

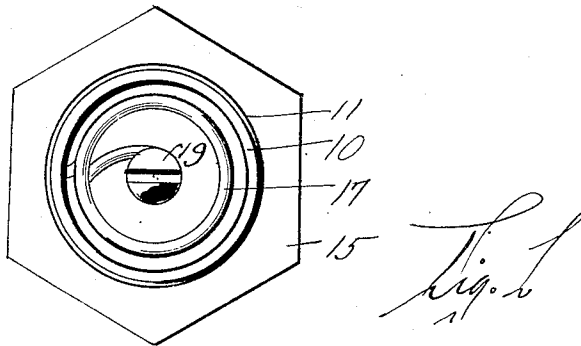
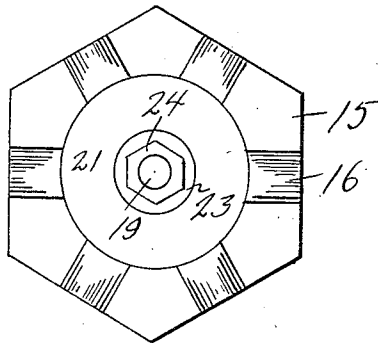
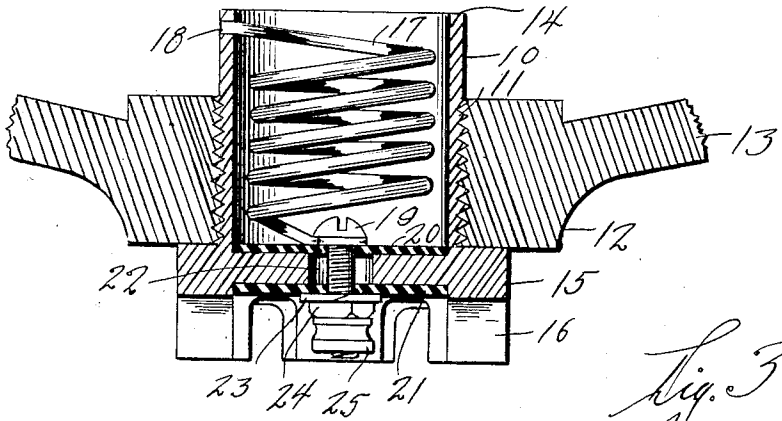
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OIL HEATER

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OIL HEATER

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Our invention relates to oil heaters for crank cases and oil containers and has for its object to provide a heater of the type involving a threaded plug adapted to replace the drain plug of a crank case or oil container, the particular problems solved in the present invention being those of obtaining a maximum heating effect in a short period of time and efficiently heating a mass of oil which has been congealed by temperatures ranging below zero.

In this connection, it may be observed that ordinary lubricating oil such as is used in the crank cases of automobiles when cooled to zero degrees Fahrenheit becomes congealed to the point where it can no longer be said to be a liquid. At such temperatures, it has a consistency similar to that of butter at 80° Fahrenheit and will not flow freely.

One of the requirements for heating a large body of oil by a small plug is that the plug sets up convection currents in the oil. The present invention has for its object the attainment of this function.

Another object is to provide a heater which is adapted to melt and vaporize a body of ice collected in the lowermost portion of the container.

Another object of our invention is to provide a very simple, inexpensive and effective construction for supporting a current carrying post extending through the head of the plug and insulating it from the plug.

A still further object is to provide means for protection of the plug and its current carrying wire from damage through contact with obstacles over which the motor vehicle in which the plug is installed may be passable.

With these and other objects in view, our invention consists in the construction, arrangement and combination of the various parts of our device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in our claims, and

illustrated in the accompanying drawings, in which:

Fig. 1 is a plan view of the plug.

Fig. 2 is an inverted plan view of the plug and

Fig. 3 is a longitudinal, sectional view through the plug.

The problems with which the present invention deal are those arising from the difficulty of starting an automobile engine in extremely cold weather, the failure of congealed oil to lubricate, the freezing of oil pumps, the congealing of oil in tank cars where changing in cold temperatures is necessary, the congealing of oil in storage tanks, the congealing of lubricating oil in aeroplanes, the condensation and freezing of moisture in internal combustion motors, the emulsification of oil with water of condensation in cold temperatures.

We have discovered that the heat from a small coil contained in a plug which can be screwed into the opening of a crank case is sufficient to deal with all of these problems providing that the plug has the proper construction. One of the primary requisites of such a heater is that it shall be capable of dispersing its heat into the body of congealing oil. This requires a certain amount of movement of the oil wherein the congealed oil moves into the heater and the thin, heated oil is expelled. But the attempt to employ a heater of this type creates certain problems which are added to those already mentioned. In the first place, the drain openings of oil containers are limited in size and the average size of these openings is such as to limit the efficiency of the plug type heater and this limitation must be compensated for in the construction of the heater itself. Another problem which arises is that of the limited capacity of a storage battery and it is highly desirable to reduce the amount of time necessary for the heater to properly react on a body of congealed oil. We have discovered that the prob-

lem of creating convection currents in the oil is solved in the best possible manner by the use of a plug embodying a shell which is open at the top to provide a thin edged wall projecting upwardly into the body of oil and a heating element comprising a coil of resistance wire, insulated from the wall of the shell and positioned fairly close to said wall. The effect of the above noted features is as follows: The air insulation of the coil from the wall of the shell increases the amount of space within the shell of the heater and allows the entire surface of the coil to radiate heat into the body of oil to be heated. The coil transmits its heat to the wall of the shell and the upper edge thereof when heated constitutes an admirable cutting edge to sever a portion of the congealed oil from the remaining body thereof and to allow it to slide downwardly into the shell.

The oil which is heated becomes very thin and will quickly rise upwardly to the surface of the body of oil within a container through an opening which has originally been made by bubbles of steam produced from the volatilization of the ice and condensation within the oil container. It will be understood that where the heater is positioned in a drain opening that it will be at the lowest point of the oil container and that water of condensation will therefore collect within the shell of the heater and be first acted upon thereby. The mass of congealed oil surrounding the hole through which the thin, heated oil is escaping upwardly will constantly crowd inwardly, tending to diminish the size of the hole, owing to the greater specific gravity of the congealed oil and as it so crowds inwardly, it will quickly slide downwardly into the heater, owing to the heated edge of the device which severs the inner sleeve of congealed oil from the body of oil surrounding it. This sleeve of oil will be rapidly melted and thinned upon coming into contact with the coil of the heating element and will be pushed inwardly by the downwardly moving sleeve of colder oil from above, thence moving upwardly from the center of the heater.

The convection currents thus set up will rapidly move the body of oil into the zone of action of the heater and we find from actual tests that in twelve minutes' time, a small heater of the type shown installed in the drain opening of an automobile and energized from the storage battery thereof will fully transform a body of oil congealed at a temperature of twelve degrees below zero to a thin state having perfect lubricating qualities.

It will be understood that the convection process described occurs in its most pronounced form at the beginning of the heating process and that after a substantial portion of the body of oil has been heated, the remainder will be heated to a large extent by conduction from the thinned body of heated oil sur-

rounding the heater. The action of the heater is therefore most rapid at the beginning and a pool of oil approximately six inches in diameter can be thinned in a period of about two minutes' time. This will be sufficient to dispel all moisture from the screen of the oil pump of an ordinary automobile engine and to absolutely insure proper supply of lubricant to the pump.

Referring now to the drawings, the particular construction of the device is as follows: The shell 10 is threaded as at 11 so as to be received in the threaded boss 12, defining the drain opening of an oil container 13. The thin, upper edge 14 of the heater constitutes, when heated, a cutting edge as hereinbefore explained. The heat 15 of the plug is multi-sided as shown in Figs. 1 and 2 and is provided with radiating depressions or channels 16 to receive a current carrying wire. The intervening portions of the head 15 protect the current carrying wire. No matter what position the head may assume after the plug is screwed tightly in place, at least one of the depressions 16 will be positioned so that the wire may be extended from the center of the plug in the proper direction toward its connection at the dash of the vehicle.

The heating coil 17 is secured at one end as at 18 in the wall of the shell 10 and thereby grounded to the plug. The other end of the coil 17 is secured beneath the head of a binding post 19, which is supported between a pair of insulating washers 20 and 21 and projects through a central opening 22 in the head of the plug. A lock washer and lock nut 23 and 24, respectively, secure the binding post 19 and washers 20 and 21 in assembled relation. The washers 20 and 21 engage the wall 10 and a shoulder formed by the head 15 and serve to support the binding post 19 against lateral movement, thereby insulating it from contact with the plug. The opening 22 being substantially larger than the binding post, no insulation is needed therein.

A binding nut 25 is threaded on the end of a binding post 19 and secures a current carrying wire which is not shown. The washer 20 serves as an insulating support for the coil 17.

The oil within the shell of the heater aids in the insulation of the coil 17 from the wall of the shell.

Some changes may be made in the construction and arrangement of the parts of my invention without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents, which may be reasonably included within their scope.

We claim as our invention:

1. In a heater for viscous oils that are non-fluid at temperatures near zero degrees Fahrenheit, an upwardly opening open-

mouthed shell adapted to be extended through and secured in the wall of an oil container at a low point thereof, and an electrical heating element in the shell, the space within the shell being entirely unoccupied with the exception of the space occupied by the heating element and the latter being spaced from the wall of the shell at any temperature of use, whereby oil from the container may fill the shell and contact directly with the heating element from all sides, thereby aiding in insulating the element from the shell wall, and being provided with a path for maximum circulation through the shell.

2. In a heater for viscous oils that are non-fluid at temperatures near zero degrees Fahrenheit, an upwardly opening open-mouthed shell adapted to be extended through and secured in the wall of an oil container at a low point thereof, and an electrical heating element of helically coiled resistance wire, arranged coaxially within the shell, the space within the shell being entirely unoccupied with the exception of the space occupied by the heating element, and the latter being spaced from the wall of the shell at any temperature of use, whereby oil from the container may fill the shell and contact directly with the heating element from all sides, thereby aiding in insulating the element from the shell wall, and being provided with a path for maximum circulation through the shell.

3. In a heater for viscous oils that are non-fluid at temperatures near zero degrees Fahrenheit, an upwardly opening open-mouthed shell adapted to be extended through and secured in the wall of an oil container at a low point thereof, and an electrical heating element of resistance wire, arranged closely adjacent the inner surface of the shell, but spaced therefrom at any temperature of use, the space within the shell being entirely unoccupied with the exception of the space occupied by the heating element, whereby oil from the container may fill the shell and contact directly with the heating element from all sides, thereby aiding in insulating the element from the shell wall, and being provided with a path for maximum circulation through the shell.

4. In an oil heater, an upwardly opening open mouthed shell, adapted to be extended through and secured in the wall of an oil container at a low point thereof, the shell having an apertured head, a binding post of diameter smaller than that of the aperture, extending therethrough and air-insulated therefrom, a pair of insulating washers seated against opposite sides of the head, the latter being constructed to engage the edges of the washers to give lateral support thereto, the post extending through the washers and deriving lateral support therefrom, and an electrical heating element attached to the post at one end and to the shell wall at its other end.

5. In an oil heater, an upwardly opening open mouthed shell, adapted to be extended through and secured in the wall of an oil container at a low point thereof, the shell having an apertured head, a binding post of diameter smaller than that of the aperture, extending therethrough and air-insulated therefrom, a pair of insulating washers seated against opposite sides of the head, the latter being constructed to engage the edges of the washers to give lateral support thereto, the post extending through the washers and deriving lateral support therefrom, and an electrical heating element of coiled resistance wire arranged coaxially within the shell and insulated by a fluid space from the side wall thereof.

6. In combination with an oil container, a heater for viscous oils that are non-fluid at temperatures near zero degrees Fahrenheit, comprising an upwardly opening open-mouthed shell extended through and secured in a wall of the container at a low point thereof, and an electrical heating element in the shell, spaced from the wall of the shell at any temperature of use, the space within the shell being entirely unoccupied with the exception of the space occupied by the heating element, the shell wall being of material having relatively high heat conductivity, and being extended above the container wall to form a rim adapted, when heated, to present a cutting edge to aid in the movement of congealed oil into the shell, the arrangement of the heating element allowing oil to contact therewith from all sides.

7. In a heater for viscous oils that are non-fluid at temperatures near zero degrees Fahrenheit, an upwardly opening open-mouthed shell adapted to be extended through and secured in the wall of an oil container at a low point thereof, and an electrical heating element within the shell, the mouth of the shell being of substantially the same area as the mean cross-sectional area of the shell's interior, and the space within the shell being entirely unoccupied with the exception of the space occupied by the heating element, the latter being spaced from the wall of the shell at any temperature of use, whereby oil from the container may fill the shell and contact directly with the heating element from all sides, and be provided with a path for maximum circulation through the shell.

8. In a heater for viscous oils that are non-fluid at temperatures near zero degrees Fahrenheit, an upwardly opening open-mouthed shell adapted to be extended through and secured in a wall of an oil container at a low point thereof, and an electrical heating element within the shell, the space within the shell being entirely unoccupied with the exception of the space occupied by the heating element and the latter being spaced from the wall of the shell at any temperature of use,

- whereby oil from the container may fill the shell and contact directly with the heating element from all sides, thereby being provided with a path from maximum circulation through the shell, both shell and heating element being so limited in height as to extend above the inner surface of the container wall a distance that is less than the height of that portion of the shell that will be positioned below said inner surface.
9. A heater for viscous oils that are non-fluid at temperatures near zero degrees Fahrenheit, comprising a plug, having a threaded portion to coact with the threads of an oil container drain opening, said portion forming an upwardly opening shell having an upper rim devoid of threads and adapted to project above the bottom of the oil container, and a heating element supported by the plug and projecting into the shell.
10. In a heater for heating viscous oils in a crank case of an internal combustion motor, a plug having a threaded portion adapted to coact with the threads of a drain opening of limited size in said crank case, the plug constituting a means of closing said drain opening, and a heating element supported by the plug, the latter being formed to allow the element to extend into the drain opening so as to occupy a portion of the space within the drain opening, the element being adapted to have direct contact with the oil of the crank case, the space above the head of the plug being unobstructed with the exception of the space occupied by the threaded portion and the heating element, and both plug and heating element being so limited in height that neither will extend above the bottom of the crank case as far as the distance through the drain opening from the inner to the outer surface of the crank case wall.
11. In combination with an oil container having a drain opening, a heater for viscous oils that are non-fluid at temperatures near zero degrees Fahrenheit, comprising an upwardly opening shell having an open mouth of substantially the full cross-sectional area of the drain opening, extended through and secured in the drain opening, and an electrical heating element within the shell, arranged to contact directly with oil filling the shell from the container, and positioned closely adjacent the shell so as to readily transmit heat thereto, the latter being of material having relatively high heat conductivity.
12. In combination with an oil container having a drain opening, a heater for viscous oils that are non-fluid at temperatures near zero degrees Fahrenheit, comprising an upwardly opening shell having a mouth of substantially the full cross-sectional area of the drain opening, extended through and secured in the drain opening, and an electrical heating element within the shell, arranged to contact directly with oil filling the shell from the container, and positioned closely adjacent the shell so as to readily transmit heat thereto, the latter being of material having relatively high heat conductivity and being extended above the container wall to form a rim adapted, when heated, to present a cutting edge to aid in the movement of congealed oil into the shell.
- Signed this 21st day of December, 1929.
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