July 2, 1940. M. LAGUZZI 2,206,258

IMPELLER

Filed April 3, 1939

FIG. 1.

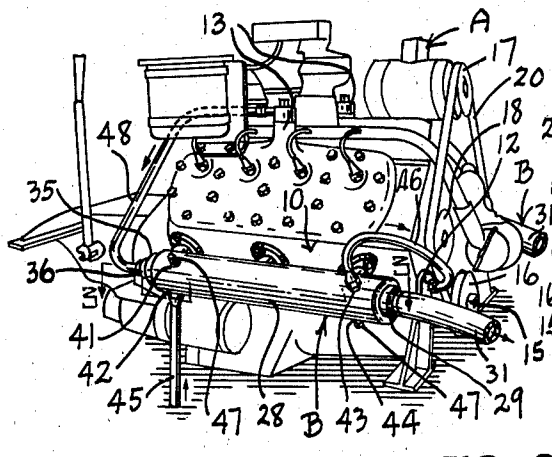


FIG. 2.

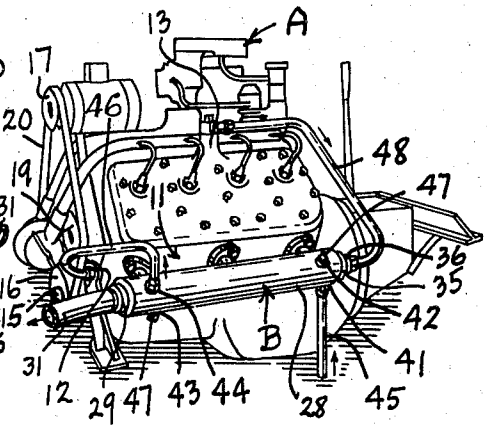


FIG. 3.

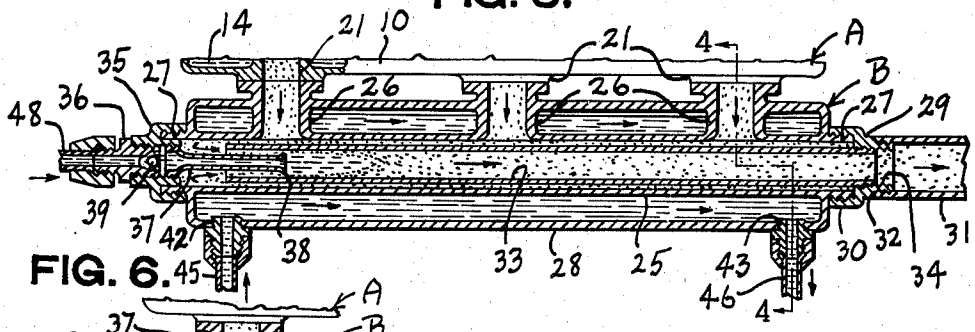


FIG. 6.

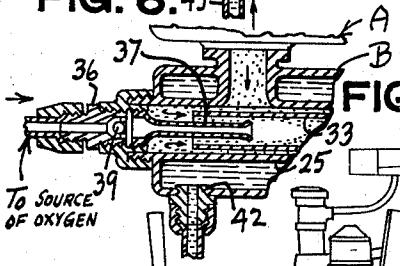
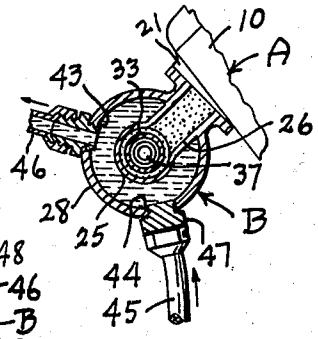


FIG. 5.

FIG. 4.



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IMPELLER

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9 Claims. (Cl. 123—175)

The invention relates to improvements in impellers particularly well adapted for use in conjunction with open circulatory temperature regulating systems, such as the water cooling systems of internal combustion engines especially for marine engines.

In open circulatory systems, where the temperature regulating medium is drawn from an unenclosed mass of heat-conducting fluid, such as the body of water on which a motor vessel floats, it has been found advantageous to pre-heat the temperature regulating medium before it is permitted to enter the engine jacket, and to eliminate the temperature regulating medium by discharging the same along with the exhaust products of combustion of the engine.

The satisfactory performance of a marine engine is greatly dependent on proper circulation of the temperature regulating medium, which is difficult to economically and permanently provide with the usual types of power-driven pumps. These pumps exert a pressure which cannot be controlled by any commercial form of thermostat of which I am aware.

An important object of the invention is to provide a fluid impeller deriving its power from a stream of fluid, such as the exhaust gases emanating from an internal combustion engine, and capable of impelling a greater amount of fluid than an injector embodying a Venturi contraction.

Another object resides in the provision of a fluid impeller capable of injecting an oxygen-containing mixture, such as air, into the exhaust stream in order to minimize the danger of carbon monoxide.

A further object of the invention is to provide means to pre-heat a temperature regulating fluid, means to introduce the heated fluid into the circulatory system of an internal combustion engine, and means to subsequently discharge the fluid into the exhaust stream of an internal combustion engine.

A still further object is the provision of means of the character described which is so constructed as to form an exhaust silencer.

Yet another object of the invention is to provide power to operate a suction actuated accessory, if desired.

The invention also aims to provide a combined exhaust manifold, fluid pre-heater, and fluid impeller which may be applied to a marine internal combustion engine that is installed in a forward or a reverse position, and so that the exhaust gases are directed from either end of the engine.

A further object of the invention resides in the provision of a combined exhaust manifold, fluid pre-heater, and fluid impeller which may be applied to either the right or left bank of cylinders of a V-type engine.

Other objects and advantages of the invention will become apparent during the course of the following detailed description, taken in connection with the accompanying drawing, forming a part of this specification and in which drawing:

Figure 1 is a perspective view of a Ford V–8 marine internal combustion engine looking toward the right bank of cylinders and showing the combined exhaust manifold, fluid pre-heater and impeller secured thereto in a manner whereby the exhaust gas is piped from the crank end of the engine.

Figure 2 is a perspective view of the same engine looking toward the left bank of cylinders and showing a companion assembly secured thereto.

Figure 3 is a longitudinal sectional view through the manifold, pre-heater and impeller substantially along the line 3—3 of Figure 1.

Figure 4 is a cross-sectional view substantially along the line 4—4 of Figure 3.

Figure 5 is a perspective view of the same engine looking toward the right bank of cylinders and showing the manifold, pre-heater and impeller assembly secured thereto in a manner whereby the exhaust gas is piped from the drive end of the engine.

Figure 6 is a fragmentary cross-sectional view of the assembly shown in Figure 3 and showing the impeller as employed to introduce a charge of oxygen or oxygen-containing mixture into the exhaust gases.

In the drawing, which for the purpose of illustration shows only a preferred embodiment of the invention, and wherein similar reference characters denote corresponding parts throughout the several views, the letter A generally designates an internal combustion engine provided with the manifold, pre-heater and impeller assembly B.

In the example shown, the engine A comprises a converted Ford V–8 marine engine, having right and left banks 10—11 of cylinders, of the usual jacketed construction and provided with individual inlets 12 and outlets 13 permitting of circulation of a suitable temperature regulating fluid 14, usually water, through the banks of cylinders.

Secured to the crankshaft at the crank end 15 of the conventional Ford V–8 engine is a pulley 16 for driving a generator pulley 17 and water-pump pulleys 18—19. The usual water-pumps (not shown) for circulating water through the right and left banks of cylinders may be removed or suitably disconnected although the pulleys 18—19 may be retained, if desired, so as to serve as guides for the belt 20 that turns the generator pulley. It will of course be understood that the water-pumps themselves may be retained, if desired, for use in conjunction with a conventional soft water engine cooling circuit (not shown) such as is employed in power plants for boats operating on salt water, wherein the salt water acts as a cooling medium for the soft water circuit, in order to prevent contact of injurious salt water with the engine.

The Ford engine A selected to illustrate the present invention is provided with three exhaust gas outlets 21 in the exterior wall of each bank of cylinders but it will be understood that the number and arrangement of exhaust outlets may vary.

Referring to the assembly B, the same may include an elongate tubular pipe 25 forming the main passageway of the manifold, lateral pipes 26 from the engine exhaust outlets 21 communicating with the elongate pipe 25 intermediate its exteriorly screw-threaded end portions 27, a tubular jacket 28 surrounding the intermediate portion of the elongate pipe 25, a coupling 29 having an interiorly screw-threaded end portion 30 for attachment to either one of the end portions 27 of the manifold pipe 25, an exhaust pipe 31 for attachment to the exteriorly threaded opposite end portion 32 of the coupling, and a tubular sleeve 33 of uniform cross-section for attachment to the screw threaded interior 34 of the coupling so as to be disposed in spaced relation within the manifold pipe 25. It will be noted from an inspection of Figure 3 that, in order for exhaust gases, diagrammatically represented by the dotted areas in the drawing, to reach the exhaust pipe 31, they must first pass along an annular channel between the manifold pipe and sleeve and then travel in an opposite direction within the sleeve and throughout its length. Secured to the remaining end portion 27 of the manifold pipe 25 is a coupling 35 provided with a screw-threaded interior for attachment of a suitable pipe joint 36 and a nozzle 37 having a flared end 38. Intermediate its ends, the nozzle 37, when properly attached is disposed in spaced relation inside the sleeve 33 with the flared end 38 disposed in more closely spaced relation within the sleeve. The pipe joint 36 may include a ball check valve 39 to prevent any outward flow of fluid through the joint.

The jacket 28 may be provided with a plurality of tapped openings so that the assembly B may be applied to the engine A, under varying circumstances. As an example, four openings 41–44 may be provided, with two of the openings 41—42 circumferentially spaced at one end portion of the jacket and the remaining two openings 43—44 correspondingly spaced at the other end portion of the jacket.

In applying the assembly B to the right bank of cylinders as shown in Figure 1, the openings 42 and 43 are connected one to an inlet duct 45 in communication with a heat-conducting fluid, such as the body of water on which the motor vessel is supported, and the other to a duct 46 in communication with the inlet 12 to the right bank of cylinders. The remaining openings 41 and 44 are provided with plugs 47. In addition to the foregoing connections, a duct 48 is provided between the outlet 13 of the right bank of cylinders and the pipe joint 36.

In applying the assembly B to the left bank of cylinders, as shown in Figure 2, the openings 41 and 44 are connected one to an inlet duct 45 and the other to a duct 46 in communication with the inlet 12 of the left bank of cylinders, and the openings 42 and 43 are provided with plugs 47. A duct 48 is provided between the outlet 13 of the left bank of cylinders and the pipe joint 36.

In applying the assembly B to the engine A so that the exhaust gases will be conducted from the crank end of the engine, the couplings 29—35 and associated parts are secured to the exteriorly threaded end portions 27 of the manifold pipe, as shown in Figures 1–3. If desired, the exhaust gases may be conducted from the drive end of the engine by reversing the couplings 29—35 and associated parts, as shown in Figure 5.

In the operation of the engine A with the assembly B applied thereto as shown in Figures 1–5, the stream of exhaust gases passing between the sleeve 33 and nozzle 37 will create a zone of suction forwardly of the flared nozzle end, which will draw the heat conducting fluid through duct 48 from the engine and manifold jackets and into the sleeve 33 from whence it will discharge along with the products of combustion of the engine. The hot exhaust gases will transfer a portion of their heat to the fluid in the manifold jacket by conduction through pipe 25, and additional heat will be transferred to the fluid that is introduced into the sleeve 33 through the nozzle.

Referring to Figure 6 of the drawing, it will be noted that the assembly B may be utilized to introduce into the exhaust manifold a supply of oxygen or an oxygen-containing mixture, such as air, whereby to minimize the danger of carbon monoxide in the exhaust gases.

It will therefore be seen that the invention provides improved impeller means particularly well adapted, but not necessarily restricted to use in conjunction with the open circulatory temperature regulating system of a marine engine.

Various changes may be made in the form of invention herein shown and described without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. Means for automatically introducing fluid into the exhaust duct of an internal combustion engine comprising a nozzle having an intake end connected to a source of said fluid exteriorly of said manifold, an intermediate portion and a flared outlet end disposed in spaced relation within the duct and pointing in the direction of flow of the products of combustion.

2. Means for introducing fluid into the exhaust duct of an internal combustion engine having a length of exhaust duct of uniform cross-section, comprising a nozzle having an intake end connected to a source of said fluid exteriorly of said duct, an intermediate portion disposed in spaced relation within said length of duct, and a flared end disposed in more closely spaced relation within said length of duct than the intermediate portion of said nozzle.

3. In a heat exchange system for a marine engine having a jacket, an exhaust manifold, a jacket surrounding the manifold and having an

inlet for a heat-conducting fluid, a duct between the jackets of the exhaust manifold and engine, a sleeve in the exhaust manifold arranged to conduct the products of combustion therefrom, a nozzle disposed in spaced relation within the sleeve and pointing in the direction of travel of the products of combustion, and a duct between the jacket of the engine and the nozzle.

4. The combination with an internal combustion engine having a fluid cooling system, of an exhaust manifold, and means to introduce fluid from said cooling system into the exhaust manifold comprising a sleeve in the manifold arranged to conduct products of combustion therefrom, a nozzle having an inlet end and a discharge end disposed in spaced relation within the sleeve and pointing in the direction of travel of the products of combustion, and a connection between the fluid cooling system of the engine and the inlet end of the nozzle.

5. In an internal combustion engine having a cooling jacket and an exhaust manifold having a surrounding jacket, said manifold jacket having an inlet for heat-conducting fluid, and an outlet, said engine jacket having an outlet, and an inlet connected to the outlet of said manifold jacket, and an injector nozzle in the exhaust manifold having an inlet connected to the outlet of said engine jacket for drawing said heat-conducting fluid through said manifold and engine jackets and into the exhaust manifold.

6. Means for heating a fluid and introducing the heated fluid into the exhaust manifold of an internal combustion engine comprising a jacket surrounding said exhaust manifold having an inlet for connection to a source of said fluid and an outlet, a tubular sleeve disposed in spaced relation within the manifold and arranged to conduct the products of combustion from the manifold, and a nozzle having an intake end for connection to the outlet of said jacket, and an outlet end disposed in spaced relation within the sleeve and pointing in the direction of flow of said products of combustion.

7. In combination with a marine engine having an exhaust manifold and a jacket for cooling fluid for said engine, means for preheating the fluid, delivering the pre-heated fluid to said engine jacket, withdrawing the fluid from said jacket and introducing the fluid into the exhaust manifold of the engine comprising a jacket surrounding the manifold having an inlet for connection to a source of said cooling fluid and an outlet, a tubular sleeve disposed in spaced relation within the manifold and arranged to conduct the products of combustion from the manifold, and a nozzle having an intake end for connection through the jacket of the engine to the outlet of the manifold jacket and an outlet end disposed in spaced relation within the sleeve and pointing in the direction of flow of said products of combustion.

8. For use with an internal combustion engine, an exhaust manifold including inlet passageways for products of combustion and a pair of ports facing in different directions, means for introducing a fluid into the manifold comprising a sleeve, means securing the sleeve to one of said ports with the sleeve arranged to conduct products of combustion therefrom, a nozzle having an inlet end for connection with a source of said fluid, and an outlet end, and means securing the nozzle to the other one of said ports with its discharge end disposed in spaced relation within said sleeve and pointing in the direction of flow of said products of combustion.

9. For use with an internal combustion engine, an exhaust manifold including inlet passageways for products of combustion and a pair of ports facing in different directions, means for heating a fluid and introducing the heated fluid into the manifold comprising a jacket surrounding the manifold and provided with an inlet for said fluid and an outlet, a sleeve, means securing the sleeve to one of said ports with the sleeve arranged to conduct products of combustion therefrom, a nozzle having an outlet end and an inlet connected to the jacket outlet, and means securing the nozzle to the other one of said ports with its discharge end disposed in spaced relation within said sleeve and pointing in the direction of flow of said products of combustion.

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