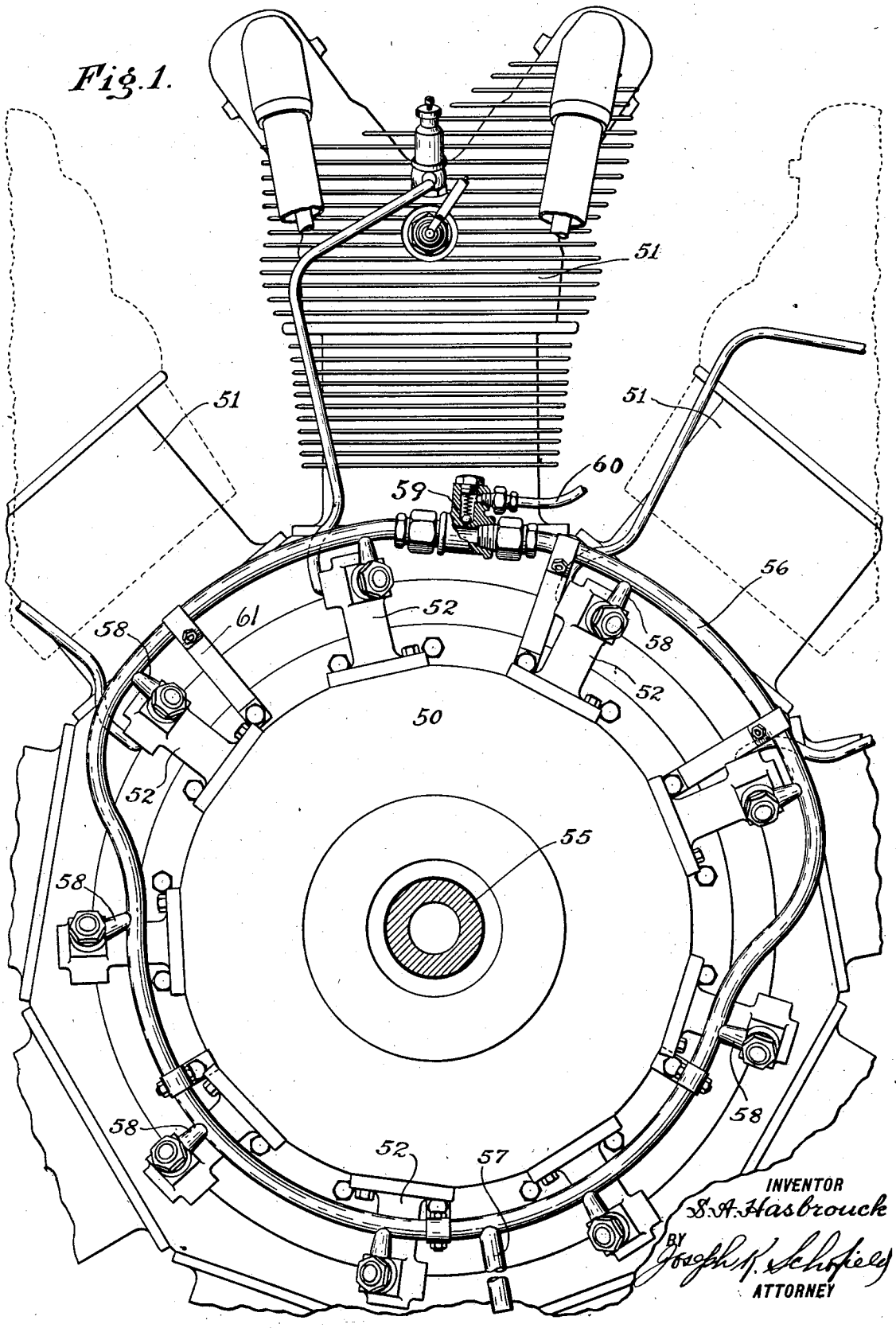
July 10, 1934. S. A. HASBROUCK 1,966,032

INLET MANIFOLD FOR LIQUID FUEL

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Fig. 1.



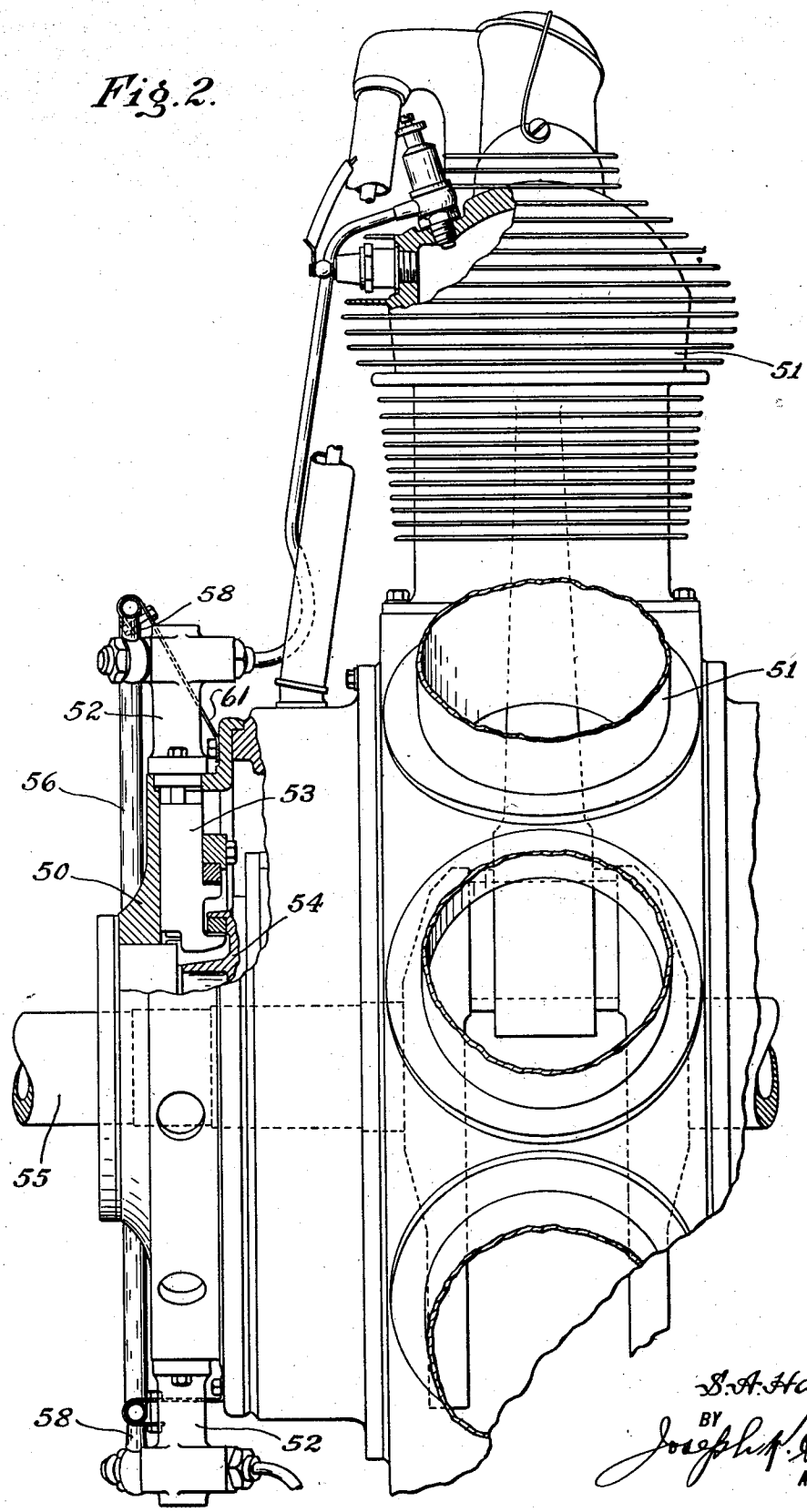
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Fig. 2.



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UNITED STATES PATENT OFFICE

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INLET MANIFOLD FOR LIQUID FUEL

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Application October 31, 1930, Serial No. 492,426

6 Claims. (Cl. 123—139)

This invention relates to inlet systems for internal combustion engines and particularly to fuel admitting means for such engines of the solid injection type.

An object of the present invention is to provide an improved inlet manifold adapted to admit liquid fuel to the combustion chambers of a multiple cylinder internal combustion engine and which will eliminate the possibility of admitting entrapped air or other gases therewith.

Another object of the invention is to provide a vertically disposed annular manifold or conduit adapted particularly for radial engines, the manifold having a fuel admitting connection at its lowermost point, an outlet or exhausting means at its uppermost point, and spaced individual connections for admitting the liquid fuel to the combustion chambers of the engine so that the combustion chambers of an engine may constantly be supplied with liquid fuel unmixed with air.

Another feature of importance is that the individual connections between the manifold and the pumps forcing the liquid fuel into the combustion chambers are so arranged that any air or gas that may be entrapped within the manifold and connections will not be admitted to the individual pumps but will be allowed to pass upwardly along the conduit and exhaust out through the uppermost portion.

With these and other objects in view, my invention includes the features of construction and operation set forth in the following specification and illustrated in the accompanying drawings.

In the accompanying drawings annexed hereto and forming a part of this specification, I have shown my invention embodied in a fuel injection internal combustion engine of the radial type, but it will be understood that the invention can be otherwise embodied and that the drawings are not to be construed as defining or limiting the scope of the invention, the claims appended to this specification being relied upon for that purpose.

In the drawings:

Figure 1 is a front elevation of an engine showing an embodiment of the present invention applied thereto, and

Fig. 2 is a side elevation thereof showing parts in cross section to more clearly indicate their construction.

In the above mentioned drawings I have shown but one embodiment of the invention which is now deemed preferable, but it is to be understood that changes and modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

In internal combustion engines utilizing liquid fuel and of the solid injection type, it is essential, in order to properly govern the quantities of fuel admitted to the combustion chambers, to eliminate the possibility of any air or other gases remaining within the fuel inlet system. The present invention is shown applied to an internal combustion engine having individual pumps for supplying liquid fuel to each comubstion chamber separately from the supply of air necessary for its combustion. Each of these fuel pumps obtains its supply of liquid from the same annular manifold or conduit, which forms a principal element of the present invention. Any air or other gas may pass about the manifold and be exhausted therefrom without entering any pump or otherwise interfering with the successful operation of the device.

Referring more in detail to the figures of the drawings, I provide an engine frame member 50 having radially disposed cylinders 51 with individual pump body members 52. Each of these pumps 52 is rigidly fastened to the engine frame member 50 and is actuated as by means of the impact member 53 shown clearly in cross section in Fig. 2. As the particular form of pumps 52 and their actuating means 53 form no part of the present invention, it is not thought that a detail description is necessary. It may suffice to state that a rotatable cam 54 concentric with the main crank shaft 55 of the engine is provided, which controls movements of the pump actuator or plunger, regulating means being also provided governing the emission of fluid by the pump 52 in accordance with the demands of the engine.

In order to supply fluid to these pumps 52 in sufficient volume and in a manner to eliminate the possibility of air becoming entrapped therein, the pumps 52 are individually connected to an annular manifold or conduit 56. This manifold or irregular ring 56 is disposed vertically surrounding the engine frame member 50 and has, at its lowermost portion, a connection 57 to a suitable source of liquid fuel under pressure such as that shown in my copending application 462,307 filed June 19, 1930. Fluid admitted to the manifold 56 through this connection 57 as by a suitable pump completely fills the conduit from which it may be admitted to the individual pumps 52 through spaced connections 58. Any gases entrapped within the manifold may exhaust upward through the manifold and pass a valve 59 into a conduit 60

by means of which it may be returned to the main tank or other suitable source of supply.

Each of the connections 58 between the manifold 56 and the pumps 52 is so disposed that passage of the fluid into the pumps 52 must be downward in each case into the intake of the pump 52, thus eliminating the possibility of any air within the manifold 56 from passing into a pump 52. Any air admitted through the inlet connection 57 for the manifold 56 is free to circulate within the manifold upwardly by reason of its buoyancy into and through the by-pass valve 59 at the uppermost portion. From this valve 59 the air or gas may pass into the return conduit 60 with the excess fluid being returned to the main tank. To secure the manifold 56 in position upon the engine a number of spaced straps 61 are provided secured at one end to the frame member 50 that opposite ends to the manifold 56.

What I claim is:

1. A fuel supply system for multi-cylinder internal combustion engines comprising in combination, a source of fuel, a manifold of open ring form connected to said source, individual downwardly extending outlets from said manifold to injection pumps for forcing fuel to the engine cylinders, and means to withdraw excess fuel from said manifold and free said manifold of entrapped air.

2. A fuel supply system for radial type multi-cylinder internal combustion engines comprising in combination, a source of fuel, a manifold of open ring form connected to said source and disposed substantially concentric with the cylinders of said engine, individual outlets from said annular manifold to fuel pumps of said engine, and means connected to said manifold to withdraw excess fuel and entrapped air therefrom.

3. A fuel supply system for multi-cylinder internal combustion engines comprising in combination, a manifold of open ring form, means to admit fuel thereto, a plurality of cylinders associated with said manifold, individual connections to admit fluid from said manifold to each of said cylinders, fuel injection pumps in said connections downwardly extending intakes from said manifold to said pumps, and outlet means at the uppermost portion of the manifold whereby air within said manifold may escape.

4. A fuel supply system for multi-cylinder internal combustion engines comprising in combination, a manifold of open ring form, means to continuously admit fuel thereto, a plurality of fuel pumps associated with said manifold, individual connections from said manifold to each of said pumps, and means whereby excess fuel and entrapped air within said manifold may be withdrawn from an upper portion thereof.

5. A fuel supply system for multi-cylinder internal combustion engines of the radial type comprising in combination, a manifold of open ring form, means to admit liquid to the lowest part thereof, means to withdraw liquid and entrapped air from the highest point thereof, pumps associated with said manifold and individual connections thereto spaced about said ring for admitting fuel to the engine, whereby entrapped air may flow from said pumps into said manifold and be exhausted therefrom.

6. A fuel supply system for radial type internal combustion engines comprising in combination, a manifold of open ring form disposed in a plane adjacent and parallel to said cylinders, means to admit liquid thereto at its lowest part, means for withdrawal of excess liquid and entrapped air from the highest point thereof, pumps associated with said manifold for forcing liquid from said manifold to combustion chambers of an engine, and individual downwardly extending connections from said manifold to said pumps spaced about said ring, whereby air within said system may flow from said pumps into said manifold and be exhausted therefrom.

STEPHEN A. HASBROUCK.