July 18, 1933. R. L. HAWKINS 1,918,471

COOLING MEANS FOR INTERNAL COMBUSTION ENGINES

Filed Nov. 7, 1930 2 Sheets-Sheet 1

Fig. 1

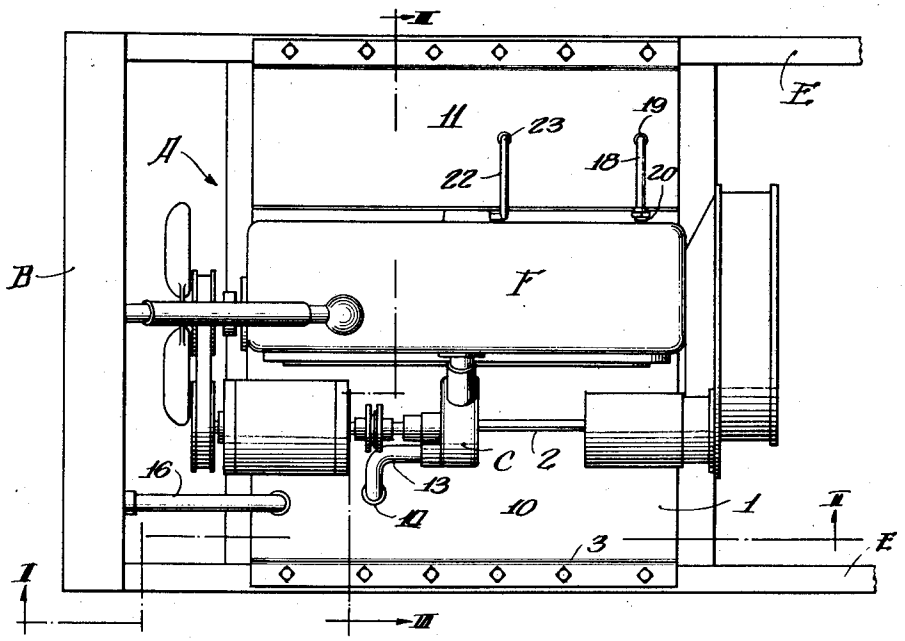


Fig. 4

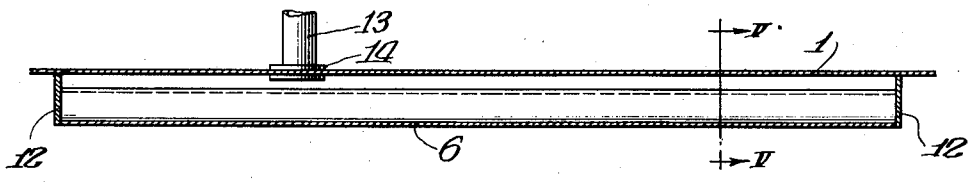
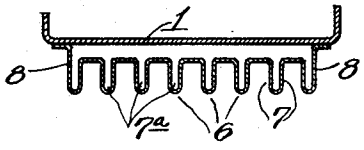


Fig. 5



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Fig. 2

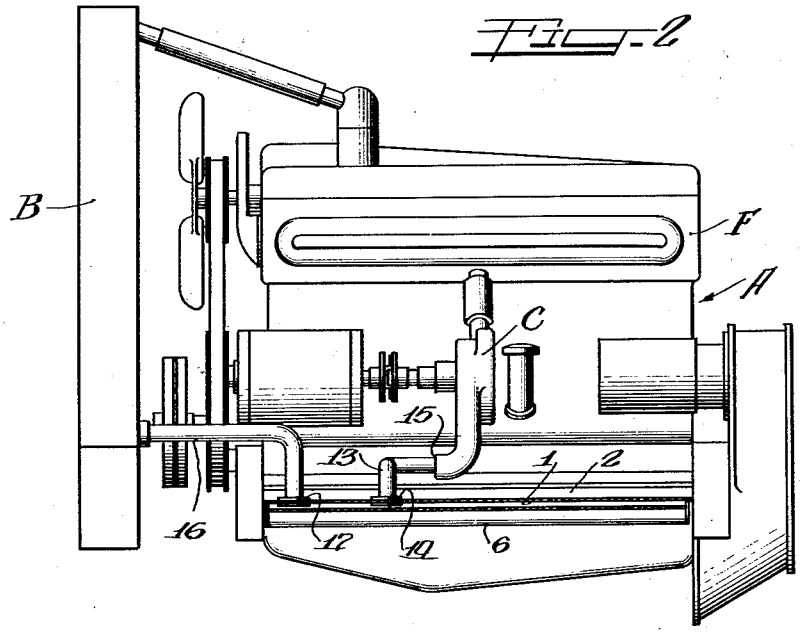
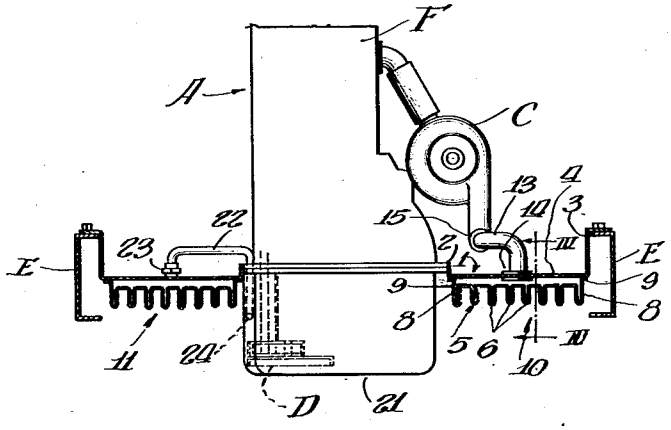


Fig. 3



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UNITED STATES PATENT OFFICE

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COOLING MEANS FOR INTERNAL COMBUSTION ENGINES

Application filed November 7, 1930. Serial No. 494,017.

This invention has to do with means for cooling fluids employed in engines, preferably of the internal combustion type.

It is a well known fact that the efficiency of an engine is contingent, among other things, upon the maintenance of the oil at a sufficiently low temperature to insure the proper viscosity for adequately lubricating the various parts of the engine and upon the maintenance of the cooling water at a sufficiently low temperature to avoid boiling and adequately cool the engine. Attempts in the past in this direction have been more or less successful, but in every case, so far as I am aware, such attempts have been accompanied by constructions which have been complex and/or expensive.

It is accordingly one of the principal objects of the invention to provide an extremely simple and inexpensive fluid cooling device which may be incorporated in the fluid system of an engine, whether it contain oil or water or any other fluid, without reorganizing the engine proper.

A further object of the invention is to provide a fluid cooling instrumentality including the mud or drip pan employed in conjunction with present day engines, so that the pan will have the double function of forming a wall of the fluid system and at the same time serve as usual to receive oil and foreign matter adapted to escape from the top and sides of the engine and from the hood.

A further object of the invention resides in the provision, in an engine fluid system, of fluid receiving means having one or more ribbed walls, each rib being elongated for the purpose of heat dissipation and being hollowed to provide greater radiation surface.

In carrying out my invention, in a preferred form, as for example, in connection with the cooling water and/or oil for an engine, I provide a substantially stiff and rigid and preferably metallic trough-like member, the free ends of whose flanges are uppermost and permanently secured by any suitable means to the bottom of the usual mud or drip pan, so that the trough-like member and the pan bottom together constitute a conduit or container having a large radiating area compared to its volume or cubical content. If desired, one such conduit may be located on each side of the engine and both may be connected by suitable piping or otherwise as a part of the cooling system, or as a part of the oil circulatory system whereby oil may be cooled therein, or a container on one side may be connected in the cooling system while the container on the other side is connected in the oil circulating system. Each conduit is preferably shallow, in order to provide a maximum amount of cooling surface per volume of fluid contained, and one or more walls of these trough-like members, preferably the bottom wall, is provided with a plurality of longitudinally extending heat dissipating fins which are narrow to provide a maximum area of contact with the air for a minimum amount of metal, each fin being shaped in cross-section to simulate the letter U or V. Thus the fluid is adapted to occupy the pocket which each of the ribs or fins in fact forms, so that the area of contact of the fluid with the ribbed wall is substantially equal to the area of contact of said wall with the outside air. It will be apparent, then, that the cooling effect of the ribs is substantially greater than would be the case were the ribs solid, and the pockets formed by the ribs may serve incidentally to catch foreign matter in the cooling fluid.

Other objects and advantages of this invention will more fully appear from the following detailed description taken in connection with the accompanying drawings which illustrate a single embodiment thereof, and in which;

Figure 1 is a fragmentary plan view showing a motor vehicle engine and associated parts embodying the invention.

Figure 2 is a sectional view taken approximately in the plane indicated at II—II in Figure 1, certain parts appearing in elevation.

Figure 3 is a fragmentary front sectional view taken approximately in the plane indicated by the line III—III in Figure 1, certain parts being shown in elevation.

Figure 4 is an enlarged fragmentary sectional view taken approximately in the plane indicated by the line IV—IV in Figure 3.

Figure 5 is an enlarged sectional view taken approximately in the plane indicated by the line V—V in Figure 4.

Referring now more particularly to the drawings, wherein the same part is indicated in each case by the same reference charac-

ter, I indicate at A an engine of the internal combustion type, a radiator B, a water pump C, and an oil pump D, combined with various conduits connecting these to form closed oil and cooling water systems.

Instead of having a direct connection by means of conduits from the bottom of the radiator to the water pump, I provide in accordance with my invention cooling instrumentalities between these parts, the construction of these instrumentalities becoming evident as the description proceeds.

Automobile engines in current use employ in connection therewith what is known as a drip or mud pan indicated generally at 1, having side flanges, the flange 2 being free and disposed adjacent the engine A, and the other flange 3 being secured to the chassis or frame E, the bottom 4 of the pan normally lying in a horizontal or a somewhat inclined plane. By my invention I made use of the mud pan 1 so that the latter, in addition to its natural function, also forms a wall of a cooling conduit for the cooling water. To this end I provide a shallow channel-shaped member indicated generally at 5, having its bottom or web extending substantially parallel with the bottom of the mud pan 1, said web including a plurality of downwardly extending heat dissipating fins 6, having spaced walls 7, the spaces thus formed being in communication with the interior of the channel member 5. The flanges 8 of the member 5 extend upwardly and are provided with lips 9 secured to the edges of the bottom of the mud pan 1 by welding or any other suitable means, to thereby prevent leakage of fluid between the channel member 5 and the mud pan 1. It will be apparent that the elongated pockets *7a* between the walls 7 of the fins 6 provide for a very appreciable increase in surface contact between the fluid and the walls of the conduit formed by the parts 1 and 5, so that the heat dissipating action of the fins 6 is greatly enhanced.

It will be appreciated that without in any way reorganizing the engine and its appurtenant parts, a duplicate construction of that just described may be disposed between the opposite side of the engine and the opposite side of the frame or chassis E as shown in Figures 1 and 3, in order to provide for cooling of any other fluid, such as oil. Each conduit formed by the parts 1 and 5 is preferably closed at its ends and connected with the remainder of the fluid system, of which it forms a part, by suitable piping. To avoid confusion, the conduit formed in accordance with my invention and appearing at the right in Figure 3 is indicated at 10 while that at the left is indicated at 11. Referring to the conduit indicated at 10, whose ends are closed at 12 by welding or other suitable means, it will be noted that conduit 13, connected to the same at 14, communicates with the water pump C at 15, the pump C being in turn connected in the conventional way to the water jacket F, and the latter communicating with the radiator B. A tube or the like 16 connects the lower part of the radiator with the cooling conduit 10 as shown at 17.

It will be appreciated from the foregoing that, starting with the pump C, the water moves in a cycle from the pump to the jacket E, whence it flows to the top of the radiator B, leaving the same at its bottom through the coupling or tubing 16 and entering the conduit 10 and substantially filling the same, leaving the same at 14 through the medium of the coupling element 13 to enter the pump C, thereby completing the cycle of flow.

As stated heretofore, both containers 10 and 11 may be connected to the water circulating system, or both may be connected to the oil or other fluid circulating system or each may be connected to a different system. For the purpose of this description, however, I employ the second container or conduit 11 in connection with an oil circulatory system. To this end, I connect piping or the like 18 at one end 19 to the conduit 11 and the other end 20 to the crankcase, preferably adjacent the other end of the oil pan 21. Other piping or the like 22 is connected at 23 to another portion of the conduit 11, the opposite end 24 of the piping extending well within the oil pan 21 to cooperate with the oil pump D shown in dotted lines in Figure 3. Of course, a suitable fluid tight connection is made between the piping 22 and the crankcase. Oil pumped by the pump D enters the tubing 22, substantially fills the container 11, and leaves the latter by way of the tubing 18 and then re-enters the crank case.

It will be evident that by employing fins, I am enabled to provide for maximum radiation for a given cubical content of the container.

While I have described my invention as providing fins extending downwardly from the trough-like member 5, it will be appreciated that, if desired, the fins could be made to extend upwardly instead, and also that the drip or mud pan 1 could be likewise formed. Moreover, the fins are preferably, though not necessarily, spaced apart a distance equal to their own depth.

It is to be understood that while the invention is illustrated as having the two connections providing the entry to and exit from each container in proximity to each other, these connections, if desired, may be located at opposite ends of the container or in any other relation.

Now I desire it understood that although I have illustrated and described in detail the preferred embodiment of my invention,

the invention is not to be thus limited but only insofar as defined by the scope and spirit of the appended claims.

I claim as my invention:

1. In a cooling water system for internal combustion engines, means for cooling the water as it flows from the radiator to the water pump, said means comprising a shallow conduit having substantially parallel top and bottom walls, said bottom wall being provided with a plurality of longitudinal hollow heat dissipating fins, thereby providing increased contact area with the water, the top wall of the conduit constituting a drip pan for receiving oil and other foreign matter escaping from the upper part of the engine.

2. In a heat dissipating and foreign matter collecting means forming a part of the cooling system of an internal combustion engine, a mud or drip pan adapted to be supported in a substantially horizontal plane by the chassis of a motor vehicle, a shallow trough-like member disposed below the pan and having upstanding flanges hermetically sealed to the pan to provide therewith a container, the web of the trough-like member being provided with hollow fins extending substantially throughout the length of the web, the pockets thereby formed communicating with the interior of the conduit to thereby afford a substantially increased area of contact with the fluid to enhance the heat dissipating effect of the fins.

3. In combination, an internal combustion engine, a frame associated therewith, a drip pan extending from the frame to a point adjacent the engine, ribbed means cooperating with said drip pan to afford a radiating container, a fluid circulating system operated by the engine and means connecting said radiating container with said circulating system whereby fluid passing therethrough will be cooled in said container.

4. In combination, an internal combustion engine, a frame associated therewith, a drip pan extending from the frame toward the engine, ribbed means cooperating with said drip pan to afford a heat radiating container, a fluid circulating system operated by the engine, and means connecting said container with said system, whereby fluid in or passing through said container will be cooled by the latter.

5. In combination, an internal combustion engine, a frame associated therewith, drip pans extending between the frame and the engine, ribbed means cooperating with said drip pans to afford radiating containers, fluid circulating systems associated with and operated by the engine, one of said systems containing cooling water and the other containing oil, and means connecting said radiating containers with said systems whereby the water and the oil in and passing through the said containers will be cooled thereby.

6. In combination, an internal combustion engine, a heat radiating container adjacent one side of the engine, a similar container adjacent the opposite side of the engine, fluid circulating systems operated by the engine, and means connecting said containers with said systems, one of said systems containing water and the other oil, whereby the fluid passing through each container is cooled thereby.

7. In a motor vehicle, an internal combustion engine, a frame associated therewith, a drip pan secured to the frame and extending therefrom to a point adjacent the engine, said pan and said engine being capable of relative movement, whereby vibration of the engine will not affect said pan, heat dissipating means cooperating with said pan to afford a container, a fluid circulating system operated by the engine, and means connecting said container with said system whereby fluid passing therethrough will be cooled in said container.

8. In a motor vehicle, an internal combustion engine, drip pans associated with the engine, fluted means cooperating with said pans to afford radiating containers, individual fluid circulating systems associated with and operated by the engine, and means connecting said containers with said systems whereby the fluids in and passing through said containers will be cooled thereby.

9. In a motor vehicle, an engine, heat radiating containers disposed adjacent opposite sides of the engine, fluid circulating systems operated by the engine, means connecting said containers with the respective systems, whereby the fluid passing through each container is cooled thereby, and means supporting said containers for relative movement between said containers and the engine, whereby vibration of the latter is not transmitted to said containers.

10. In a motor vehicle, an internal combustion engine, drip pans associated with the engine, fluted means cooperating with said pans to afford radiating containers, individual fluid circulating systems associated with and operated by the engine, means connecting said containers with said systems whereby the fluids in and passing through said containers will be cooled thereby, and means supporting said containers for relative movement between said containers and the engine, whereby vibration of the latter is not transmitted to said containers.

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