Jan. 15, 1929.

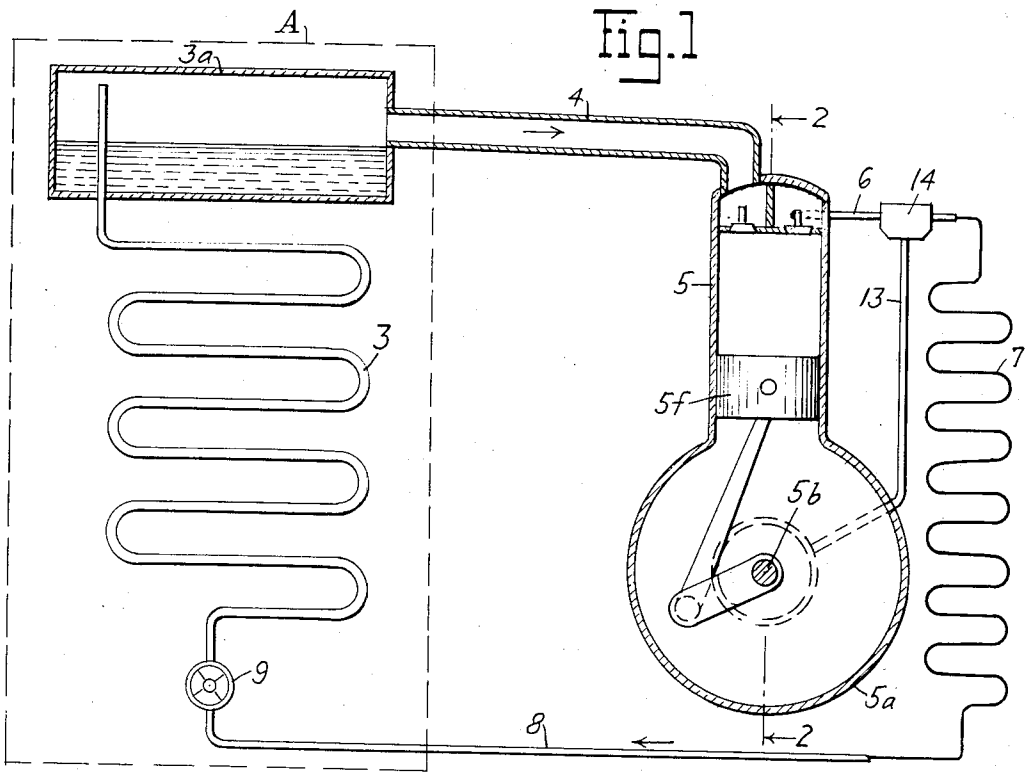
1,698,941

R. W. DAVENPORT

APPARATUS FOR TRANSFORMING HEAT

Original Filed May 5, 1926

Fig. 1



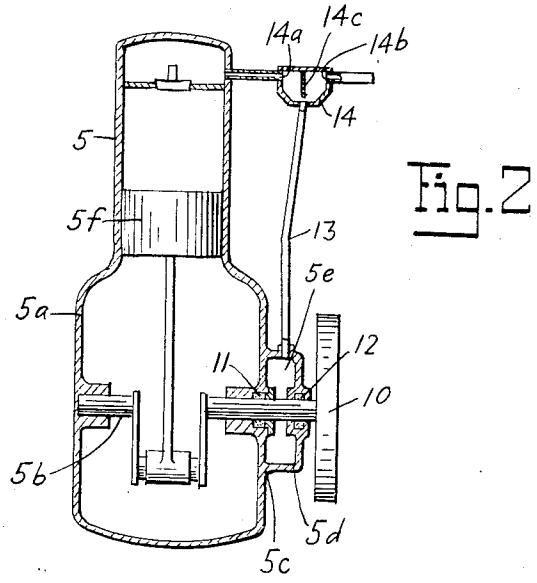


Fig. 2

INVENTOR.
Ransom W. Davenport

BY

Ira L. Nickerson
ATTORNEY.

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UNITED STATES PATENT OFFICE.

RANSOM W. DAVENPORT, OF DETROIT, MICHIGAN, ASSIGNOR TO CHICAGO PNEUMATIC TOOL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

APPARATUS FOR TRANSFORMING HEAT.

Application filed May 5, 1926, Serial No. 106,826. Renewed May 1, 1928.

This invention relates to heat transforming apparatus, and more particularly to such apparatus adapted and intended for use with lubricating working substances of the type disclosed and claimed in my copending application, Serial No. 60,311, filed October 3, 1925.

One object of the invention is to provide apparatus which will successfully utilize lubricating working substances in the transforming of heat. Another object is to provide such apparatus of the evaporator-compressor-condenser type operating with the crank case of the pump or compressor at a pressure intermediate the condenser and evaporator pressures. Another object is to minimize leakage from the crank case. Other objects will be apparent from the detailed description which follows:

In order to illustrate the invention, one concrete embodiment thereof is shown in the accompanying drawings, in which:

Fig. 1, illustrates in a somewhat diagrammatical manner a refrigerating system of the closed-cycle type, certain parts of the same being shown in vertical section.

Fig. 2, is a sectional view of the compressor and associated parts substantially on the line 2—2 of Fig. 1.

Fig. 1 illustrates a refrigerating system comprising an evaporator 3 disposed in a refrigerating compartment indicated at A and provided with a concentrating chamber 3^a connected by a conduit 4 to the inlet of a compressor 5, a discharge connection 6, and a condenser 7 from which leads a conduit 8 connecting with evaporator 3 through a suitable feeding or expansion device 9. Compressor 5 has a crank case 5^a wherein is rotatably mounted in suitable bearing a crank shaft 5^b, one end of which projects from the crank case and carries a suitable driving member such as a pulley 10. Adjacent the projecting portion of the crank shaft, the crank case has spaced walls 5^c and 5^d providing therebetween a chamber 5^e separate from the crank case chamber. Packings 11 and 12 are provided in walls 5^c and 5^d respectively to prevent leakage along shaft 5^b. To assist in sealing the shaft, lubricant is fed to chamber 5^e through a conduit 13 extending from a separator 14 disposed in connection 6 intermediate compressor 5 and condenser 7. The separator may take the form of a chamber having an inlet 14^a at one end and an outlet 14^b at the other. Suitable means are provided for intercepting liquid carried in the fluid stream passing through connection 6. Such means may take the form of one or more baffle plates 14^c interposed between inlet 14^a and outlet 14^b upon which the concentrated liquid refrigerant mixture may collect and drop into conduit 13.

The apparatus may be placed in operation by starting with pure lubricant (for example, a thin grease composed of a mixture of vaseline and "Nujol") in crank case 5^a, and pure refrigerant (for example, methylene chloride) in evaporator 3 and its concentrating chamber 3^a. As compressor 5 operates, leakage will take place past its piston 5^f, some of the lubricant finding its way into the circulated refrigerant and some of the refrigerant finding its way into the crank case. By continually adding grease, a point will be reached where the concentration and level are nearly constant and the grease which has accumulated in the concentrating chamber 3^a will increase the liquid level therein until it overflows into connection 4 and returns a little at a time to the compressor. As the concentrated grease along with the vaporized refrigerant leaves the compressor it passes into separator 14 and impinges against the baffle means therein such as plate 14^c. Much of the liquid grease mechanically entrained with the vapor is there separated out mechanically and fed to the stuffing box chamber 5^e where it helps to seal the packings 11 and 12.

A feature of the present invention as distinguished from the inventions disclosed and claimed in my copending applications, Serial No. 95,531, filed March 18th, 1926 and Serial No. 106,825 filed of even date, herewith, is that the crank case 5^a is not connected either to the evaporator as in the former case, or to the condenser as in the latter case. As a consequence of this difference, the pressure in the crank case 5^a tends to stay at a point between the high and low side pressures of the system with the result that there is a tendency for lubricant and vapor to enter the crank case from the stuffing box chamber 5^e through packing 11 and for some of the lubricant mixture to leave the crank case 5^a by the leakage path around

piston 5^f, thus tending to establish equilibrium in the quantity and concentration or viscosity of lubricant in chamber 5^a.

While one form of the invention has been herein shown and described, it is to be understood that the invention is not limited to the specific details thereof but covers all changes, modifications and adaptations within the scope of the appended claims.

I claim as my invention:

1. In a heat transforming system of the closed cycle type utilizing a lubricating working substance, a concentrating evaporator, a condenser, a compressor withdrawing vapor and concentrated lubricant from said evaporator, a discharge connection from said compressor to said condenser, said compressor having a crank shaft projecting therefrom, sealing means for said shaft, and means conducting concentrated lubricant from said connection to said sealing means.

2. In a heat transforming system of the closed cycle type utilizing a lubricating working substance, a concentrating evaporator, a condenser, a compressor withdrawing vapor and concentrated lubricant from said evaporator, a discharge connection from said compressor to said condenser, said compressor having a crank shaft projecting therefrom, a packing chamber for said shaft, means in said discharge connection for separating the lubricant from the vapor, and a conduit directing the separated lubricant into said chamber.

3. In a heat transforming system of the closed cycle type utilizing a lubricating working substance, a concentrating evaporator, a condenser, a compressor withdrawing vapor and concentrated lubricant from said evaporator, a discharge connection from said compressor to said condenser, said compressor having a crank shaft projecting therefrom, said compressor providing a packing chamber for said projecting shaft, baffle means in said discharge connection for separating the lubricant from the vapor, and means conducting said separated lubricant into said packing chamber.

4. In a refrigerating system of the closed cycle type utilizing a lubricating refrigerant, an evaporator having a concentrating chamber, a condenser, a compressor having its inlet connected to said chamber and arranged to withdraw vapor and concentrated liquid from said evaporator, a discharge connection from said compressor to said condenser, said compressor having a crank shaft projecting therefrom, a chamber surrounding said projecting shaft and enclosing a packing for said shaft, a separator in said discharge connection, and a conduit from said separator to said packing chamber.

5. In a refrigerating system of the closed cycle type utilizing a lubricating refrigerant, an evaporator having a concentrating chamber, a condenser, a compressor having its inlet connected to said chamber and arranged to withdraw vapor and concentrated liquid from said evaporator, a discharge connection from said compressor to said condenser, said compressor having a crank case and a crank shaft projecting therefrom, said crank case providing a chamber surrounding said shaft, spaced packings for said shaft within said last named chamber, a separator in said discharge connection providing a baffle for separating the lubricant from the vaporized refrigerant, and a conduit directing the separated lubricant into said packing chamber.

Signed by me at Detroit, Wayne County, Michigan, this 30th day of April, 1926.

RANSOM W. DAVENPORT.