

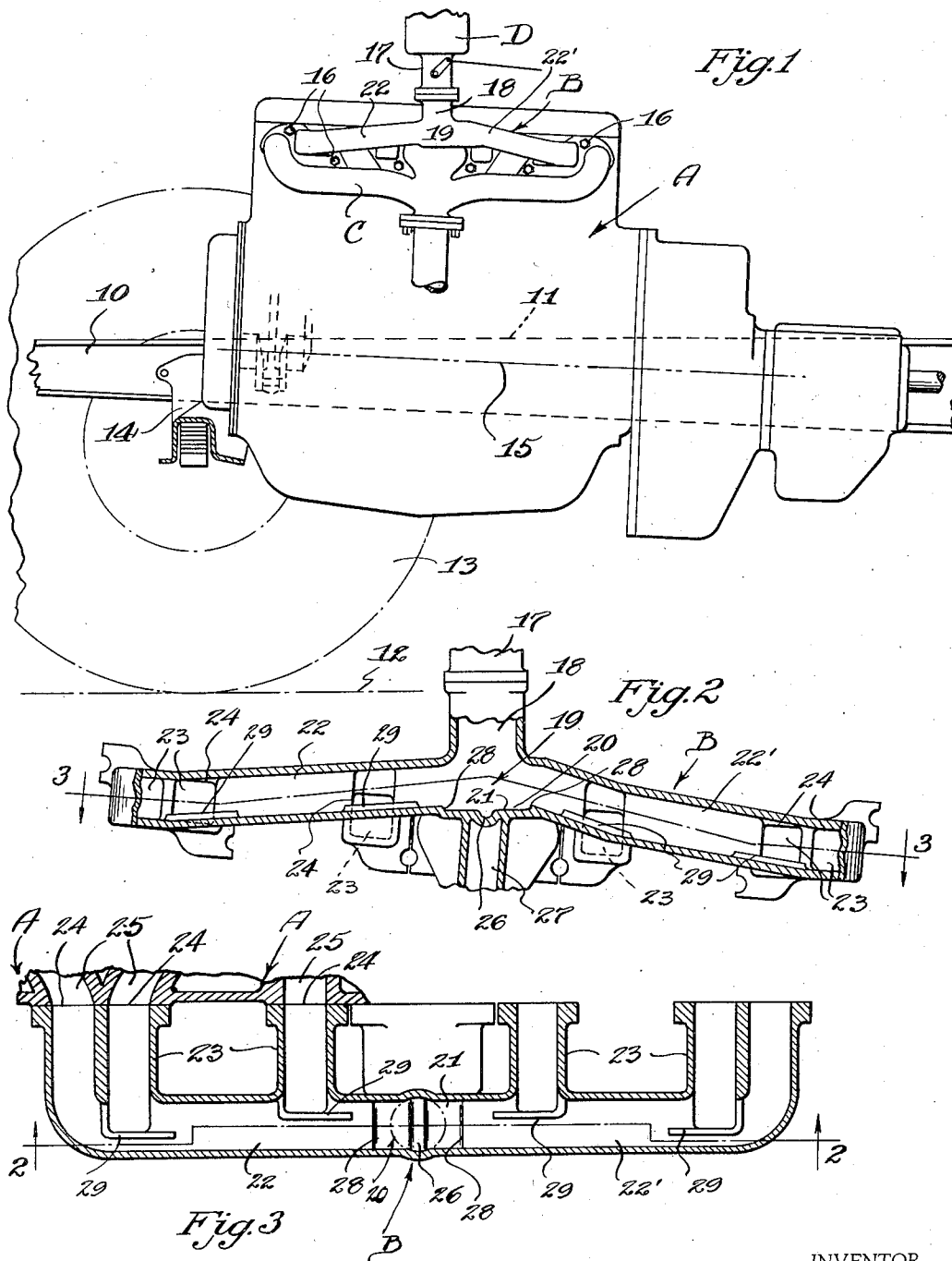
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ENGINE

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My invention relates to engines and more particularly to the fuel mixture distributing system for an internal combustion engine, my present invention in its more particular aspects relating to the construction of the intake manifold structure employed in such fuel mixture distributing systems.

Engines employed with automotive vehicles and also utilized as the power unit for marine vessels, are usually mounted on a chassis in such a way as to permit the power take-off shaft to be downwardly inclined to the traction elements. In the case of an automobile, the propeller shaft is usually inclined downwardly towards the rear axle of the vehicle, and in a boat or other marine vessel the propeller shaft is also usually inclined downwardly towards the propeller. It is usually preferable to so support the engine from the chassis that the longitudinal axis of said engine is inclined with respect to the normal horizontal plane of the chassis in order to eliminate the installation of complicated universal couplings in transmitting the drive. In the particular art for which the present invention was developed, it was noted that the usual type of intake manifold was not entirely satisfactory since uniform distribution of wet fuel could not be attained with that degree of efficiency that is desirable at the present time. This unsatisfactory engine performance was more noticeable at idling speeds of the engine and during engine acceleration due to the fact that the wet fuel precipitate tended to collect at one end of the manifold or tended to supply certain of the engine cylinders, in particular the rear cylinders of the engine, with a richer fuel mixture than others.

It is an object of my present invention to facilitate the distribution of fuel precipitate to the cylinders of a multi-cylinder engine by providing an improved fuel mixture distributing system therefor, in which the inclination of the engine with respect to the normal horizontal plane of the chassis has no effect on the wet fuel preprecipitate distribution.

Another object of my present invention is to provide an intake manifold structure for an engine of the character described in which the fuel mixture conducting portions of the manifold are adapted to receive the fuel precipitate during engine idling, during engine acceleration and during part throttle engine operation in such a manner as to effect a uniform distribution of the wet fuel to the engine cylinders. A further object of my present invention is to provide an intake manifold structure in which uniform wet fuel dis-

tribution may be had by providing a puddling chamber for collecting wet fuel precipitate, which is so constructed as to provide a floor or other surface on which the fuel is precipitated and collected that is constructed to lie substantially parallel with the normal horizontal plane of the chassis whereby to evenly distribute the fuel precipitate over said floor and to prevent the tendency of said fuel precipitate to collect an excessive amount near one end of the puddling chamber from which the tendency of supplying some of the engine cylinders with an excessive amount of wet fuel to the detriment of the other cylinders is eliminated.

My present invention in its more particular aspects relates to a manifold structure of the down-draft type in which the carburetor or fuel mixture forming and distributing device is located above the manifold structure, the fuel mixture being conducted downwardly from the carburetor to the lateral distributing runners of the manifold by means of a downwardly extending primary fuel mixture conducting means.

For a further understanding of my invention reference may be had to the accompanying drawing illustrating one embodiment of my invention, and in which:

Fig. 1 is an elevational view of an internal combustion engine and associated vehicle chassis, this figure showing the relationship between the engine and chassis and further illustrating an intake manifold structure assembled to the engine and which is constructed in accordance with my present invention,

Fig. 2 is a longitudinal vertical sectional view through the manifold structure illustrated in Fig. 1 as taken on the section line 2—2 of Fig. 3, and

Fig. 3 is a horizontal sectional view through said manifold structure taken substantially on the line 3—3 of Fig. 2.

Certain phases of my invention as will be more apparent hereinafter have particular significance with an engine, either stationary or otherwise employed, in which the crankshaft axis is inclined to the horizontal.

I have chosen for purposes of illustration to show my invention as being incorporated with an engine employed for propelling an automotive vehicle, but it will be obviously understood that the principles of my invention may be incorporated with engines other than those used with automotive vehicles such as stationary and marine engines, and the reference in the specification and claims to a chassis for supporting said engine in its broadest aspects refers to any en-

gine support such as carried by a land, water or air vehicle. In the present embodiment of my invention I have illustrated a vehicle chassis 10 having a normal horizontal plane 11 which extends substantially parallel with the ground level 12, the chassis frame 10 being supported from the ground by the usual traction elements 13. An engine A is preferably supported from the chassis 10 by suitable supports or brackets, one of said brackets being shown as at 14. It is customary in automotive vehicles to so support the engine as to tilt the same toward the rear of the vehicle, this being clearly illustrated in Fig. 1 in which it will be noted that the longitudinal crankshaft axis 15 of the engine is inclined to the normal horizontal plane 11 of the chassis.

My present invention especially relates to the fuel mixture distributing system for such an engine and it will be noted that I have provided an intake manifold structure especially adapted for assembly with a multi-cylinder engine, this intake manifold structure B being secured to the engine A in the usual manner by means of a plurality of bolts or other fastening devices 16. Preferably an exhaust manifold structure C is also provided for assembly with the engine A in the usual manner. In the illustrated embodiment of my invention, I have provided a fuel mixture forming and distributing device D of the downdraft type, this device being usually referred to as a carburetor and is provided with the downwardly extending extension 17 adapted to connect the carburetor with the primary fuel mixture conducting means of the manifold structure, said primary fuel mixture conducting means being designated by the reference character 18 and extending downwardly from the carburetor extension to the distributing chamber 19 of the manifold structure. The distributing chamber 19 includes a puddling chamber 20 having a floor portion 21 preferably located opposite to the outlet of the primary fuel mixture conducting means 18 and constructed to lie parallel with the horizontal plane of the chassis. The oppositely extending lateral runners 22 and 22' communicate respectively with the distributing chamber 19 and extend substantially longitudinally of the engine A. Suitable port runner portions 23 connect the lateral runners 22 and 22' with the engine, said engine preferably being provided with suitable intake ports 24 communicating with the engine intake passages 25 communicating to the engine cylinders (not shown). If desired, the puddling chamber 20 may be provided with a recessed portion 26 for collecting excessive amounts of fuel precipitate, this particular recess being preferably subjected to heat of the exhaust gases which are conducted in heat transference relation therewith through the heating jacket 27 built into the manifold structure. The ends of the puddling chamber 20 adjacent the mouth of the runners 22 and 22' preferably provide a shoulder 28 over which the wet fuel precipitate is caused to flow during engine operation, this shoulder acting to spread out the wet fuel so that the same can flow along the communicating runners in the form of a film of uniform depth in order that the said wet fuel can be properly distributed to the engine cylinders. The distribution of the wet fuel flowing through the lateral runners may be had by any suitable means and in the illustrated embodiment of my invention I have provided suitable baffles 29 for obtaining such a distribution. The particular advantages and features of this type of fuel distribution being described and claimed in my co-

pending application, Ser. No. 658,691 filed February 27, 1933.

It will be noted that the lateral runners 22 and 22' are inclined downwardly away from the distributing chamber 19 and toward the ends of the engine. Due to the inclination of the engine crankshaft with respect to a horizontal plane, the runners 22 and 22' are differently inclined, that is, one of said runners is inclined to this plane at a different angle than the other of said runners since the rear cylinder ports are relatively lower than the front cylinder ports. The inclination of these lateral runners is such that longitudinal tilting of the vehicle which carries the engine during normal operation of said vehicle when moving over hilly ground which is not level, the said runners are substantially inclined downwardly with respect to the level ground and therefore uniform distribution of the wet fuel may be had during substantially all normal operation of the vehicle. It is obvious that there may be some occasions where the vehicle is climbing a steep grade that the said runners will not be both inclined downwardly away from the distributing chamber with respect to level ground, but under this condition, the engine is operating generally with wide open throttle and the tendency of the fuel mixture to precipitate and collect along the floor of the runners and in the puddling chamber is at a minimum. Usually the runner leading to the front cylinders of the engine is not inclined with respect to the horizontal plane of the chassis as much as the rear runner, but it is customary to design manifolds constructed in accordance with this invention with a forward runner having an inclination with this normal horizontal plane of the chassis with a factor of safety of about two degrees, that is, the runner is inclined at an angle of about two degrees more than that normally required so as to provide a sufficient factor of safety to take care of about one degree variation resulting from a loading of the vehicle.

A manifold structure of the character described above facilitates engine operation and more particularly improves part throttle engine operation and considerable improvement in the operation is noted during acceleration by reason of the uniform distribution of the wet fuel precipitate to the various cylinders of the engine. On starting an engine having a manifold constructed in accordance with my invention, it is found that uniform amounts of wet fuel are swept into the engine cylinders and a tendency of more wet fuel to sweep in the rear cylinders than into the forward cylinders of the engine as is the case with manifold structures heretofore employed in which the floor of the puddling chamber is inclined to the horizontal plane and in which fuel precipitate tends to collect at one end of the puddling chamber, is substantially eliminated. Greater fuel economy results from the employment of a manifold structure of the character described and the prevention of crankcase dilution will add considerable to the life of the engine as well as improve the fuel economy.

It will be obvious that the principles of my invention may be incorporated in an intake manifold structure other than that of the downdraft type as illustrated in the accompanying drawing, and in its broadest aspects I do not limit my invention to the particular showing as herein described and illustrated in the accompanying drawing, as this will be apparent to those skilled in the art to which my invention pertains and various modifications and changes may be made

therein without departing from the spirit of my invention or from the scope of the appended claims.

What I claim as my invention is:

5 1. An intake manifold structure for a multi-cylinder internal combustion engine having a longitudinal axis inclined to the normal horizontal plane of the chassis by which said engine is supported, said engine having intake ports associated with the engine cylinders, said manifold structure including a primary fuel mixture conducting means, a distributing chamber including a puddling chamber, and oppositely extending lateral runners communicating with said distributing chamber and extending substantially longitudinally of the engine, said lateral runners communicating with the engine intake ports, the rim of said puddling chamber extending substantially parallel with the normal horizontal plane of said chassis.

2. An intake manifold structure for a multi-cylinder internal combustion engine having a longitudinal axis inclined to the normal horizontal plane of the chassis by which said engine is supported, said engine having intake ports associated with the engine cylinders, said manifold structure including a primary fuel mixture conducting means, a distributing chamber including a puddling chamber having a substantially flat floor, and oppositely extending lateral runners communicating with said distributing chamber and extending substantially longitudinally of the engine, said lateral runners communicating with the engine intake ports, said puddling chamber having a rim extending substantially parallel with the normal horizontal plane of said chassis and with said puddling chamber floor, whereby to provide a collecting basin for wet fuel to the engine cylinders during engine operation.

3. An intake manifold structure for a multi-cylinder internal combustion engine having a longitudinal axis inclined to the normal horizontal plane of the chassis by which said engine is supported, said engine having intake ports associated with the engine cylinders, said manifold structure including a primary fuel mixture conducting means, a distributing chamber including a puddling chamber having a substantially flat floor and a rim of substantially uniform height, and oppositely extending lateral runners communicating with said distributing chamber and extending substantially longitudinally of the engine, said lateral runner communicating with the engine intake ports, the floor and rim of said puddling chamber extending substantially parallel with the normal horizontal plane of said chassis and arranged to distribute said fuel precipitate in substantially equal amounts to both sides of the transverse engine plane containing the axis of said primary conducting means, said lateral runners communicating with the engine intake ports and each having a different inclination with respect to the horizontal plane of said chassis.

4. An intake manifold structure for a multi-cylinder internal combustion engine having a longitudinal axis inclined to the normal horizontal plane of the chassis by which said engine is supported, said engine having intake ports associated with the engine cylinders, said manifold structure including a primary fuel mixture conducting means, a distributing chamber including a puddling chamber having a rim, and oppositely extending lateral runners communicating with said distributing chamber and extending sub-

stantially longitudinally of the engine, said lateral runner communicating with the engine intake ports, the floor and rim of the puddling chamber extending substantially parallel with the normal horizontal plane of said chassis, said wet fuel precipitate uniformly spreading over the floor of said puddling chamber in substantially equal amounts to both sides of the transverse engine plane containing the axis of said primary conducting means, said lateral runners communicating with the engine intake ports and each having a different inclination with respect to the horizontal plane of said chassis and inclined downwardly towards the ends of the engine.

5. An intake manifold structure for a multi-cylinder internal combustion engine having a longitudinal axis inclined to the normal horizontal plane of the chassis by which said engine is supported, said engine having intake ports associated with the engine cylinders, and provided with a fuel mixture forming and distributing device, said manifold structure including a distributing chamber, a primary fuel mixture conducting means extending downwardly from said device and opening into said chamber, and oppositely extending lateral runners communicating with said chamber and extending substantially longitudinally of the engine for conducting the fuel mixture to the engine, said distributing chamber including a puddling chamber having a recessed floor directly opposite to the outlet of said primary fuel mixture conducting means for collecting fuel precipitate and extending substantially parallel with the normal horizontal plane of said chassis, the edges of said puddling chamber being arranged to lie in a common plane extending substantially parallel to the normal horizontal plane of the chassis.

6. An intake manifold structure for a multi-cylinder internal combustion engine having a longitudinal axis inclined to the normal horizontal plane of the chassis by which said engine is supported, said engine having intake ports associated with the engine cylinders, and provided with a fuel mixture forming and distributing device, said manifold structure including a distributing chamber, a primary fuel mixture conducting means extending downwardly from said device and opening into said chamber, and oppositely extending lateral runners communicating with said chamber and extending substantially longitudinally of the engine for conducting the fuel mixture to the engine, said distributing chamber including a puddling chamber having a recessed floor for collecting fuel precipitate and extending substantially parallel with the normal horizontal plane of said chassis, said lateral runners each having a different inclination with respect to the horizontal plane of said chassis, the edges of said puddling chamber being arranged to lie in a common plane extending substantially parallel to the normal horizontal plane of the chassis.

7. An intake manifold structure for a multi-cylinder internal combustion engine having a longitudinal axis inclined to the normal horizontal plane of the chassis by which said engine is supported, said engine having intake ports associated with the engine cylinders, and provided with a fuel mixture forming and distributing device, said manifold structure including a distributing chamber, a primary fuel mixture conducting means extending downwardly from said device and opening into said chamber, and oppo-

sitely extending lateral runners communicating with said chamber and extending substantially longitudinally of the engine for conducting the fuel mixture to the engine, said distributing chamber including a puddling chamber having a recessed floor for collecting fuel precipitate and extending substantially parallel with the normal horizontal plane of said chassis, said lateral run-

ners each having a different inclination with respect to the horizontal plane of said chassis, and inclined downwardly towards the ends of the engine, the edges of said puddling chamber being arranged to lie in a common plane extending substantially parallel to the normal plane of the chassis. 5

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