

(19)



(11)

EP 4 531 498 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
30.04.2025 Bulletin 2025/18

(51) International Patent Classification (IPC):
H05B 3/14 (2006.01) **H05B 3/26** (2006.01)
H05B 3/84 (2006.01)

(43) Date of publication A2:
02.04.2025 Bulletin 2025/14

(52) Cooperative Patent Classification (CPC):
H05B 3/141; H05B 3/265; H05B 3/283; H05B 3/84;
H05B 3/86; H05B 2203/013; H05B 2203/017

(21) Application number: **24200452.1**

(22) Date of filing: **16.09.2024**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

(72) Inventors:
• **Cycon, Dawid**
35-317 Rzeszów (PL)
• **Kwasnicki, Pawel**
35-233 Rzeszów (PL)

(74) Representative: **Warzybok, Tadeusz**
Biuro Patentowe "INICJATOR" Sp.z o.o.,
ul. Żolkiewskiego 7B/1
35-203 Rzeszów (PL)

(30) Priority: **26.09.2023 PL 44621923**

(71) Applicant: **ML SYSTEM Spółka Akcyjna**
36-062 Zaczernie (PL)

(54) **ELECTRIC HEATING PANEL WITH INCREASED EFFICIENCY OF CONVERTING ELECTRICAL ENERGY INTO THERMAL ENERGY AND METHOD OF MANUFACTURING AN ELECTRIC HEATING PANEL**

(57) The subject of the invention is an electric heating panel with increased efficiency of converting electrical energy into thermal energy and a method of manufacturing an electric heating panel, wherein the panel consists of a glass pane (1) with a textured ceramic layer (2) printed on its upper surface with a thickness of $g_1 = 50 \mu\text{m} - 480 \mu\text{m}$ and a glass pane (3) with a transparent heating layer (4) - FTO, ITO, AZO with a thickness of $g_3 = 180 \mu\text{m} - 700 \mu\text{m}$ deposited on its upper surface, comprising metal oxides: tin, zinc, indium, wherein two electrodes (5) with a width of $S_1 = 3\text{mm} - 15\text{mm}$ and a thickness of $g_4 = 50 \mu\text{m} - 500 \mu\text{m}$ and resistances per

1 m not exceeding 1Ω are deposited on the heating layer (4), with one end of each electrode connected to electrical contact leads (6), and further, a temperature sensor (7) connected by a copper electrical wire (8) to an externally powered control system (15) is deposited on the heating layer (4), housed in a plastic casing (14) inseparably connected to the lower surface of the glass pane (3), and additionally, the lower surface (10) of the glass pane (1) and the heating layer (4) deposited on the upper surface of the glass pane (3) are laminated together using a lamination polymer film (9) with a thickness of $g_5 = 300 \mu\text{m} - 0.85\text{mm}$.

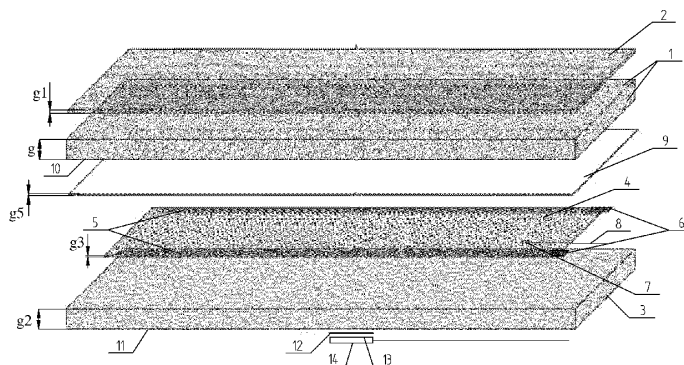


Fig. 3

EP 4 531 498 A3



EUROPEAN SEARCH REPORT

Application Number

EP 24 20 0452

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	CN 215 453 327 U (XIAMEN HAPSTAR ELECTRONIC TECH CO LTD) 7 January 2022 (2022-01-07)	8-13	INV. H05B3/14 H05B3/26 H05B3/84
Y	* abstract; claims 1-5; figures 1-3 *	1-7	
Y	US 2020/374985 A1 (DIETMANN STEFAN [DE] ET AL) 26 November 2020 (2020-11-26) * paragraph [0071]; figure 1 *	1-7	
Y	EP 2 591 638 B1 (SAINT GOBAIN [FR]) 19 October 2016 (2016-10-19)	1-7	
A	* paragraphs [0005], [0038] - [0040]; claim 1; figures 1-4 *	8-13	
A	EP 2 399 735 A1 (SAINT GOBAIN [FR]) 28 December 2011 (2011-12-28) * paragraphs [0002], [0003], [0043]; claims 1,2; figure 5 *	1-13	
A	EP 3 852 491 A1 (NITTO DENKO CORP [JP]) 21 July 2021 (2021-07-21) * paragraph [0049]; figure 3 *	1-13	TECHNICAL FIELDS SEARCHED (IPC) H05B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 10 March 2025	Examiner Strømmen, Henrik
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	

EPO FORM 1503 03.82 (P04C01)

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

EP 24 20 0452

5

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.

10-03-2025

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
CN 215453327	U	07-01-2022	NONE	

US 2020374985	A1	26-11-2020	CN 110446606 A	12-11-2019
			EP 3409467 A1	05-12-2018
			JP 6914357 B2	04-08-2021
			JP 2020517073 A	11-06-2020
			KR 20190133048 A	29-11-2019
			US 2020374985 A1	26-11-2020
			WO 2018219584 A1	06-12-2018

EP 2591638	B1	19-10-2016	BR 112012028471 A2	19-07-2016
			CN 102960053 A	06-03-2013
			EA 201291454 A1	30-04-2013
			EP 2591638 A1	15-05-2013
			ES 2611662 T3	09-05-2017
			JP 5639269 B2	10-12-2014
			JP 2013532115 A	15-08-2013
			KR 20130066656 A	20-06-2013
			PL 2591638 T3	31-03-2017
			PT 2591638 T	31-01-2017
			US 2013092676 A1	18-04-2013
			WO 2012004280 A1	12-01-2012

EP 2399735	A1	28-12-2011	CN 102947086 A	27-02-2013
			DK 2585291 T3	10-10-2016
			EA 201291330 A1	30-04-2013
			EP 2399735 A1	28-12-2011
			EP 2585291 A1	01-05-2013
			JP 5957448 B2	27-07-2016
			JP 2013530916 A	01-08-2013
			KR 20130106775 A	30-09-2013
			US 2013062119 A1	14-03-2013
			WO 2011161039 A1	29-12-2011

EP 3852491	A1	21-07-2021	CN 112703818 A	23-04-2021
			EP 3852491 A1	21-07-2021
			JP 2020047370 A	26-03-2020
			KR 20210047928 A	30-04-2021
			TW 202029832 A	01-08-2020
			US 2021345457 A1	04-11-2021
			WO 2020054626 A1	19-03-2020

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82