Aug. 9, 1938. W. E. BRILL 2,126,609

EXHAUST MANIFOLD SYSTEM FOR INTERNAL COMBUSTION ENGINES

Filed Feb. 17, 1937 2 Sheets-Sheet 1

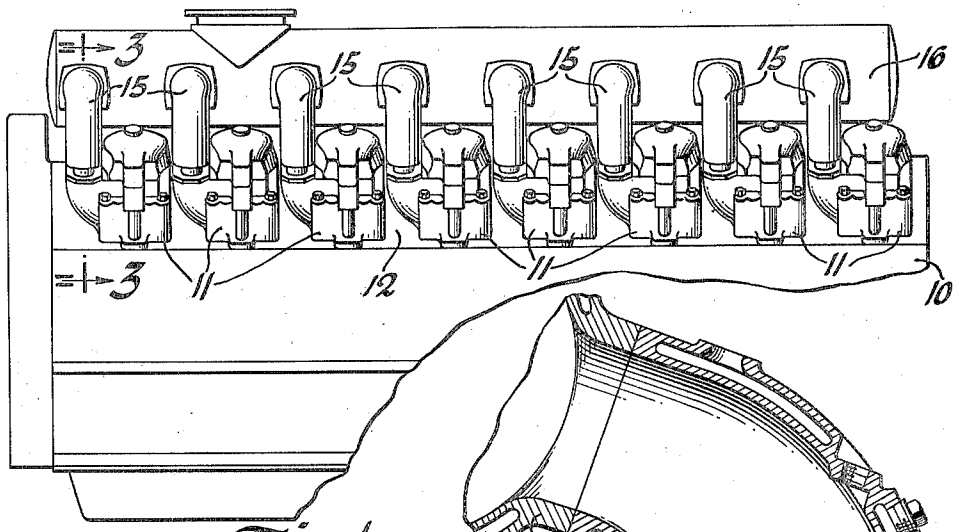

Fig. 1

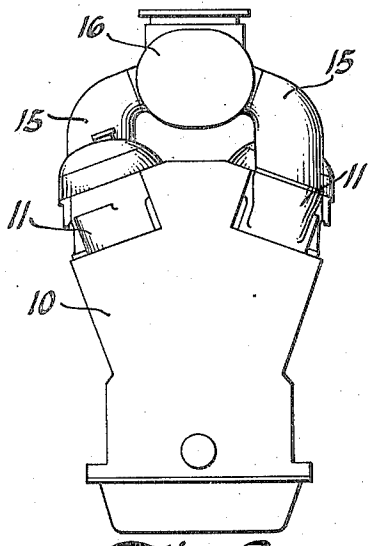

Fig. 2

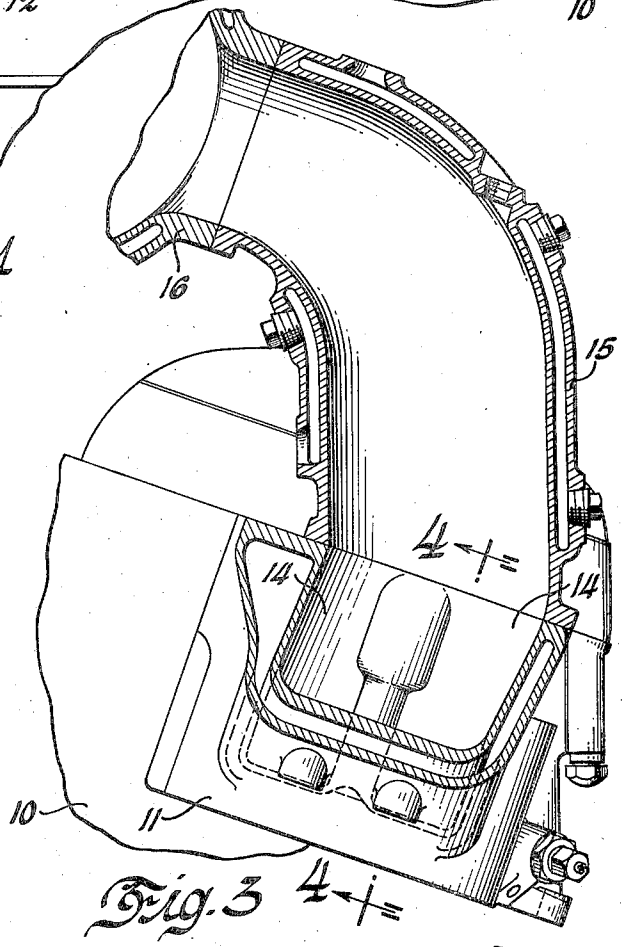

Fig. 3

Inventor
William E. Brill

By Blackmore, Spencer & Flint
Attorneys.

Aug. 9, 1938. W. E. BRILL 2,126,609

EXHAUST MANIFOLD SYSTEM FOR INTERNAL COMBUSTION ENGINES

Filed Feb. 17, 1937 2 Sheets-Sheet 2

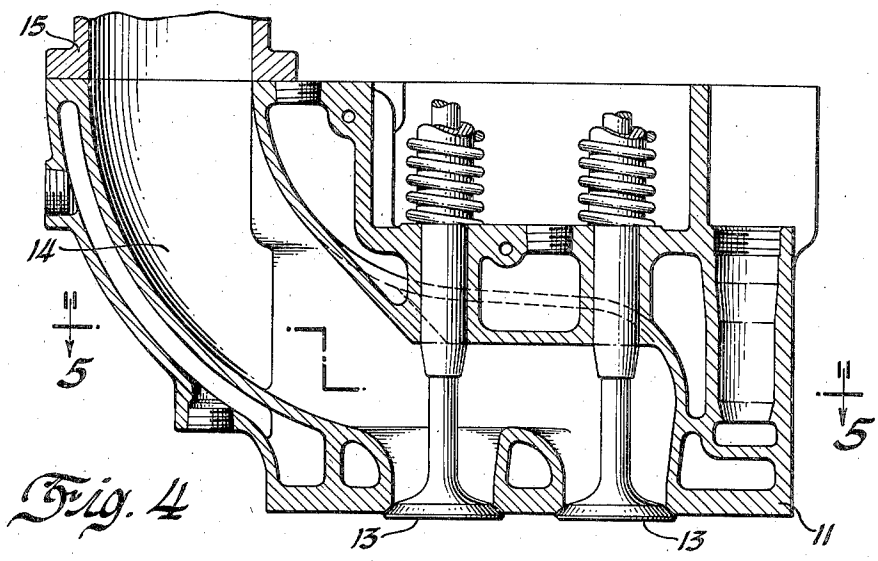

Fig. 4

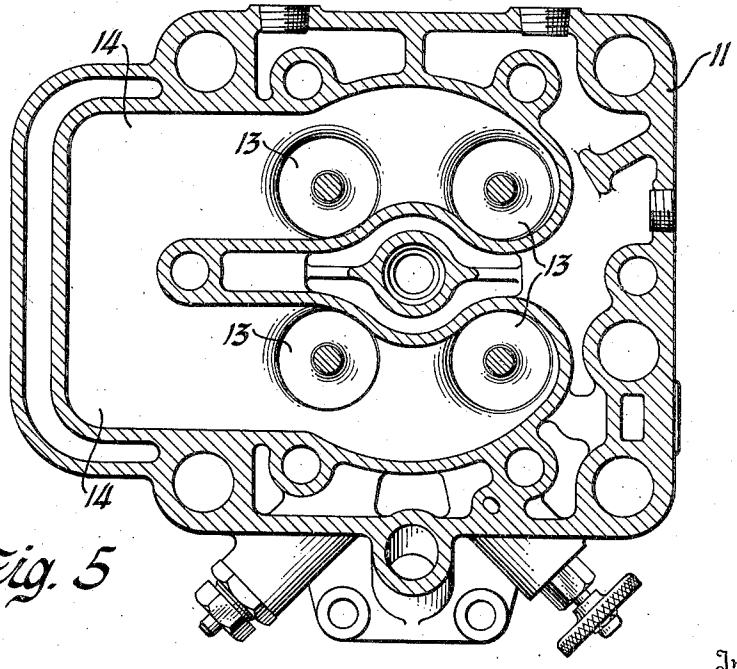

Fig. 5

Inventor
William E. Brill

By Blackmore, Spencer & Flint
Attorneys

Patented Aug. 9, 1938 2,126,609

UNITED STATES PATENT OFFICE

2,126,609

EXHAUST MANIFOLD SYSTEM FOR INTERNAL COMBUSTION ENGINES

William E. Brill, Cleveland, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application February 17, 1937, Serial No. 126,115

3 Claims. (Cl. 123—55)

My invention relates to exhaust manifold systems for multiple cylinder internal combustion engines and the object thereof is to provide an exhaust manifold system all the parts of which are located between planes extending longitudinally of the engine and along the sides of the cylinder block; this being a feature of great importance when the engine has to be installed in a space of limited width, or when for any reason it is desirable that the engine shall be as narrow as possible.

In the drawings accompanying and forming a part of this specification and wherein the preferred form of my invention is illustrated:

Figure 1 is a view showing a multiple cylinder engine in side elevation and equipped with my improved exhaust manifold system.

Figure 2 is a schematic view showing the engine in end elevation.

Figure 3 is a view showing a section upon a transverse plane indicated by the line 3—3, Figure 1.

Figure 4 is a view showing a section of one of the cylinder heads upon a plane extending longitudinally of the engine, the position thereof being indicated by the line 4—4, Figure 3.

Figure 5 is a view showing a section of one of the cylinder heads upon a plane indicated by the line 5—5, Figure 4, the plane being parallel with an upper deck or wall of the cylinder block.

Referring now to the drawings, the numeral 10 designates a cylinder block having two rows or banks of cylinders arranged at an angle to one another, each bank having eight cylinders arranged in line so that the particular engine illustrated has sixteen cylinders. My invention, however, and although it is particularly concerned with engines having a comparatively large number of cylinders arranged in line in one or more banks, is not limited to any particular number of cylinders so arranged, so long as the number of cylinders is more than one.

The engine illustrated is of the two-stroke cycle type wherein combustible mixture is supplied to the several cylinders through ports adjacent their lower ends which are overrun by the pistons as they approach the lower ends of their travel, and wherein burned gases leave the cylinders through exhaust ports in the cylinder heads; said heads, there being a separate head for each cylinder, being indicated by the reference numerals 11. The heads are secured to top decks or walls at the upper end of the cooling jacket and which have openings registering with the cylinders, as is usual in multiple cylinder engines, one of said walls being indicated by the numeral 12 in Figure 1.

In the engine illustrated each cylinder head has four exhaust valves 13 in order to secure a more free and rapid outflow of burned gases from the cylinders when fresh combustible mixture enters their lower ends as the pistons overrun the supply ports; although my invention is equally applicable to engines operating upon a four-stroke cycle, in which case outflow of burned gases occurs during upward exhaust strokes of the pistons as will be understood. The exhaust valves are operated by the usual cam operated rocker arms which are not shown as they form no part of the invention to which this present application relates.

Leading from the exhaust valves and upwardly therefrom, see Figure 4, are passages 14 which extend parallel with the longitudinal plane of the engine and the discharge ends of which passages are at the ends of the heads; and these passages communicate with elbows 15 which are disposed at ends of the heads and are offset from transverse planes thereof and of the engine, as shown in Figure 1; and which elbows conduct the exhaust gases longitudinally of and upward and inward toward the longitudinal central plane of the engine. The discharge ends of all these elbows communicate with a single centrally arranged exhaust manifold 16 which is located above and extends longitudinally of the engine, as shown in Figures 1 and 2.

In view of the premises it will be seen, referring to Figures 1 and 2, that the provision of exhaust passages 14 which extend parallel with the length of the engine, and which discharge through upwardly and inwardly extending elbows 15 connected with the ends of the heads and into a centrally arranged exhaust manifold 16, provides a narrower engine (including the exhaust manifold system) than would be the case if the exhaust gases were discharged through exhaust passages which discharged laterally or sidewise relative to the longitudinal plane of the engine. No part of the exhaust manifold system, it will be noted, lies outside of or beyond longitudinally extending planes passing along the sides of the cylinder block, which is a feature of great importance where width of engine has to be limited, as is the case when the engine is used on shipboard.

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

1. In a multiple cylinder engine of the class described, a plurality of cylinder heads each hav-

ing an exhaust passage which extends longitudinally of the engine and beyond an end of the head; and a plurality of elbows connected with said exhaust passages and offset from transverse planes of said heads and leading upwardly and inwardly therefrom toward the longitudinal plane of the engine, and through which elbows exhaust gases are discharged into a single exhaust manifold.

2. In a multiple cylinder engine having two banks of cylinders arranged at an angle to one another, a plurality of cylinder heads each having an exhaust passage which extends longitudinally of the engine and beyond an end of the head; a plurality of elbows connected with said exhaust passages and offset from transverse planes of said heads and leading upwardly therefrom and inwardly toward the longitudinal central plane of the engine; and a centrally arranged exhaust manifold located above said cylinder heads and extending longitudinally of the engine and into which exhaust gases are discharged through said elbows.

3. In a multiple cylinder engine of the class described, a plurality of cylinder heads each having two parallel exhaust passages which extend longitudinally of the engine and beyond an end of the head; a plurality of elbows connected with said exhaust passages and offset from transverse planes of said heads and each of which communicates with the two passages aforesaid of a head; and an exhaust manifold located above and extending longitudinally of the engine, and into which exhaust gases are discharged through said elbows.

WILLIAM E. BRILL.