

July 19, 1932.

M. J. GOLDBERG
MANIFOLD CONSTRUCTION

1,868,355

Filed Nov. 30, 1928

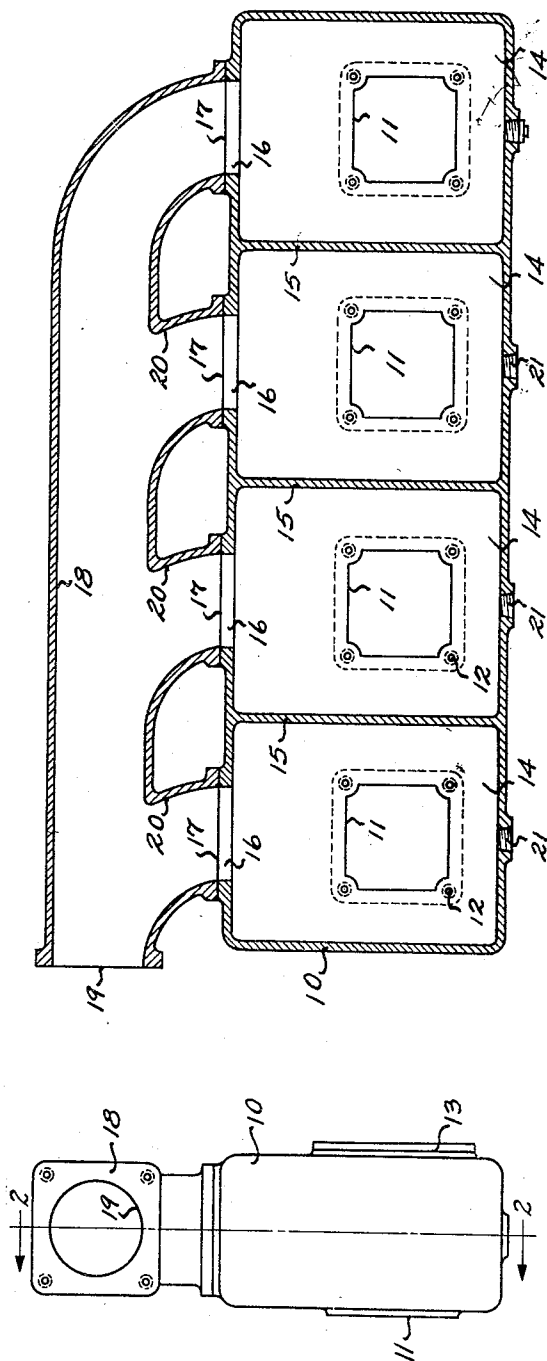


Fig. 1

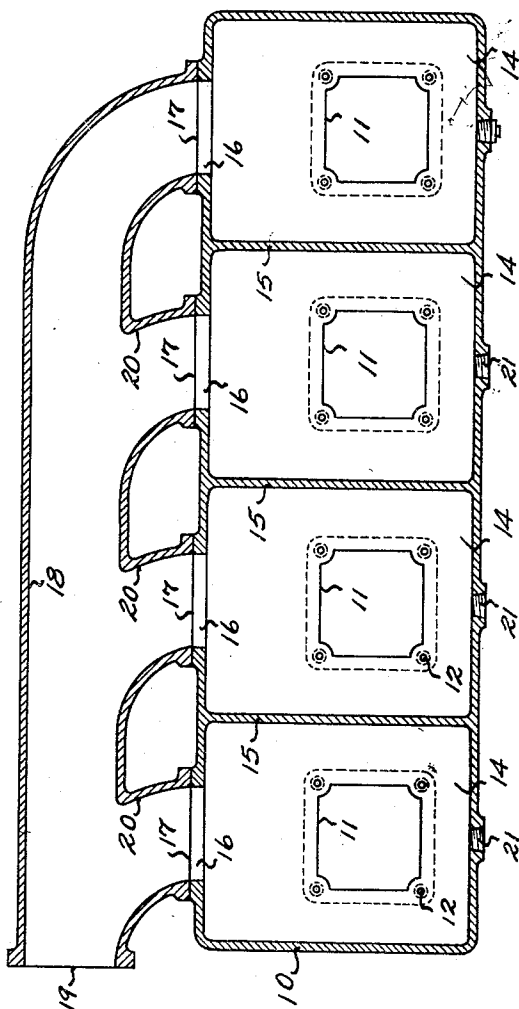


Fig. 2

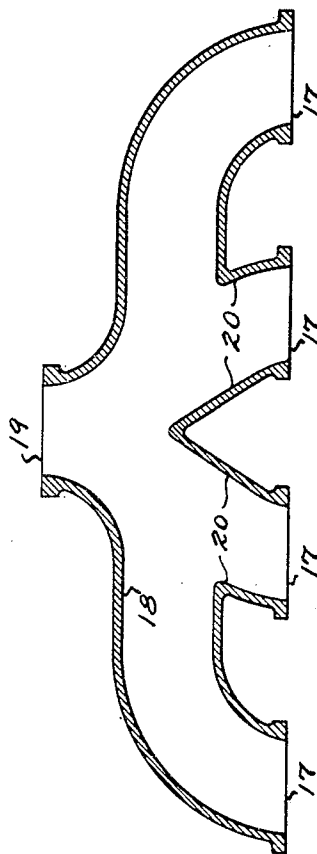


Fig. 3

INVENTOR
MORRIS J. GOLDBERG
BY *Roy M. Eiler*
ATTORNEY

UNITED STATES PATENT OFFICE

MORRIS J. GOLDBERG, OF BELOIT, WISCONSIN, ASSIGNOR TO FAIRBANKS, MORSE & CO.,
OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

MANIFOLD CONSTRUCTION

Application filed November 30, 1928. Serial No. 322,932.

This invention relates to improvements in manifold construction, and particularly to an improved exhaust manifold construction for use on multi-cylinder, internal combustion engines.

The heretofore prevailing exhaust manifold constructions permit the exhaust gases, from all of the cylinders, to discharge into a common manifold chamber. It has been found that such a construction is sensitive to the length and arrangement of the exhaust pipe and that under certain operating conditions, unfavorable and uneconomical engine performance prevails. This is especially true, when the older manifold is employed in connection with multi-cylinder, scavenging engines. It is usually the case that a multi-cylinder engine of this type, does not develop power proportional to that of a single cylinder engine of the same type and construction. The present invention has, as a primary objective, to improve the efficiency and performance of multi-cylinder engines in general, and particularly those types of engines employing scavenging air.

An object of the present invention is to provide an improved manifold construction, embodying means for reducing the effective length of the exhaust pipe on the engine, and thereby improving the economy and operation of the engine.

A further object of the invention is to provide an improved manifold construction, in which the exhaust gases are freely led from the engine exhaust ports through passages of the correct shape and area, and thereby improving engine performance.

A still further object is to provide an improved manifold construction which is neat and compact, and readily adaptable to either portable or stationary engines.

Further objects and advantages will appear from the following detailed description of parts and the accompanying drawing, in which Fig. 1 is an end elevation of a preferred, improved form of exhaust conduit assembly; Fig. 2 is a sectional elevation along the line 2-2 of Fig. 1. Fig. 3 is a sectional elevation showing a modified form of exhaust manifold proper which is interchangeable

with the exhaust manifold shown in Fig. 2.

It will be understood that in the preliminary discussion and stated objects, the exhaust conduit structure as a whole is referred to as the manifold structure. According to present preference this manifold structure, as will appear, includes a receiver having distinct compartments, this receiver being disposed between the engine and the manifold proper.

It will, of course, be understood that the present description of parts and the accompanying illustrations, relate to a single preferred executional embodiment of the present invention, and that substantial changes may be made in the described construction of the parts without departing from the spirit and scope of this invention.

Referring by numerals to the drawing, the exhaust receiving casing or body 10 forms, preferably, an exhaust enclosure, whose section, as indicated in Fig. 1, is substantially rectangular. This preferred form is effective in providing an enclosure, of much more than usual volume, and so constructed as to facilitate expulsion of the exhaust gases therefrom, and to aid in reducing the hitherto prevailing exhaust back-pressure on the engine. The casing 10 is adapted to be attached directly to the cylinders of the engine, and in direct communication with the cylinder exhaust ports through openings 11 formed in the casing. Openings 12 are provided for stud bolts or an equivalent, (not shown) to attach the casing to the cylinders; such stud bolts being internally fastened through openings 13. Cover plates of any suitable form are provided to seal each of the openings 13 from the atmosphere.

In the preferred example shown, the improved casing or receiver is applied to a four-cylinder engine, although it will be readily understood that the improved construction may be applied to any type of multi-cylinder engine, regardless of the number of its cylinders. The enclosure forming the receiver casing, is divided or separated into distinct, exhaust receiving compartments 14 by an arrangement of partitions or walls 15, by preference formed integrally with the body 10.

From the drawing it will be seen that the walls 15 are placed, preferably, midway between each pair of exhaust openings 11, thus providing one of the receiving chambers 14 for each cylinder, these chambers being of substantially equal volume. This improved arrangement confines the exhaust gases of each cylinder into a restricted space, which causes the gases to be expelled through openings 16, each of which is arranged in registering communication with an opening 17 of the exhaust manifold 18. The gases are then conducted in the usual manner through the manifold, and are expelled to the atmosphere, or conducted to any desired silencing apparatus, through an opening 19. Removal of condensation or the like from each chamber 14, is effected by means of plugged openings 21.

The openings and passages are so constructed and formed as to aid the flow and free expulsion of the gases to the atmosphere. By way of illustration, the exhaust manifold 18 is formed with arcuate projections 20, which serve to direct the gases in their travel, and materially to reduce the usual frictional effects of their flow. In order to equalize the distance of travel of the exhaust gases, say to the atmosphere, the opening 19 may be formed in substantially the center of the exhaust manifold 18, as shown in the modified construction of Fig. 3. The two types of exhaust manifold, shown respectively in Figs. 2 and 3, may be used interchangeably with the casing 10, according to the particular requirement of either a side- or an end-discharge arrangement, as may be dictated by available engine space, and other factors.

The improved construction and arrangement of the exhaust conduit structure described above, provides many advantages over the older manifold construction. It will be readily seen that the provision of an intermediate receiver, and the division of the receiver into separate chambers, materially reduces the effective length of the conduit structure. Also, each compartment 14, with its attached cylinder, forms, with respect to the exhaust, a plurality of single cylinder operating units, and the pressure fluctuations of each exhaust are not directly communicated to the other cylinders or exhaust ports of the engine. Therefore, it is found that the improved construction aids in producing a power effect which is fairly proportional to that of a single cylinder engine. In crank-case scavenging engines, it is noted that the performance of the engine is very sensitive to the length of exhaust piping, and as this improved arrangement reduces this effective length, the engine operates more economically and satisfactorily.

The improved assembly forms a neat and compact unit, which is easily assembled and installed on marine or stationary engines, and

which may be provided initially, or easily added as an accessory, at any time.

I claim as my invention:

1. In an exhaust assembly for multi-cylinder engines, a casing carried by the engine in adjacency thereto and having an exhaust connection to each power cylinder, means forming distinct chambers in the casing for separating, entirely, the exhaust gases issued from the several cylinders, said chambers providing for free expansion and through gas passage, and means, connected to the casing, for conducting therefrom, the gases of each cylinder, in separate passages.

2. In an exhaust assembly for multi-cylinder, internal combustion engines, a casing of integral construction having a plurality of separate chambers therein, each chamber providing for free expansion and discharge of exhaust gases, and having openings in spaced wall portions, one of such openings being directly connected with a cylinder exhaust port of the engine, and an exhaust pipe having branches each forming an outlet connection to a separate opening of each of the several chambers of said casing.

3. An exhaust assembly for multi-cylinder engines comprising a one-piece casing having a connection with each of the power cylinders and forming individual exhaust-receiving chambers of open interior construction, each chamber provided with a separate discharge port having unobstructed fluid connection with its chamber, and means connected to each of said ports providing a separate path for the gases therefrom.

4. In an exhaust receiver for use with multi-cylinder engines, expansion compartments of open interior construction, formed within said receiver, and each provided with spaced inlet and discharge openings, said compartments arranged to receive and discharge freely and separately, gases of each cylinder, and a manifold in detachable engagement with said receiver, comprising means to permit free removal of the exhaust gases.

5. In an exhaust assembly for multi-cylinder engines, an exhaust manifold providing a separate exhaust passage for each of the cylinders, a receiver having discharge openings detachably connected to said manifold, and having inlet openings each connected to one of the cylinder exhaust ports, and means forming in said receiver, a distinct exhaust-receiving expansion chamber for the exhaust of each cylinder, said chambers being of open interior construction and having direct, free fluid connection to the engine cylinders and manifold.

6. An exhaust assembly for multi-cylinder engines, comprising a one-piece hollow casting forming a receiver having direct exhaust connection with each of the power cylinders, partitions in said receiver having a trend along the paths of the exhaust gases, and

forming a separate chamber for exhaust gases from each cylinder, the chambers being of unobstructed interior construction, and means forming a continuation of the paths for conducting the gases of each cylinder from said receiver.

7. An exhaust assembly for multi-cylinder engines, comprising a one-piece casing having exhaust connections with each of the power cylinders, means forming in the casing, substantially enlarged receiving chambers of rectangular section, and entirely open interior construction, having unobstructed outlet ports, there being one of such chambers for each cylinder of the engine, and means constituting a plurality of separate, open exhaust passages connected directly to the outlet ports, for conducting therefrom the exhaust gases of each cylinder.

8. In an exhaust assembly for multi-cylinder engines, the combination with an exhaust manifold having a branch for each of the engine power cylinders, of a one-piece exhaust receiving casing connected between the cylinder exhaust ports and the exhaust manifold, imperforate partitions in said receiver casing, dividing it into individual cylinder-exhaust receiving and expansion compartments of substantially rectangular cross-section, means forming inlet and outlet openings in each compartment, the openings being disposed at substantially a right angle to each other, and forming an access port for each compartment independent of the inlet and outlet openings, and a drain opening for each compartment; and a closure member for each of the drain openings and access ports.

MORRIS J. GOLDBERG.