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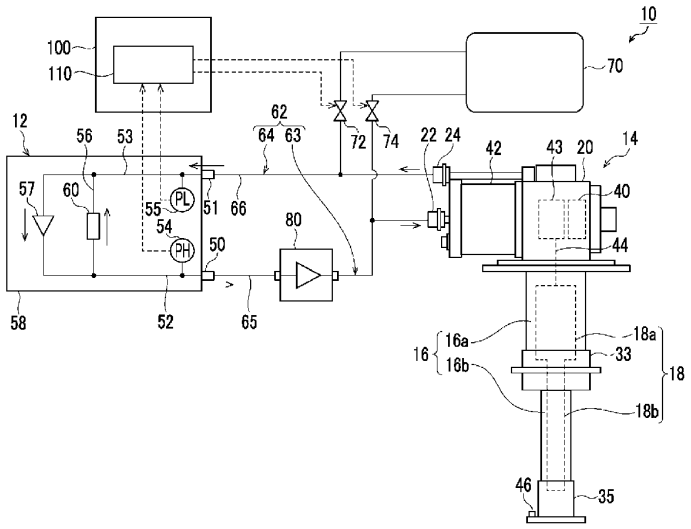
(54) METHOD FOR OPERATING CRYOCOOLER AND CRYOCOOLER

(57) An initial cooling time of a cryocooler (10) is shortened. A method for operating a cryocooler 10 includes: connecting a second compressor 80 in series with a first compressor 12 on a high pressure line 63 or a low pressure line 64; connecting a buffer volume 70 to the low pressure line 64 via a supply valve 72; executing initial cooling for cooling an expander 14 from an initial temperature to a cryogenic temperature in a state where the second compressor 80 and the buffer volume 70 are connected to the cryocooler 10; and executing a steady operation of maintaining the expander 14 at the cryogenic temperature after the initial cooling. The execution of the initial cooling includes supplying a working gas to the expander 14 by using the first compressor 12 and the second compressor 80, and controlling the supply valve 72 to keep a pressure of the high pressure line 63 within a preset appropriate pressure range based on the measured pressure of the high pressure line 63.

FIG. 12



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PARTIAL EUROPEAN SEARCH REPORT

under Rule 62a and/or 63 of the European Patent Convention. This report shall be considered, for the purposes of subsequent proceedings, as the European search report

Application Number
EP 23 19 6704

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 3 913 300 A1 (SUMITOMO HEAVY INDUSTRIES [JP]) 24 November 2021 (2021-11-24) * the whole document *	1-5, 10-12	INV. F25B9/06 F17C1/00 F25B9/10 F25B9/14 F25D19/00
A	US 2022/163030 A1 (TAKAHASHI KAKERU [JP]) 26 May 2022 (2022-05-26) * the whole document *	1-5, 10-12	
A	US 2013/232999 A1 (MATSUI TAKAAKI [JP]) 12 September 2013 (2013-09-12) * the whole document *	1-5, 10-12	

TECHNICAL FIELDS SEARCHED (IPC)

F25B
F25D
F17C

INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:

see sheet C

Place of search	Date of completion of the search	Examiner
Munich	24 April 2024	Lucic, Anita

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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L : document cited for other reasons

& : member of the same patent family, corresponding document

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INCOMPLETE SEARCH
SHEET C

Application Number
EP 23 19 6704

Claim(s) completely searchable:
1-5, 10-12

Claim(s) not searched:
6-9

Reason for the limitation of the search:

The search has been restricted to the subject-matter indicated by the Applicant in their letter of March 11, 2024 filed in reply to the invitation pursuant to Rule 62a(1) EPC. Thus, the search report has been drawn up on the basis of independent method claim 1 and its associated dependent claims 2-5 and the corresponding apparatus claim 10 and its associated dependent claims 11 and 12.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 19 6704

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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24-04-2024

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