ample clearance for air circulation around the lower ends of the cylinders.

In a block constructed in this manner the coring problem involved in casting cylinder blocks is greatly simplified and the lower ends of the cylinders are not subject to distortion resulting from unequal heat transfer from different parts thereof and from stresses resulting from the connection thereof to the transverse walls employed in the crankcase. With such construction it is also possible to freely circulate air and crankcase vapors between the different compartments of the crankcase, around the lower ends of the cylinders and between the crankcase and the camshafted gallery between adjacent banks of cylinders.

In the drawings:

Figure 1 is a transverse sectional view through an engine block embracing the principles of the invention. Figure 1 is taken substantially in the plane of line 1—1 on Figure 3.

Figure 2 is a fragmentary longitudinally sectional view through one bank of the cylinders of the block and taken substantially in the plane of line 2—2 on Figure 1 looking in the direction of the arrows thereon.

Figure 3 is a plan view of the engine block illustrated by Figures 1 and 2.

The block 10 illustrated by the drawing comprises banks of cylinders 11 and 12 which are arranged in rows with the axes thereof in planes obliquely disposed with respect to an intermediate plane extending through the axis of rotation of the crankshaft of the engine with which the block 10 may be employed. The cylinders 13 in each of the banks of cylinders 11 and 12 project at the inner extremities thereof through obliquely disposed walls 14 which define the upper part of a crankcase 16. The crankcase 16 is formed in the block 10 between parallel sidewalls 17 and end walls 18 which extend across the block at the opposite ends of the banks of cylinders 11 and 12. It will be noted that the ends of the cylinders 13 project beyond the walls 14 and a considerable distance into the crankcase 16. Above the walls 14 the cylinder banks 11 and 12 are formed to provide inner sidewalls 19 and 21 and outer sidewalls 22 and 23 which merge at the upper ends thereof in obliquely disposed outer walls 24 and 26 which are parallel to the walls 14 and into which the outer ends of the cylinders 13 may also be integrally cast. The walls 14, 19, 21, 22, 23, 24, 26 and 18 provide jackets surrounding the outer parts of the cylinders 13 to provide jacketed spaces 27 and 28 within the cylinder banks 11 and 12 for the circulation of water or other cooling fluid which may be employed in cooling the cylinders 13.

The walls 14 terminate in spaced relation to one another to provide an elongated passage 29 which provides communication between the upper part of the crankcase 16 and a camshaft gallery 31 which is formed in the space between the cylinder bank sidewalls 19 and 21 and the block end walls 18. Formed integrally with the lower extremities of the sidewalls 19 and 21 and extending between the block end walls 18 are block reenforcing columns indicated at 32. The columns 32 may be formed internally to provide elongated passages indicated at 33 which may be used for lubricating oil passages or for other suitable purposes. The passages 33 cause the columns 32 to be of light tubular formation which provides strong and centrally disposed structural members extending longitudinally of the block 10. Bosses 34 may be formed outwardly from the columns 32 and provided with transversely disposed openings indicated at 36 for supporting valve lifters which may be employed in operating the engine with which the block 10 is used. The block 10 also is formed to provide transversely disposed walls 37 which divide the crankcase into crankcase compartments 42. The walls 37 extend across the crankcase 16, the lower part of the camshaft gallery 31, between the columns 32 and between and in parallel relation to the crankcase end walls 18. The walls 37 also are disposed approximately between the cylinders 13 in each row of cylinders in the banks 11 and 12. The lower parts of the walls 37 may be formed to provide bearing supports indicated at 38 while the upper parts thereof are formed to provide aligned camshaft bearing supports indicated at 39. The walls 37 are cut out between the lower extremities of the cylinders 13 to provide openings or windows indicated at 41. It will be noted that the parts of the walls 37 forming the edges of the openings 41 are spaced a considerable distance from the lower ends of the cylinders to provide ample spaces between the cylinders 13 and the walls 37. The openings 41 also extend a considerable distance beyond the lower extremities of the cylinders 13 so that the lower ends of the cylinders likewise will have ample clearance for manufacturing purposes. The upper extremities of the openings 41 terminate in the upper crankcase walls indicated at 14.

The columns 32 and the walls 37 provide a relatively rigid longitudinally and transversely disposed beam struc-

ture which extends through the block **10** and between the cylinder banks **11** and **12**. However, it will be noted that this centrally disposed beam structure does not close nor substantially obstruct the passage **29** between the adjacent ends of the cylinder banks **11** and **12**, thereby leaving the passage **29** open for the circulation crankcase vapors and for manufacturing purposes. The walls **37** divide the crankcase **16** into the transversely disposed compartments **42** which extend from front to rear of the block and each of which has an oppositely disposed pair of the cylinders **13** projecting therein. It will be noted that the openings **41** provide communication between the compartments and around the lower extremities of the cylinders **13** thereby facilitating the flow of fluid between the compartments and the equalization of fluid pressure through all parts of the crankcase.

I claim:

1. An engine block comprising a pair of banks of cylinders disposed obliquely with respect to an intermediate plane, said banks of cylinders being formed to provide cooling fluid jackets around the outer parts of said cylinders and terminating in spaced relation to the inner ends of said cylinders, transversely disposed reenforcing walls extending across said block between the end walls thereof and between the ends of said cylinders extending inwardly from said jackets, aligned bearing supports formed in the edges of said transversely disposed walls opposite said cylinders for rigidly supporting the engine crankshaft with respect to said jackets, and openings formed in said transversely disposed walls and between said cylinders and terminating immediately adjacent the lower ends of said cylinders and in spaced relation to said bearing supports for receiving said inner ends of said cylinders.

2. An engine block comprising a row of cylinders having cooling fluid jacket means formed about the outer ends thereof and having said jacket means terminating in spaced relation to the inner ends of said cylinders, a plurality of reenforcing and supporting walls extending transversely across said block and between said inner ends of said cylinders, aligned bearing supports formed in the edges of said walls opposite said cylinders for rigidly supporting the engine crankshaft with respect to said jacket means, and a plurality of openings formed in said walls and between said cylinders and terminating immediately adjacent the lower ends of said cylinders and in spaced relation to said bearing supports, each of said openings being formed between the inner and adjacent ends of two of said cylinders and externally of said jacket means and in position to render the spaced inner ends of said cylinders readily accessible.

3. An engine block comprising a pair of banks of aligned cylinders having the axes thereof in planes intersecting and obliquely disposed with respect to the intermediate plane of said block, the inner ends of said cylinder banks being spaced from one another to provide an elongated passage between said banks and on opposite sides of said intermediate plane of said block, a crankcase formed in the lower part of said block and having obliquely disposed upper walls extending from the opposite sides of said passage and across said cylinder banks and between the opposite ends of said cylinders and terminating in the edges of the side walls of said crankcase, a plurality of reenforcing and supporting walls extending transversely across said block and between said side walls and with one of said transverse walls being disposed substantially between adjacent pairs of opposed cylinders in said banks, and openings formed in said transverse walls and in opposed relation to the inner ends of said cylinders and extending to said upper crankcase walls and providing communication between the sections of said crankcase formed by said transverse walls.

4. An engine block comprising a pair of cylinders having the inner ends thereof projecting into a crankcase formed in said block and with the inner ends of said

cylinders being disposed in spaced relation to one another, a reeinforcing and supporting wall extending across said crankcase and dividing said crankcase into crankcase compartments each communicating with one of said cylinders, aligned bearing supports formed in the edge of said wall opposite said cylinders, and an opening formed in said wall and between said ends of said cylinders and terminating immediately adjacent the lower ends of said cylinders and in spaced relation to said bearing supports and providing substantial clearance between the edges of said wall surrounding said opening and said ends of said cylinders projecting into said compartments of said crankcase.

5. An engine block comprising banks of cylinders arranged in rows and with the axes thereof in planes disposed obliquely with respect to an intermediate plane through said block, the inner and adjacent ends of said banks of cylinders being spaced from one another to provide an elongated passage extending from the space between said banks to a crankcase formed in said block at the inner extremities of said cylinders, spaced and transversely disposed column means formed adjacent the inner extremities of said banks of cylinders and forming the opposite sidewalls of said passage for longitudinally reenforcing said banks of cylinders, crankcase sidewalls extending lengthwise of said block adjacent the outer and lower extremities of said cylinders, transversely disposed reenforcing walls extending across the upper part of said crankcase and between the inner ends of said cylinders and between said columns and between said sidewalls for transversely reenforcing said block, and openings formed in said transversely disposed walls between said inner ends of said cylinders and providing clearance space between the inner ends of said cylinders and the edges of said walls surrounding said openings.

6. An engine block comprising a crankcase formed to provide a plurality of spaced and aligned cylinders with the inner ends thereof projecting into said crankcase, walls extending transversely across said crankcase and across the spaces between said cylinders and having surfaces in planes intersecting the adjacent sides of certain of said cylinders and dividing said crankcase into crankcase compartments, aligned bearing supports formed in the edge of said wall opposite said cylinders, and openings formed in said walls and receiving said inner ends of said cylinders and having the edges thereof disposed in spaced relation to said cylinders and to said bearing supports.

7. An engine block comprising banks of cylinders arranged in rows and with the axes thereof in planes disposed obliquely with respect to an intermediate plane through said block, said block between the adjacent ends of said banks of cylinders being formed to provide a passage between said banks and extending from front to rear of said block, column means formed between the ends of said block and along the inner and adjacent edges of said banks of cylinders and on opposite sides of said passage, and spaced and transversely disposed walls extending across said block and said passage and between said banks of cylinders and between said columns.

8. An engine block comprising banks of cylinders arranged in rows and with the axes thereof in planes disposed obliquely with respect to an intermediate plane through said block, said banks of cylinders being spaced at the inner adjacent ends thereof to provide an elongated passage extending between the ends of said block, tubular column means disposed between the opposite ends of said block and on the opposite sides of said passage and formed along the inner and adjacent extremities of said cylinder banks, and spaced and transversely disposed reenforcing walls extending across said passage and between said cylinder banks and formed between said tubular column means and said cylinder banks.

9. An engine block comprising banks of spaced cylinders arranged in rows and with the axes thereof in planes disposed obliquely with respect to an intermediate plane

through said block, a crankcase and a camshaft gallery formed in said block and between and below said banks of cylinders, said block being formed to provide obliquely disposed and spaced upper walls extending transversely across said banks of cylinders intermediate the ends thereof and forming the upper walls of said crankcase, an elongated passage formed between said cylinder banks and extending between said crankcase and said camshaft gallery, elongated columns extending between the ends of said block and along the inner edges of said obliquely disposed walls and on opposite sides of said passage, and transversely disposed walls extending across said crankcase and said camshaft gallery and between said columns and in spaced relation to one another along the length of said columns for transversely bracing said columns and said cylinder banks along the length of said block.

10. An engine block comprising banks of individually spaced cylinders arranged in rows with the axes thereof in planes disposed obliquely with respect to an intermediate plane through said block, a crankcase and a camshaft gallery formed in said block beyond and between said rows of cylinders, said crankcase and said camshaft gallery being formed by parallel walls each extending along the sides of said crankcase and beyond the inner ends and outside of said rows of said cylinders and obliquely across said rows of cylinders in spaced relation to the inner ends of said cylinders and substantially normally with respect to the axes of said cylinders and along the sides of said camshaft gallery and between said rows of cylinders and substantially in parallel relation to the axes of said cylinders, said parallel walls being spaced from one another throughout the extent thereof to form said crankcase and said camshaft gallery and a communicating passage between said crankcase and said camshaft gallery, parallel reinforcing column means extending along the length of said parallel walls and adjacent the opposite sides of said passage, and spaced and transversely disposed walls extending between said parallel walls and said columns and dividing the interior of said block into a plurality of separate compartments, crankshaft bearing support means formed in the edges of said transversely disposed

walls remote from said cylinders, camshaft bearing support means formed in said transversely disposed walls and extending lengthwise of said block and within said passage, said transversely disposed walls being formed to provide openings for receiving the inner ends of said cylinders and terminating at said parallel walls and adjacent the inner ends of said cylinders and in spaced relation to said camshaft bearing support means.

11. An engine block comprising outer side walls and front and rear end walls and obliquely disposed banks of cylinders arranged in opposed relation to one another, said cylinder banks each having inner and outer side and front and rear end walls forming cooling fluid jackets about said cylinders, said jackets being formed to terminate above the inner and adjacent ends of said cylinders and being disposed in spaced relation to one another at the inner and adjacent ends of the inner side walls of said banks, said inner side walls at the inner and adjacent ends thereof being enlarged along the adjacent edges thereof to provide spaced and elongated reenforcing columns extending from the front to the rear end walls of said banks, and transversely disposed webs extending across said block in spaced relation to one another and between the inner adjacent parts of said inner side walls of said banks and the outer side walls of said block which extend inwardly beyond the edges of the outer side walls of said banks for reenforcing said block between said banks, said side walls and said colunms.

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