D. P. DAVIES.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED OCT. 1, 1919.

1,417,804. Patented May 30, 1922.

Fig. 1.

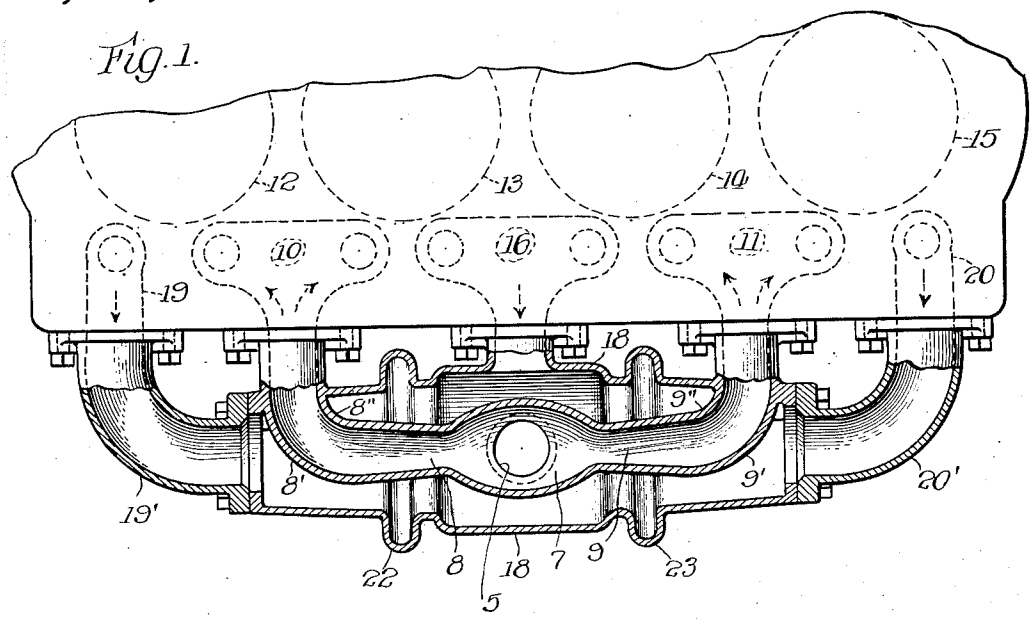
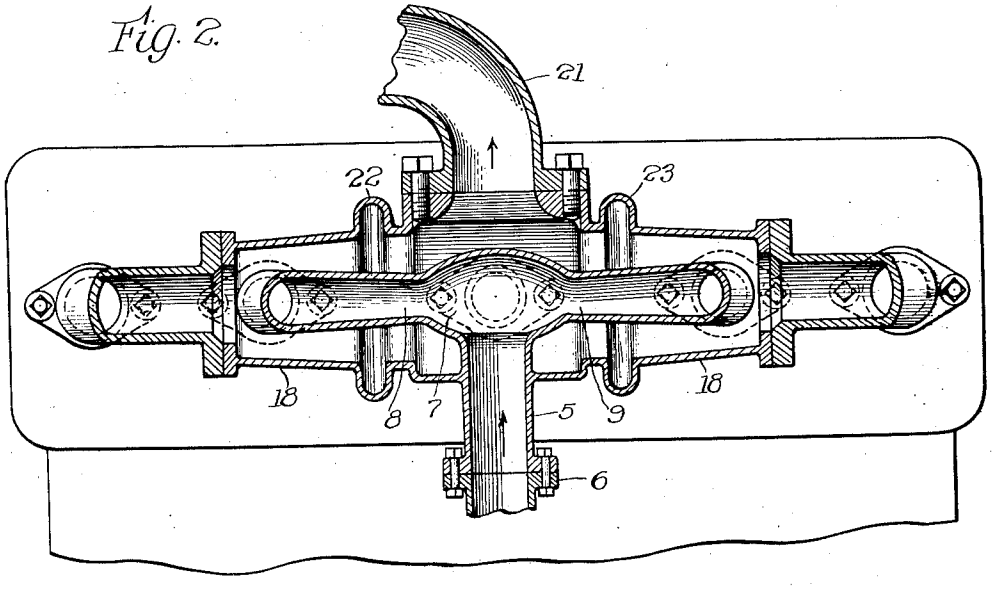


Fig. 2.



Witness:
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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

1,417,804. Specification of Letters Patent. Patented May 30, 1922.

Application filed October 1, 1919. Serial No. 327,803.

To all whom it may concern:

Be it known that I, DAVID P. DAVIES, a citizen of the United States, residing at Racine, in the county of Racine and State of Wisconsin, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

My invention relates to improvements in internal combustion engines, my object being to obtain a high degree of fuel vaporization by maintaining constantly heated surfaces with which the fuel particles come in contact, which heated surfaces are so arranged as to give the fuel mixture high velocity in its travel, and thus break up or dissipate the heavier fuel particles and reduce the mixture to thorough gaseous condition, all as will be hereinafter more particularly pointed out.

In the accompanying drawing, which forms a part hereof, Figure 1 is a horizontal sectional view through an engine manifold, the position of the cylinder and inlet and exhaust valves being indicated by dotted lines, and Fig. 2 is a vertical sectional view through the manifold showing the mixture inlet and exhaust outlet.

In said drawing, the portion marked 5 indicates the fuel mixture inlet, which is connected to a carbureter, as at 6, in a well known manner, said mixture inlet leading to and connecting with an enlarged mixing chamber, 7, for expansion of the mixture before the same passes in opposite directions through the Venturi tubes, 8 and 9, and conducted thereby to the inlets, 10 and 11, of the engine, which, as will be understood, communicate with the engine cylinders, 12, 13, 14 and 15. The exhaust outlet, 16, communicates with and leads from the cylinders 13, 14 to the jacket, 18, of the exhaust manifold, and similar exhaust outlets, 19, 20, communicate with and lead from the end cylinders 12, 15 to said jacket 18, from which latter the gases are discharged through the main exhaust pipe, 21. In said jacket 18 I prefer to form channels, 22, 23, to take care of the difference in expansion between said jacket and the tubes 8 and 9.

The fuel and air furnished by the carbureter pass through the mixture inlet 5 and into chamber 7, which latter is maintained at high temperature by the exhaust gases discharging from the engine through exhaust outlets 16, 19, 20, which gases impinge upon the outer walls of the inner inlet manifold comprising the expansion chamber 7, and tubes 8, 9. This heat being constantly applied to said chamber so affects the mixture flowing thereinto from the carbureter that expansion of said mixture occurs, and the same passes through the throats of the Venturi tubes 8, 9, the result being a very high velocity at this point, which materially assists in the intermingling of the fuel particles with the air. The fuel and air thus passing through the Venturi tubes is caused to be increased in its velocity as it reaches the bends or elbows, 8′ and 9′, leading from said tubes, the result being that the heavier particles are thrown to the outer radius of the elbows with considerable force, while the lighter particles and gasified fuel pass around the elbows 8″ and 9″ of the smaller radius, and through inlets 10, 11. The heavier fuel particles, however, as indicated, strike the bends 8′, 9′, at considerable velocity and become broken up in finer particles, and as the surfaces of the bends are kept hot by the impinging exhaust gases which constantly pass through the exhaust elbows, 19′ and 20′, into jacket 18, these finer particles become gasified at that point.

In the manner described the exhaust gases from the engine constantly heat the Venturi tubes, and also the walls of the expansion chamber 7, so that the fuel mixture from the carbureter flowing into said chamber is sufficiently heated to create the proper gas to be taken into the engine through its inlets as indicated; and it is also readily apparent by reference to Fig. 1 that said expansion chamber and Venturi tubes, comprising the inner inlet manifold, are enclosed within the outer manifold jacket, so that the exhaust gases entering into said outer manifold circulate about said inner manifold and constantly uniformly heat the same to gasify the fuel from the carbureter. It will also be understood that in vaporizing fuel the time element is important, that is, the longer time the fuel particles can remain in contact with heated surfaces the more thorough vaporization will take place, and, as fuel particles are always heavier than the air with which they are mixed, when passing around the bends at high velocity, they will be thrown out toward the larger radius of the bends by centrifugal force, and thus be subjected to the

heat from the exhaust elbows 19′, 20′ in the manner stated.

I am aware that the Venturi tube principle has been proposed in the development of fuel vaporizers, but my improvement, comprising an enlarged expansion chamber having such tubes communicating therewith for conducting the vaporized fuel therefrom at high velocity, and so arranged that the exhaust gases from cylinders 13, 14, impinge directly upon said chamber, and those from cylinders 12, 15, impinge directly upon the elbows of such tubes, has proven in extensive practice to be a highly efficient arrangement for quickly and thoroughly vaporizing such fuel as kerosene and the like, and reducing the particles of such fuel mixtures to a thoroughly gasified condition. It is essential to provide the channels 22, 23, in jacket 18 to take care of the expansion and contraction of said jacket during the varying changes of temperature created by the fuel circulating therein and the intense heat of tubes 9, as will be understood.

I claim as my invention:

1. The combination, with an internal combustion engine, of a manifold comprising a jacket having channels integrally formed in its walls to permit expansion and contraction thereof, an expansion chamber therein for the reception of a fuel mixture, and Venturi tubes communicating with said chamber and extending laterally from each side thereof, said tubes terminating in curved formation and communicating with said engine.

2. The combination, with an internal combustion engine, of a manifold having means at its middle and two end portions for the reception of exhaust gases from said engine, said manifold embodying channels at each side of its middle portion for permitting expansion and contraction of its walls and a manifold in said first mentioned manifold having an expansion chamber and tubes leading therefrom to said engine, said tubes gradually enlarging and curving, for the vaporization and discharge of a fuel mixture into said engine.

3. The combination, with an internal combustion engine, of an exhaust manifold having channels in its walls, and a fuel vaporizing and inlet manifold in said exhaust manifold comprising an enlarged mixing chamber and Venturi tubes leading therefrom and communicating with said engine, said tubes being curved so that the gas from said exhaust manifold will impinge upon the outer curved portion thereof.

In testimony whereof I affix my signature.

DAVID P. DAVIES.