Nov. 4, 1958 V. V. KELLEY 2,858,823

LIQUID HEATING DEVICE FOR WARMING ENGINES AND THE LIKE

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FIG. 1

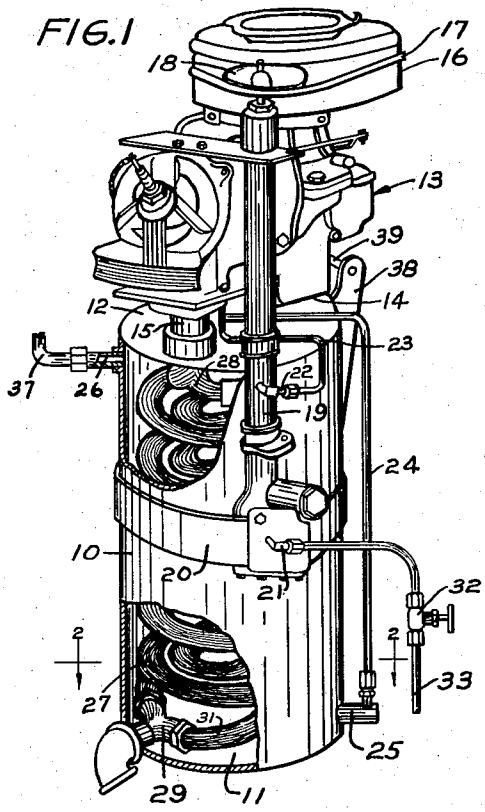


FIG. 2

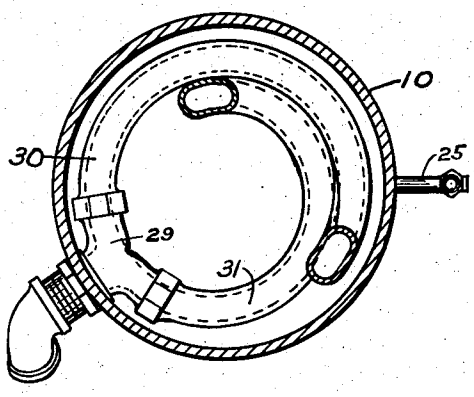


FIG. 4

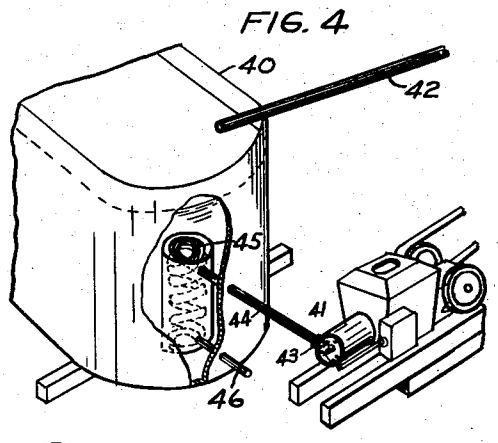
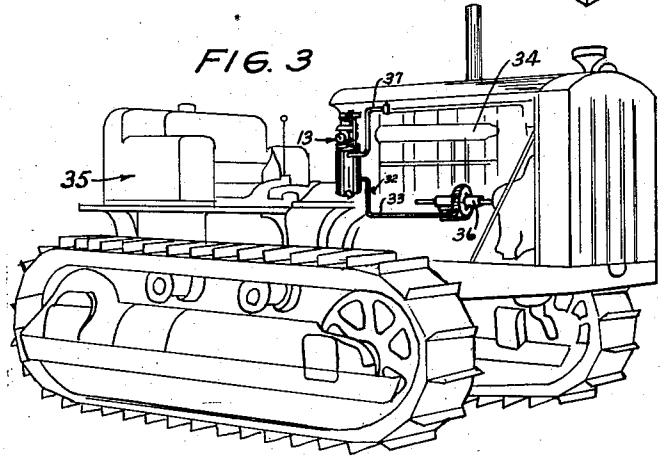


FIG. 3



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LIQUID HEATING DEVICE FOR WARMING ENGINES AND THE LIKE

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4 Claims. (Cl. 123—142.5)

This invention relates to heating devices.

Low climatic temperatures render many types of equipment almost unusable. Engines of trucks, bulldozers and the like are difficult to start, and equipment such as stock watering tanks freezes over to prevent cattle from getting water. Many such devices employ liquid, such as water or the like for one purpose or another, and, of course if such water could be heated, the device would be warmed and rendered usable.

An object of my invention is to provide new and improved apparatus which is readily attachable to equipment that is exposed to low temperatures for warming liquids therein and thereby warming the equipment so that it may be readily used.

Another object of my invention is the provision of a novel portable device which is connectible in flow communication with the cooling system of a truck or tractor engine for warming the coolant therein and thereby warming the engine to facilitate starting thereof.

Still anotner object of my invention is to provide a liquid-warming device including a combustion engine, the exhaust from which is passed through the heat transfer coils to heat water or other liquid which is circulated therearound.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to the same parts throughout the several views and in which:

Fig. 1 is a perspective view, partly broken away, of the heating device comprising the present invention;

Fig. 2 is a detail horizontal section view taken on a substantially horizontal plane as indicated substantially at 2—2 in Fig. 1;

Fig. 3 is a perspective view showing an application of the present invention to a crawler-type tractor; and

Fig. 4 is a perspective view, partly broken away, of a modified form of the present invention for warming the water in a stock watering tank.

The invention as seen in Fig. 1 comprises a generally cylindrical tank or enclosure **10** having a bottom **11** and a top **12**. A combustion engine indicated in general by numeral **13** is affixed as by welding at **14** to the top of the tank **10** and has an exhaust outlet **15**. The combustion engine **14** has a driving member **16** rotatably mounted on a vertical axis which is connected by a belt **17** to a driven member or pulley **18** of a liquid pump **19** which is affixed as by band **20** to the enclosure **10**. The pump **19** has a liquid flow inlet **21** and a liquid flow outlet **22** which is connected by means of conduit **23** to the water cooling system of the combustion engine **13**. The cooling system of combustion engine **13** is connected by a conduit **24** to the inlet fitting **25** which is secured in the lower portion of the side wall of tank **10**. Flow communication is thereby provided from the inlet **21** of pump **19** to the lower end portion of the tank **10**. The tank **10** also has a liquid flow outlet **26** at the upper portion thereof.

A heat transfer coil **27** is disposed within the enclosure **10** and the upper inlet end **28** of coil **27** opens through the upper portion of enclosure **10** and is connected to the exhaust outlet of the combustion engine **13**. The lower discharge end **29** opens through the lower end of the enclosure **10** for discharging exhaust from the engine outwardly into free air. It will be noted in Fig. 2 that the heat transfer coil is of the double wound type with one coil portion **30** wound concentrically and outwardly of a second coil portion **31**. The concentric coil portions **30** and **31** provide a substantial heat transfer area for transmitting the heat from the hot combustion gases to liquid contained within the tank **10**.

The inlet **21** of pump **19** is connected through a flow control valve **32** to a conduit **33** to the lower front portion of the power engine **34** of a power implement **35**. The conduit **33** may be connected to the engine adjacent the water pump **36** thereof. The outlet **26** of tank **10** is connected by means of conduit **37** to the upper rear portion of the power engine **34** in flow communication with the liquid cooling system thereof. The tank **10** has a mounting bracket **38** affixed thereto and a mounting rod or shaft **39** affixed to the bracket to adapt the mechanism for easy mounting on the power implement which may be provided with suitable hooking means for supporting the rod **39**. The engine-warming mechanism comprising the present invention may also be applied to a truck type tractor having an enclosed cab and a hot water heater, in which case, the inlet conduit **33** would be connected to the heater hose which is conventionally attached to the engine adjacent the water pump.

In operation, it is normally quite difficult to start such a large power engine **34** as is conventionally employed in a power implement such as the endless-track tractor **35**. The combustion engine **13** may generally be quite easily started in cold weather because of its light nature. When the combustion engine **13** is started, the pump **19** will be driven to cause flow of the cooling liquid from power engine **34** through the conduit **33** into pump **19**, through the conduits **23** and **24** and into the inlet **25** of enclosure **10**. The hot exhaust from the combustion engine **13** will be driven through the exhaust outlet **15** and downwardly through the heat transfer coil **27** and will be discharged at the lower discharge end **29** thereof. As the hot exhaust gases flow through the heat transfer coil **27**, the cool liquid from the power engine **34** will be heated as it moves upwardly through the tank **10**. The liquid will enter the tank at the bottom and will be first circulated around the lowermost portion of the heat coil **27** which is adjacent the lower end thereof. The water will circulate upwardly to be progressively heated to high temperatures as it circulates around the upper portion of the coil **27** which is substantially hotter than the lower portion because of the proximity thereto of the exhaust outlet **15**. The heated liquid will flow outwardly through the outlet **26** and through the conduit **37** into the upper rear portion of the engine **34** for providing flow circulation through the engine **34** and injecting warm liquid thereinto. It should be apparent that some types of combustion engines are air cooled rather than water cooled and in such applications the outlet **22** of pump **19** will be connected directly to the inlet **25** of the tank **10**. The combustion engine **13** will be run for a period of time, and it has been found that approximately one-half hour is sufficient, to circulate sufficient fluid from the power engine **34** around the heat transfer coil **27** and back to the power engine **34** for warming the power engine sufficiently to permit easy starting thereof even though the climatic temperatures may be well below zero.

In the modification of the invention shown in Fig. 4, the mechanism is arranged for heating the water in the stock watering tank **40**. The combustion engine **41** which

may be used for pumping water into the stock watering tank 40 as through a conduit 42, has the exhaust outlet 43 connected to the inlet 44 of a heat transfer coil 45 which is immersed in the water in the stock watering tank. The discharge end 46 of the coil 45 extends outwardly through the tank side wall for discharging the combustion gases from engine 41 as the gases have been used for heating the water in the tank.

It will be noted that in both of these applications of the liquid heating mechanism, the problem of expansion due to changes in temperatures of the liquid is avoided by virtue of the fact that the combustion gases flow within the coil and the water or liquid to be heated flows around the outside of the coil.

It will be seen that I have provided a new and improved liquid heating device which may be applied to a heavy power engine for heating the cooling liquid thereof and thereby heating the engine to facilitate ready and easy starting thereof, and which is also well adapted for heating liquids in other types of machinery and equipment which is normally exposed to low climatic temperatures and thereby facilitate the full usage of such equipment.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of our invention which consists of the matter shown and described herein and set forth in the appended claims.

What is claimed is:

1. In apparatus for heating the cooling liquid of a power engine, said apparatus having in combination a rigid liquid-confining enclosure, a combustion engine mounted on said enclosure and having an exhaust outlet, a heat transfer coil within said enclosure and having an inlet end connected with said exhaust outlet and also having a discharge end opening through said enclosure, a liquid pump drivably connected with said combustion engine to be operated thereby and having one flow connection with the power engine for passing cooling liquid therebetween, said enclosure having a liquid inlet and a liquid outlet, one connected to the pump in fluid communication and the other connected to the power engine for carrying cooling liquid between the power engine and the enclosure, whereby the cooling liquid will be circulated through the enclosure to be warmed by heat transfer from the exhaust passing through the coil and thereby cause the power engine to be heated to facilitate ready and easy starting thereof.

2. In apparatus for heating the cooling liquid of a machine, said apparatus comprising a rigid liquid-confining enclosure, a combustion engine mounted on said enclosure and having an exhaust outlet, a heat transfer coil within said enclosure and having an inlet end connected with said exhaust outlet for receiving exhaust therefrom and also having a discharge end opening through said enclosure, said enclosure having a liquid inlet and a liquid outlet, conduit means connected with said liquid inlet and outlet and with the machine and arranged to facilitate circulation of the cooling liquid from the machine and through said enclosure to be heated and then back to the machine for warming the same.

3. In apparatus for heating the cooling liquid of a power engine, said apparatus having in combination an upright liquid-confining enclosure having upper and lower ends, a heat transfer coil within said enclosure and having an inlet end extending through the upper portion of said enclosure and having a discharge end opening through the lower end of said enclosure, a combustion engine secured on the upper end of said enclosure and having an exhaust outlet connected with the inlet end of said coil whereby to circulate the hot exhaust through the coil for warming the enclosure interior, said combustion engine also having a rotary driving member on a vertical axis, a rotary liquid pump mounted on said enclosure and having a driven member rotating on a vertical axis and drivably connected with the driving member of the combustion engine, a pair of liquid flow conduits adapted for connection with the power engine in widely spaced relation with each other and in fluid communication with the cooling liquid therein, said conduits being respectively connected in flow communication with the upper and lower ends of the enclosure, said pump being connected in flow communication in one of said conduits and arranged to move the liquid into the lower end of the enclosure and out of the upper end thereof, whereby to forcibly circulate water from the power engine and upwardly through the enclosure to be heated by the heat from the exhaust of the combustion engine, and then back to the power engine.

4. In combination, a power implement having a liquid-cooled power engine, an engine-warming device comprising a liquid-confining enclosure secured to the power implement, a pair of liquid flow conduits respectively connected to the front and rear portions of the power engine in flow communication with the cooling liquid thereof, said conduits being respectively connected in widely spaced relation with respect to each other and circulating water therethrough and through the power engine, a heat transfer coil within said enclosure and having an upper inlet end opening through the enclosure and also having a lower discharge end opening through the enclosure, a combustion engine mounted on said enclosure and having an exhaust outlet connected with the inlet of said heat transfer coil whereby to circulate hot exhaust therethrough for warming the enclosure interior and the liquid therein, said combustion engine also having a driving member rotating on a vertical axis, and a rotary pump having a rotary driven member on a vertical axis and drivably connected with said driving member of said combustion engine, said pump being connected in flow communication in one of said conduits whereby to circulate cooling liquid from the power engine and through the enclosure to be warmed therein and thereby facilitate warming of the power engine of the implement for easy starting thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

1,866,015	Davey	July 5, 1932
2,414,214	Spackman	Jan. 14, 1947
2,533,881	Duff	Dec. 12, 1950
2,623,511	Welin-Berger	Dec. 30, 1952
2,661,015	Allred et al.	Dec. 1, 1953
2,681,052	Kazial	June 15, 1954
2,737,169	Kimberlin	Mar. 6, 1956

FOREIGN PATENTS

884,163	France	Apr. 12, 1943