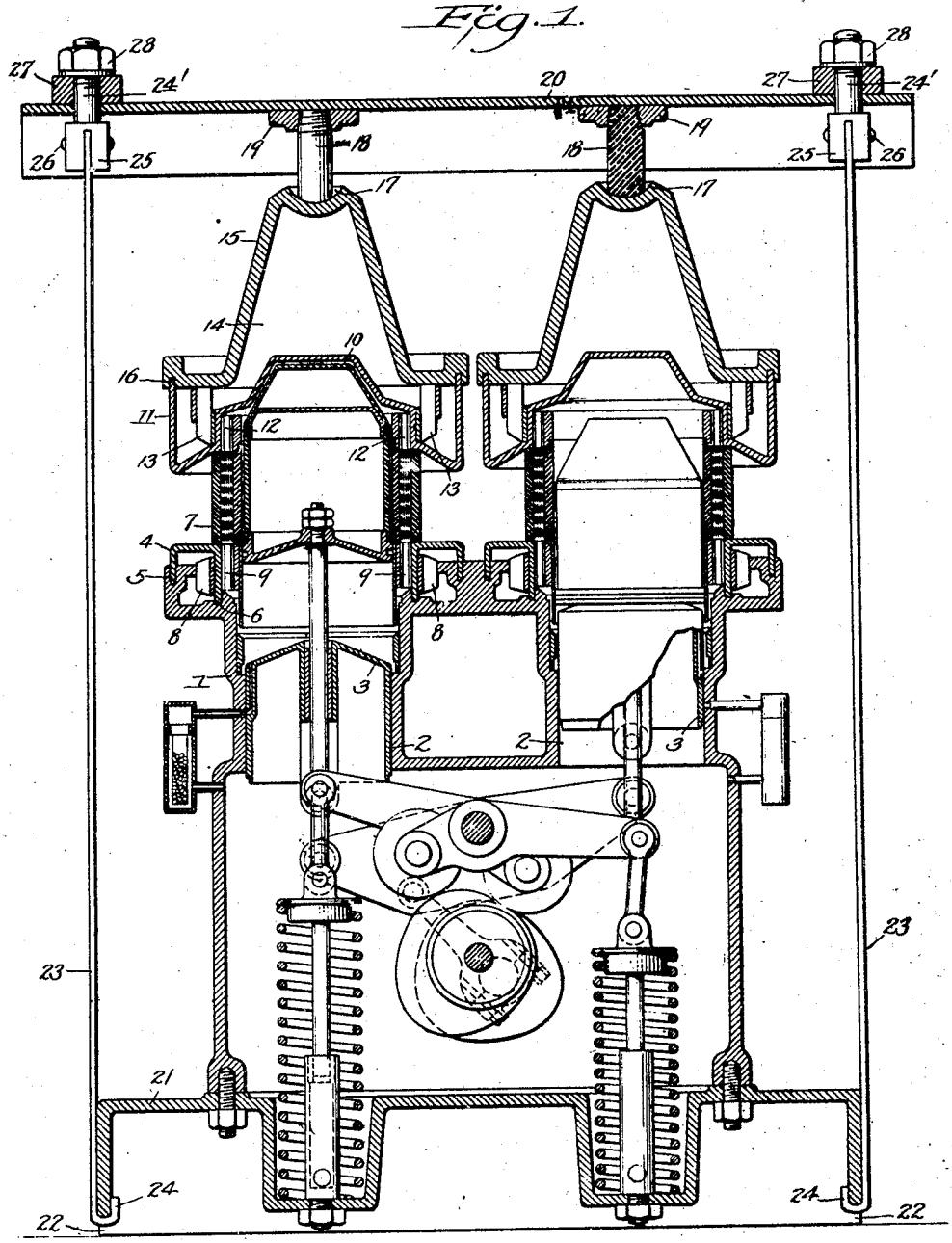
Nov. 27, 1923. 1,475,234

I. LUNDGAARD

AIR REFRIGERATING MACHINE

Filed March 30, 1922 2 Sheets-Sheet 1

Fig. 1.



WITNESSES

Oliver K. Kolmie

INVENTOR

Ivar Lundgaard

BY Knight Bros

ATTORNEY

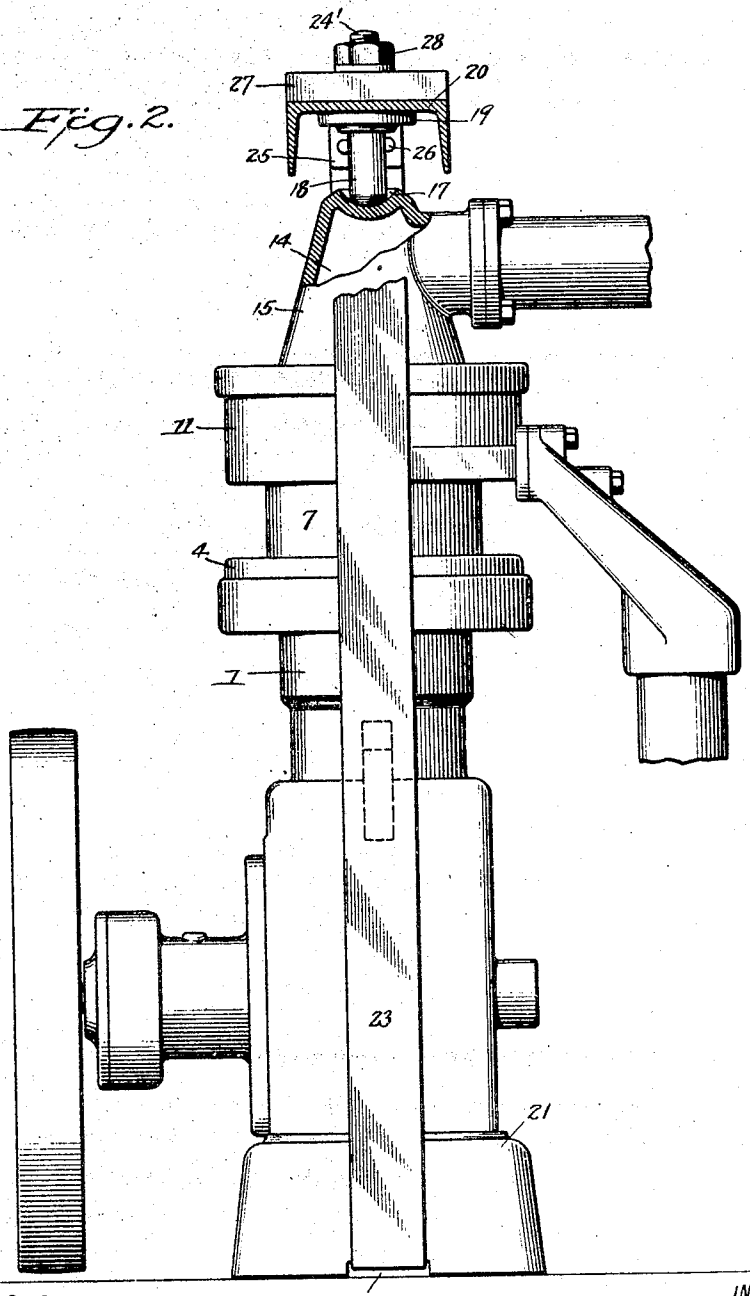
Nov. 27, 1923. 1,475,234

I. LUNDGAARD

AIR REFRIGERATING MACHINE

Filed March 30, 1922 2 Sheets-Sheet 2

Fig. 2.



WITNESSES

Oliver H. Holmes

INVENTOR

Ivar Lundgaard

BY Knight Bros

ATTORNEYS

Patented Nov. 27, 1923. 1,475,234

UNITED STATES PATENT OFFICE.

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

AIR-REFRIGERATING MACHINE.

Application filed March 30, 1922. Serial No. 548,220.

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 Air-Refrigerating Machines, of which the following is a specification.

My invention relates to air refrigerating machines of the type using air as a mediating fluid for effecting the refrigeration. Such a machine is described in my Patent No. 1,240,862.

The object of my invention is to prevent heat from being conducted from the hot end of the machine to the cold end and the consequent loss of capacity that would result therefrom.

This result is accomplished by constructing the cylinders, regenerators, heat exchangers, and heads so that there are no bolt flanges held together with bolts. The parts are fitted to each other and held by a clamping action, the tension members being at some distance from the machine and certain compression members being of heat insulating material.

That my invention may be readily understood, it is described in connection with the accompanying drawings, in which—

Figure 1 is a longitudinal vertical cross-section of the machine.

Figure 2 is an end elevation of the machine.

The crank-case 1 contains the operating mechanism for the machine and has two cylindrical borings 2 for the compression pistons 3. An annular inverted U-shaped piece 4 is fitted in suitable grooves 5 and 6, turned concentric with each cylinder in the crank-case 1. The piece 4 holds the heat conveyors 8 and 9 for carrying off the heat of the compressed air. The outer cylindrical wall 7 of the regenerator rests on the piece 4, central with the cylinder axis. Wall 7 is of heat insulating material, such as bakelite. On top of and central with wall 7 there is applied the cylinder head 10, the outside edge of which is turned up to form a narrow circular wall 11. Heat conveyors 12 and 13 for extracting heat from a fluid circulating in the space 14 are supported by member 10. Cylinder cover 15 is supplied with a groove 16 in which wall 11 fits snugly. In the center of cover 15 at its upper end there is a spherical depression 17. A block 18 of heat insulating material seats in the depression 17 of each cylinder. This block 18 may be of bakelite or other strong rigid heat insulating material. The upper ends of the blocks 18 are fastened in metal blocks 19, which in turn are secured to the web of a channel 20 by suitable means, such as welding. The channel 20 extends across the machine beyond its greatest length.

The base 21 of the crank-case 1 is provided with grooves 22 at each end. Bars 23 of flat metal with their lower ends bent in the form of hooks as at 24 are engaged in slots 22. At their upper ends the bars 23 have attached to them bolts 24′ which have slotted heads 25. Bars 23 are fastened in the slots by pins 26. Bolts 24′ extend through suitable holes in the channel 20 and washers 27. Nuts 28 are applied to bolts 24.

In assembling my machine, the members comprising it are successively put in place as described above and the nuts 28 are then tightened evenly to the proper tension. It is to be noted that bolting flanges are absent and that the amount of metal for lengthwise heat conduction is a minimum. It is understood that the space 14 and surrounding parts constitute the cold end and the crank-case 1, with associated parts, the hot end. When assembled as shown, the cold end is surrounded by material (not shown) such as hair felt.

Due to the great difference of temperature, (possibly exceeding 100° F.) that may exist between the cold end and the hot end, it is essential that the two be insulated from each other as completely as possible, and that as little material as is consistent be included in their construction. With the construction shown, I have obtained most excellent results.

Modifications may be made in the application of the principle of construction involved without being outside the scope of the invention.

I claim:—

1. An air refrigerating machine comprising an end to be operated hot and an end to be operated cold, said two ends being separated by heat insulating material in combination with clamping means in heat insulated relation to said end to be operated cold to hold the latter in position by compression.

2. An air refrigerating machine comprising an end to be operated hot and an end to be operated cold, said two ends being separated by heat insulating material in combination with clamping means in heat insulated relation to said end to be operated cold to hold the latter in position by compression, said clamping means having a heat insulating compression member bearing on said end to be operated cold, a cross member extending across said end to be operated cold and bearing on said compression member, and a tension member suitably anchored at one end and secured at its free end to said cross member to provide the force for compression.

3. An air refrigerating machine comprising an end to be operated hot and an end to be operated cold, said two ends being separated by heat insulating material in combination with clamping means in heat insulated relation to said end to be operated cold to hold the latter in position by compression, said clamping means having a heat insulating compression member bearing centrally on said end to be operated cold, a cross member extending across said end to be operated cold and bearing on said compression member, and a tension member extending from said end to be operated hot to said cross member for developing the force for compression.

4. An air refrigerating machine comprising a crank case, an annular member containing heat conveyors for removing the heat of compression, a regenerator, a cylinder head containing heat conveyors for extracting heat from a fluid to be refrigerated, a cylinder head cover and clamping means for securing said annular member to said crank case, said regenerator to said annular member, said cylinder head to said regenerator, and said cylinder head cover to said cylinder head, said clamping means including a heat insulating compression member for applying the clamping force to said cylinder head cover.

5. An air refrigerating machine comprising a crank case, an annular member containing heat conveyors for removing the heat of compression, a regenerator, a cylinder head containing heat conveyors for extracting heat from a fluid to be refrigerated, a cylinder head cover and clamping means for securing said annular member to said crank case, said regenerator to said annular member, said cylinder head to said regenerator, and said cylinder head cover to said cylinder head, said clamping means having a heat insulating compression member secured therein and abutting against the outer end of the cylinder head cover.

6. An air refrigerating machine comprising a crank case, an annular member containing heat conveyors for removing the heat of compression, a regenerator, a cylinder head containing heat conveyors for extracting heat from a fluid to be refrigerated, a cylinder head cover and clamping means for securing said annular member to said crank case, said regenerator to said annular member, said cylinder head to said regenerator, and said cylinder head cover to said cylinder head, said clamping means having a heat insulating compression member bearing on the outer end of said cylinder head cover, a cross member extending across said cylinder head cover and an adjustable tension member extending from said crankcase to said cross member.

IVAR LUNDGAARD.