Title (en)

HEAT EXCHANGER AND AIR CONDITIONER

Title (de)

WÄRMETAUSCHER UND KLIMAANLAGE

Title (fr)

ÉCHANGEUR DE CHALEUR ET CLIMATISEUR

Publication

**EP 4155625 A4 20230621 (EN)**

Application

**EP 20937009 A 20200522**

Priority

JP 2020020348 W 20200522

Abstract (en)

[origin: EP4155625A1] A heat exchanger includes a main heat exchanger and a sub-heat exchanger connected to the main heat exchanger. The main heat exchanger includes a plurality of main heat transfer tubes extending in an up-down direction, each of the plurality of main heat transfer tubes having a flow passage inside which refrigerant flows, a first main header into which one end portion of each of the main heat transfer tubes is inserted, main fins provided to the main heat transfer tubes and helping heat exchange between air and refrigerant flowing inside the main heat transfer tubes, and a second main header into which the other end portion of each of the main heat transfer tubes is inserted, the second main header being opposite to the first main header. The sub-heat exchanger includes a plurality of sub-heat transfer tubes extending in an up-down direction, each of the plurality of sub-heat transfer tubes having a flow passage inside which refrigerant flows, sub-fins provided to the sub-heat transfer tubes and helping heat exchange between air and refrigerant flowing inside the sub-heat transfer tubes, a first sub-header into which one end portion of each of the sub-heat transfer tubes is inserted, and a second sub-header into which the other end portion of each of the sub-heat transfer tubes is inserted, the second sub-header being opposite to the first sub-header. The heat exchanger satisfies Expression (1) below, where the number of the main heat transfer tubes is represented as N<sub>1</sub>, and the number of the sub-heat transfer tubes is represented as N<sub>2</sub>. The heat exchanger satisfies Expressions (2) and (3) below, where a cross-sectional area of the flow passage of each of the main heat transfer tubes is represented as Ta<sub>1</sub>, a cross-sectional area of the flow passage of each of the sub-heat transfer tubes is represented as Ta<sub>2</sub>, a cross-sectional area of the first main header per each of the main heat transfer tubes is represented as Ha<sub>1</sub>, and a cross-sectional area of the first sub-header per each of the sub-heat transfer tubes is represented as Ha<sub>2</sub>. The heat exchanger satisfies Expressions (4) and (5) below, where a sum total of cross-sectional areas of the flow passages of the main heat transfer tubes is represented as AT<sub>1</sub>, a sum total of cross-sectional areas of the flow passages of the sub-heat transfer tubes is represented as AT<sub>2</sub>, a flow rate [kG/h] of all refrigerant flowing through the main heat exchanger is represented as Gr<sub>1</sub>, a flow rate [kG/h] of all refrigerant flowing through the sub-heat exchanger is represented as Gr<sub>2</sub>, a gravitational acceleration [m/s<sup>2</sup>] is represented as G, an equivalent diameter [m] of a cross-section of the flow passage of each of the main heat transfer tubes is represented as D<sub>1</sub>, an equivalent diameter [m] of a cross-section of the flow passage of each of the sub-heat transfer tubes is represented as D<sub>2</sub>, a density [kG/m<sup>3</sup>] of liquid refrigerant flowing in the main heat transfer tubes is represented as ρL<sub>1</sub>, a density [kG/m<sup>3</sup>] of liquid refrigerant flowing in the sub-heat transfer tubes is represented as ρL<sub>2</sub>, a density [kG/m<sup>3</sup>] of gas refrigerant flowing in the main heat transfer tubes is represented as ρG<sub>1</sub>, a density [kG/m<sup>3</sup>] of gas refrigerant flowing in the sub-heat transfer tubes is represented as ρG<sub>2</sub>, a quality [-] of refrigerant flowing in the main heat exchanger is represented as X<sub>1</sub>, and a quality [-] of refrigerant flowing in the sub-heat exchanger is represented as X<sub>2</sub>. 0.03<Ta1/Ha1<0.30.03<Ta2/Ha2<0.30.1<N2/N1+N2<0.4AT1<Gr1/G×D1ρL1−ρG11/2×X11/2×ρG1−1/4+1−X11/2×ρL1−1/42AT2<Gr2/G×D2ρL2−ρG21/2×X21/2×ρG2−1/4+1−X21/2×ρL2−1/42

IPC 8 full level

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CPC (source: EP US)

**F25B 13/00** (2013.01 - EP); **F25B 39/00** (2013.01 - EP); **F25B 39/02** (2013.01 - US); **F25B 39/04** (2013.01 - US); **F28D 1/0417** (2013.01 - US); **F28D 1/0443** (2013.01 - US); **F28D 1/05391** (2013.01 - EP US); **F28F 1/022** (2013.01 - EP US); **F28F 1/126** (2013.01 - US); **F28F 1/22** (2013.01 - EP); **F28F 9/0212** (2013.01 - US); **F28F 9/0214** (2013.01 - EP); F28D 2021/0061 (2013.01 - EP); F28D 2021/0064 (2013.01 - EP)

Citation (search report)

- [A] JP 4686062 B2 20110518
- [A] WO 2017110474 A1 20170629 - SANDEN HOLDINGS CORP [JP]
- [A] US 9664423 B2 20170530 - MATSUMOTO YUUICHI [JP], et al
- [A] US 2017211857 A1 20170727 - TAKEICHI KOTA [JP], et al
- See references of WO 2021234955A1

Designated contracting state (EPC)

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DOCDB simple family (application)

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