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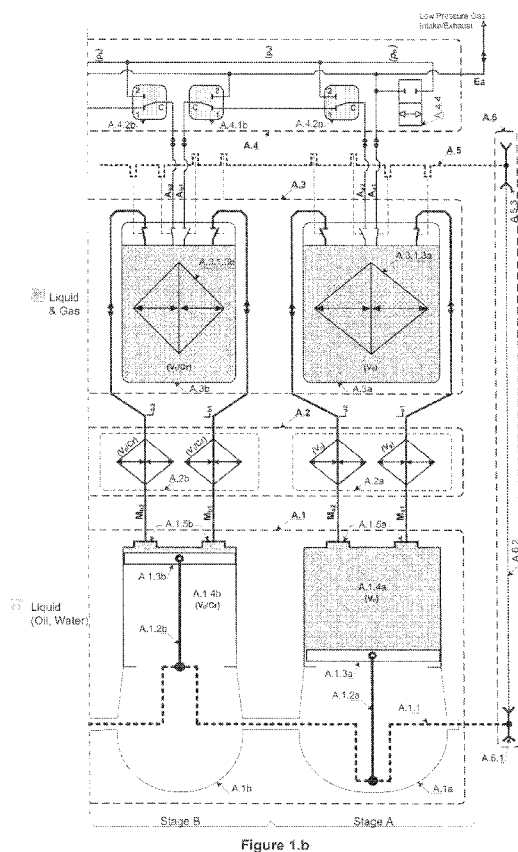
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[Continued on next page]

(54) Title: MULTISTAGE HYDRAULIC GAS COMPRESSION/EXPANSION SYSTEMS AND METHODS

(57) Abstract: Multistage hydraulic systems and methods for converting the potential energy of a pressurized gas, particularly air, into mechanical work operating in motor, and for producing compressed gas from the mechanical work of the rotating shaft (A1.1) when rotating when operating in compressor mode, by performing a successive expansion / compression of the said gas. Each of the systems comprises: a multistage Compression-Expansion Unit (1.3) made of several hydraulic Compression-Expansion Modules (A.3a to A.3d) having different capacity and integrating a gas / liquid separating heat exchanger (A.3.1.5) designed to convert pressure power into a hydraulic power and vice-versa, by performing an essentially isothermal compression / expansion of the gas, a single stage or multistage, direct or indirect, external forced-air Heat Exchanger (A.2) for maintaining the active liquid at ambient temperature; and a multi-circuit, multi-displacement Hydraulic Motor / Pump (A.1) for converting hydraulic power into mechanical power and vice-versa.





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A. CLASSIFICATION OF SUBJECT MATTER

IPC⁸: **F03B 17/00** (2006.01); **F04B 39/00** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁸: F03B, F04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 1886164 A (CHRISTENSEN) 1 November 1932 (01.11.1932) <i>Fig. 1-3, 7; page 1, line 100 - page 2, line 78; page 3, lines 17-41; page 4, lines 29-71;</i> --	1,7,10,14,15
A	US 1929350 A (CHRISTENSEN) 3 October 1933 (03.10.1933) <i>Fig. 1; page 2, line 46 - page 3, line 73;</i> --	1-4,9,14,15
A	DE 170677 C (FLAMM ET AL.) 16 May 1905 (16.05.1905) <i>Fig. 1,2; page 1, line 40 - page 2, line 14;</i> --	1-3,15

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 19846481 A1 (SCHNEIDER) 4 May 2000 (04.05.2000) <i>Abstract; Figure; column 2, line 62 - column 3, line 45;</i> -----	1,4,9,15

INTERNATIONAL SEARCH REPORT
Information on patent family members

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Patent document cited in search report			Publication date	Patent family member(s)			Publication date
US	A	1886164		US	A	1886164	1932-11-01
US	A	1929350		US	A	1929350	1933-10-03
DE	A	170677		DE	C	170677	0000-00-00
DE	A	19846481		WO	A1	0022300	2000-04-20
				DE	A1	19846481	2000-05-04