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1,508,522

I. LUNDGAARD

REFRIGERATING MACHINE

Filed Nov. 21, 1923

Fig. 2.

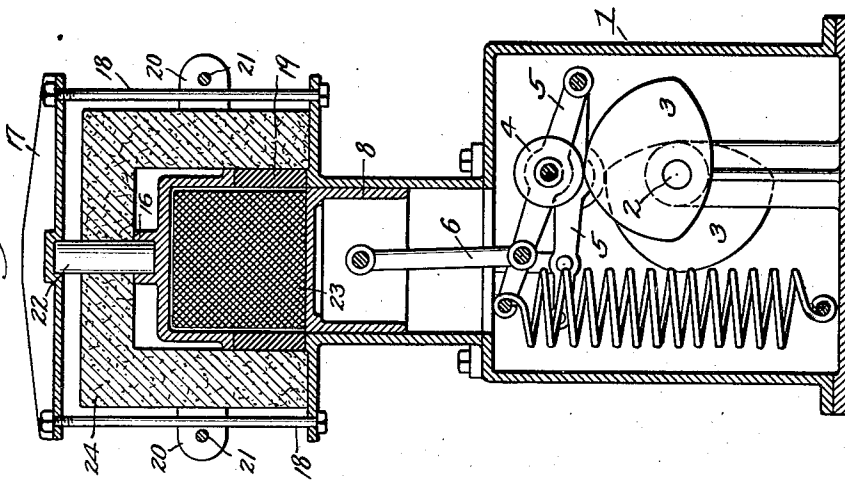
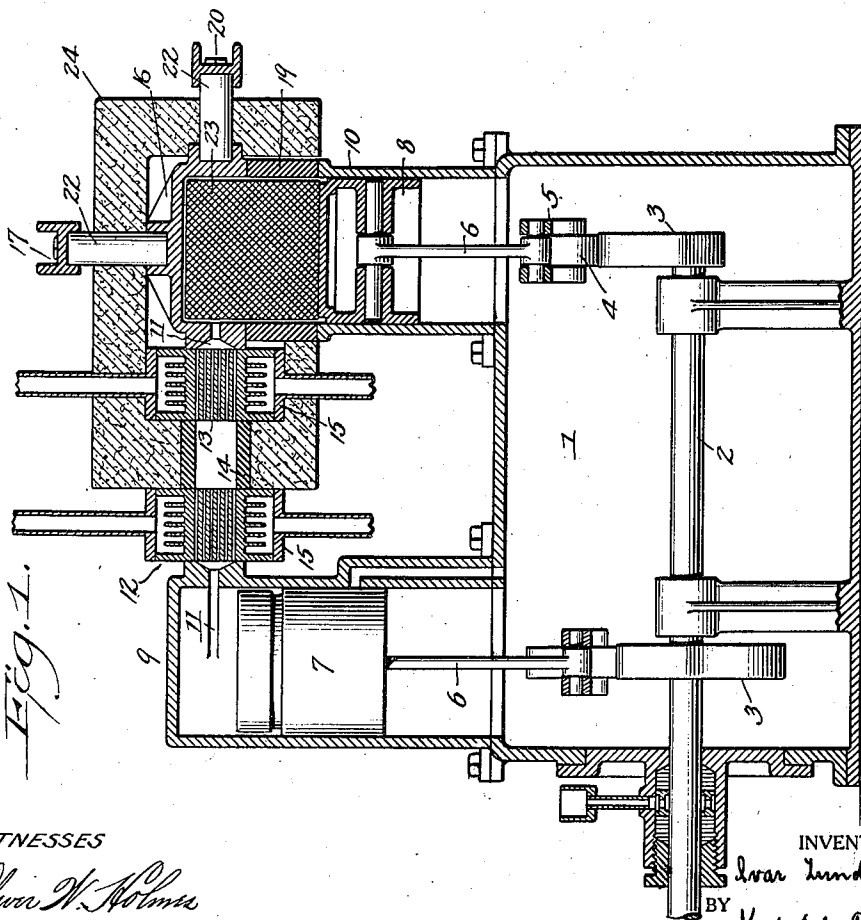


Fig. 1.



WITNESSES

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IVAR LUNDGAARD, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE AUTOMATIC REFRIGERATING COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF NEW JERSEY.

REFRIGERATING MACHINE.

Application filed November 21, 1923. Serial No. 676,053.

To all whom it may concern:

Be it known that I, IVAR LUNDGAARD, a citizen of the United States, and a resident of Hartford, county of Hartford, State of Connecticut, have invented certain new and useful Improvements in Refrigerating Machines, of which the following is a specification.

This invention relates to an air refrigerating machine of the closed cycle type. A machine of this class is shown in my previous Patent No. 1,240,862, dated September 25th, 1917. The present invention has for its object a different relation of the air compressing cylinder and the air expanding cylinder, whereby the latter is separated from the former with a view to more thoroughly insulate the cold end of the machine from the hot end.

The invention will be more fully understood by reference to the accompanying drawings in which—

Figure 1 is a longitudinal section, and Figure 2 is a transverse section.

In the drawings, 1 represents a crank case having a driving shaft 2 contained therein, which driving shaft has cams 3 mounted thereon that operate through rollers 4 and levers 5, connected rods 6 to pistons 7 and 8 of the compressing and expanding cylinders 9 and 10. These cylinders are mounted on the crank case at a substantial distance apart and a communicating passage or conduit 11 leads from the head of one cylinder to the head of the other. This passage has interposed in it heat exchangers 12 and 13 separated by a portion of the conduit 14 that is made of material which is a poor conductor of heat. The heat exchangers are surrounded with casings 15 so that cooling fluid may be brought to act upon the hot exchanger 12 while another fluid may be chilled by being brought into contact with the cold exchanger 13. These exchangers have vanes that give out and absorb heat from the air in its passage from one cylinder to the other. The edges of these vanes are in contact with the walls of the exchangers and the walls have outside vanes for imparting and receiving heat from the surrounding fluids.

The expanding cylinder has its cylinder head 16 held on by a clamp 17 and bolts 18, to the base of the cylinder, the intermediate insulating section of the cylinder 19 being

clamped between the head and the base, to prevent the passage of heat from the cylinder head to the cylinder base. A similar clamp 20 is held by bolts 21 to the cylinder 9 and operates to clamp these two cylinders together, and at the same time compress between them so as to hold securely in place the heat exchangers 12 and 13 and the intermediate section of conduit 14. Compression members 22 are interposed between the clamps and the cylinder head of the expansion or cold cylinder and these members are preferably made of heat insulating material also. The upper end of the expansion piston 8 is made of heat insulating material (as shown at 23), so as to keep the warmth of the piston 8 from being communicated to the refrigerated air in the upper part of the cylinder. The cold exchanger and the upper part of the expansion cylinder are enveloped in a heat insulating jacket 24 to prevent absorption of heat thereby.

The thermo-dynamic cycle upon which this machine operates is similar to that of the patent above referred to and need not be further explained herein.

I claim:—

1. An air refrigerating machine of the closed cycle type comprising a crank case, a compression cylinder, an expansion cylinder, the said expansion cylinder having a heat insulating band between the head and the base of the cylinder, both cylinders opening into the crank case and having closed outer ends, a conduit connecting the closed ends of the cylinders, heat exchangers in said conduit for discharging heat into a cooling fluid and abstracting heat from a fluid to be cooled, a heat insulating section between the exchangers, pistons in said cylinders, a driving shaft in the crank case, interconnected mechanism between the shaft and pistons operating to transfer the air from one cylinder to the other through the said exchangers and heat insulating cover for the expansion piston.

2. An air refrigerating machine of the closed cycle type comprising a crank case, a compression cylinder, an expansion cylinder, the said expansion cylinder having a heat insulating band between the head and the base of the cylinder, both cylinders opening into the crank case and having closed outer ends, a conduit connecting the closed ends of the cylinders, heat exchangers in

said conduit for discharging heat into a cooling fluid and abstracting heat from a fluid to be cooled, a heat insulating section between the exchangers, pistons in said cylinders, a driving shaft in the crank case, interconnected mechanism between the shaft and pistons operating to transfer the air from one cylinder to the other through the said exchangers, heat insulating cover for the expansion piston and a heat insulating jacket surrounding the expansion cylinder and its adjacent exchanger. 10

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