Sept. 15, 1936. H. M. YEAGER 2,054,403

OIL COOLING SYSTEM

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Fig. 1.

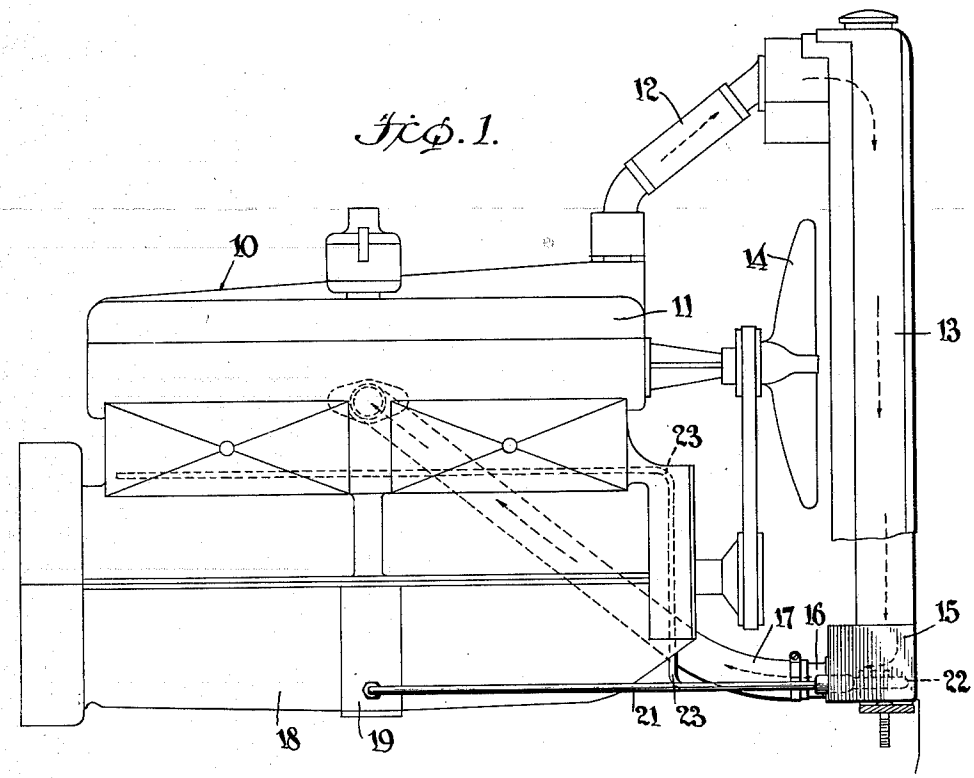


Fig. 4.

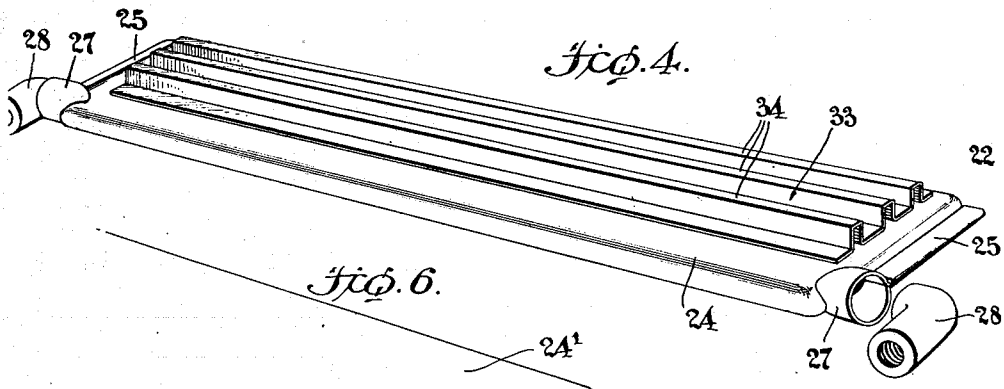
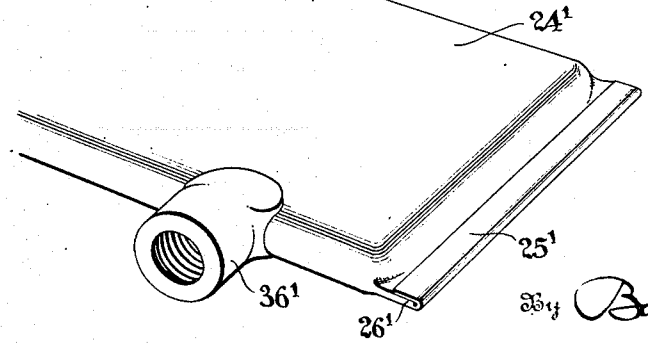


Fig. 6.



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Fig. 2.

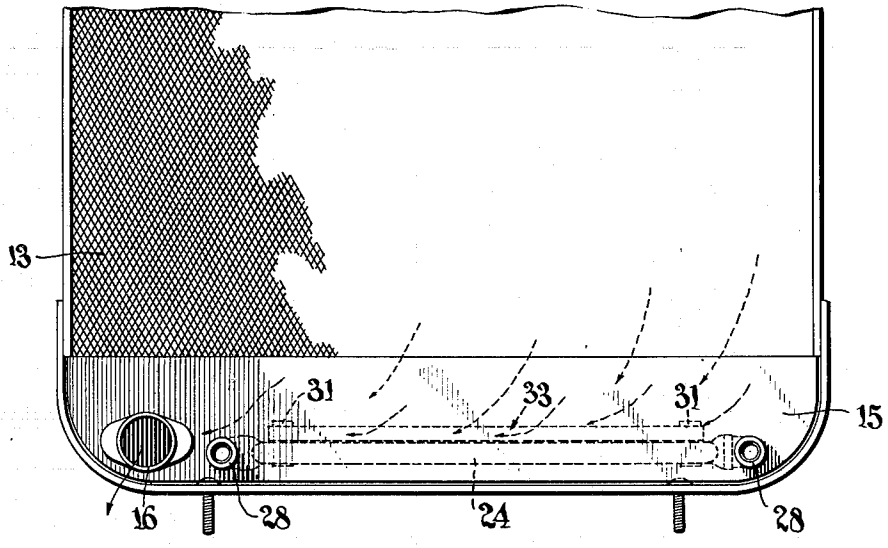


Fig. 7.

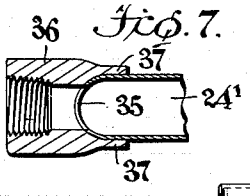


Fig. 3.

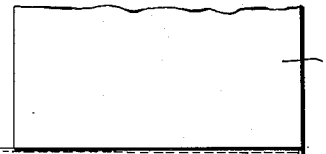
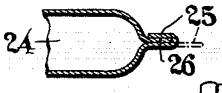
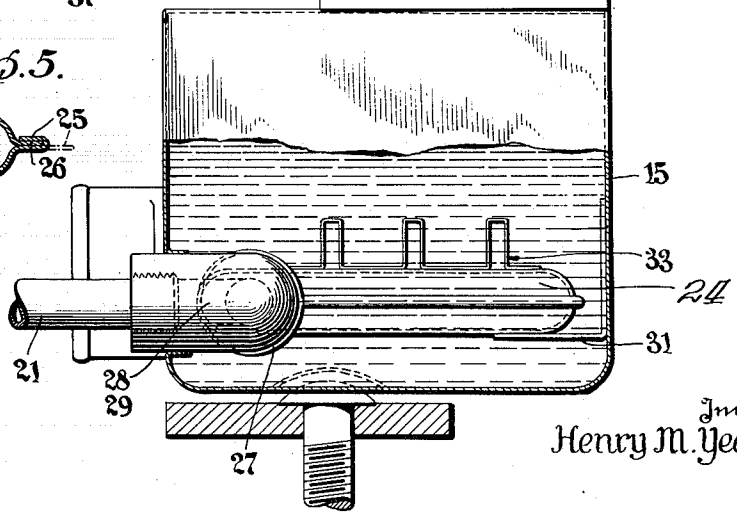


Fig. 5.





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OIL COOLING SYSTEM

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Application January 27, 1931, Serial No. 511,638

2 Claims. (Cl. 123—196)

This invention relates to an oil cooling system for internal combustion engines and particularly to such engines which are water-cooled, as those ordinarily used for powering motor vehicles.

Under certain operating conditions the oil in the crank case of such an engine may become excessively heated so that it becomes ineffective as a lubricant and may be burned at a rapid rate. Under other operating conditions, such as when the engine is started in cold weather, the oil may be cold and congealed and will ordinarily require considerable time to become heated to a temperature proper for lubricating. Heretofore, it has been proposed to utilize engine heat which has been transferred to the water of the engine cooling system to regulate the temperature of the crank case oil.

This invention comprehends an improved means of heat transfer whereby the crank case oil, when at a sub-normal temperature may be heated by the engine cooling water, and may be cooled to a normal temperature by the water, when it might otherwise become excessively heated. The transfer means comprises a small unit, capable of economical manufacture and installation, which may be disposed in a water tank of the engine water-cooling radiator. Such a tank is conventionally disposed beneath the cooling elements of the radiator and serves as a collector for receiving water passing from the entire lower portion of the cooling elements and for conducting the water to a conduit leading to the engine water jacket. The heat transfer means comprises a unitary element, disposed longitudinally of the tank in order that the water may circulate about it to efficiently exchange heat with the crank case oil which may be circulated through the transfer means.

The invention further resides in the features of construction and installation of the unit which render it efficient in operation and economical to manufacture, as will become apparent from a perusal of the following description of typical embodiments of the principles of the invention, reference being made to the accompanying drawings wherein:—

Fig. 1 is a side elevational view of an internal combustion engine, including the water cooling system, and showing an oil cooling system of the invention installed therewith;

Fig. 2 is a rear elevational view of a portion of the water cooling radiator with a heat transfer device installed;

Fig. 3 is an enlarged side elevation of the parts shown in Fig. 2, portions thereof being broken away;

Fig. 4 is a perspective view of the heat transfer device of the preceding views;

Fig. 5 is a fragmentary sectional view of an end of the device shown in Fig. 4;

Fig. 6 is a fragmentary perspective view of a heat transfer device having an alternative construction; and

Fig. 7 is a detail cross sectional view through a portion of the device depicted in Fig. 6.

As shown in Fig. 1 the internal combustion engine 10 has a jacket 11 for conducting cooling water about the engine cylinders. A conduit 12 may conduct the heated water to the radiator 13, which may be cooled by air drawn by a fan 14. A water tank 15 is disposed at the bottom of the radiator to collect the water passing to the bottom of the radiator and to conduct it, through a hose attaching nipple 16 which may be disposed at one side of the tank, to the conduit 17 leading to the water jacket 11. Lubricating oil from the engine crank case 18 may be circulated, being forced under pressure by a pump 19 if desired, through an oil line 21, through the heat transfer device 22 which is disposed in the tank 15, and thence through the oil line 23 to the engine oil distributing system. The latter may conduct the oil to the engine bearings, cylinder walls, or other parts to be lubricated.

The heat transfer device 22 comprises a metallic tube 24 which, preferably, has been flattened to afford it a large surface as compared with its volumetric content. As shown in Figs. 4 and 5, the ends of the tube may be cut with the upper and lower portions of unequal length, the longer portions 25 being bent over and sealed, by soldering or otherwise, against the shorter portions 26. The dotted lines in Fig. 5 indicate the condition of a tube end before the latter operation and the full lines show the final relationship. In order to provide oil inlet and exhaust passages at the tube ends, the latter may be sealed, in the manner above pointed out, across only a portion of the tube ends, the remaining portions of the ends being formed into tubular sections 27. Elbow fittings 28 may be inserted in the tubular sections and fixedly secured therein by soldering or otherwise.

The rear face of the tank 15, adjacent the ends, may be provided with flanged apertures 29, through which the outer ends of the elbows 28 may be inserted and secured, the flanges of the apertures providing a sufficient area of contact

with the elbows to insure a permanent, water-tight joint. The forward edges of the tube 24 may be secured to the forward wall of the tank 15 by one or more brackets 31, indicated in Figs. 2 and 3. In order to increase the radiating area of the tube 24, fins may be provided. In the illustrated embodiment these comprise a single strip of metal 33, secured to the top surface of the tube, and having a plurality of longitudinally extending serrations or corrugations 34.

In the modified construction shown in Figs. 6 and 7, the tube 24', which may be flattened as the tube 24, has its ends sealed entirely across by bending the longer of the upper and lower tube end portions 25' over the shorter portions 26'. Openings 35, shown in Fig. 7, are formed on the rear side of the tube adjacent the ends thereof and forked nipples 36 are secured to the tube over these openings. The forked portions 37 overlie a considerable area of the tube 24' so that a strong joint is effected. The unit, including the nipples and tube, and cooling fins upon the tube if desired, may be secured to a radiator tank 15 in the same manner as the unit 24, 26, 33, the nipples 28 extending through the flanged apertures 29 in the tank wall.

The oil lines 21 and 23 may be attached to the ends of the elbows 28, or in the modified construction of the nipples 36, which protrude from the tank. Heated oil passing through the line 21 will flow substantially the entire length of the tubular element within the radiator tank, where due to the close contact with the tube walls, heat will be transferred between the oil and the cooling water. Upon leaving the tube 24 or 24' the oil, cooled to a temperature suitable for efficient lubricating, will be conducted by the line 23 to the engine oil distributing system. Should the engine be started in cold weather, so that the crank case oil is unduly cooled, the process of heat transfer may be reversed and the water, heated in the engine jacket, may be utilized to heat the oil. Due to the flattening of the heat transfer tube, the volume of oil contained therein at any one instant will be small as compared with the contacting area of the tube, enabling the oil to rapidly assume a temperature approaching that of the water in the tank.

The water, following a path indicated by arrows in Fig. 2, will move downwardly through the radiator and will impinge upon the upper surface of the tube 24, 24' or the fin members 33, and will move thereacross to the water outlet 16. Because of the contour of the heat transfer tubes and the member 33, and their comparatively small displacement, the flow of water through the radiator tank will not be materially impeded, but due to the necessary close contact of the water to the transfer element, efficient cooling or heating of the oil may be effected.

It will be understood that the embodiments of the invention herein described are merely illustrative and that other embodiments may be made. It is therefore intended that the invention be considered of scope commensurate with the appended claims.

What is claimed is:

1. A heat transfer unit comprising a tube of wide, narrow cross section, the opposing wide portions of the tube being in contact at the ends of the tube for closing said ends, said tube having an opening in the narrow portion adjacent one end of the tube, a forked fitting joined to the tube over said opening, the forked portions of said fitting overlying parts of the wide portions of the tube, and a plate having ridges extending longitudinally of the tube secured to one of the wider faces of the tube.

2. For use with a water tank of a water cooling radiator having water inlet and outlet passages, a wall of said tank having spaced flanged apertures, an oil temperature regulator comprising a tube of wire, narrow cross section disposed longitudinally of said tank with the longer cross sectional axis of the tube in alignment with the axes of said flanged apertures, tubular fittings joined to end portions of said tube and extending through said flanged apertures, the tube walls contacting the flanges to support one side of the tube, and a bracket secured to said tube for supporting the opposite side of the tube.

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