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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte AHMED AL JASSANI, HAKAN L. KARLSSON, and STEN HAKAN ALMSTROM

Appeal 2018-002779
Application 13/700,201[1]
Technology Center 3700

Before JOHN C. KERINS, BENJAMIN D. M. WOOD, and NATHAN A. ENGELS, *Administrative Patent Judges*.

ENGELS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from a final rejection of claims 1, 4, 5, and 8–18. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

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[1] Appellants identify Electrolux Laundry Systems Sweden AB as the real party in interest. Appeal Br. 2.

ILLUSTRATIVE CLAIM

Appellants state that the claimed invention relates to an energy-efficient cooling technology for fluid that is used as a solvent in dry-cleaning systems. Appeal Br. 6. Claims 1, 5, and 12 are independent claims and are reproduced as illustrative of the claimed subject matter:

> 1. An apparatus for cleaning articles comprising:
> a first compressor stage for a first processing of fluid,
> a second compressor stage for a second processing of the fluid,
> a first cooling unit arranged between the first and second compressor stages, the first cooling unit being configured to first cool the fluid after the first processing of the fluid, the first cooling unit comprising a storage device and a tube section within or surrounding the storage device, the storage device being configured to store the fluid after a second cooling of the fluid that takes place after the second processing of the fluid, the tube section being configured to convey the fluid from the first compressor stage to the second compressor stage such that the fluid in the tube section is cooled by the fluid in the storage device.
>
> 5. A method for cooling fluid being used as a solvent in a dry cleaning system, the method comprising:
> first compressing the fluid,
> first cooling the fluid after the first compressing of the fluid,
> second compressing the fluid after the first cooling of the fluid,
> second cooling the fluid after the second compressing of the fluid,
> storing the fluid for a period of time after the second cooling of the fluid in a storage device,
> wherein, the first cooling comprises, after the first compressing of the fluid and before the second compressing of the fluid, cooling the fluid by the fluid that is stored, and

after passage of the period of time, conveying the stored fluid from the storage device to one or more components of the apparatus for an operation of the apparatus for cleaning articles.

12. A cooling system comprising:

a compressor unit for sequential compression of a fluid, and

a cooling unit for intermediary cooling of the fluid between the sequential compressions, the cooling unit comprising a storage device of cooled fluid and a tube section within or surrounding the storage device being configured to convey fluid between the sequential compressions, the compressor unit and the cooling unit being interlinked in such a way that the intermediary cooling is made by the stored cooled fluid.

THE REJECTIONS

Claims 12, 13, and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable in view of Taras et al. (US 2010/0326100 A1; publ. Dec. 30, 2010) and Manole (US 2005/0132729 A1; publ. June 23, 2005).

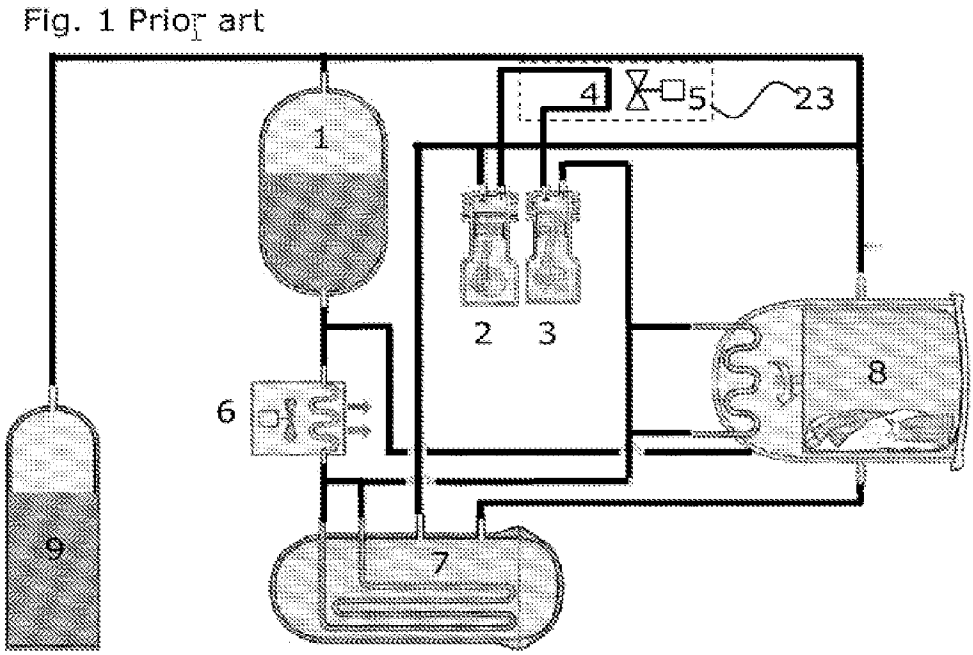
Claims 1, 4, 5, 8–11, 14, 15, 17, and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable in view of Taras, Manole, and Shore et al. (US 5,970,554; iss. Oct. 26, 1999).

ANALYSIS

As background of Appellants' invention, Appellants' Specification explains that known dry cleaning systems usually include a cleaning chamber in which fabrics are cleaned by a solvent such as carbon dioxide, a distiller for separating the carbon dioxide from contaminants so that the carbon dioxide can be reused, a storage tank for storing the carbon dioxide when not in use for cleaning, a cooling unit, and one or more compressors

for moving solvent and increasing pressure in the system. Spec. 1:11–2:2. The Specification explains that dry cleaning systems that include multi-stage compressors also require an intercooler to control temperature and pressure of carbon dioxide gas within the system. Spec. 2:2–18.

Appellants' Figure 1, copied below, depicts a dry cleaning system of the prior art.

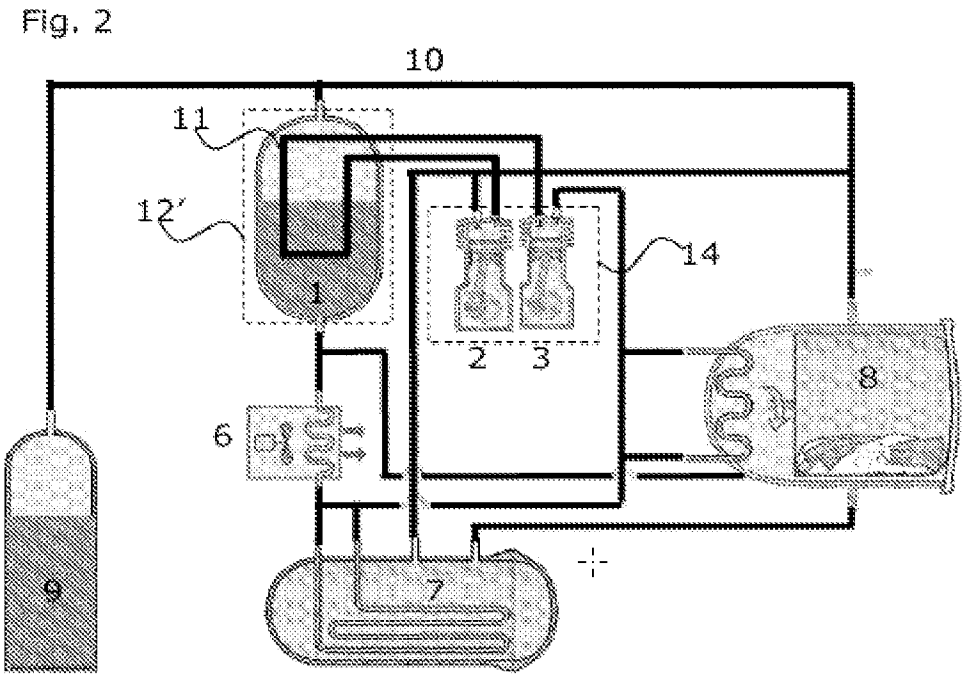


Appellants' Figure 1

As described by Appellants, Figure 1, copied above, depicts a prior art system that includes cleaning chamber 8 and storage device 1, with fluid connections between the storage device and cleaning chamber. In relevant part, Figure 1 depicts that tube section 4 conveys compressed gas from first compressor stage 2 through air-cooled intercooler 5 and into second compressor stage 3. Spec. 2:11–18.

Instead of the air-cooled intercooler of the prior art, Appellants' invention uses the storage tank to cool compressed gas between sequential

compression stages. Appellants' Figure 2, copied below, depicts the claimed invention.



Appellants' Figure 1

In relevant part, Figure 2 depicts tube section 11 that conveys compressed gas from first cooling stage 2 to intermediary cooling unit 12' (e.g., through or around storage tank 1) and then to second compressor stage 3. Spec. 9:25–10:24.

Each of independent claims 1, 5, and 12 includes limitations that require a fluid storage and using the fluid storage to provide intermediate cooling between sequential compression stages. In the rejections of each independent claim, the Examiner finds that Taras teaches an apparatus that includes a first and second compressor stage with intermediary cooling between the sequential cooling stages, with "the compressor unit and cooling unit being interlinked in such a way that the intermediary cooling is made by the cooled fluid (fluid in line 62)." Final Act. 4.

The Examiner further states that Taras offers only a schematic representation of its cooling unit such that "it would be left to [a person of] . . . ordinary skill in the art to select an appropriate style [of] heat exchanger." Ans. 2. The Examiner cites Manole as disclosing a cooling system that includes a tube section within or surrounding a device storing refrigerated liquid, and the Examiner concludes that it would have been obvious to a person of ordinary skill "to have provided Taras with the storage device of Manole in order to increase the storage capacity of the system, allowing for a more readily variable capacity." Final Act. 4; Ans. 4. According to the Examiner, that rationale for combining Taras and Manole is supported by Manole's suggestions that regulating the mass of refrigerant in the storage tank allows control of the pressure, capacity, and efficiency of the system. Ans. 4 (citing Manole ¶ 30).

Appellants argue, and we agree, that the Examiner misinterprets the teachings of Taras. Contrary to the Examiner's finding that Taras teaches using cooled fluid 62 as intermediary cooling of refrigerant in between sequential compressor stages (third refrigerant flow pass 66), Taras teaches a separate, "second refrigerant flow pass 64" that cools both the first refrigerant flow pass 62 and the third refrigerant flow pass 66. Taras ¶ 27; *cf.* Final Act. 4; Ans. 3 (stating that it is "clear from the disclosure of Taras . . . that elements 62 and 66 are in [a] heat exchange relationship"). As argued by Appellants, the Examiner has not established that Taras teaches or suggests first refrigerant flow pass 62 is in a heat exchange relationship with third refrigerant flow pass 66. Reply Br. 3.

Further, Taras states that it is the flow of refrigerant in second flow pass 64 that provides heat transfer, explaining that second flow pass 64 "will

always be a cooling medium" with respect to first and third refrigerant flow passes 62 and 66, with pass 64 being in a counterflow configuration to passes 62 and 66 to increase heat transfer effectiveness. Taras ¶ 27. Thus, the Examiner's position relative to the heat exchange conditions in the Taras system is without support in that reference. Further, unlike the known cleaning systems described in the Specification, Taras does not address refrigerant storage or capacity, and the Examiner has not adequately established how or why it would have been obvious to a person of ordinary skill to have added a storage tank to Taras's system. *Cf.* Spec. 1:11–2:18 (describing prior art cleaning systems that include a storage tank), Fig. 1.

Reading the Examiner's rejections of independent claims 1, 5, and 12 in light of Appellants' arguments and the evidence of record, we agree with Appellants that the Examiner erred, and we do not sustain the Examiner's rejections of independent claims 1, 5, and 12, nor the rejections of dependent claims 4, and 8–11, and 13–18 which include the same error.

DECISION

We reverse the Examiner's rejections of claims 1, 4, 5, and 8–18.

REVERSED