Aug. 16, 1932. E. W. HELLER 1,871,688

LIQUID HEATING DEVICE

Filed Aug. 22, 1930 2 Sheets-Sheet 1

Fig. 1.

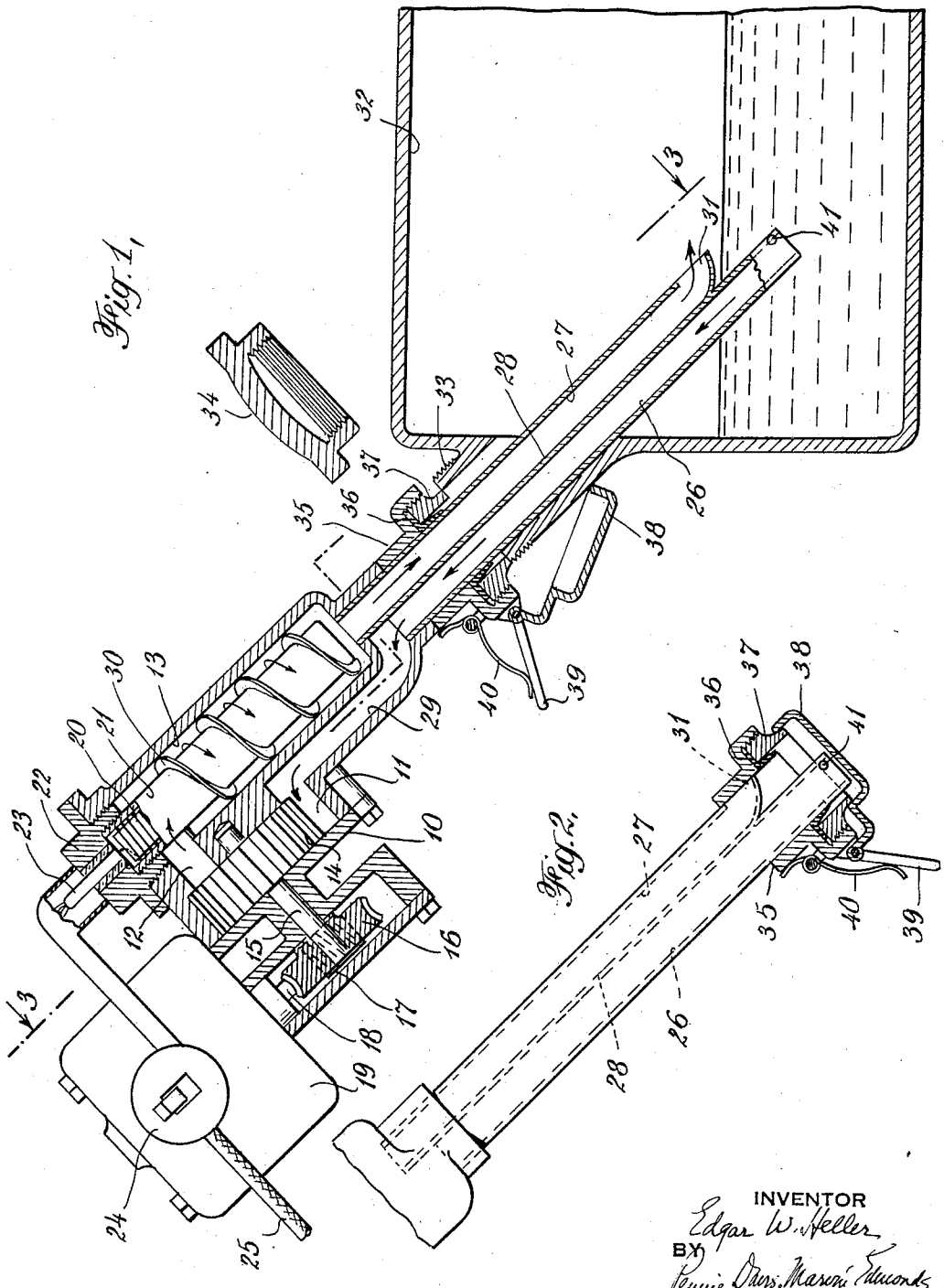


Fig. 2.

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Fig. 3,

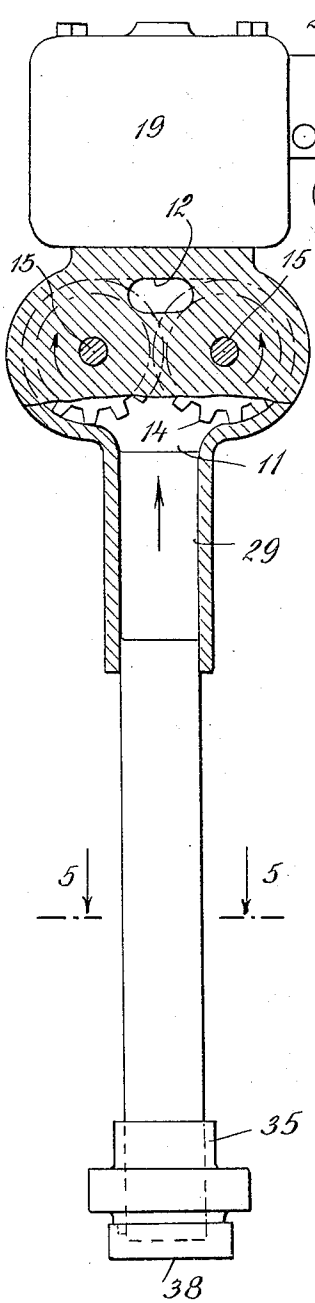


Fig. 4,

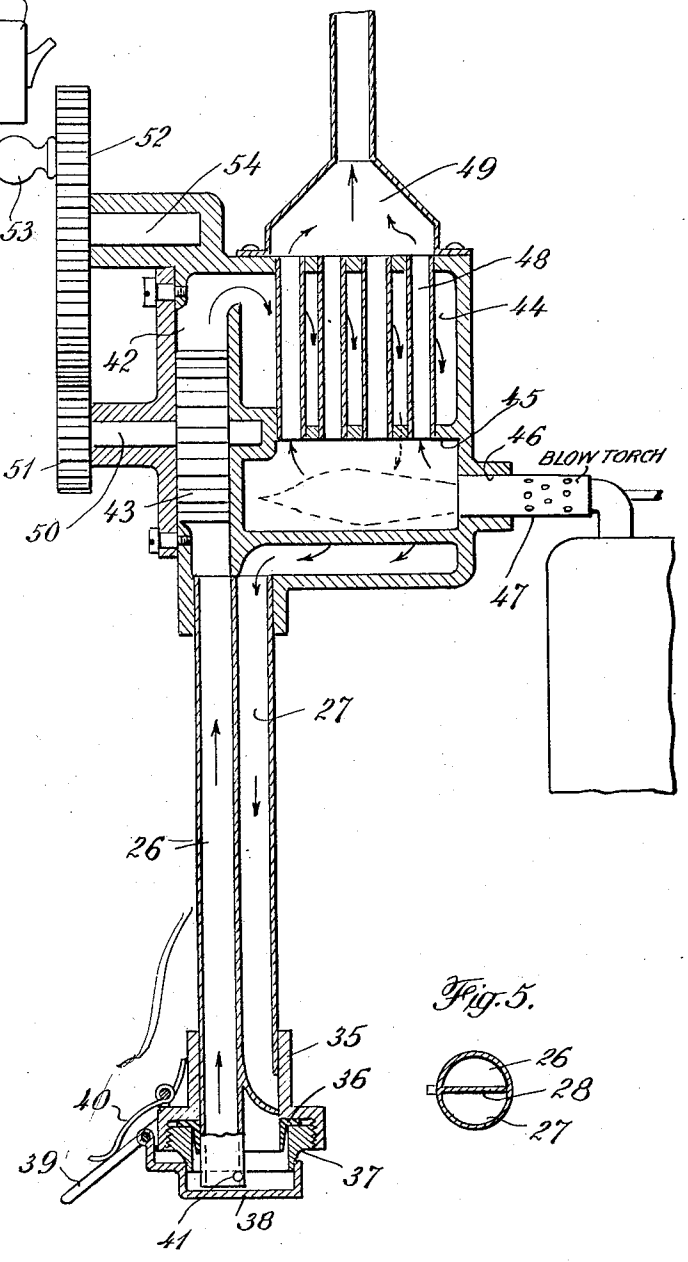


Fig. 5.

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UNITED STATES PATENT OFFICE

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LIQUID HEATING DEVICE

Application filed August 22, 1930. Serial No. 477,138.

This invention relates to liquid heating apparatus and is concerned more specifically with a device by which liquid may be withdrawn from a vessel, heated, and returned to the vessel in a continuous operation. The device of the invention is especially adapted for use in connection with heating the lubricating oil for a gasoline engine during the warming-up period, and an embodiment of the invention suitable for that purpose will be presently described in detail, though it is to be understood that the utility of the apparatus is general and not limited to that particular use.

When gasoline engines are put into operation after a period of rest, the lubricating oil is likely to be thick, particularly on cold winter mornings. Accordingly, it is the practice to idle such motors, especially airplane motors, for a considerable period, to give the oil a chance to heat up and become sufficiently fluid to afford proper lubrication. If this is not done, the oil may not provide the proper film, for example, for the cylinder walls, and these walls are liable to be scored and injured. The idling time required depends on temperature conditions, and even though the motor be idled, damage is likely to be done it by reason of improper lubrication.

Attempts have been made heretofore to provide means for heating the oil in the tank of a motor but so far as I am aware, these heating devices have always taken the form of immersion heating units inserted into the oil through an opening in the tank wall. Such heating devices are not satisfactory because they provide no means for circulating the oil and consequently do not heat efficiently or rapidly. Also they require electric current which may not always be available.

To overcome these difficulties, I have devised a heating device for the purposes mentioned, by which oil is withdrawn from the tank by means of a pump, heated, and returned in a continuous operation, the oil being circulated within the tank, so that the entire body of oil may be heated to the desired temperature in a short space of time. One form of device to be used where electric current is available may include an electric heating element and a motor for driving the pump, while in another form, the device may be arranged for use in connection with a source of heat such as a blow torch, in which case, the pump may be driven by hand or by a motor operating on a battery. In either form, the device is light in weight, and simple in construction and may be mounted permanently in place in the tank wall, or else inserted through an opening therein for use and removed when the heating is completed. When the device is to be mounted temporarily in the tank opening, it is preferably provided with means to prevent drip when it is withdrawn.

For a better understanding of the invention reference may be had to the accompanying drawings, in which:

Fig. 1 is a view in longitudinal section of a device embodying the invention shown in operative position;

Fg. 2 is a fragmentary side elevation with parts illustrated in section;

Fig. 3 is a view on the line 3—3 of Fig. 1;

Fig. 4 is a view showing a modified form of the invention, and

Fig. 5 is a sectional view on the line 5—5 of Fig. 3.

Referring further to the drawings the device of the form illustrated in Fig. 1 comprises a casing 10 in which is a pump chamber 11 which communicates through passage 12 with a heating chamber 13. Within the pump chamber are meshing gears 14 suitably mounted for rotation and with the chamber wall forming a gear pump. One of these gears is mounted on a shaft 15 which carries a worm gear 16 with which meshes a worm 17 and shaft 18 of an electric motor.

Disposed within the heating chamber is an electric heating element which comprises a resistance coil 20 disposed within a suitable casing 21. This heating element is insertable through an opening in the end of the heating chamber which may be closed by a cover 22 having an opening for the passage of the leads 23 by which current is supplied to the coil. The leads extend to a switch 24 from which extends a cable 25 by which the device may be connected to a source of current.

Extending from the casing are intake and outlet conduits 26 and 27 respectively. If desired these conduits may be formed of separate pipes or of a single pipe with a partition 28 extending lengthwise therethrough. One of these conduits leads to the pump chamber and the other leads from the heating chamber. In the construction illustrated the intake conduit is connected through the passage 29 in the casing 10 to the pump chamber and liquid drawn into the chamber is pumped out through passage 12 into the heating chamber where it is caused to flow about the outside of the casing 21 by a vane 30 which cooperates with the heating chamber wall to form a helical passage. Liquid leaving this passage flows out through the outlet conduit 27. The intake conduit 26 is preferably slightly longer than the outlet conduit and the latter has a discharge opening 31 at an angle to the axis thereof.

When the device is to be used for heating oil contained for example in a tank 32 having an opening in the wall thereof defined by a neck 33, the cap 34 normally closing the neck is removed and the double conduit inserted through the neck until the end of the intake passage 26 lies beneath the normal liquid level in the tank. The switch 24 is now turned on supplying current to the motor and to the heating element. The pump draws oil through the conduit 26 and passes it through the heating chamber where its temperature is raised and the heated oil is then discharged through the outlet conduit 27. The discharge of the oil into the tank causes movement of the liquid therein and circulation is promoted by forming the discharge outlet of conduit 27 at an angle to the axis thereof so as to cause the heated liquid to flow into the tank in a direction substantially parallel to the level of the liquid therein. The continuous heating and pumping are continued until the temperature of the oil in the tank is raised to the desired degree and the oil becomes sufficiently fluid so that it can be used with proper lubricating effect. When these operations are completed the device may be removed and the cap 34 restored to close the tank opening although, in some instances, the device may be permanently installed in the tank wall since it is light in weight and occupies little space. When the device is not permanently installed in the tank it is desirable to provide some means for removing oil which adheres to those portions of the conduits which extend below the liquid level when the device is in use and for this purpose the device may be provided with a sleeve 35 mounted slideably on the conduits and provided with a wiping member 36 which may take the form of a leather washer held on the end of the sleeve by a nut 37. Pivotally mounted on the sleeve is a cover 38 having a handle 39 acted on by a spring 40. When the device is to be removed from the tank the operator grasps the sleeve and holds it in place against the tank nozzle at the same time drawing the device out of the tank. The washer removes oil from the outside of the pipes during this operation. The movement of the pipes through the sleeve continues until the sleeve strikes the pin 41 at the end of one of the pipes. When this occurs the pipes are withdrawn through the nozzle and as soon as the pipes are moved clear of the nozzle the cover 38 swings to a position over the ends of the pipes as illustrated in Fig. 2. The cover thus catches any drip from the pipes.

In some instances where a supply of current suitable for energizing the heating element is not available another source of heat such as a blow torch may be employed, the device to be used for this purpose having a form illustrated in Fig. 4. In this form of the mechanism the casing is provided with a pump chamber 42 containing the gears 43 and this pump chamber is in communication with a heating chamber 44. Formed in the heating chamber is a flame chamber 45 having an opening 46 in which may be inserted the nozzle 47 of a blow torch. Leading from the flame chamber through the opposite wall of the heating chamber are pipes 48 communicating with a chimney 49. In using this device the blow torch is ignited and its nozzle inserted in the opening 46 so that the flame enters the flame chamber and passes through the pipes 48 of the chimney 49.

When the pump is operated oil from the tank is drawn through the pump chamber and forced through the heating chamber in contact with the outer walls of the pipes 48 and of the flame chamber. The oil is then discharged through the outlet conduit 27.

The device illustrated in Fig. 4 may be motor driven from a battery or other low tension source of current or may be hand operated. The hand operated pump is illustrated in the figure and one of the gears of the pump is mounted on the shaft 50 on which is mounted a pinion 51 meshing with a gear 52 provided with a handle 53. The gear 52 is mounted on a shaft 54.

While the device is illustrated as provided with heating means in the path of flow of liquid leaving the pump it will be evident that the liquid may be heated before passing into the pump or the heating means may be so disposed as to heat the liquid both as it flows to and from the pump.

What I claim:

1. In a device for heating liquids contained in a vessel, the combination of a casing, a pair of pipes connected to lie side by side and extending parallel, one of said pipes having an intake opening at its end, the other having an outlet opening for discharge of liquid at

an angle to the axis of the pipe, said pipes being adapted to be introduced into the vessel with at least said intake opening lying below the level of the liquid and said pipes being attached to said casing, a chamber in the casing to which said first pipe leads, a pump in said chamber, a second chamber in the casing from which said second pipe leads, said chambers being in communication, and means in said second chamber for heating the liquid passing therethrough.

2. In a liquid heater, a pair of pipes secured together in parallel relation, said pipes having adjacent open ends, a pump to and from which said pipes lead, heating means for heating liquid flowing through said pipes, and means slidably mounted on said pipes and operable in one position to close the open ends thereof.

3. In a liquid heater, a pair of pipes secured together in parallel relation, said pipes having adjacent open ends, a pump to and from which said pipes lead at their other ends, and a collar mounted slidably on said pipes and provided with means for wiping the exterior of said pipes.

4. In a liquid heater, a pair of pipes secured together in parallel relation, said pipes having adjacent open ends, a pump to and from which said pipes lead at their other ends, and a collar mounted to slide on said pipes and having a closure operable to move to a position to close the open ends of said pipes.

5. In a liquid heater, a casing containing a pump chamber and a heating chamber, said chambers being in communication, heating means in the heating chamber, a pipe leading to the pump chamber, a pipe leading from the heating chamber, and means in the pump chamber for drawing liquid through the first pipe, passing it through the chambers in succession, and discharging it through the second pipe.

6. In a portable liquid heater, the combination of a pump chamber, a heating chamber in communication therewith, pump means in the pump chamber, an inlet pipe leading to one chamber, an outlet pipe leading from the other chamber, said pipes being connected to lie side by side and a heating element in the heating chamber in the path of liquid flowing therethrough.

7. In a portable liquid heater, the combination of a pump chamber, a heating chamber in communication therewith, pump means in the pump chamber, an inlet pipe leading to one chamber, an outlet pipe leading from the other chamber, an enclosed heating element in the heating chamber, and a partition in the chamber for causing liquid flowing through the chamber to pass in contact with the casing of the element along a tortuous path.

8. In a portable liquid heater, the combination of a pump chamber, a heating chamber in communication therewith, pump means in the pump chamber, an inlet pipe leading to one chamber, an outlet pipe leading from the other chamber, a plurality of tubes within the heating chamber, the liquid flowing through said chamber in contact with the outside of said tubes, and means for introducing hot gases into said tubes to give up heat to said liquid.

9. In a portable liquid heater, the combination of a casing containing a pump chamber and a heating chamber in communication therewith, pump means in the pump chamber, an inlet pipe leading to one chamber, an outlet pipe leading from the other chamber, means in the heating chamber for heating the liquid flowing therethrough, and means mounted on the casing for operating the pump.

10. In a portable liquid heater, the combination of a casing containing a pair of chambers in communication, a pair of pipes each in communication with one of the chambers, a pump in one chamber, pipes in the other chamber, the liquid flowing therethrough contacting with the exterior of said pipes, an admission chamber in said casing through which hot gases may be admitted into said pipes within said other chamber, and an exhaust chamber into which said gases are discharged from said pipes.

11. In a device for heating liquids contained in a vessel, the combination of a casing, a pair of parallel pipes leading from the casing and connected together, the free ends of said pipes being open and said pipes being adapted to be introduced into the vessel with the open end of at least one pipe below the level of the liquid therein, means in the casing for drawing liquid from the vessel through said pipe into the casing, a chamber in the casing into which the liquid drawn in is discharged, said second pipe being in communication with said chamber, and means in said chamber for heating the liquid passing through the chamber.

In testimony whereof I affix my signature.

EDGAR W. HELLER.