July 20, 1937. C. M. FRANCISCO 2,087,617

AUTOMOBILE HEATER

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Fig. 1.

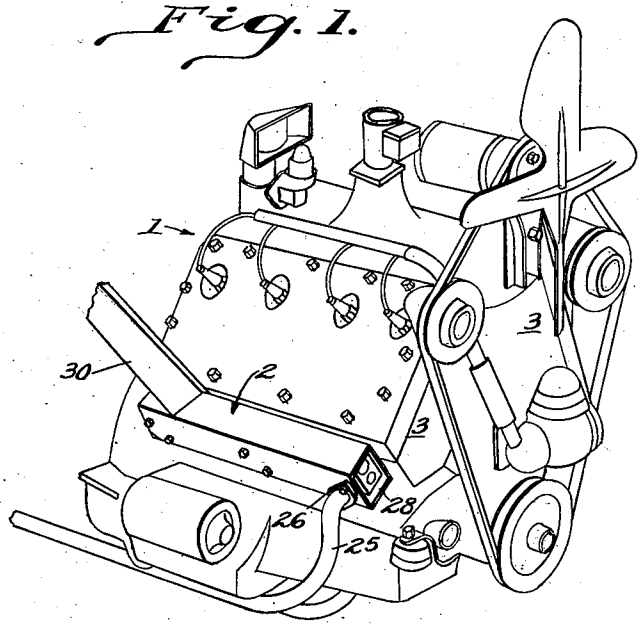


Fig. 2.

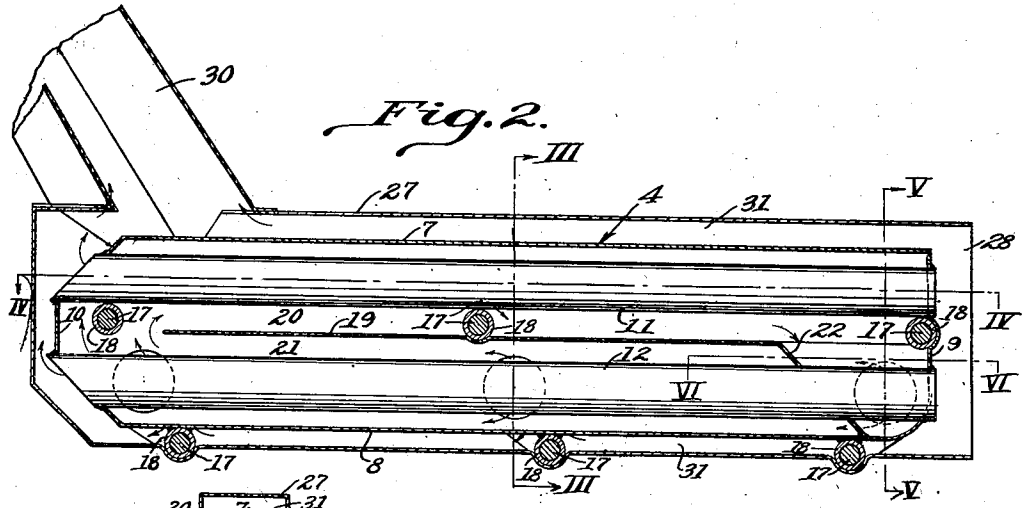
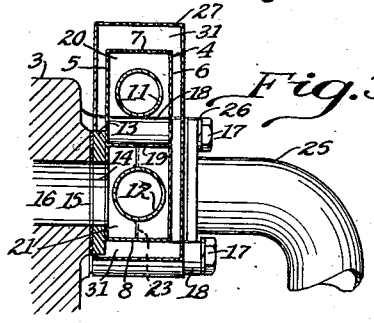


Fig. 3.



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Fig. 4.

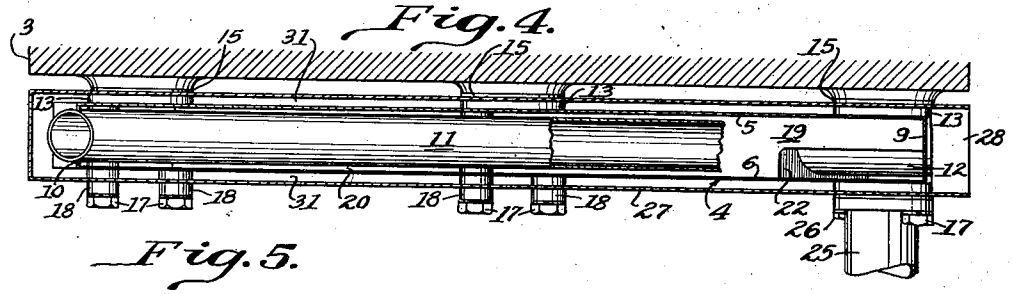


Fig. 5.

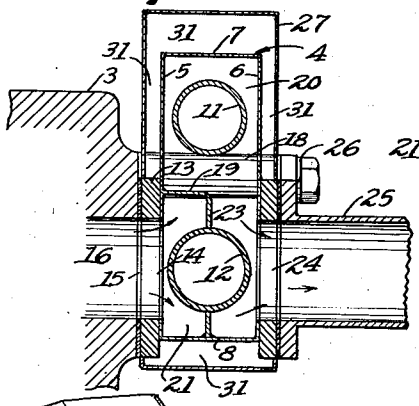


Fig. 6.

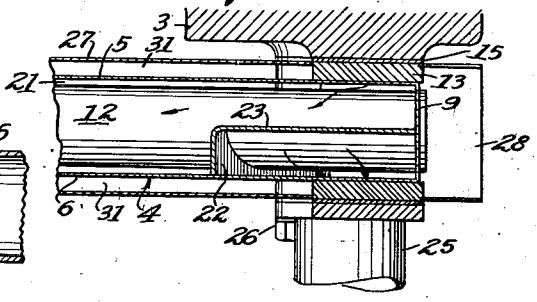


Fig. 7.

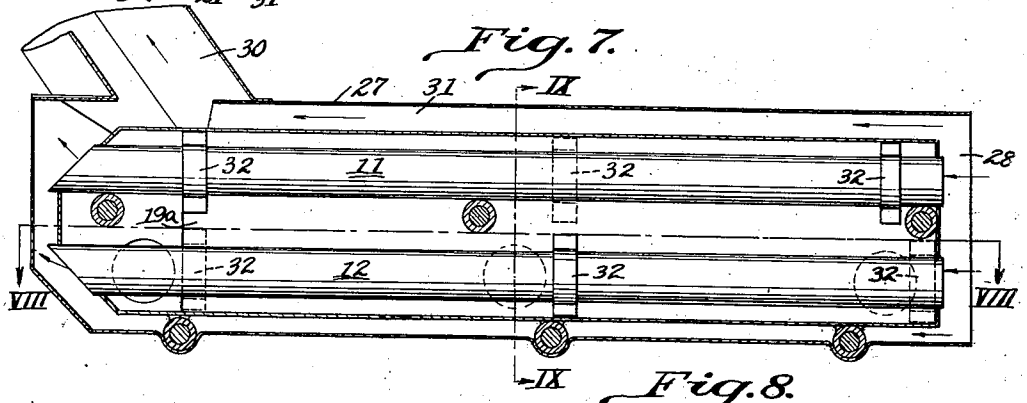


Fig. 8.

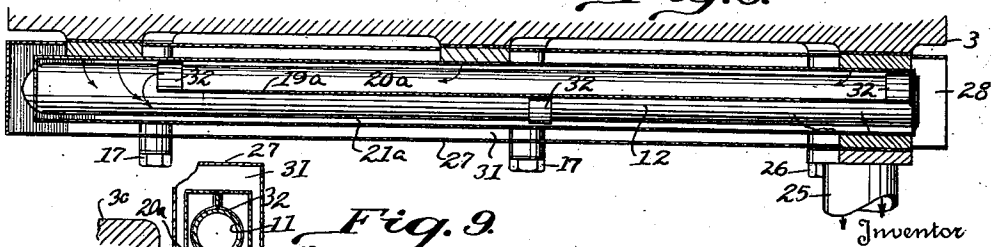
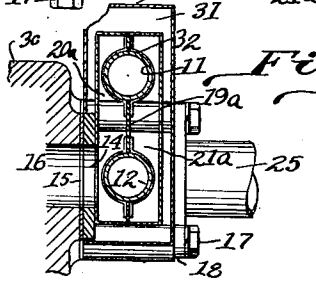


Fig. 9.



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UNITED STATES PATENT OFFICE

2,087,617

AUTOMOBILE HEATER

Charles M. Francisco, Columbus, Ohio, assignor to Francisco Auto Heater Company, Columbus, Ohio, a corporation of Ohio

Application July 17, 1935, Serial No. 31,847

4 Claims. (Cl. 257—241)

This invention relates to improvements in automobile heaters, and has particular reference to that type of heater utilizing an outer casing which is applied to the side of an internal combustion engine to surround the manifold of the engine through which the heated exhaust gases pass when issuing from the engine cylinders, and wherein the resultant heated walls of the manifold are employed to heat air passing through the casing and over the exterior heated surfaces of the manifold, to the end that the air may be delivered in a heated state to the interior of an associated motor vehicle body for the comfort of the vehicle occupants.

It is an object of the present invention to provide a motor vehicle heater of the type indicated of simple and efficient construction, and one wherein the heat of the exhaust gases, passing through the exhaust manifold of the associated engine, will be utilized to a greater degree than heretofore in increasing the temperature of the air which is finally delivered to the vehicle body.

It is another object of the invention to provide a simple and improved heater of the type set forth which is especially adapted for use in conjunction with the currently manufactured V-type of engine involving eight cylinders in two angularly disposed engine blocks. Such an engine is equipped with an exhaust manifold of relatively short length for each cylinder block with the result that when the usual heater casing is applied to one of these standard manifolds, the latter does not offer sufficient heat radiating surface to raise the temperature of the air passing through the heater casing to the required degree for the purpose of securing rapid, comfortable and efficient heating of the vehicle body.

Therefore, in accordance with the present invention, there is provided, as a component and essential part of the heater, a special exhaust manifold comprising a welded sheet metal body of high heat conductivity, and wherein the body is formed to provide spaced parallel passageways through which the heated exhaust gases pass directly from the engine, flowing first in one direction through one of said passageways and then in the opposite direction through the other of the passageways, open ended air heating conduits being disposed in said passageways so that efficient and effective heat interchange takes place between the exhaust gases and the air which passes through the heater for delivery to the vehicle passenger compartment.

It is a further object of the invention to provide an exhaust manifold heater of strong and substantial construction, one which may be readily connected with an associated automobile engine and, further, one which will be safe and reliable in operation.

The present application constitutes a continuation-in-part of the disclosures set forth in my prior application, Serial No. 20,424 filed May 8, 1935.

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

Fig. 1 is a perspective view of a V-type automobile engine equipped with the heater mechanism comprising the present invention;

Fig. 2 is a vertical longitudinal sectional view taken through the heater mechanism;

Fig. 3 is a vertical transverse sectional view on the plane indicated by the line III—III of Fig. 2;

Fig. 4 is a horizontal sectional view on the plane disclosed by the line IV—IV of Fig. 2;

Fig. 5 is a vertical transverse sectional view on the plane indicated by the line V—V of Fig. 2;

Fig. 6 is a detail horizontal sectional view on the plane disclosed by the line VI—VI of Fig. 2;

Fig. 7 is a vertical sectional view disclosing a slightly modified form of heater mechanism;

Fig. 8 is a horizontal sectional view on the line VIII—VIII of Fig. 7;

Fig. 9 is a vertical transverse sectional view on the line IX—IX of Fig. 7.

Referring more particularly to the drawings, the numeral 1 designates an internal combustion engine of the type used in motor vehicles, and the numeral 2 indicates the heater mechanism comprising the present invention in its entirety. The engine 1 to which the heater mechanism is especially applicable, comprises a pair of angularly related V-shaped cylinder blocks 3, the latter being of the type found in the presently manufactured Ford automobile. However, as the description proceeds, it will be obvious that the heater mechanism may be also adapted to many other different types of automobile engines.

As has been previously pointed out, in a V-type of engine of the type referred to, the exhaust manifold found on each side of the cylinder blocks, does not possess sufficient length or radiating surface to provide for adequate heating of the associated vehicle body when surrounded by an ordinary heater casing, and this is true even though air circulating fans, of the electric motor driven type, are employed in establishing a forced circulation of air over the exhaust manifold surfaces. Other types of heaters, such as those employing a radiator through which hot water from

the cooling system of an associated engine is circulated, and having in combination therewith a motor driven fan for forcing air to be heated through the radiator, are also quite inadequate in quickly attaining comfortable driving temperatures during periods of cold weather.

Our problem, therefore, has been to provide a simple, readily installed and safe heater for use in connection with automobile engines having limited manifold area and yet to attain a heater mechanism which after a very short period of operation will deliver air to the vehicle body at a temperature sufficiently high to assure comfort to the vehicle occupants.

To obtain these and other ends, the present invention provides a special type of exhaust manifold, which is adapted to be substituted for the conventional manifold used in connection with such engines.

In the form of the invention disclosed in Figs. 1 to 6, the manifold comprises a welded sheet metal body 4 of flat, box-like rectangular construction and includes transversely spaced, substantially vertically extending, inner and outer side walls 5 and 6, respectively, substantially horizontally and longitudinally extending top and bottom walls 7 and 8, respectively, and front and rear walls 9 and 10, respectively, all of which are welded, or otherwise assembled, to produce a strong, unitary structure.

Also, the manifold body includes a plurality of vertically spaced, longitudinally extending, open ended upper and lower tubes 11 and 12 respectively, which have the ends thereof positioned within and secured to the walls of openings provided in the front and rear walls 9 and 10 of the manifold body, the tubes being immovably retained in connection with said body. The back or inner wall 5 of the manifold body has welded thereto relatively heavy metallic plates 13 which are formed with openings 14 disposed to register with similar openings provided at spaced longitudinal intervals in the wall 5. The plates 13 are arranged to engage with gaskets 15 and to align with exhaust gas outlets 16 formed in connection with the cylinder block 3. Screw bolts 17 pass transversely through the manifold body and are positioned in welded sleeves 18 carried by said body, the inner threaded ends of said bolts being received within correspondingly threaded openings, not shown, formed in the cylinder block, while the outer or headed ends of the bolts 17 are accessible from the exterior of the heater. By this construction, the combined heater and manifold mechanism may be easily and readily mounted in connection with the engine 1 and without involving any changes in its conventional construction.

Within the interior of the body 4 there is arranged, above the openings 14, a horizontally extending, longitudinally disposed partition wall 19, which divides the interior of the manifold body into upper and lower passageways 20 and 21 for the travel of the heated exhaust gases. The exhaust gases first enter the lower passageway 21 and travel longitudinally and rearwardly through the passageway 21, heating the air passing through the lower tube 12 and also the air surrounding the outer walls of the body 4. The partition 19 terminates short of the rear wall 10 which, as shown in Fig. 2, allows the heated exhaust gases to enter the upper passageway 20 and to flow through the latter in a reverse direction to the exhaust gases passing through the lower passageway. While traveling through the upper passageway 20, which is of the same length as the lower passageway, the heated exhaust gases contact with the upper tube 11 heating the latter and the air traveling therethrough, as well as the exterior walls of the body 4.

To provide for the removal of the exhaust gases from the manifold body, the forward end of the partition 19 terminates in a downwardly and forwardly inclined wall 22 and a vertical side wall 23, which is located in approximately the center of the manifold body and, as shown in Figs. 5 and 6, is spaced from the forward opening 14 to avoid interference with the heated exhaust gases entering the forward end of the manifold body and to separate such gases from those leaving or being discharged from the forward end of the manifold body. The exhaust gases discharged from said manifold body pass through an opening 24 and thence into the conduit 25 which leads to the muffler of the vehicle, the conduit 25 being detachably connected with the forward end of the manifold and with the forward end of the heater as indicated at 26.

By this construction, the effective length of the manifold body is approximately twice that afforded by the standard manifold, as well as providing for a great increase in radiating or heat transmitting surfaces and it is to this fact that the efficiency of the heater is attributable. The manifold body is substantially surrounded on all sides by a heater casing 27, which, preferably, is also of flat rectangular design, in conformity with the cross sectional configuration of the manifold body. The front end 28 of the casing 27 is open to the atmosphere while the rear end thereof is provided with a closing wall. Adjacent to its rear end, the upper portion of the heater casing 27 carries an angularly directed discharge conduit 30, which communicates with the passenger compartment (not shown) of an associated vehicle body.

Air enters the open front of the casing and travels through the restricted passageways 31 formed between the outer walls of the manifold body and the inner walls of the casing, absorbing heat from the sheet metal walls of the manifold body, and thereby increasing the temperature of the air. In addition to this, air is also heated by the passage thereof through the tubes 11 and 12 and the heated air stream is finally merged in the discharge conduit 30 and delivered to the passenger compartment of the associated vehicle body. This operation is rendered more effective by the fact that increased travel is given to the exhaust gases during their movement through the manifold passageways 20 and 21, so that effective and efficient heat interchange takes place.

In Figs. 7 to 9, a slight variation of my invention has been disclosed, wherein the partition wall 19*a*, instead of being horizontally disposed, is substantially vertically arranged within the manifold body, in order to produce vertical passageways 20*a* and 21*a*. The inner passage 20*a* directly receives the exhaust gases from the outlet of the engine, while the outer passageway 21*a* communicates with the exhaust conduit 25. The division plate or plates 19*a* are retained in their proper operative positions by metallic strips 32, secured to the walls of the manifold body and the tubes 11 and 12.

In view of the foregoing, it will be seen that the present invention provides a compact and efficient heater which is particularly adapted for automobile engines having relatively short length manifolds. In addition to the matter of length

and radiating surface, the present invention compensates for lower exhaust gas temperatures. These lower temperatures are quite noticeable in the modern high compression internal combustion engine, which possesses higher thermal efficiency than older types of engines of lower compression ratio. By the provision of the efficient heat exchanging means disclosed, the heater is well adapted for internal combustion engines of high compression ratio and solves the problem of providing passenger comfort at a low cost with prevailing engine conditions and requirements.

What is claimed is:

1. An automobile heater comprising a longitudinally extending substantially rectangular casing open to the atmosphere at its forward end and provided with an air outlet adjacent to its rear end, a second similarly shaped casing provided within said first casing, the side walls of said casings being spaced to provide an air passage therebetween, a partition provided internally of said inner casing, said partition dividing said casing into a pair of compartments arranged one above the other and communicating with one another at one end only of the inner casing, the lower of said compartments being provided on one side with a plurality of laterally directed gas inlets, an oppositely directed gas outlet provided on the other side of said manifold, and a portion of said partition being offset to separate the gas outlet from said inlets and connect said outlet with said upper compartment.

2. An automobile heater comprising a longitudinally extending casing open to the atmosphere at one end and provided with an air outlet adjacent to its other end, a second casing provided within said first casing, the side walls of said casings being spaced to provide an air passage therebetween, a partition wall shorter in length than said inner casing arranged internally of the latter, said partition dividing said inner casing into a pair of adjoining compartments communicating with one another at one end only of the inner casing, one of said compartments being provided with a plurality of laterally directed gas inlets, an oppositely directed gas outlet provided in said inner casing in direct alignment with one of said inlets, and a second partition wall positioned between said aligned outlet and inlet, said second partition being joined with said first partition to connect said outlet with the other compartment.

3. An automobile heater comprising a casing open to the atmosphere at its forward end and provided with an air outlet at its opposite end, a second casing provided within said first casing, the side walls of said casings being spaced to provide an air passage therebetween, a horizontal partition wall provided internally of said second casing, the forward portion of said partition being offset, said partition dividing said second casing into upper and lower compartments which communicate at the rear end only, and said offset providing a downward extension of said upper compartment, said extension being positioned beside the forward portion of said lower compartment, said lower compartment being provided with a plurality of laterally extending gas inlets and said downward extension being provided with an oppositely directed gas outlet.

4. An automobile heater comprising a casing open to the atmosphere at one end and provided with an air outlet at the opposite end, a second casing provided within said first casing, the side walls of said casings being spaced to provide air passages therebetween, a partition wall provided internally of said second casing, said partition dividing said second casing into adjoining compartments having relative communication at one end only, a plurality of laterally directed gas inlets communicating with one of said compartments, a gas outlet communicating with the other compartment, and tubular guides extending transversely through said casings adjacent said inlets and outlet, said guides being welded to said inner casing to prevent the escape of gas therearound.

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