

Sept. 24, 1929.

P. H. LONERGAN
AUTOMOBILE RADIATOR
Filed Aug. 22, 1927

1,728,973

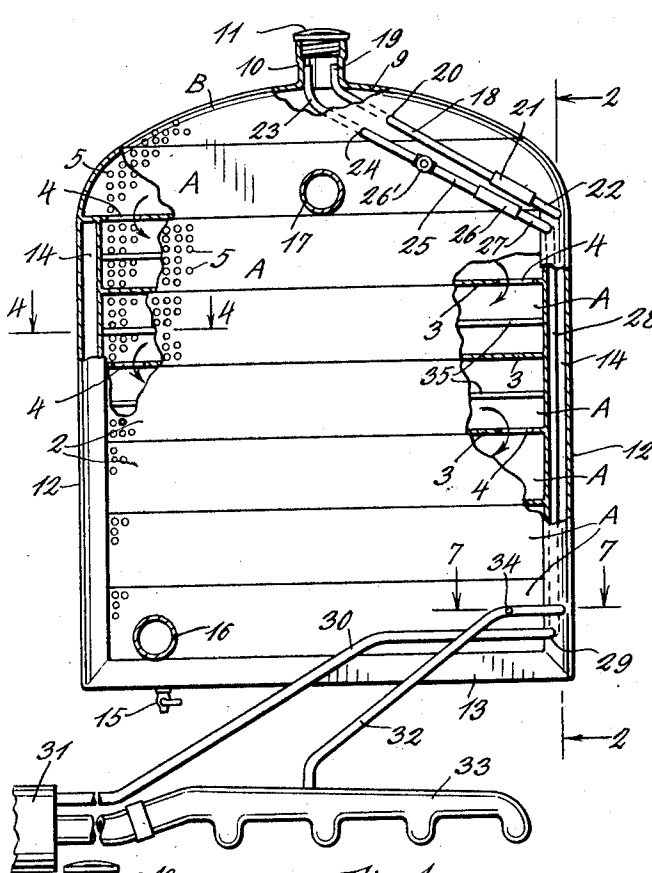


Fig. 1.

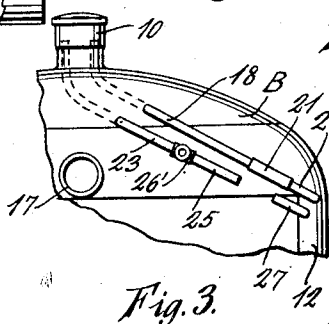


Fig. 3.

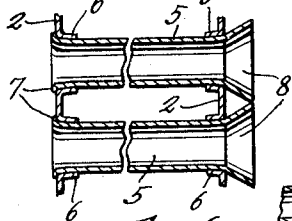


Fig. 6.

Fig. 4.

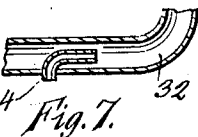


Fig. 7.

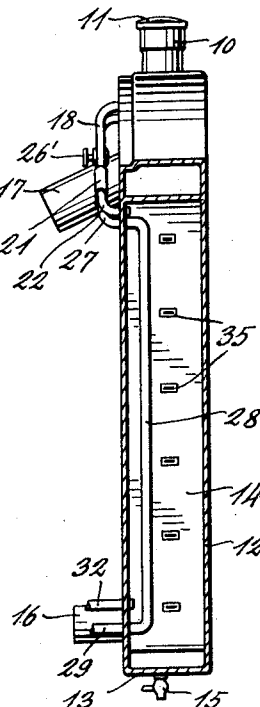


Fig. 2.

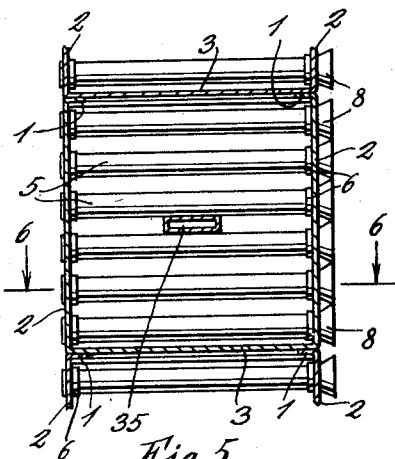


Fig. 5.

Inventor

Patrick H. Lonergan.

A. J. O'Brien

Attorney

UNITED STATES PATENT OFFICE

PATRICK H. LONERGAN, OF WHITING, INDIANA

AUTOMOBILE RADIATOR

Application filed August 22, 1927. Serial No. 214,495.

This invention relates to improvements in the construction of radiators of the type employed in connection with internal combustion engines for the purpose of cooling the water employed in the cooling system.

It is the object of this invention to produce a radiator of the type above referred to which shall be so constructed that it will have a large water capacity and which shall be provided with means for the purpose of readily thawing the water in case it should accidentally become frozen and which shall also be provided with means for assisting the condensation of vapor during the operation of the engine.

The above and other objects which will become apparent and to which attention will be called as the description proceeds are attained by means of a construction and association of elements which will now be described in detail, reference for this purpose being had to the accompanying drawing in which the preferred embodiment of my invention has been illustrated and in which:

Fig. 1 is an elevation of the rear surface of my improved radiator, portions thereof being broken away to better disclose the construction; this view also shows the connections from the radiator to the exhaust manifold and the muffler connection with the exhaust conduit;

Fig. 2 is a section taken on line 2—2, Fig. 1;

Fig. 3 is a fragmentary rear elevation similar to that shown in Fig. 1 and illustrates a slight modification in the connection;

Fig. 4 is a section taken on line 4—4, Fig. 1;

Fig. 5 is a section taken on line 5—5, Fig. 4;

Fig. 6 is a section taken on line 6—6, Fig. 5; and

Fig. 7 is a section taken on line 7—7, Fig. 1.

My improved radiator consists of a plurality of sections which have been indicated by the letter "A", which are connected one to the other in the manner illustrated in Fig. 5 in which reference numeral 1 designates the inturned edges of the side members 2 of each radiator section. The bottom 3 of each section is soldered to the flanges 1 in the manner shown in this figure. The bottom of each section is provided with an opening 4

through which the water may pass from the section above to the section directly beneath. It will be observed from an inspection of Fig. 1 that openings 4 are located in opposite ends of the adjacent sections so that the water will have to flow back and forth through the several sections in the manner indicated by the arrows in this figure. Each section is provided with a plurality of tubes 5 that pass through the same and connect the front and rear sides in the manner shown in Figs. 5 and 6. The sides 2 of the radiator sections are punched so as to provide openings for the tubes 5 and this punching is performed in such a manner that inwardly extending flanges 6 are formed about the openings and these flanges engage the sides of the tubes in the manner shown in Fig. 6. After the tubes have been inserted, one end is flared outwardly in the manner indicated by reference numeral 7. The front ends of the tubes are made with conical outwardly flared sections 8 which are of such diameter that the edges of these sections come into contact with each other at their outer extremities. The air passes through the interior of the tubes in a manner quite obvious from the drawing and this air serves to cool the water which surrounds the several tubes. The top of the radiator is formed by a section B which is shaped in the manner shown in Fig. 1, but which is otherwise constructed the same as sections A, which have just been described. The top of section B has been designated by numeral 9 and has a fillpipe opening 10 which is normally closed by means of a cap 11. Secured to the ends of the sections A is a boxing 12 that is formed as shown in Fig. 4. A similar boxing 13 is secured to the bottom of the lowermost section and connects with the side sections 12 so as to form a chamber 14 that extends along the vertical sides of the radiator and across the bottom in the manner quite clearly disclosed in Fig. 1. This chamber has an opening at the bottom which opening has been shown as provided with a petcock 15, which may, however, be omitted as it is the intention to have the interior of the chamber 14 in communication with the

air at all times. The radiator is provided with tubular projections 16 and 17, which are adapted to receive a hose connection by means of which the interior of the radiator is connected with the usual water jacket employed for the purpose of cooling internal combustion engines. When the engine is in operation, the water becomes heated and due to the difference in specific gravity between the heated water in the water jacket and the cooler water in the radiator, a circulation of the water is set up in a manner well understood as this cooling system is quite extensively employed in connection with automobile engines. The tubular member 16 may be connected in series with a pump, if desired, although this is immaterial as far as the present invention is concerned. I have shown a pipe 18 whose upper end terminates at a point 19 within the fillpipe 10 and which passes through the radiator wall 20 and is connected by means of a flexible tube such as a rubber hose 21 with a short section of pipe 22 that extends through the side of the boxing 12 and opens into the interior of chamber 14. Another pipe 23 extends from the interior of the fillpipe 10 and passes through the radiator wall at 24 and terminates at 25. This pipe is provided with a stopcock 26 by means of which the passageway can be controlled. A short section of flexible tubing such as that indicated by numeral 26 connects the end 25 of pipe 23 with the upper end 27 of a pipe 28 which extends through the interior of the chamber 14 along one side of the radiator and which emerges from the chamber at point 29. That part of this conduit or pipe which has been designated by numeral 30 connects with the muffler 31 in the manner shown in Fig. 1. Another pipe 32 connects the interior of the exhaust manifold 33 with the interior of chamber 14. A short section of pipe 34 extends through the wall of pipe 32 in the manner shown in Fig. 7 and is curved in such a manner that the portion of this pipe that lies within the pipe 32 opens in the direction of the chamber 14. This short section of pipe 34 cooperates with the pipe 32 to form an inspirator by means of which air is introduced into chamber 14 and finally conducted to the interior of the radiator by means of pipe 18.

My improved radiator operates in the following manner: Let us assume that the radiator has been connected with the water jacket of an internal combustion engine in the usual manner and that the engine is operating. During the operation of the engine, a large amount of heat is generated which tends to warm the water in the cooling jacket and as this begins to heat it will flow upwardly and enter the radiator through pipe 17. It will then pass downwardly in succession through section B and through each

of sections A and will finally emerge through the tubular connection 16, from which it returns to the water jacket. During the passage of the water downwardly through the radiator, it will cool by the radiation that takes place and by contact with the metal surfaces which are being constantly subjected to a current of air. As the engine operates the exhaust gas will pass into the exhaust manifold and will pass from this into the muffler 31 from which they will be discharged through the atmosphere. Since pipe 32 connects the interior of the exhaust manifold with the interior of chamber 14 and since there is usually considerable gas pressure in the exhaust manifold, a portion of the gas will flow through pipe 32 and into chamber 14. These gases will fill the chamber and will finally pass through pipes 22 and 18 into the interior of the radiator in a manner quite apparent from an inspection of Fig. 1. The flow of gases will produce a suction that tends to cause air to flow inwardly through pipe 34. This air will mix with the exhaust gases and this mixture of air and exhaust gas will finally enter the radiator at point 19. It is evident that gas cannot be continuously introduced into the radiator unless a corresponding volume of gas is permitted to leave and for this purpose pipes 23, 28 and 30 have been provided. During the operation of the engine, water vapors and uncondensed exhaust gases flow from the radiator into the muffler and mix with the exhaust gases. I have found that if a sufficient amount of steam or water vapors are mixed with the exhaust gases, that the offensive odor which usually accompanies these gases is almost entirely neutralized so that the disagreeable effect of exhaust gases that are delivered from the muffler in the usual manner will be absent in my device. This is of great importance in large cities where a large number of automobiles are continuously discharging exhaust gases into the atmosphere.

Attention will now be called to another feature of my invention which I consider to be of great importance. This feature consists of tubes 35 that extend lengthwise through each of the radiator sections A and have their ends in communication with the vertical sections of chambers 14. Tubes 35 permit gases and water vapors to flow from one side of the radiator to the other and therefore assist in cooling the water during the summer time and in winter they are especially valuable for the reason that if the water circulation should be stopped on account of the freezing of the water, a large amount of steam will soon be generated in the water jacket space of the engine and this stream will pass through pipe 28 into the chamber 14 and part of this will flow through the tubes 35 to the opposite side of the radiator, there-

by helping to melt the frozen water within the sections and to reestablish the circulation of the water in the cooling system.

In Fig. 3 I have shown the tubular connector 26 removed from the pipes 23 and 27. When this section is removed the gas that escaped through pipe 23 will of course pass into the atmosphere at 25 and will not pass along pipes 28 and 30 in the manner above described. When the section 26 is removed and the valve 26' is open, there will be a regular flow of gas through the interior of the radiator due to the lessened friction in the pipes and therefore there will be a greater amount of condensation of vapors which is very desirable during hot weather as it prevents the abnormal loss of water which might otherwise take place.

From the above it will be apparent that I have provided a novel radiator construction by means of which several desirable results are obtained and that I have also provided an improved cooling system in which the interior of the radiator is connected with the exhaust conduits from the engine in such a way that exhaust gases and air are constantly circulated through the interior of the radiator above the water level therein.

I want to call attention to the fact that with a radiator constructed as shown on the drawing and described above, that all of the soldering can be done from the outside and this greatly simplifies the manufacture and repair.

Another advantage of the construction shown is that if any of the tubes 5 should spring a leak the two ends of the leaking tube may be closed by suitable plugs or corks and the loss of water thereby prevented.

Owing to the fact that the construction is such that the water space between tubes 5 is quite large, it is unnecessary to provide the ordinary top and bottom tanks and the construction is thereby simplified and cheapened. In my radiator tubes 5 are used from the top to the bottom in the manner shown.

I also want to call attention to the fact that tubes 5 are spaced apart at least one quarter of an inch, which gives greater water capacity and consequently greater expansion space. This also permits solids to settle to the bottom without obstructing the passageways and permits steam bubbles to pass upwardly more freely than if the passages were smaller. On account of this feature of the construction there will always be a free circulation of water at all times.

Having thus described my invention what I claim as new is:

1. A radiator comprising a central core section of substantially rectangular shape, a chamber enclosing the two sides and the bottom, means for establishing communication between the upper end of said chamber and that portion of the radiator above the water

level and a plurality of tubes that extend through the radiator core and have their ends in communication with the chambers along the sides of the core.

2. A radiator comprising a central core section of substantially rectangular shape, a chamber enclosing the two sides and the bottom, means for establishing communication between the upper end of said chamber and that portion of the radiator above the water level and a plurality of tubes that extend through the radiator core and have their ends in communication with the chambers along the sides of the core, that portion of the chamber that extends across the bottom having an opening.

3. A radiator comprising a plurality of superposed core sections formed into a substantially rectangular core, a boxing secured to the sides and the bottom so as to form a chamber that encloses three sides of the core, a tube extending lengthwise through each section, said tubes having their ends in communication with said chamber and a tube connecting said chamber with the upper portion of the core.

4. A radiator comprising a plurality of superposed core sections formed into a substantially rectangular core, a boxing secured to the sides and the bottom so as to form a chamber that encloses three sides of the core, a tube extending lengthwise through each section, said tubes having their ends in communication with said chamber and a tube connecting said chamber with the upper portion of the core, that portion of the boxing that extends across the bottom of the core having an opening in communication with the atmosphere.

In testimony whereof I affix my signature.
PATRICK H. LONERGAN.

110

115

120

125

130