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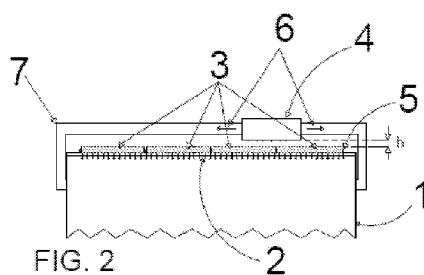


FIG. 2

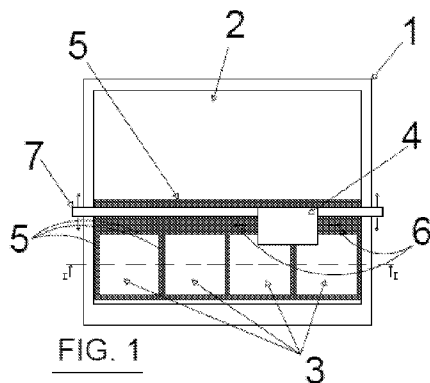


FIG. 1

(57) Abstract: A process for decorative printing on the surfaces of panels for false ceilings and/or walls, in particular on panels made of fibrous, deformable, and porous materials such as rock wool, glass wool, and the like, which comprises, once the decorative graphics have been created and the necessary printing tests have been conducted, the following fundamental steps in the order shown: - preparation, if necessary, or chroming of the surface of the panel (3) to be decorated; - arrangement of the panel to be decorated (3) inside a jig (5), which is shaped to fit perfectly, on top of the surface of the printing bed of a UV printing machine; - treatment, if necessary, of the surface to be decorated by wiping with a microfibre cloth dampened with demineralised water; - performance of the UV printing.



PROCESS FOR DECORATIVE PRINTING OF THE SURFACES OF PANELS FOR FALSE CEILINGS AND/OR WALLS

DESCRIPTION

The invention relates to a process for decorative printing on the surfaces of panels for false ceilings and/or walls. Specifically, but not exclusively, the invention is aimed at panels made of fibrous, deformable, and porous materials such as rock wool, glass wool, and the like and specifically, but not exclusively, it can be advantageously used for printing panels that perform technical functions, such as noise and temperature insulation, which are commonly used in the construction of modular false ceilings. These panels are made of various types of materials such as rock wool, glass wool, and the like, foamed plastic materials, plasterboard, **and also metal materials.**

Commonly known false ceiling panels are normally a uniform white or natural colour, as they are designed to address purely technical rather than decorative issues.

The first decorative printing tests were carried out on plasterboard panels.

Use of this media has led to certain problems arising, which must be solved, including the possible - and frequent - presence of breakages inside the body of the panel, which only appear when handling the said panel during the decoration process, and which make the panel unusable, forcing the rejection thereof from the production cycle. Another drawback is attributable to the fragility of

the surface of the said plasterboard panels, which are easily damaged during any stage of the handling process and/or during transportation, with small parts coming away, thereby ruining the decoration.

Furthermore, the use of panels made of materials other than plasterboard, such as rock wool panels (which are also functionally suitable for making false ceilings and the like), poses various types of problems, including, with respect to plasterboard panels, the fact that they have a less white, high-porosity and therefore more absorbent, non-planar surface which on the one hand guarantees good breathability, but on the other can create serious issues during processing since the printing process involves positioning the panels on a suction surface to keep them stationary and planar.

The object of this invention is to overcome the problems described above, giving rise to a process for high-resolution printing on the surfaces of panels made of elastically deformable and/or porous materials such as rock wool, foamed plastic materials, plasterboard, and the like, as described below, as illustrated in the appended drawings, and as claimed.

Further characteristics and advantages of the present invention will emerge more clearly in the description that follows of a preferred but not exclusive embodiment illustrated, in the form of a non-limiting example, with the aid of the appended drawings, in which:

- Figure 1 shows a schematic top-down plan view of an embodiment concerning the implementation of a stage of the process;
- Figure 2 shows a schematic sectional view taken according to plane line I-I in Figure 1.

With reference to the aforesaid figures, 1 schematically denotes the upper part of the frame of a UV printing machine hosting a suction support surface 2, which constitutes the work surface, arranged to support various panels 3 and keep them positioned during the printing operation. The latter is performed by a print head 4 which slides along the bar 7.

In this case, the panel to be printed consists of a rock wool panel 3 for false ceilings, which delivers good performance in terms of temperature and noise insulation and fire resistance, but has characteristics including elastic deformability and porosity.

To overcome the problems caused by the aforesaid characteristics, the panel is inserted, inside a perfectly sized jig 5, which is black in colour or in any case is a colour which does not reflect ultraviolet radiation onto the print heads, to prevent catalysis of the inks coming out of the said heads and consequently clogging of the ink outlet holes.

The use of UV inks guarantees a very high graphic rendering without obstructing the pores of the panel 3 without altering the breathability thereof, which is an essential characteristic for a rock wool panel with advanced technical performance.

The printer employed utilises micro-drop ink transfer technology and is equipped with a suction support surface 2, which holds the panel inside the jig 5, and a print head 4 equipped with a UV lamp. The print head 4 is moved, during printing, in a transversal direction 6 to the printing bed and in a longitudinal direction to the bar 7, which operates at a distance h from the surface to be decorated of between approximately 1.6 and 2.2 mm (for products that are designed for digital printing, as a rule, the distance of the head from the surface is 1.2 mm).

The description set out above concerns part of the entire process, which is divided into the following fundamental stages once the decorative graphics have been created and the necessary printing tests carried out:

- a) arrangement of the panels to be decorated inside a jig 5, which is shaped to fit perfectly, on top of the surface of the UV printing bed;
- b) treatment, if necessary, of the surface to be decorated by blowing ionised air thereonto to neutralise electrostatic charges;
- c) treatment, if necessary, of the surface to be decorated by wiping with a microfibre cloth dampened with demineralised water;
- d) performance of the UV printing.

Once the panel held in the black PVC foam jig has been positioned on the suction support surface of the UV printing machine and the firm positioning thereof on the printing bed has been ensured, a further preparatory treatment is performed on the surface of the panel to prevent tiny filaments being lifted up on the surface to be printed in the case of fibrous and porous materials such as the filaments of glass on rock fibre panels.

The printing is then performed by sliding the head 4 in the transverse direction 6 shown and in the longitudinal direction to the bar 7.

This production process makes it possible to perform decorative printing on false ceiling panels (therefore, products created for the construction industry, not for digital printing or the visual communication industry) such as panels made of rock wool, thereby making it possible, for the first time, to market a product which is innovative and unique in the industry.

CLAIMS

1). A process for decorative printing on the surfaces of panels for false ceilings and/or walls, on panels **made of various types of materials, including metal materials** and in particular of fibrous, deformable, and porous materials such as rock wool, glass wool, plasterboard and the like, characterised by the fact that, once the decorative graphics have been created and the necessary UV printing tests have been conducted, the said process comprises the following fundamental steps in the order shown:

a) preparation, if necessary, or chroming of the surface of the panel (3) to be decorated;

b) arrangement of the panel to be decorated (3) inside a jig (5), which is shaped to measure, on top of the surface of the printing bed of a UV printing machine;

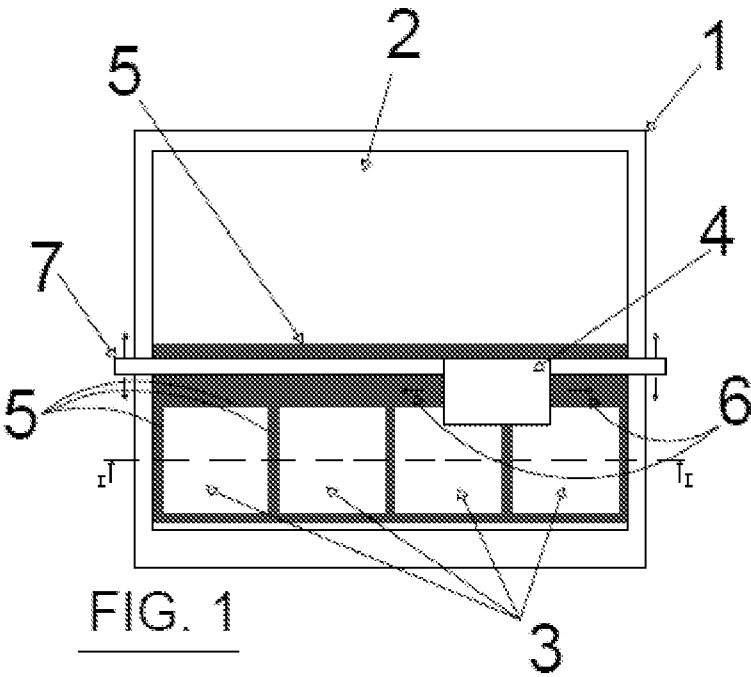
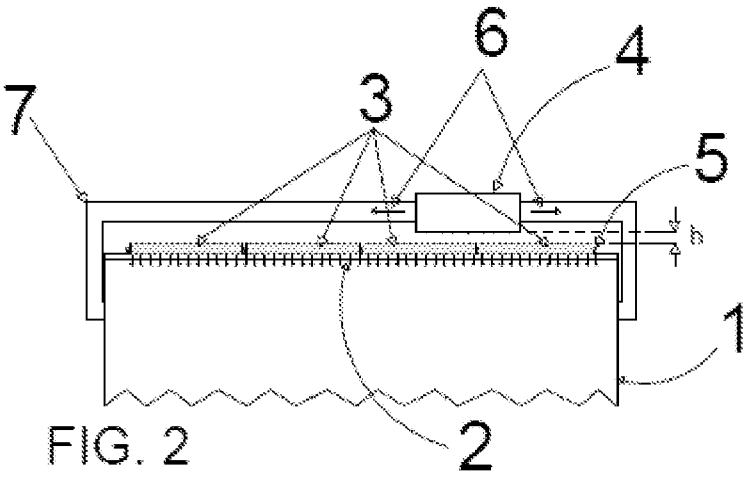
c) treatment, if necessary, of the surface to be decorated by wiping with a microfibre cloth dampened with demineralised water;

d) performance of the UV printing;

the jig (5) being made of black PVC foam and having a thickness of approximately 8 mm;

the UV printing being performed using a UV printer by arranging the panel to be printed (3), framed by a jig (5), on a suction support surface (2) above which the print heads (4) operate, the said print heads having nozzles positioned at a preset distance, of between approximately 1.6 and 2.2 mm, from the surface of the panel to be decorated.

2). A process according to Claim 1, **characterised by the fact** that the jig (5) is shaped to measure so as to contain the panel (3) to be decorated.



INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER		
INV.	B41J3/407	B41J11/00
		B41M5/00
		B44C5/04
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ADD.	B41J3/413	
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)		
B41J B44F B41M B44C E04B		
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)		
EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 3 816 991 A1 (GOMEZ HERRERA ANGEL MANUEL [ES]; COMPOSTIZO OLARTE PEDRO LUIS [ES]) 5 May 2021 (2021-05-05) paragraphs [0006], [0039], [0041], [0045]; figure 1	1,2
X	US 2022/379654 A1 (MASIA STEVEN L [US] ET AL) 1 December 2022 (2022-12-01) paragraphs [0027], [0041]; figures 1-7	1,2
X	EP 0 649 751 B1 (CANON KK [JP]) 6 February 2002 (2002-02-06) paragraphs [0001], [0004], [0076]; figure 7	1,2
A	US 2017/008303 A1 (LOEBEL ARNE [DE]) 12 January 2017 (2017-01-12) the whole document	1,2
☐ Further documents are listed in the continuation of Box C.		
☒ See patent family annex.		
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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3816991	A1	05-05-2021	NONE

US 2022379654	A1	01-12-2022	BR 112023024748 A2 15-02-2024
		CA 3220208 A1 01-12-2022	
		EP 4347273 A1 10-04-2024	
		US 2022379654 A1 01-12-2022	
		WO 2022251416 A1 01-12-2022	

EP 0649751	B1	06-02-2002	AT E212915 T1 15-02-2002
		AU 686209 B2 05-02-1998	
		CA 2131424 A1 31-03-1995	
		CN 1116990 A 21-02-1996	
		DE 69429802 T2 14-08-2002	
		DK 0649751 T3 11-03-2002	
		EP 0649751 A2 26-04-1995	
		ES 2167344 T3 16-05-2002	
		KR 950008130 A 17-04-1995	
		PT 649751 E 31-07-2002	
		US 5786835 A 28-07-1998	

US 2017008303	A1	12-01-2017	CN 105873769 A 17-08-2016
		DE 102014100858 B3 09-07-2015	
		EP 3099510 A1 07-12-2016	
		PL 3099510 T3 29-12-2017	
		US 2017008303 A1 12-01-2017	
		WO 2015110213 A1 30-07-2015	
