Dec. 13, 1932. O. D. NORMAN 1,891,006

LUBRICATION COOLER FOR GAS ENGINES

Filed Aug. 14, 1928

Fig. 3.

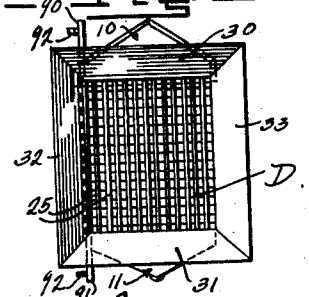


Fig. 4.

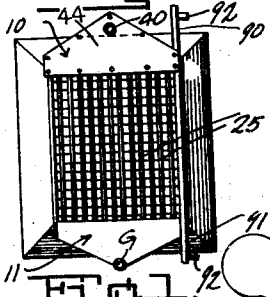


Fig. 1.

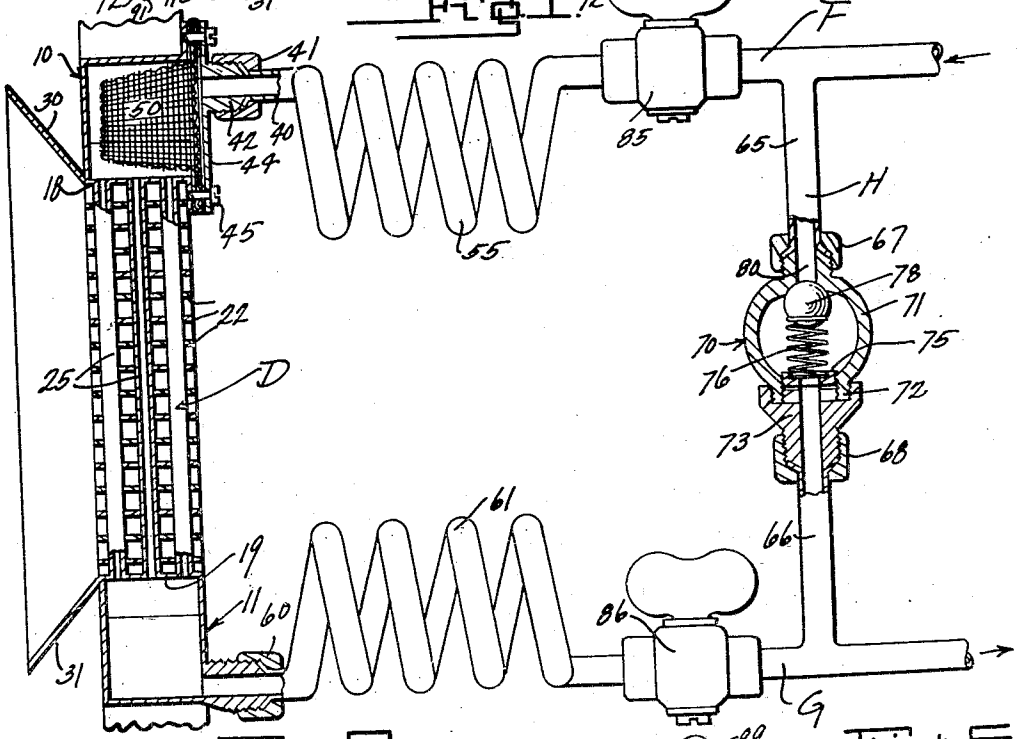


Fig. 2.

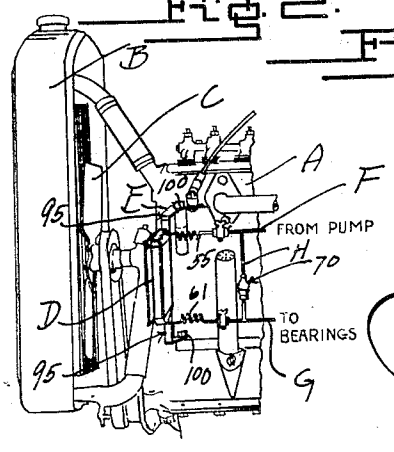


Fig. 5.

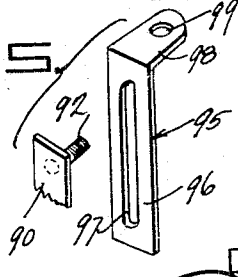
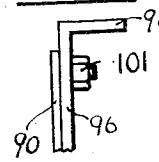


Fig. 6.



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UNITED STATES PATENT OFFICE

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LUBRICATION COOLER FOR GAS ENGINES

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This invention relates to improvements in means for cooling the lubricating medium of internal combustion engines.

The primary object of this invention is the provision of an improved lubrication cooler, in the nature of a radiator, which may be connected with the lubrication circulating system of an internal combustion engine, in such manner that the lubricant may be led therethrough for cooling and direct feed to the bearings; the improved lubricator comprising a unit which may be attached in a novel and efficient manner to an internal combustion engine for the purpose of most efficiently cooling the lubricant.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawing, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a fragmentary view, partly in section, showing the improved lubrication cooler.

Figure 2 is a perspective view, showing the relative location of the lubrication cooling unit upon an internal combustion engine.

Figure 3 is a front elevation of the improved lubrication cooling radiator.

Figure 4 is a rear view of the radiator.

Figure 5 is a fragmentary perspective view of a supporting bracket for the improved lubricant cooling radiator.

Figure 6 is a sectional view showing the attachment of the bracket to the radiator.

In the drawing, wherein for the purpose of illustration is shown only a preferred embodiment of the invention, the letter A may generally designate an internal combustion engine of any approved type, which has a water cooling system of which the radiator B is a part, connected in conventional relation with the water jacket of the engine A. A water cooling fan C is provided, of conventional construction. The improved lubrication cooler comprises a radiator unit D which may be supported by means E in a novel relation upon the engine A, so that it may take advantage of the air stream from the fan C, and as an incident of travel of the vehicle through space. The radiator unit D is connected by means of a conduit F to a pump which forces the oil into the top of the radiator D. A return flow line G for the oil, which conducts the latter to the bearings and working parts of the engine, is provided. In conjunction with the conduits F and G, a by-pass H is provided, having a novel relation to the by-passing of lubricant with respect to the radiator D, in a manner to be more fully set forth hereinafter.

The radiator D preferably comprises upper and lower headers or manifolds 10 and 11, which are substantially triangular in form, that is, the facing walls 18 and 19 thereof respectively are flat, and in parallel horizontal position. The upper walls of the header 10 are first parallel to each other and then upwardly convergent from opposite ends of the wall 18, and similarly the lower walls of the lower manifold or header 11 are first parallel to each other and then downwardly convergent to the longitudinal vertical center of the radiator. The headers 10 and 11 are connected by a honey-comb radiating frame 22, of approved construction, in which vertical tubes 25 are supported, in a connected relation between the facing walls of the upper and lower headers; the passageways through said tubes or ducts being open into the compartments of the upper and lower headers, as shown in Figure 1 of the drawing.

At the front of the radiator D, air collecting flanges are provided, of funnel-shaped formation, that is, the same flare divergent away from the honey-comb frame, between the upper and lower headers, providing upper and lower flanges 30 and 31 respectively, and side flanges 32 and 33; said flanges being connected in a forwardly divergently flaring relation from the radiator, in order to guide a maximum amount of air to the honey-comb frame, and past the flues or ducts 25, for cooling the oil as the same flows through the latter.

The conduit F extends from the oil pump, or some part of the circulating system of the engine A, having an end 40 detachably connected by a packing nut 41, to an apertured

shank 42 of a detachable plate 44; the latter being adapted for detachable connection by bolts or means 45 to the rear wall of the upper header 10. This plate 44 is provided for the purpose of securing a screen-like oil strainer 50, of cup-shaped formation, in place; the said strainer 50 including an annular flange secured by a ring-shaped gasket in place between the rear surface of the header 10 and the plate 44; the rear wall of the header having an opening through which the tapered cup-body of the strainer extends into the compartment of the upper header; it, of course, being obvious that the lubricant passes through the cup 50 and is strained before dropping through the tubes 25 into the lower header. The conduit F includes, as a part thereof, a flexible spiral coil 55, which increases the path of flow of the lubricant, in a cooling relation prior to entrance to the radiator, and which also increases the flexibility of mounting of the radiator in a leak-proof connection with the conduit F. The return conduit G is connected by a packing nut 60, with the rear wall of the lower header, at the lowermost level in the header 11, and the conduit G has a spiral coil 61 similar to the coil 55, the same being of a flexible nature and provided to increase radiation, and permit of flexibility of mounting of the radiator.

The by-pass H comprises conduits 65 and 66 respectively connected with the conduits F and G, and extending in right-angled relation thereto; being connected by detachable packing nuts 67 and 68 respectively, with a check valve construction 70 which operates to permit oil to enter the conduit G from the conduit F, but not vice versa. The check valve construction 70 includes a substantially spherical casing 71, to the upper threaded end of which the packing nut 67 may connect. The lower tubular neck 72 of the casing 71 is threaded for detachable connection with a coupling 73, which in turn couples to the nut 68. The tubular neck 72 is internally threaded for detachable connection with an externally threaded ring-shaped seat 75, whereon a spring 76, preferably spiral, seats, within the spherical body of the casing 71, and urges a ball-shaped check valve 78 into seating engagement to close off the passageway 80 above the check valve to the conduit 65. The seat 75 is threadably adjustable in the casing 71 in order to increase or decrease the compression of the spring 76, and permit of disassemblage of the check valve parts. It is at once obvious that the lubricant will be permitted to flow from the conduit F through the by-pass check valve 78 into the conduit G, but not for a reverse flow.

In the conduits F and G respectively, between the by-pass connection therewith, and the radiator D, are respectively positioned stop cocks or valves 85 and 86, which may be used to manually shut off the conduits F and G between the by-pass construction H and the radiator, if it is desired to cut out the latter.

The means E is provided in order that the radiator may be adjustably supported to best position it on the engine with respect to the slip stream of air. To this end, the radiator D at one side thereof is provided with upwardly and downwardly extending attaching shanks 90 and 91 respectively, preferably vertically positioned contiguous with a side wall of the radiator; said shanks 90 and 91 having transversely extending screw threaded stems 92. Upper and lower angle brackets 95 are provided as part of the means E, each of the same including a body 96 having a longitudinal slot 97 therein, and a right angled attaching clip 98 at the end thereof apertured at 99 for receiving one of the conventional block bolts 100 of the engine A. The bolts 100 are provided on a conventional engine, such as the engine A, for clamping the cylinder block on the crank case, and also above this for clamping the valve head or cap block to the cylinder block, and these bolts 100 are taken advantage of to hold the angle clips 95 in place, as shown in Figure 2. The screw threaded stems 92 are slipped through the slots 97, and a nut 101 threaded thereon, on each, as shown in Figure 6 of the drawing. The fact that the coils 55 and 61 are flexible permit the radiator to be adjusted with respect to the attaching clips 95, without disconnecting the conduits F and G.

It is to be particularly noted that the lubricant is forced from a pump through the radiator unit D and returns through the conduit G direct to the bearings and working parts of the engine to be lubricated. If oil should congeal in the radiator, or the radiator tubes become clogged, the lubricant will be by-passed through the conduit H. In like manner, if it is desired to by-pass the radiator at any time, for any reason, such as on a very cold day, the valves 85 and 86 may be manually closed, and the lubricant shunted in the system past the radiator D. With the improved radiator D, the lubricant will be maintained under substantially uniform temperature conditions. In warm weather the slip stream will cool the lubricant and maintain it at a substantially uniform temperature, and in cold weather, with conventional water cooling radiator B, the heat therefrom will be caused to travel in a concentrated condition through the radiator D, due to the funnel mouth flanges, and will warm the lubricant in the radiator, and prevent the same from becoming too viscid in cold weather.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In combination with an internal combustion engine including a water cooling system with a radiator and a cooling fan for directing air thru the water cooling radiator in the direction of the engine, an oil cooling radiator carried by the engine at the opposite side of the fan from the water cooling radiator, the oil cooling radiator comprising a plurality of spaced oil dividing conduits having upper and lower inlet and outlet manifolds.

2. In combination with an internal combustion engine including a water cooling system with a radiator and a cooling fan for directing air thru the water cooling radiator in the direction of the engine, an oil cooling radiator carried by the engine at the opposite side of the fan from the water cooling radiator, and means mounting the oil cooling radiator for adjustment on the engine with respect to said fan.

3. In an oil cooling radiator construction for internal combustion engines, the combination of an internal combustion engine including upper and lower clamping bolts thereon, an oil cooling radiator having connections with the oil circulating system of the engine for passing oil through the radiator, and means connected with the radiator and detachably connected to the engine by said bolts for mounting the radiator on said engine.

4. In an oil cooling system of the class described the combination with an internal combustion engine including a water cooling system having a radiator and a fan rearwardly thereof, and an oil circulating system including a cooling radiator therefor having means to mount the oil cooling radiator for vertical adjustment on the engine rearwardly of said fan.

5. In an oil cooling radiator for internal combustion engines provided with a fan for causing cool air currents, a frame, means for mounting said frame free of and to the rear of said fan, and oil circulating conduits within the frame, said frame provided with outwardly flaring flanges collecting air currents from said fan and directing them against said conduits.

6. In an oil cooling radiator for internal combustion engines provided with a fan for causing cool air currents, a frame, means for adjustably mounting the frame free of the fan and to one side of its axis of rotation, oil circulating conduits within the frame, said frame provided with flanges arranged to collect air currents from said fan and direct them against said conduits.

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