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(54) Title: A SINGLE PHASE INVERTER FOR PHOTOVOLTAIC PANELS

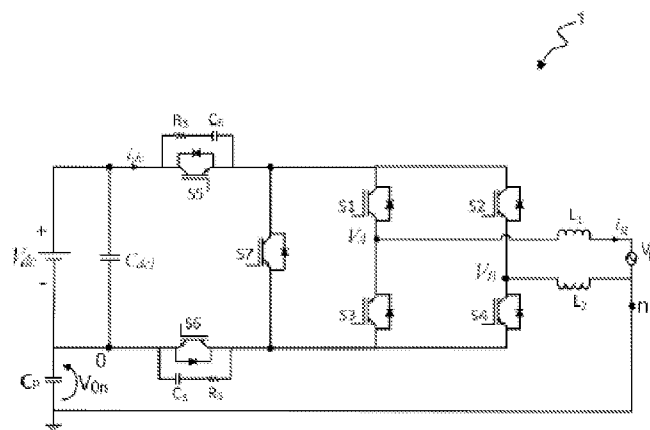


Fig. 7

(57) Abstract: This invention is related to a single phase inverter which enables converting the direct current voltage to alternating current voltage, allowing the energy obtained from photovoltaic (PV) panels to be transferred to the voltage of the grid, connecting to the grid voltage without using a transformer, keeping the leakage current below the standards and keeping the efficiency (ratio between output and input powers) at the rated power value up to 96 %.



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H02P 27/08 (2006.01)i; H01L 31/042 (2014.01)i; H02M 1/34 (2007.01)i		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) H01L 31/042; H02P 27/08; H02M 1/34		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Google Academy, Google Patents		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPODOC, WPI, EPOQUE English Text Databases (TXTE), IEEE Xplore		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 106411171 A (UNIV JIANGSU) 15 February 2017 (2017-02-15) Paragraphs 7-24	1-9
A	US 2014268932 A1 (SPARQ SYSTEMS INC [CA]) 18 September 2014 (2014-09-18) Paragraphs 12,24-25,58,69-70	1-9
A	US 2018026550 A1 (DENT PAUL WILKINSON [US]) 25 January 2018 (2018-01-25) Paragraphs 10,26-27,86,168-169,229-240	1-9
A	CN 107834888 A (YANCHENG POWER SUPPLY CO STATE GRID JIANGSU ELECTRIC POWER CO; STATE GRID JIANGSU ELECTRIC POWER CO; STATE GRID CORP CHINA) 23 March 2018 (2018-03-23) The Whole Document	1-9
A	KR 101514803B B1 (NASAN ELECTRIC IND CO LTD [KR]) 23 April 2015 (2015-04-23) The Whole Document	1-9
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**INTERNATIONAL SEARCH REPORT**  
**Information on patent family members**

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Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
US	2014268932	A1	18 September 2014	US	2014268932	A1	18 September 2014
				US	9641099	B2	02 May 2017
US	2018026550	A1	25 January 2018	US	2012281444	A1	08 November 2012
				US	8937822	B2	20 January 2015
				US	2014084687	A1	27 March 2014
				US	9735703	B2	15 August 2017
				US	2015288225	A1	08 October 2015
				US	2016372970	A9	22 December 2016
				US	10135361	B2	20 November 2018
				US	2015295413	A1	15 October 2015
				US	2016365731	A9	15 December 2016
				US	10205324	B2	12 February 2019
				US	2015318796	A1	05 November 2015
				US	2017070162	A9	09 March 2017
				US	10128774	B2	13 November 2018
				US	2017346413	A1	30 November 2017
				US	2019140556	A1	09 May 2019
				US	2020028447	A1	23 January 2020
				US	2020059166	A1	20 February 2020
				US	2018026550	A1	25 January 2018
				US	10090777	B2	02 October 2018
CN	106411171	A	15 February 2017	CN	106411171	A	15 February 2017
CN	107834888	A	23 March 2018	CN	107834888	A	23 August 2018
KR	101514803B	B1	23 April 2015	KR	101514803B	B1	23 April 2015