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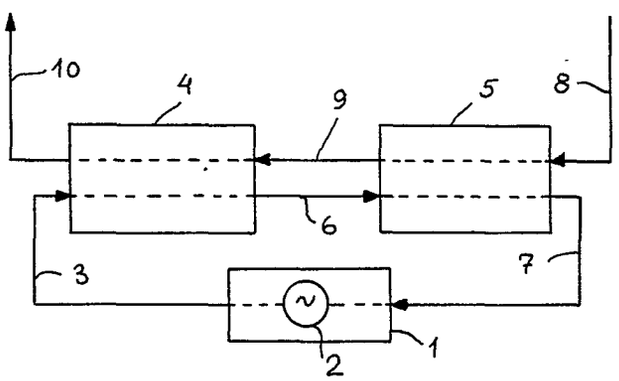
(71) Applicant: **NIL-DAN Inh. E. u. A. Nielsen oHG., Lollfuss 23, D-2380 Schleswig (DE)**

(72) Inventor: **Nielsen, Arne Christian, Lollfuss 23, D-2380 Schleswig (DE)**

(74) Representative: **Koepsell, Helmut, Dipl.-Ing., Mittelstrasse 7, D-5000 Köln 1 (DE)**

(54) Heat pump.

(57) In a heat pump, in which the first medium by a pump (2) is circulated in an enclosed system (1-7) with a heat exchanger (4), in which the first medium is emitting heat to a second medium, the closed system is oil-filled. The pump (2) is an oil engine, and the oil tubes of the heat exchanger (4) have a flow passage section compressing the oil to a substantial pressure. Hereby the oil is heated without cooling off the surroundings, and the heat pump offers a very high rate of efficiency.



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NIL-DAN Inh. E. u. A. Nielsen oHG.

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Heat Pump

The invention relates to a heat pump in which the first medium is circulated by a pump in an enclosed system with a heat exchanger, in which it is emitting heat to a second medium.

Ordinary heat pumps are working like known refrigerator olants in which the first medium is cooling the surroundings and transmits the hereby absorbed heat to the second medium which e.g. could be water circulating in a central heating plant. The circulation pump applied for the first medium is usually operated by an electric motor.

It is according to the invention suggested that the closed system is oil-filled, that the pump is an oil engine, and that the oil tubes of the heat exchanger have a flow passage cross section compressing the oil to a high pressure.

In the present connection a high pressure means the rate of 3-400 ato.

When compressed the oil or an alternative suitable liquid with similar characteristics is heated, and it has surprisingly been established that the quantity of heat transmitted to

a second medium is considerably higher than the quantity equalling the effect received by the oil engine. The described heat pump will accordingly offer a noticeably high rate of efficiency.

It is according to the invention advantageous that the oil engine is installed in an insulated oil receptacle in the enclosed system, thereby utilizing even the waste heat of the pump motor.

The invention is described in detail below with reference to the drawing showing schematically a heat pump according to the invention in connection with a central heating plant.

The heat pump comprises an oil receptacle, in which is installed a pump 2 with an electric driving engine. The suction side of the pump 2 discharges into the oil receptacle 1, whereas the pressure side of the pump through a tube 3 is connected to a heat exchanger 4. In the heat exchanger 4 the oil from the pump 2 is under substantial pressure directed through a helical tube with a relatively narrow flow passage, whereby the oil is heated.

Through the heat exchanger 4 also water is passing absorbing heat from the oil, which is thereby cooled off.

From the heat exchanger 4 the oil is directed to a second heat exchanger 5 through a tube 6.

In the second heat exchanger 5 the oil is led from the tube 6 through a helical tube with a relatively large flow passage cross section, whereby the oil pressure wil be lowered. Through the second heat exchanger water is likewise directed absorbing the heat from the oil.

From the second heat exchanger 5 the oil is directed via a tube 7 back to the oil receptacle 1.

The water supplied to the second heat exchanger 5 through a tube 8 can e.g. be return water from a central heating plant. From the second heat exchanger 5 the water is passing through a tube 9 to the first heat exchanger 4. From the latter the water heated in the heat exchangers 4 and 5 is directed through a tube 10 to the central heating plant.

The below stated example will illustrate the operation and the efficiency of the heat pump.

The oil pump 2 is operated by a 4.5 kW motor with a capacity of 10 l/min. The total quantity of oil being 33 l, and the specific heat of the oil being 0,5 cal/g/degree C. A highly recommendable oil is the type of oil used in the hydraulic system of a jet aeroplane, as this kind of oil retains mainly a uniform viscosity over a large interval of temperatures.

The first heat exchanger 4 comprises a 40 m helical oil tube with an internal diameter of 4 mm, whereas the second heat

exchanger 5 comprises a 15 m helical oil tube with a considerably larger internal diameter.

From a central heating plant approximately 15 l of water per minute is directed through the two heat exchangers.

The return water in the tube 8 has a temperatur of about 50 degrees C, whereas the water having passed the heat exchangers in the tube 10 holds a temperatur of 60 degrees C.

The oil in the tube 6 between the two heat exchangers 4 and 5 has a temperatur of 60 degrees C, while the oil in the tube 7 has a temperature of 55 degrees C.

Caused by the waste heat of the pump motor the oil in the receptacle 1 is heated to 75 degrees C.

On account of the very small flow passage cross section of the oil tubes of the first heat exchanger 4, the actual pump pressure will reach approximately 330 ato.

15 l of water will per minute be heated by 10 degrees C. This equals - the specific heat of the water being 1.0 cal/g/degree C -

$$\frac{15}{60} \cdot 1{,}0 \cdot 10 \cdot 4{,}1868 = 10{,}467 \text{ kW}.$$

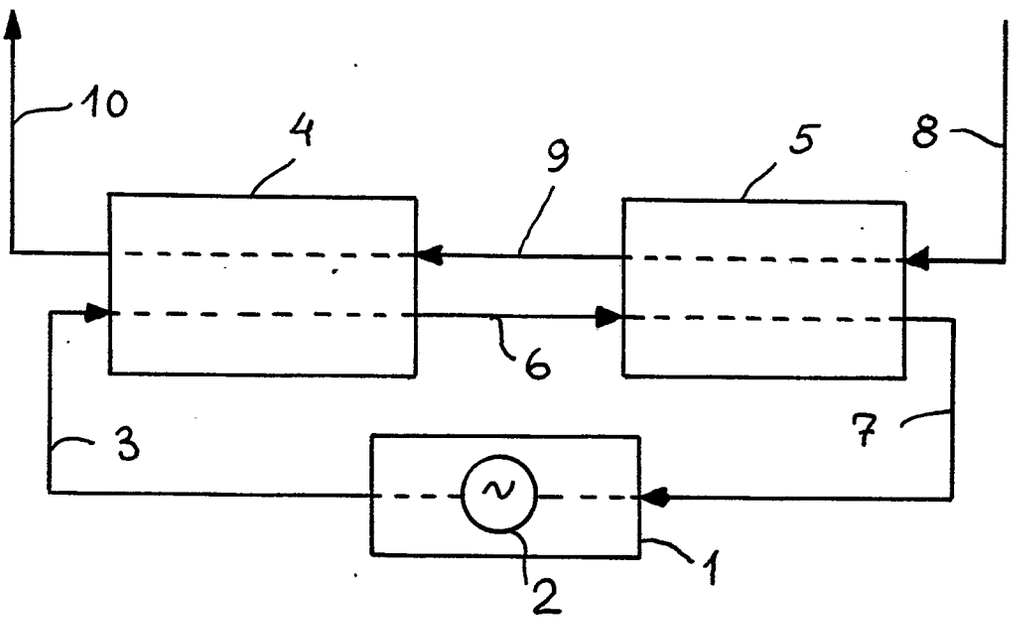
By comparison to note that the effect of the pump motor being 4.5 kW, and that no cooling of/absorption of heat from the surroundings is taking place.

C l a i m s :

1. Heat pump in which the first medium by a pump (2) is circulated in an enclosed system (1-7) with a heat exchanger (4), in which it is emitting heat to a second medium, characterized in that the closed system is oil-filled, that the pump (2) is an oil engine, and that the oil tubes of the heat exchanger (4) have a flow passage cross section compressing the oil to a high pressure.

2. Heat pump according to claim 1, characterized in that the oil engine (2) is installed in an insulated oil receptacle (1) in the enclosed system.

3. Heat pump according to claims 1 and 2, characterized in that in the enclosed system after the first mentioned heat exchanger (4) a second heat exchanger (5) is inserted, which is passed by the second medium before this being directed through the first heat exchanger /4).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