Dec. 1, 1936. C. M. FRANCISCO ET AL 2,062,509

AUTOMOBILE HEATER

Filed July 17, 1935

Fig. 1.

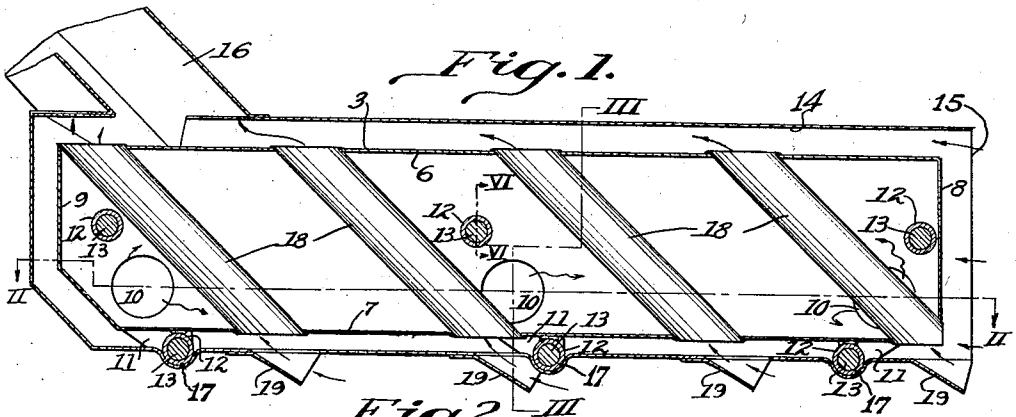


Fig. 2.

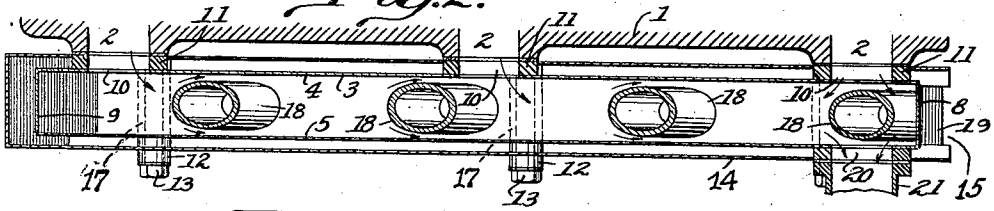


Fig. 3.

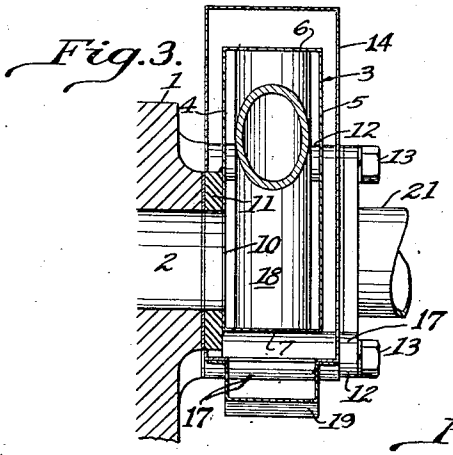


Fig. 5.

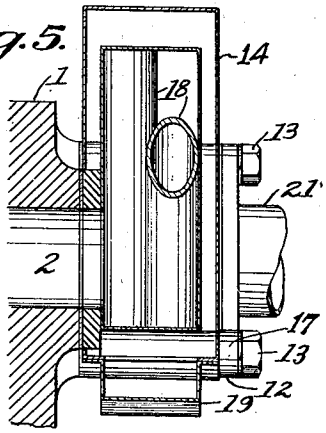


Fig. 4.

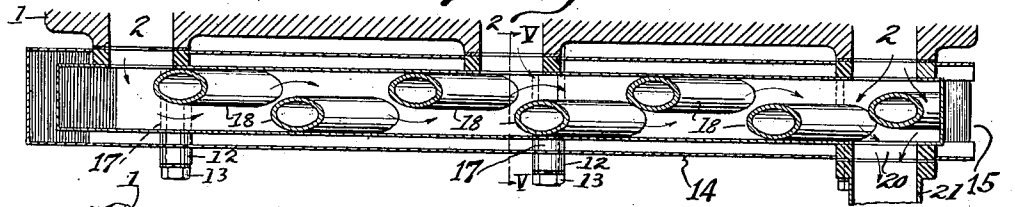
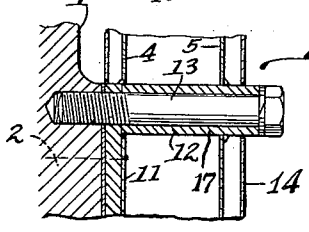


Fig. 6.



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UNITED STATES PATENT OFFICE

2,062,509

AUTOMOBILE HEATER

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Application July 17, 1935, Serial No. 31,848

10 Claims. (Cl. 257—241)

This invention relates to improvements in automobile heaters and has particular reference to that class of heaters utilizing the heat contained in the exhaust gases discharged from the cylinders of a motor vehicle engine for raising the temperature of the air which is delivered by the heater to the passenger compartment of an associated motor vehicle body.

It is a primary object of the present invention to provide a simple, reliable and efficient heater which is adapted to be clamped to the cylinder block of an associated engine in lieu of the ordinary exhaust manifold and wherein the heater is provided internally with air and exhaust gas circulating passages so relatively arranged as to provide effective heat transfer between said gases and the air which is used for heating the interior of the vehicle body.

It is another object of the invention to provide a heater of efficient design from which all movable parts have been eliminated, one which will be safe and efficient to use and operate and one wherein a high degree of heat may be produced within the vehicle passenger compartment and in a shorter period of time than is obtainable with conventional automobile heating appliances.

For a further understanding of the invention, reference is to be had to the following description and the accompanying drawing, wherein:

Fig. 1 is a vertical longitudinal sectional view taken through the combined heater and exhaust gas manifold comprising the present invention;

Fig. 2 is a horizontal sectional view on the line indicated by the line II—II of Fig. 1;

Fig. 3 is a vertical transverse sectional view on the line III—III of Fig. 1;

Fig. 4 is a horizontal sectional view through a slightly modified form of the invention;

Fig. 5 is a transverse sectional view on the line V—V of Fig. 4;

Fig. 6 is a detail vertical sectional view on the plane indicated by the line VI—VI of Fig. 1.

Referring more particularly to the drawing, the numeral 1 designates the cylinder block of an automobile engine. Provided in the block are the longitudinally spaced outlets 2 through which heated exhaust gases pass from the cylinders of the engine to the manifold leading to the muffler. In lieu of employing the conventional manifold, the present invention provides a special type of manifold particularly adapted for use as an air heater and to this end is constructed to provide for greater surface area for the release or removal of heat than exists in the ordinary manifold.

In the preferred form of the invention, the manifold comprises a sheet metal casing 3 of hollow formation and composed of flat substantially rectangular walls. In this instance, the casing includes longitudinally extending, transversely spaced inner and outer substantially vertical side walls 4 and 5 respectively, substantially flat, horizontally extending top and bottom walls 6 and 7 respectively, and front and rear walls 8 and 9 respectively. These walls may be joined by welding or in any other suitable manner to present a gas retaining structure. The inner walls 4 are provided with longitudinally spaced ports 10 which are adapted to communicate with the gas outlets 2 in the cylinder block 1. To provide a firm union, relatively heavy metallic plates 11 are welded or otherwise secured to the inner wall 4 around the ports 10, and the plates 11 are provided with openings registering with said ports. The usual gaskets are disposed between the plates 11 and the side surfaces of the cylinder block 1. Transverse sleeves 12 are carried by the casing and are adapted to receive the attaching bolts 13 which pass through said sleeves and have their inner threaded ends received within sockets provided on the block 1.

Surrounding the manifold is a sheet metal housing 14, which is spaced from the walls of the manifold casing to provide restricted passages for the travel of air over the heated exterior surfaces of the manifold casing. The front of the housing 14 is open to the atmosphere as indicated at 15, while the rear of the housing communicates with a conduit extension 16 which leads to the passenger compartment of the associated motor vehicle body. As shown in Fig. 1, the lower portion of the housing 14 is also provided with welded sleeves 17 for the reception of the securing bolts 13.

To increase the rate of heat transfer between the exhaust gases and the air to be delivered to the passenger compartment, the interior of the manifold casing is provided with a plurality of angularly extending open-ended tubes 18, the latter being disposed within the interior of the casing 3 so that they are subject to direct contact with the heated exhaust gases passing through the manifold. If desired, the bottom of the housing 14 may be provided with a plurality of spaced downwardly and forwardly inclined baffles 19 which are disposed in registration with the lower ends of the tubes 18 and constitute air inlets for effecting a forced flow of air through said tubes. The air thus passing through the tubes becomes heated by contact with the walls thereof, and

upon discharge from the upper ends of the tubes, the heated air is delivered into the housing and merged with the heated air which is contacted with the exterior surfaces of the manifold casing walls, the heated air then flowing through the conduit 16 into the automobile body. At the front of the casing 3, the outer wall 5 is provided with a gas outlet 20 which is adapted to be connected with a pipe 21 leading to the motor vehicle muffler. If desired, as shown in Fig. 4, a multiplicity of the tubes 18 may be used. In this form of the invention, the tubes are of somewhat smaller diameter than that disclosed in the preferred form but because of their greater number present increased surface area for heat exchange.

In view of the foregoing, it will be seen that the present invention provides a simple, readily installed, safe and efficient heater for rendering the operation of motor vehicles comfortable in periods of cold weather. The heater comprising the present invention is devoid of moving or delicate parts which are likely to become out of order and require frequent attention and repair. By being located directly along the side of an engine block, the heater receives the exhaust gases when the latter possess a very high temperature. Then, by the provision of a mechanically efficient heat exchanger wherein a novel arrangement of elements is present to provide increased surface for heat exchange, a mechanism is presented by which during ordinary operation of a motor vehicle, a steady and assured flow of air is caused to travel through the heat exchanger, removing heat from the exhaust gases and using this otherwise waste heat for the useful purpose of enhancing the comfort of the vehicle occupants.

We are aware that the prior art discloses manifold heaters wherein the heater comprises a casing which surrounds a conventional exhaust manifold. For instance, as disclosed in the Patent to J. B. Francisco, No. 1,284,643 dated Nov. 12, 1918.

The present invention, however, differs from such prior constructions chiefly through the provision of the specially constructed manifold by which more effective use is made of the heated exhaust gases for heat transfer purposes, particularly by bringing the air to be heated into more intimate and extended contact with thin metallic surfaces heated through the exhaust gases. These improved results are also attained with complete safety to the vehicle occupants, since it is impossible for the engine exhaust gases to commingle with the air used for supplying heat, since the manifold parts are securely welded and tested under pressure for possible leaks, with the result that a strong homogeneous structure is presented well adapted for the purposes set forth. Again, the heater has the advantage of being easily and readily connected with an automobile engine without altering or changing the construction of the latter, and, in fact, may be applied with the same facility and simplicity as is obtainable in connecting the exhaust manifold of the conventional design with an engine cylinder block.

It will be understood that various changes may be made in the construction of the heater mechanism from the disclosures set forth in the accompanying drawing and described above without departure from the spirit and scope of the following claims.

For instance, the inlets 19 may be closed and all of the air entering the heater will be obtained through the open front end thereof. The present heater is particularly adapted for engines having high compression ratios in which, due to the thermal efficiency thereof, the temperature of the exhaust gases is considerably lower than that of engines of lower compression ratio.

What is claimed is:

1. An automobile heater comprising a manifold casing formed to be directly secured to the side of an engine to receive therefrom heated exhaust gases, spaced open-ended tubes arranged angularly with respect to the vertical and passing through said manifold from the top to the bottom thereof and around which tubes the heated exhaust gases pass while traveling through said casing, a gas outlet at one end of said casing, and a sheet metal housing surrounding said manifold and secured to the side of said engine in spaced relationship from the walls of said manifold, said housing being open at its front end and being adapted to communicate at its rear end with the interior of a motor vehicle body.

2. In an automobile heater, a manifold casing formed to be directly attached to the side of an internal combustion engine to receive from said engine the highly heated exhaust gases issuing from the cylinders thereof, said manifold including a thin sheet metal body having one of the side walls thereof ported to provide gas inlets and the opposite side thereof provided with a single port for the discharge of exhaust gas from the manifold, a plurality of open-ended tubes passing through said manifold casing from the top to the bottom thereof, said tubes being arranged at an angle other than vertical, a sheet metal housing secured to said engine and surrounding said manifold in spaced relation with respect to the walls thereof, said housing being open at its front to the atmosphere, and a conduit leading from the rear of said housing adapted to deliver heated air to the passenger compartment of an associated motor vehicle body.

3. In an automobile heater, a manifold casing formed to be directly attached to the side of an internal combustion engine to receive from said engine the highly heated exhaust gases issuing from the cylinders thereof, said manifold including a thin sheet metal body having one of the side walls thereof ported to provide gas inlets and the opposite side thereof at the forward end of the casing provided with a single port for the discharge of exhaust gas from the manifold, a plurality of diagonally extending open-ended tubes passing through said manifold casing from the top to the bottom thereof, a sheet metal housing secured to said engine and surrounding said manifold in spaced relation with respect to the walls thereof, said housing being open at its front to the atmosphere, and a conduit leading from the rear of said housing adapted to deliver heated air to the passenger compartment of an associated motor vehicle body.

4. In an automobile heater, a manifold casing formed to be directly attached to the side of an internal combustion engine to receive from said engine the highly heated exhaust gases issuing from the cylinders thereof, said manifold including a thin sheet metal body having one of the side walls thereof ported to provide gas inlets and the opposite side thereof at the forward end of the casing provided with a single port for the discharge of exhaust gas from the manifold, a plurality of angularly extending open-ended

tubes passing through said manifold casing from the top to the bottom thereof, a sheet metal housing secured to said engine and surrounding said manifold in spaced relation with respect to the walls thereof, said housing being open at its front to the atmosphere, a conduit leading from the rear of said housing adapted to deliver heated air to the passenger compartment of an associated motor vehicle body, and a plurality of air inlets provided in the lower portion of said housing and arranged in registration with the lower open ends of said tubes.

5. An automobile heater comprising a manifold casing formed to be directly secured to the side of an engine to receive heated exhaust gases therefrom, longitudinally spaced open-ended tubes passing through said manifold from the bottom rearwardly and upwardly to the top thereof, a gas outlet adjacent one end of said casing, and a sheet metal housing surrounding said manifold and secured to the engine in spaced relationship from the walls of said manifold, said housing being open at its front end and being adapted to communicate at its rear end with the interior of a motor vehicle body.

6. An automobile heater comprising a manifold casing formed to be directly secured to the side of an engine to receive heated exhaust gases therefrom, an angularly extending open ended tube passing through said manifold from the top to the bottom thereof, the lower end of said tube being positioned in advance of the top end thereof, a gas outlet at one end of said casing, and a sheet metal housing surrounding said manifold and secured to the side of the engine in spaced relationship from the walls of said manifold, said housing being open at its front end and being adapted to communicate at its rear end with the interior of a motor vehicle body.

7. An automobile heater comprising a manifold casing formed to be directly secured to the side of an engine to receive heated exhaust gases therefrom, an angularly extending open ended tube passing through said manifold from the top to the bottom thereof, a gas outlet at one end of said casing, a sheet metal housing surrounding said manifold and secured to the side of the engine in spaced relationship from the walls of said manifold, said housing being open at its front end and being adapted to communicate at its rear end with the interior of a motor vehicle body, and a baffle carried by said housing in registration with said tube to direct air thereinto to be heated.

8. An automobile heater comprising a manifold casing formed for attachment to the side of an engine to receive exhaust gases therefrom, a plurality of longitudinally and laterally spaced diagonally extending open ended tubes passing through said manifold from top to bottom thereof, the lower ends of said tubes being positioned in advance of the upper ends, a gas outlet at one end of said casing, and a sheet metal housing surrounding said manifold and secured to the side of said engine in spaced relationship from the walls of said manifold, said housing being open at its forward end and being adapted to communicate at its rear end with the interior of a motor vehicle body.

9. An automobile heater comprising a manifold casing formed for attachment to the side of an engine to receive exhaust gases therefrom, a plurality of longitudinally spaced diagonally extending open ended tubes passing through said manifold from top to bottom adjacent one side wall thereof, additional tubes extending parallel to said first tubes and arranged adjacent the other wall of said manifold, a gas outlet at one end of said manifold, and a sheet metal housing surrounding said manifold and spaced therefrom, the forward end of said housing being open and the rear end being adapted to communicate with the interior of a motor vehicle body.

10. An automobile heater comprising a manifold casing formed for attachment to the side of an engine to receive exhaust gases therefrom, a plurality of spaced diagonally extending open ended tubes passing through said manifold from top to bottom, each of said tubes being positioned substantially in engagement with one of the side walls of said casing, each tube being positioned on the opposite wall from its adjacent tubes, a gas outlet in said casing, and a thin metallic housing surrounding said manifold and spaced therefrom, the front end of said housing being open and the rear end being adapted to communicate with the interior of a motor vehicle body.

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