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(54) **Methods and systems for heating thermal storage units**

(57) Methods and systems for heating a thermal storage unit (TSU) are provided. A thermal storage system is provided that includes a system of heaters removably disposed at least partially within the TSU, a control system for adjusting power provided to the heaters, and a removal tool for removing one or more of the heaters from the TSU when the TSU is still hot. The thermal storage system may be used in a thermal and compressed air storage system for backup power applications.

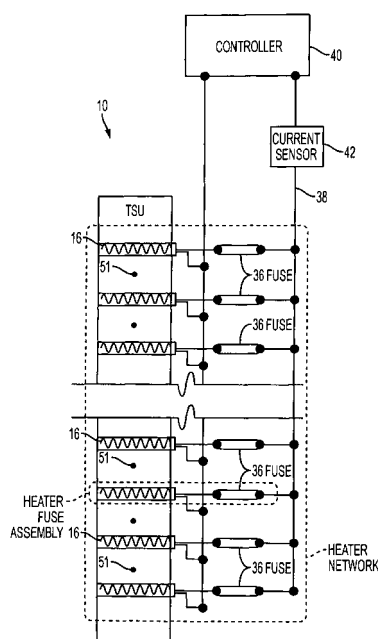


FIG. 3



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CH 137 379 A ("THERMA" FABRIK FUER ELEKTRISCHE HEIZUNG A.-G. VORM. S. BLUMER) 31 December 1929 (1929-12-31) * the whole document *	1-5,31,32	INV. F24H7/04 F24H9/20 F24H1/18
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X	BE 638 977 A (ATELIERS DE CONSTRUCTIONS ELECTRIQUES DE CHARLEROI) 21 April 1964 (1964-04-21) * page 2, line 23 - page 4, last line ; figures *	1,2,7,31,32,36	
A	GB 1 158 687 A (G. BAUKNECHT GESELLSCHAFT MIT BESCHRANKTER HAFTUNG ELEKTROTECHNISCHE F) 16 July 1969 (1969-07-16) * page 2, line 51 - line 74; figures *	1-6,25,30-32	
A	DE 21 00 241 A1 (HOEHNE NZ FERTIGMONTAGE E) 27 July 1972 (1972-07-27) * page 5, paragraph 3 - page 6, last paragraph; figures *	25	TECHNICAL FIELDS SEARCHED (IPC) F24H F02C F28D H05B G05D
A	BE 783 049 A1 (ATELIERS DE CONSTRUCTIONS ELECTRIQUES DE CHARLEROI , 54, CHAUSSEE DE CH) 6 November 1972 (1972-11-06) * page 2, line 28 - page 3, last line ; figures *	25	
A	FR 1 300 946 A (FOULCHER) 10 August 1962 (1962-08-10) * page 2, left-hand column, last paragraph - right-hand column, paragraph 3; figures *	25	
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 11 August 2006	Examiner Van Gheel, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 289 858 A (CHARLEROI ATELIERS CONST ELECT) 28 May 1976 (1976-05-28)	27	
A	* page 1, line 1 - line 17 * * page 2, line 12 - line 29; figures * -----	25,30	
A	DE 24 31 318 A1 (G. BAUKNECHT GMBH, ELEKTROTECHNISCHE FABRIKEN, 7000 STUTTGART) 15 January 1976 (1976-01-15) * page 3, last paragraph - page 5, last line ; figures * -----	9,27	
A	FR 2 288 952 A (CHARLEROI ATELIERS CONST ELECT) 21 May 1976 (1976-05-21) * the whole document * -----	27	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
Place of search The Hague		Date of completion of the search 11 August 2006	Examiner Van Gheel, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03/82 (P04C01)

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-24 31-38

a plurality of heaters disposed within a thermal storage unit, each of the heaters is independently removable

2. claims: 25-26

thermal storage heater with heater-fuse assemblies coupled in parallel

3. claims: 27-29

controller for controlling electric power to a plurality of heaters of a thermal storage unit, the controller is programmed to require no more than a single temperature input signal

4. claim: 30

a plurality of heaters for a thermal storage unit including at least one redundant heater

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 02 9843

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-08-2006

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