W. YOUNG.

REFRIGERATOR MACHINE.

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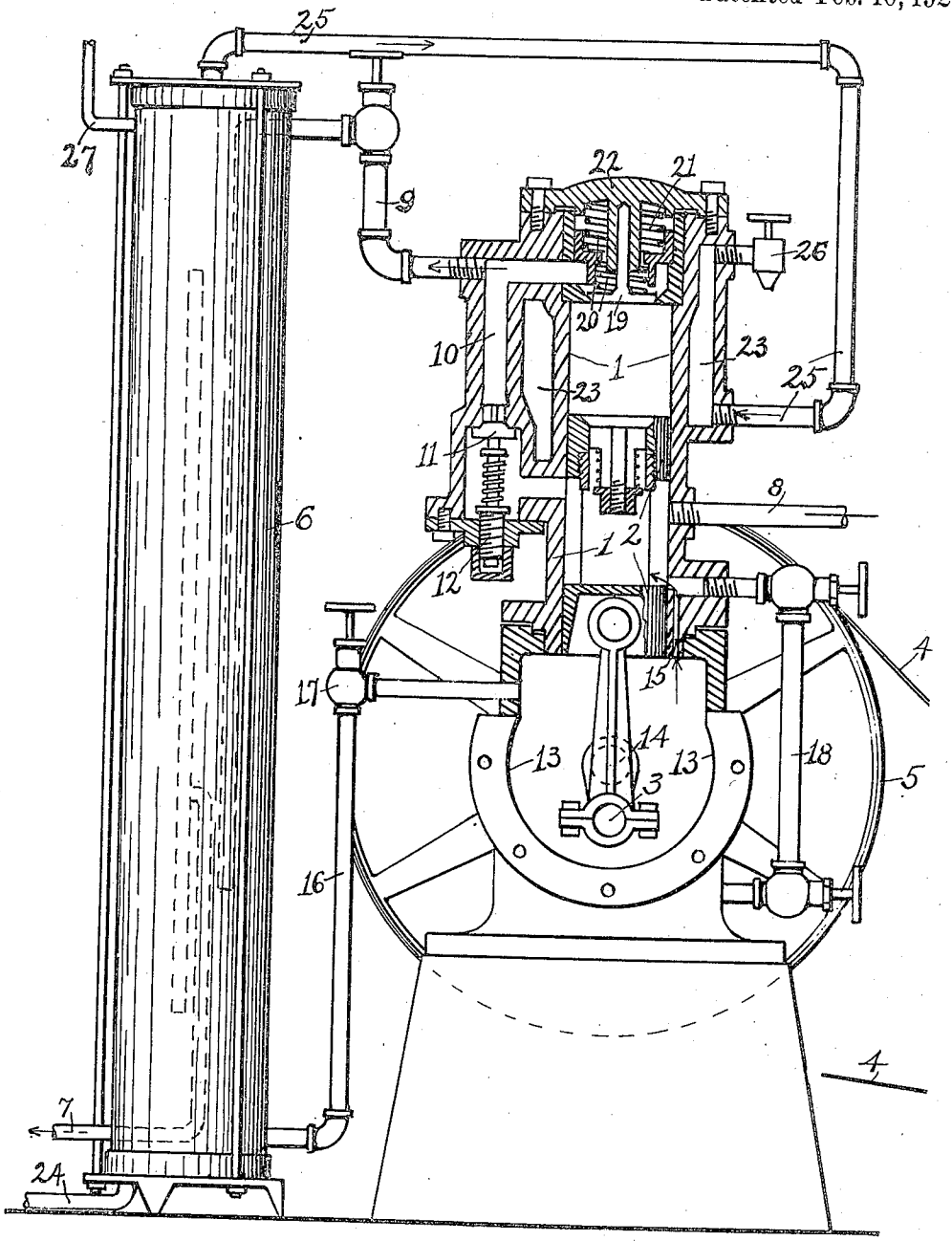
1,330,458.

Patented Feb. 10, 1920.



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REFRIGERATOR-MACHINE.

1,330,458. Specification of Letters Patent. Patented Feb. 10, 1920.

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To all whom it may concern:

Be it known that I, WILLIAM YOUNG, a citizen of the United States, residing at the city of Tacoma, in the county of Pierce and State of Washington, have invented new and useful Improvements in Refrigerator-Machines, of which the following is a specification.

My invention relates to improvements in refrigerator machines in which ammonia gas is put under pressure, and from which ammonia liquid is derived and distributed to expansion coils for refrigerating purposes.

The objects of my invention are, first, to provide a safety valve by-pass between the high and low pressures within the cylinder of the compressor, and thus automatically control the pressure within the condenser tank; second, to provide a by-pass between the crank case and cylinder of the compressor whereby the piston will be lubricated and the valves sealed automatically; and, third, to construct a small refrigerator machine suitable for residences and small restaurants as well as for larger establishments.

I attain these objects by means of the mechanism shown in the accompanying drawing exhibited in one figure and described with reference to the numerals thereon.

My improved refrigerator machine comprises a compressor having a cylinder 1 in which is operated a piston 2, by the crank 3 which is driven by an electric or other motor power operating the belt 4 on the wheel 5. The compressor machine is operated in conjunction with a condenser tank 6 in which are new improvements described under a separate patent application. The required amount of liquid ammonia is put into the condenser tank 6 with the expansion coils in vacuum. Gas of ammonia is then compressed into the condenser tank 6 till the required pressure is obtained to fill the expansion coils with ammonia gas, after which the compressor machine will work automatically.

In the automatic refrigerating process of the machine, the ammonia passes from the condenser tank 6 through the outlet pipe 7 from which it is sprayed into gas and into the expansion coils of the refrigerating system. The return from the expansion coils is received into the compressor cylinder 1 through the inlet pipe 8 whence it is again forced into the condenser tank 6 through the connecting outlet pipe 9 where it is again condensed and used as before.

The pressure within the condenser tank is automatically controlled by a by-pass 10 in which is a spring actuated valve 11 adjusted by the screw 12 to the pressure desired within the tank 6. When the pressure exceeds the limit set, the spring actuated valve 11 will yield and let the gas pass back into cylinder 1 and thus continue to circulate therethrough till the pressure is lowered within the condenser tank 6, after which it will continue to circulate through the condenser tank and the expansion coils system. By means of this spring actuated by-pass valve 11, it will be seen that a uniform pressure is kept within the tank 6 at all times and all danger of explosion is prevented without the care of an operator.

The case 13 in which the crank 3 revolves is designed to be filled with oil to a height above the crank shaft 14 to lubricate the bearings and to prevent the escape of gas around the crank shaft. The action of the crank so agitates the oil that a spray is formed thereby. A by-pass 15 in the side of the compressor cylinder allows the oil spray to be forced into the cylinder 1 above to lubricate the piston 2 and seal the compressor valves. It will be observed this by-pass port opens into the cylinder 1 just above the piston head when it is at the lowest point and a pressure is thus formed within the crank case 13. This pressure will cause the oil spray to dash through by-pass 15 and into the cylinder 1 as the piston 2 completes its return stroke, as shown in the drawing. This oil spray mixes with the ammonia gas and is forced therewith into the condenser tank 6 where it is collected by an oil separator in the bottom of the tank. By means of pipe 16, controlled by valve 17, the oil thus collected is redrawn into the crank case 13 to be again used. The sight feed glass 18 reveals the amount and character of oil within the crank case 13.

It is to be observed that instantly after the pressure within the crank case 13 is reduced below the pressure within the suction chamber of the cylinder, there is created a back-suction through the by-pass 15 into the crank case. This back-suction removes any oil that may have settled on the lower head of the piston 2 from the ammonia gas while within the suction chamber

and deposits it within the crank case 13, thus keeping a working supply of oil therein in addition to the oil returned thereto from the condenser 6. Another improvement to be observed is in the outlet valve 19. This valve is provided with duplex springs 20 and 21 to relieve the strain on the cylinder head 22 and prevent breaking it out.

It will be observed the upper part of the compressor cylinder is surrounded by a water jacket 23. The water pipe 24 supplies water at the bottom of the condenser tank 6 and passing up through internal pipes to the top and out through the connecting pipe 25 into the water jacket 23. The outlet valve 26 permits the water to be changed when desired to keep the tank 6 and cylinder 1 cool.

The pipe extension 27 is designed for a pressure gage to be attached thereto to complete the refrigerating machine.

With the improvements herein described I provide a compressor for a refrigerating machine that will operate automatically and that may be run continuously without the care of an attendant operator. The entire invention is so compact that a machine of three tons daily capacity will occupy a very small space.

Having described my invention I claim:

In a refrigerating machine comprising a compressor cylinder, a piston within said cylinder, said piston having a lower head and upper head forming a suction chamber and a discharging chamber within said cylinder, the pressure within said discharging chamber controlled by a spring actuated valve by-pass therefrom to said suction chamber, said piston operated by a motor driven crank, said crank confined within a lubricating crank case, a by-pass between said crank case and said suction chamber, the pressure within said crank case made by the return stroke of said piston relieved by said by-pass discharging oil spray therefrom into said suction chamber and the liquid oil gathered on the lower head of said piston drawn therefrom into said crank case by the back-suction through said by-pass instantly following the discharge of said oil spray from said crank case, as described and for the purposes set forth.

WILLIAM YOUNG.