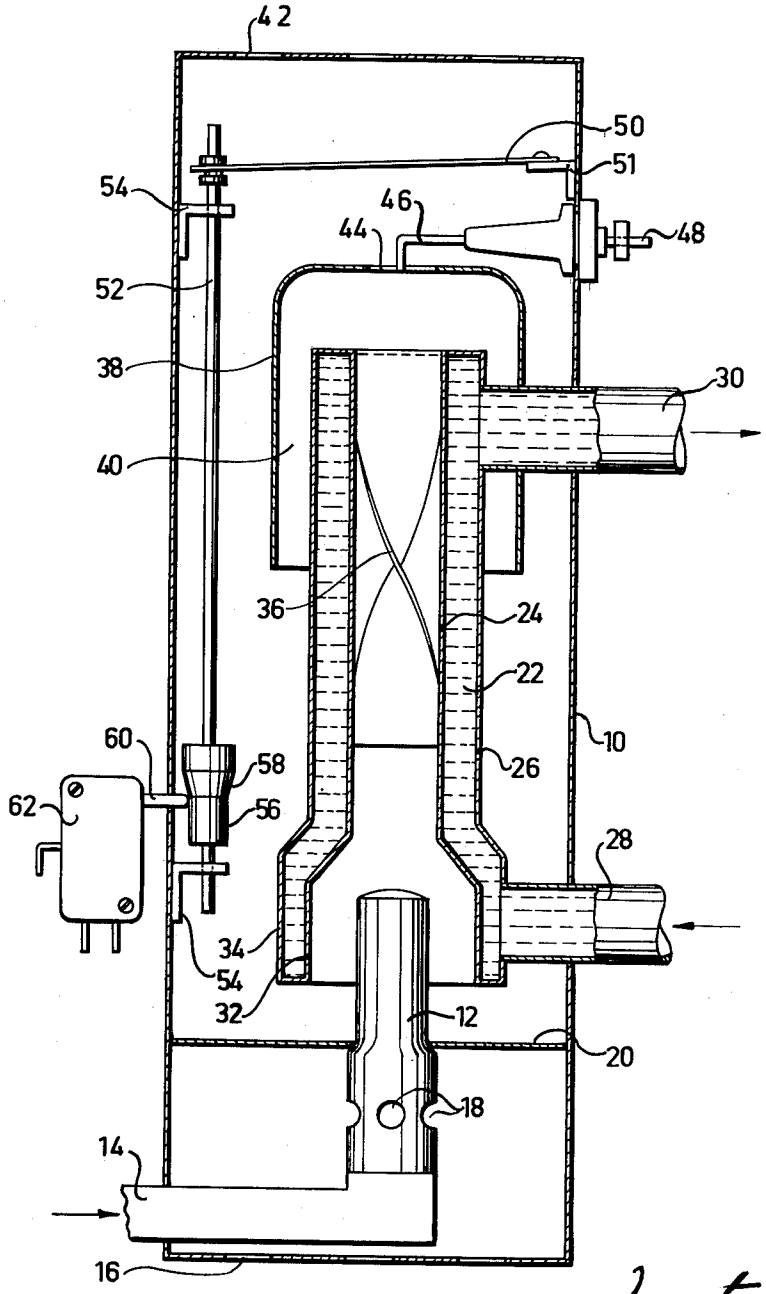
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HEATING DEVICE FOR SMALL CALORIC REQUIREMENTS

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HEATING DEVICE FOR SMALL CALORIC REQUIREMENTS

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1 Claim. (Cl. 126—350)

This invention relates to a heating device intended for small caloric requirements.

More particularly this invention relates to an engine preheater comprising a burner producing a flame and a double-mantled container mounted concentrically above said burner. The container has at its top and base respectively connection members for connecting the container with an element containing a liquid or with a heat exchanger. By the heating effected within the container the liquid is caused to circulate between said container and said element.

The invention is primarily intended to be applied to car motors, its particular purpose being at low external temperatures to effect a preheating of the cooling water system of the motor. In the following specification the invention will be described more detailed in connection with such motor preheaters though it is well understood that the invention is not limited to this specific field but may be applied to other fields where correspondingly small caloric demands are to be met.

One main object of the invention is to provide a heating device of the type set forth which has a substantially improved efficiency in the heat transfer between the flame of the burner and the circulating liquid.

A further object of the invention is to provide a heating device of the type set forth constructed so as to effect the heat transfer from the flame of the burner to the double-mantled container in a manner causing it to reach its top value in a zone located in the container above the level of the connection to the element through which the colder liquid enters the container.

A still further object of the invention is to provide a heating device of the type set forth which ensures unrestricted circulation of the liquid between the heating device and the element so as to obtain the largest possible drawing column in the system of circulation with a minimum of losses of flow.

A still further object of the invention is to provide a heating device of the type set forth which is simple in construction and nevertheless reliable in all conditions of operation.

Further objects and advantages of the invention will become apparent from the following description considered in connection with the accompanying drawing showing a vertical longitudinal sectional view of an engine preheater constructed according to the invention.

Referring to the drawing reference numeral **10** denotes a casing the lower part of which houses a burner **12** which preferably is intended for operation with condensed hydrocarbon gas and which has a feeding pipe **14** connected to a storage vessel (not shown) containing the gas condensed under pressure. The casing **10** has at its base an air intake **16** and the burner is around its circumference provided with inlets **18** for combustion air. A partition **20** keeps this air separated from the flue gases leaving the burner. The gas supplied through the pipe **14** is mixed with primary air admitted through the inlets **16**, **18** and with secondary air admitted through an opening (not shown) in the casing **10** and is burned with a flame developed and maintained above the burner **12** as long as fuel and air are supplied to this latter.

Within the casing **10** is further provided a double-

mantled container **22** having an internal wall **24** and an external wall **26**. In the embodiment shown both walls are cylindric. Connected to the container **22** are at its base an inlet conduit **28** and at its top a discharge conduit **30** which both conduits are adapted to be connected to the cooling water system of an internal combustion engine such as a car motor. Both cylindrical walls of the container **22** have at their base widened portions **32** and **34**, respectively, formed on substantially the same level as the connection of the inlet conduit **28**. The burner **12** projects into the widened portion **32** of the internal cylindric wall **24** so as to cause the hottest zone of the flame to be displaced slightly above said widened portion. The ratio between the diameters of the widened portions **34** and **32** is chosen so as to cause the area for the flow passage of the liquid to be heated within the container to be substantially equal as or larger than the area of flow passage in the upper narrower part of the container **22**. Since the portions **32**, **34** are positioned on larger radii than the cylindric walls **24** and **26** located thereabove this condition of flow passage area may be met in spite of the fact that the radial spacing between the wall portions **32** and **34** is smaller than the radial spacing between the walls **24** and **26**.

In order to make the heat exchange between the flue gases and the interior wall **24** of the container more effective this latter may be formed with a blade-shaped flange **36** which entails to the gases increased turbulence and also by itself conveys heat to the wall **24**. A dome **38** is superimposed to the upper part of the container **22**. Said dome is open at its base and the main portion of the flue gases leaving the interior of the container is forced by said dome to sweep around the upper portion of the container through the annular space **40** by which means the heat content of the flue gases is exploited further. The gases finally escape through apertures **42** formed in the top part of the casing **10**. A minor portion of the gases passes through an opening **44** provided in the central portion of the dome **38**. Located in said opening is an ignition plug **46** which through wires **48** is connectable to the starting battery of the car motor to ignite the flame in the preheater. Mounted above the dome **38** is a spring **50** made of bimetal, said spring with its one end being rigidly secured to a bracket **51** of the casing **10** and with its other end carrying a bar **52**. Said bar **52** which is axially displaceable within brackets **54** provided on the casing **10** carries a member **56** formed with a tapering surface **58**. The member **56** is adapted to co-operate with an arm **60** forming part of a circuit breaker **62**. When in the starting operation of the preheater the mixture of gas and air has been ignited by means of the igniting plug **46** the hot gases flowing upwardly will act on the spring **50** of bimetal and cause this latter to displace the free end of the bar **52** downwardly. This downwardly directed movement of the bar will result in the member **56** pushing the arm **60** into the circuit breaker **62** which latter thus is caused to break the supply of current to the igniting plug **46**. Thus the battery of the car motor will deliver current to the igniting plug only during a short period of time.

When operating the motor preheater the container **22** is heated and the cooling water of the motor is caused to circulate in an upward direction within said container. The relatively colder water entering through the inlet conduit **28** is given in the lower widened portion of the container at the utmost a minor heating, and instead the heating attains its maximum of intensity at a level above said inlet conduit where due to the location of the heater inside the container the hottest zone of combustion is created. The efficiency of the motor preheater has proved to be substantially improved over prior construc-

tions where the heater is located entirely below said container. The shape of the container with its widened base portion as described hereinfore further ensures that the intensity of circulation of the water will be high. It is easily understood that the resulting driving force which is defined by the difference in temperature and thus in density of the water column in the container 22 and in the motor, respectively, is small in itself, for which reason it is of substantial importance that the container is formed in a manner advantageous for the flow.

The container 22 must not necessarily be composed of two cylindrical walls but may, for example, be subdivided into vertical sections or tubes between the upper and the lower connection to the element to be preheated.

While one more or less specific embodiment of the invention has been shown and described, it is to be understood that this is for purpose of illustration only and that the invention is not to be limited thereby, but its scope is to be determined by the appended claim.

What I claim is:

Heating apparatus for effecting thermal circulation in a confined main body of liquid comprising a flame burner productive of a zone of maximum temperature, a closed liquid container comprising a double walled elongated annular tube disposed around said burner and providing a tubular flue extending substantially vertically above said burner, the lower portion of said tube being flared outwardly to provide an enlarged base portion, said base portion being of substantially less height than the reduced

upper portion of said tube, the cross sectional area of the liquid flow passage of said base portion being at least substantially equal to the cross sectional area of the liquid flow passage of said upper portion, a delivery conduit leading from the upper part of said container and adapted to communicate with the upper portion of said main body of liquid, a return conduit adapted to communicate with the lower portion of said main body and connected to said base portion, said burner being disposed in said base portion with the upper end of said burner terminating at substantially the same level as the uppermost point of said return conduit and with said maximum temperature zone located in the flared upper part of said base portion above the point of connection of said return conduit, whereby with said burner operating liquid will circulate through said delivery conduit to said main body and through said return conduit to said container.

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