May 13, 1941. W. E. BRILL 2,241,630

INTAKE SYSTEM FOR INTERNAL COMBUSTION ENGINES

Filed July 22, 1940 2 Sheets-Sheet 1

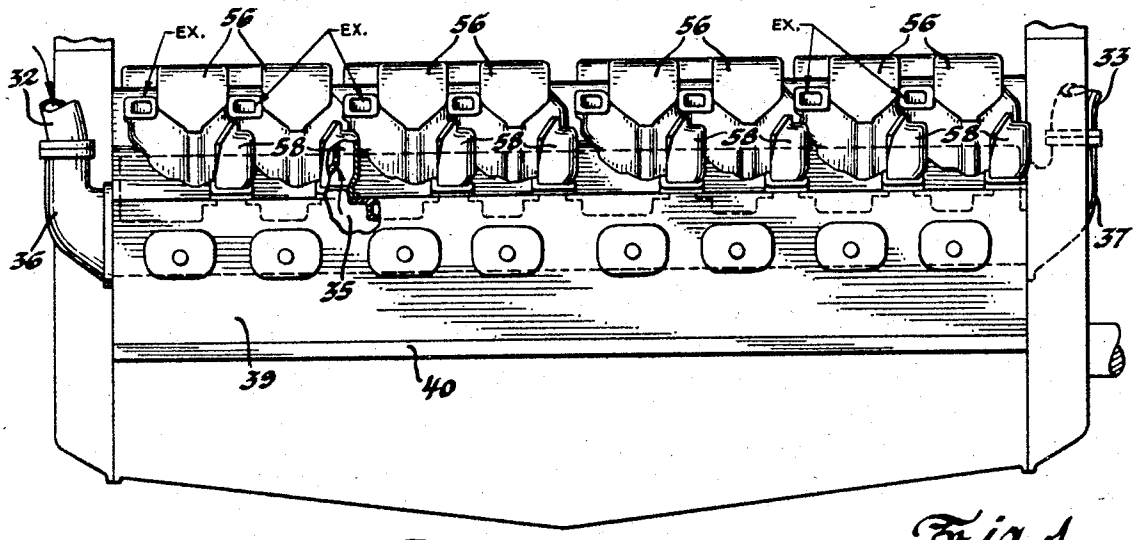


Fig. 1

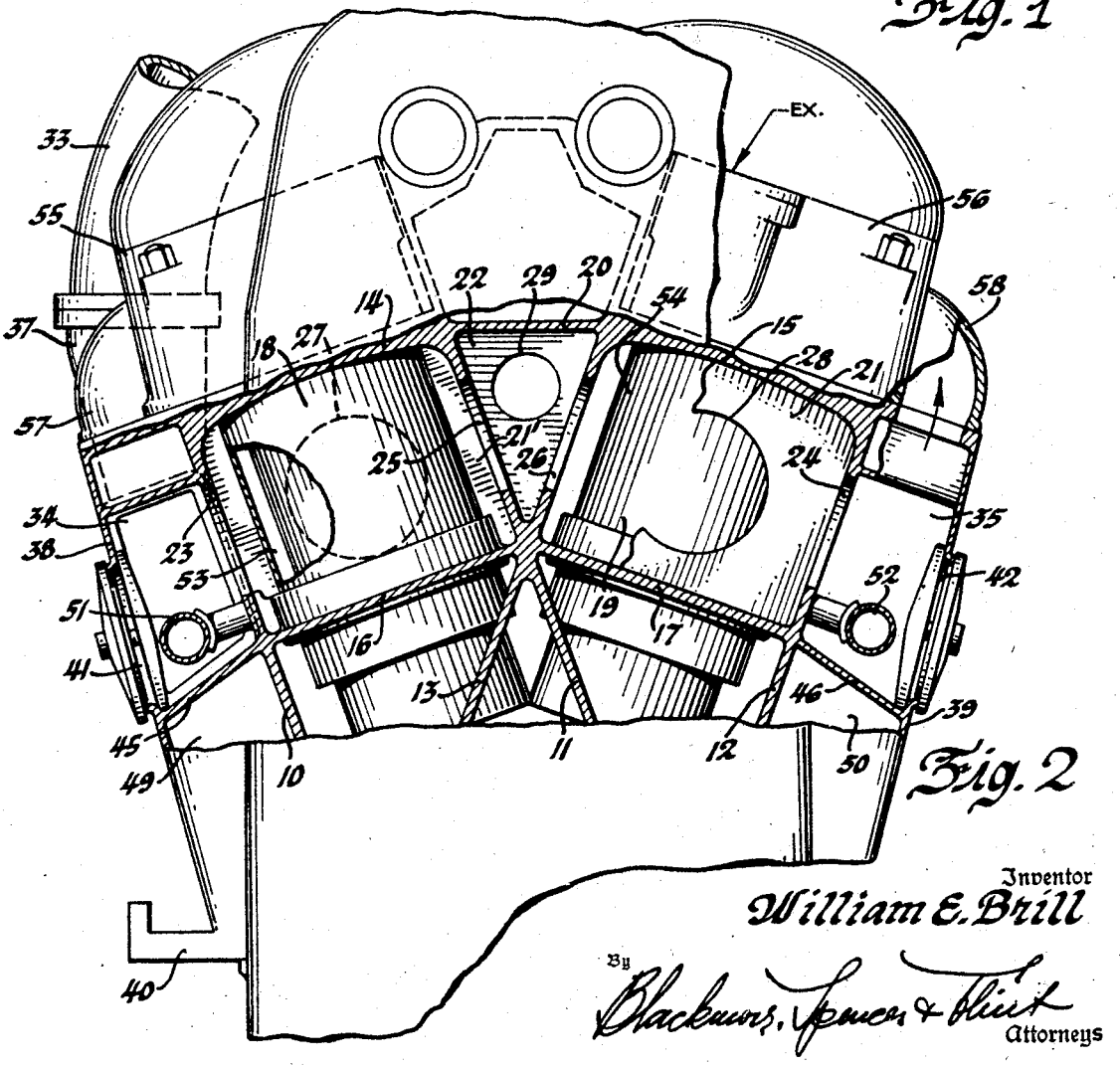


Fig. 2

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INTAKE SYSTEM FOR INTERNAL COMBUSTION ENGINES

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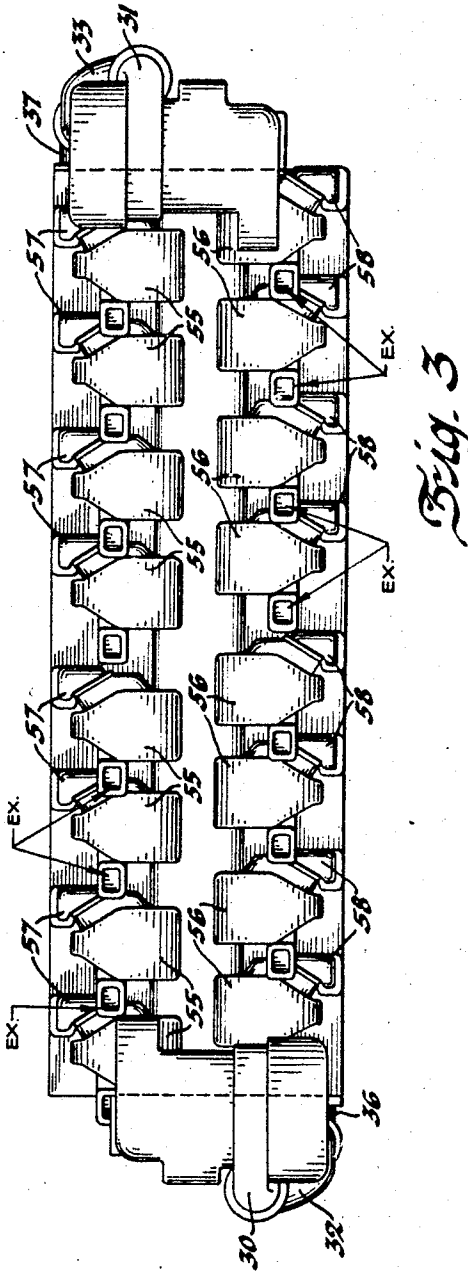


Fig. 3

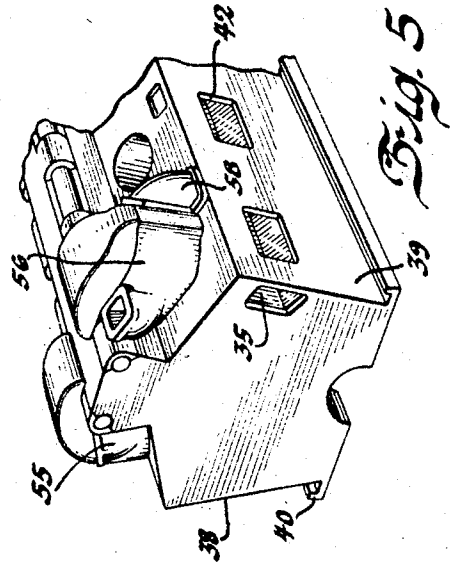


Fig. 5

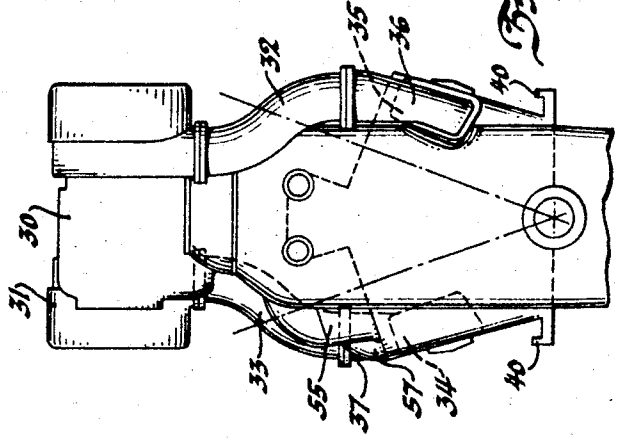


Fig. 4

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UNITED STATES PATENT OFFICE

2,241,630

INTAKE SYSTEM FOR INTERNAL COMBUSTION ENGINES

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Application July 22, 1940, Serial No. 346,793

5 Claims. (Cl. 123—55)

My invention relates to intake systems for internal combustion engines wherein air or a combustible mixture of air and a hydrocarbon is supplied to two passages extending longitudinally of a closed cylinder block structure, the two passages being in permanently open communication with the interior of the block, preferably by two turbine driven blowers located one at each end of the block and discharging into said passages; and from which passages the air or mixture flows upward through suitable elbow shaped conduits to cylinder heads supported by the block, and past suitable inlet valves and into the engine cylinders; the passages being arranged opposite one another and upon opposite sides of the block, and being in communication with one another through the closed interior of the block, so that pressure of the air or mixture within the passages is equalized through the interior of the block. Although applicable generally to engines having the features above enumerated my invention is shown as applied to an engine having two banks of eight cylinders each arranged at an angle one bank to the other, and acting upon a single crankshaft, and to a "Diesel" engine wherein liquid fuel is supplied under pressure and in the liquid form directly into the interiors of the engine cylinders.

In the drawings wherein the preferred form of my invention is illustrated:

Figure 1 is a view showing a sixteen cylinder internal combustion engine in side elevation, and having an air intake system in accordance with my invention.

Figure 2 is a view upon a much larger scale than Figure 1, and showing certain features of my invention in elevation as seen from the left of Figure 1, and others upon a transverse vertical plane.

Figure 3 is a view showing an engine equipped with my invention in plan, the exhaust manifold system thereof being omitted as it forms no part of this present invention.

Figure 4 is a view showing the engine in end elevation, and as seen from a position to the left of Figures 1 and 3.

Figure 5 is a schematic view in perspective submitted to convey a more perfect understanding of certain features of my invention.

Although the particular way in which the cylinder block is constructed is not involved in this present application, the block illustrated includes parallel side plates 10, 11, and 12, 13; inclined upper deck plates 14, 15, and lower plates 16, 17, these pairs having openings for the cylinders 18, 19 as shown; and a plate 20 closing the upper end of a triangular chamber in the upper end of the cylinder block; all of which plates extend throughout the length of the block and the ends of which block are closed by transverse plates not shown, whereby a closed chamber is provided within the block across which the cylinders 18, 19 extend, as will be understood.

Within the cylinder block are transverse bracing plates 21, 21', one between each two cylinders although only two such plates are shown, and there are similar plates 22 within the triangular chamber at the upper end of the cylinder block. These longitudinally extending and transverse plates are all welded together, as shown, so that the cylinder block is one single unitary and integral structure. The longitudinal plates have large holes 23, 24, 25, 26, one adjacent each cylinder; the plates 21, 21' have similar holes 27, 28, one in each of them; and the transverse plates 22 have each a somewhat smaller hole 29. These several holes serve to equalize the pressure between two passages 34, 35 and the inside of, and throughout the entire cylinder block, so that the pressure is the same in every part thereof.

The numerals 30, 31 designate two turbine driven blowers supported by and located one at each end of the engine block, and which discharge air taken from the surrounding atmosphere downward through conduits 32, 33 and into opposite ends of two oppositely arranged passages 34, 35 located within and extending longitudinally and throughout the length of the cylinder block, through elbow shaped connecting conduits 36, 37 as shown. The passages 34, 35 are shown as provided by plates 38, 39 extending longitudinally of the cylinder block and welded to the deck plates 14, 15 and to the base 40 of the block (as are also the lower ends of the plates 10, 11, 12 and 13); these plates having hand holes 41, 42 through which access may be had to the interiors of the passages 34, 35. Within and closing the bottoms of the passages 34, 35 are partitions 45 and 46 which extend longitudinally thereof, and the ends of which are welded to the plates 10, 12, 38 and 39 so that they are integral with the block; whereby longitudinally extending chambers 49, 50 are provided. Conduits 51, 52 which supply cooling liquid to the cylinder jackets 53, 54, and to the several cylinder heads 55 and 56, are housed within the passages 34, 35 as shown.

The air or combustible mixture supplied through

the conduit 33 and elbow 37 to the right hand end of the longitudinally extending passage 34 flows upward therefrom through a series of elbows, all identified by the numeral 57, which communicate with supply passages in the cylinder heads 55 leading to the intake valves, not shown, for the cylinders of the left hand cylinder bank; and likewise air or mixture supplied through the conduit 32 and elbow 36 to the left hand end of the longitudinally extending passage 35 flows upward therefrom through a series of elbows, all identified by the numeral 58, which communicate with supply passages in the cylinder heads 56 leading to the intake valves, not shown, for the cylinders of the right hand cylinder bank of the engine. The pressure within the passages 34 and 35 is equalized, and a uniform pressure is maintained throughout the entire interior of the cylinder block, by the holes 23, 24, 25 and 26 in the longitudinal plates 10, 12, 11 and 13, and the holes 27 and 28 in the transverse bracing plates 21, 21'; and it is obvious that such air or combustible mixture as enters the interior of the block through the holes 23, 24 will come into contact with the outside of the cylinder jackets 53, 54 and will derive heat from them, thus heating to a considerable degree the entire mass of air or mixture within the intake system. While the passages 34, 35 are thus in permanently open communication with one another through the holes 23, 24, 26 and 25 there will ordinarily be no considerable flow from one passage to the other, the purpose of the equalizing openings in the plates being primarily to secure uniform pressure throughout the interior of the cylinder block and to insure that neither turbine blower shall build up pressure in the longitudinally extending passage (34 or 35) which it supplies to a degree substantially in excess of the pressure maintained by the other blower in the other passage into which it discharges. If the characteristics of the intake system as a whole are such that identical volumes of air or combustible mixture are supplied to each cylinder block, then there will be no sustained flow from one longitudinally extending passage 34 or 35 to the other; but there may be and commonly will be unpredictable and otherwise non-controllable waves or surges which will result in the momentary flow from said passages into or out from the interior of the cylinder block, or from one portion thereof or locality therein to another, thus necessitating the equalization of the pressures in the two passages and in the intake system as a whole in order to secure proper operation of an engine equipped with my invention.

Having thus described and explained my invention, I claim and desire to secure by Letters Patent:

1. In combination in a multiple cylinder cylinder block having two banks of parallel cylinders spaced apart from the side walls of the block so as to provide an internal closed space surrounding said cylinders, and cylinder heads upon the upper ends of said banks; two oppositely located supply passages extending one along the outer side of each bank, and which passages are placed in communication with the interior of said block through holes in the outer side walls thereof; and a plurality of supply conduits leading upward from said passages, one to each of said cylinder heads.

2. In combination in a multiple cylinder cylinder block having two mutually inclined banks of parallel cylinders spaced apart from the side walls of the block so as to provide an internal closed space surrounding said cylinders, and cylinder heads upon the upper ends of said banks; two oppositely located supply passages at the upper ends of and extending one along the outer side of each bank, and which passages are placed in communication with the interior of said block through holes in the outer side walls thereof; and a plurality of supply conduits leading upward from said passages, one to each of said cylinder heads.

3. In combination in a multiple cylinder cylinder block having two banks of parallel cylinders spaced apart from the side walls of the block so as to provide an internal closed space surrounding said cylinders, and cylinder heads upon the upper ends of said banks; two oppositely located supply passages at the upper ends of and extending one along the outer side of each bank, and which passages are placed in communication with the interior of said block through holes in the outer side walls thereof; means for supplying air or a combustible mixture to one end of each of said passages; and a plurality of supply conduits leading upward from said passages, one to each of said cylinder heads.

4. In combination in a multiple cylinder cylinder block having two banks of parallel cylinders spaced apart from the side walls of the block so as to provide an internal closed space surrounding said cylinders, and cylinder heads upon the upper ends of said banks; two oppositely located supply passages at the upper ends of and extending one along the outer side of each bank, and which passages are placed in communication with the interior of said block through holes in the outer side walls thereof; two blowers discharging one into one and the other into the other of said supply passages; and a plurality of supply conduits leading upward from said passages, one to each of said cylinder heads.

5. In combination in a multiple cylinder cylinder block having two banks of parallel cylinders spaced apart from the side walls of the block so as to provide an internal closed space surrounding said cylinders, and cylinder heads upon the upper ends of said banks; two oppositely located supply passages at the upper ends of and extending one along the outer side of each bank, and which passages are placed in communication with the interior of said block through holes in the outer side walls thereof; two blowers supported by and located above said cylinder block and one at each end thereof, and which blowers discharge into opposite ends of said supply passages; and a plurality of supply conduits leading upward from said passages, one to each of said cylinder heads.

WILLIAM E. BRILL.