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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,331,001 A * 5/1982 Jones F25B 43/006 62/474
4,509,340 A 4/1985 Mullally et al.
(Continued)

FOREIGN PATENT DOCUMENTS

EP 0276943 A2 8/1988
EP 2787306 A1 10/2014
(Continued)

OTHER PUBLICATIONS

International Search Report and Written Opinion (in Japanese with English Translation) for PCT/JP2013/004700, mailed Aug. 27, 2013; ISA/JP.
(Continued)

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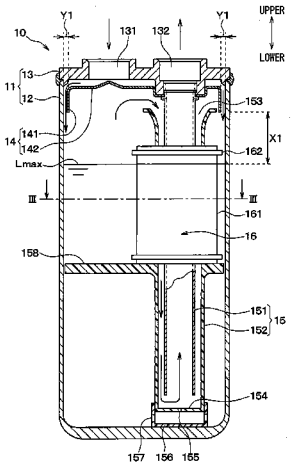
(57) **ABSTRACT**

An accumulator has a tank and a desiccant. The tank separates refrigerant flowing to the tank into vapor-phase refrigerant and liquid-phase refrigerant, therein stores the liquid-phase refrigerant, and emits the vapor-phase refrigerant toward a suction side of a compressor. The desiccant is disposed in the tank and removing a water content from the refrigerant. Liquid-phase refrigerant included in the refrigerant flowing to the tank drops downward from a location that is located above the desiccant, and is stored in a lower portion in the tank. Vapor-phase refrigerant included in the refrigerant flowing to the tank is drawn through a suction port that is located above the desiccant to flow out of the tank. At least a part of the desiccant is exposed to vapor-phase refrigerant under a normal condition, and the desiccant is located at a location that is away from a dropping route of liquid-phase refrigerant in the tank.

9 Claims, 7 Drawing Sheets