

(19)



(11)

EP 4 067 598 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

05.10.2022 Bulletin 2022/40

(51) International Patent Classification (IPC):

E04C 2/16 (2006.01)

E04B 1/80 (2006.01)

E04B 1/74 (2006.01)

(21) Application number: **21020426.9**

(52) Cooperative Patent Classification (CPC):

E04C 2/16; E04B 1/80; E04B 2001/745

(22) Date of filing: **25.08.2021**

(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 MK MT NL NO
PL PT RO RS SE SI SK SM TR**

Designated Extension States:

BA ME

Designated Validation States:

KH MA MD TN

(71) Applicant: **Prespaglia Srls**

70026 Modugno (BA) (IT)

(72) Inventor: **The designation of the inventor has not yet been filed**

(74) Representative: **Cornacchia, Pierluigi**

Corlex Studio Legale

Via Principi di Savoia, 67

73100 Lecce (IT)

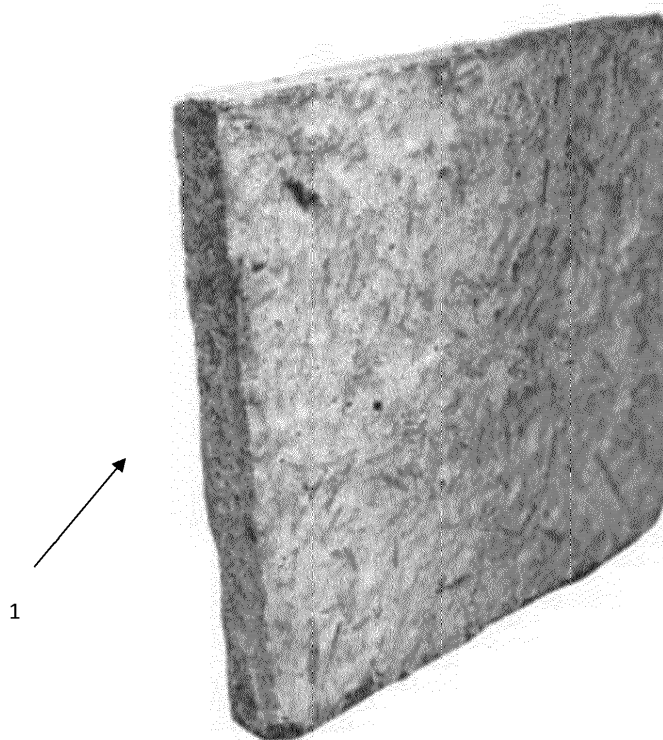
(30) Priority: **30.03.2021 IT 202100007919**

(54) **PANEL FOR THERMAL INSULATION**

(57) The present invention relates to a panel (1) for thermal insulation consisting in a screed containing straw, lime, clay, pozzolan and water which has preferred dimensions that are equal to 50 cm x 50 cm x 10 cm, and a weight that is equal to 25 kg and the net dry density is

equal to 554 kg/m³ and the thermal conductivity is equal to 0,0823 W/(mK) and its proceeding for manufacture.

Fig. 1



EP 4 067 598 A1

Description

[0001] Of the patent for industrial invention entitled: "Panel for thermal coat" on behalf of Prespaglia Italia Srls, electively domiciled at the law firm of lawyer Pierluigi Cornacchia, Via Principi di Savoia, 67 - Lecce.

Field of the technique

[0002] The present invention relates to a method of thermal and/or acoustic insulation of a housing structure. In particular, it relates to an ecological prefabricated element where also the realization process is eco-sustainable in line also with CAM (minimum environmental criteria).

Noted art

[0003] The state of the art reveals that the current methods of thermal insulation of housing structures provide for the need to create buildings with good performance of energy efficiency, low environmental impact and with an acceptable benefit also in terms of health and not only environmental. As a result, there is great industrial interest in finding economic solutions, in terms of cost-benefit and not only that provide environmentally sustainable building products throughout the construction process. The traditional method of making bricks or walls does not take into account the healthiness of indoor and even outdoor environments and their "weight" in terms of ecological footprint. The state of the art in reference to the present buildings shows, moreover, that they are unreliable in terms of guaranteeing the transmittance prescribed in correlation to the construction process to realize them as well as having a realization system quite energy-consuming.

[0004] With reference to the state of the art emerge industrial patents such as "102013902219329 - PREFABRICATED INSULATION PLATE FOR A WALL STRUCTURE, WALL STRUCTURE INCLUDING SUCH PLATE" or "102014902273933 - MULTISTRATE INSULATING PANEL, IN PARTICULAR FOR USE IN THE INSULATION PLATE COATING OF BUILDINGS". However, such patents and others, even though they boast technical advantages, have in no way devised the use of natural raw materials like the present invention, nor is the construction process to be considered as being based on the same *modus operandi* as the present invention.

Description of the invention

[0005] The present invention deals with a panel made of decorticated and dedusted straw, hydraulic lime, clay and pozzolan. It has thermal, acoustic and hygrometric comfort, as well as being permeable to water vapor, that is, it is breathable and resistant to frost, insects and rodents, and finally it has a reduced amount of CO₂ emis-

sions during manufacture, since it adopts a so-called "cold" process. The panels are laid by gluing them to the existing wall using suitable glue and dowels. The cut can be made by manual or electric saw and the walls, finally, can be covered with a natural network and plastered. This panel is ideal for use as a thermal coat for exteriors to be superimposed on the facades of existing buildings and that require an intervention of energy efficiency. Thanks to its characteristics, it guarantees high thermal insulation performance both at low and high temperatures.

[0006] It should be noted that this component of green building has an enormous versatility, in fact, can be easily used for the construction of walls in all structures, where the structural elements are made of wood, steel or reinforced concrete. Its main function is to make external perimeter walls of a building. However, it can be suitable not only for external plugging but there is the possibility to use it also to realize internal masonry, in this case it is necessary to add a layer of plaster for internal use.

[0007] This finding also follows and complies with the requirements of UNI EN 12664:2002 dated 01/02/2002, namely "Thermal performance of building materials and products. Determination of thermal resistance by the hot plate method with guard ring and by the thermo-flowmeter method. Dry and wet products with medium and low thermal resistance".

[0008] The panel described and the relative method of realization constitute a new and inventive alternative to the state of the art, solving a series of industrial problems linked to the reliability and speed of assembly of the panels themselves as well as the guarantee of having natural materials that strongly reduce the environmental impact of the building.

Detailed description of the invention and its figures

[0009] Further features and advantages of the device according to the invention will become clearer with the following detailed description of a form of realization of the invention, made with reference to the attached drawings, provided for illustrative and non-limiting purposes only.

[0010] The percentages of preparation of the dry mixture are by weight: Lime, clay and pozzolan between 70% and 85% while straw between 15% and 30%. The screed, to be prepared for the realization of the panels, before being inserted in the clean formworks, is spread on the internal sides, a "veil" of natural oil; the thermal screed is realized having as a percentage: dry mixture of lime, clay, pozzolana and straw that varies, in weight, between 85% and up to 95% while the percentage of the weight of water, varies accordingly, from 5% up to 15%. This panel with the doses mentioned above has a density of cured panels equal to about 554 kg/m³.

[0011] It follows that the panel shows the following characteristics:

- Dimensions(cm) H 50 x L 50 x SP10
- Thermal conductivity is equal to 0,0823 W/(m·K)
- Volumic mass: about 554 kg/m³
- Specific gravity: about 25kg

[0012] Figure 1 shows the perspective view of the panel that has an area of about 0.25 m² (50cm x 50 cm) while the thickness can vary from 5 cm up to 20 cm. 10

[0013] Figure 2 illustrates the production process including the following stages:

- Mixing of materials (straw, lime, clay, pozzolan and water) 15
- Insertion of materials in the formwork
- Formwork vibration for air removal 20
- Pressing inside the formwork
- Fast drying in the oven 25
- Formwork opening and final drying at room temperature. 30

[0014] The present invention has been described by way of illustration, but not limitation, according to its preferred embodiments, but it is to be understood that variations and/or modifications may be made by those skilled in the art without departing from the scope of protection thereof, as defined by the appended claims. 35

Claims

1. Panel (1) for thermal insulation consisting in a screed containing straw, lime, clay, pozzolan and water which in its preferred but not exclusive embodiment is **characterised by** dimensions that are equal to 50cm x 50cm x 10cm, by weight that is equal to 25 kg and by the fact that the net dry density " ρ_0 " is equal to 554 kg/m³ and the thermal conductivity " λ " is equal to 0,0823 W/(m·K). 40 45
2. Panel according to the preceding claim, **characterised by** the fact that the dosage percentage of the dry blend is realised by weight: lime, clay and pozzolan stand between 70% and 85% while straw stands between 15% and 30%, thus the weight of the dry blend composed by lime, clay, pozzolan and straw varies between 85% and up to 95%, while the percentage of the water weight stands between 5% and up to 15%. 50 55

3. Proceeding for the realisation of a panel for thermal insulation according to the preceding claims, **characterised by** the fact that, once the screed (2) is amalgamated to the point that it reaches a uniform plasticity level, it is poured into a steel container that shows only one lateral opening, and on whose inner surface a superficial layer of natural oil is blended before the pour, and subsequently, the product resulting from the pour is extracted from the container within 48 hours and stored at room temperature, protected by climate factors, until the aging is completed.

4. Proceeding for the realisation of a panel according to the preceding claims, **characterised by** the fact that the final drying at room temperature allows to obtain a panel including net dry density " ρ_0 " approximately equal to 554 kg/m³ e thermal conductivity of the dried material " λ " approximately equal to 0,0823 W/(m·K).

Fig. 1

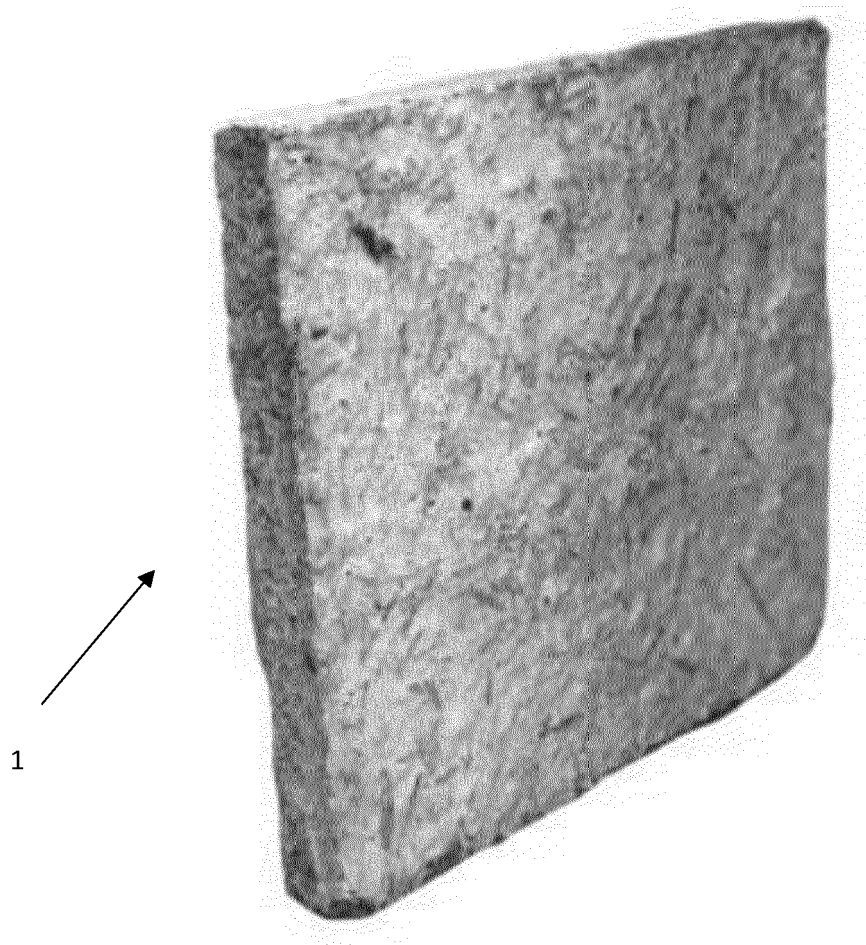
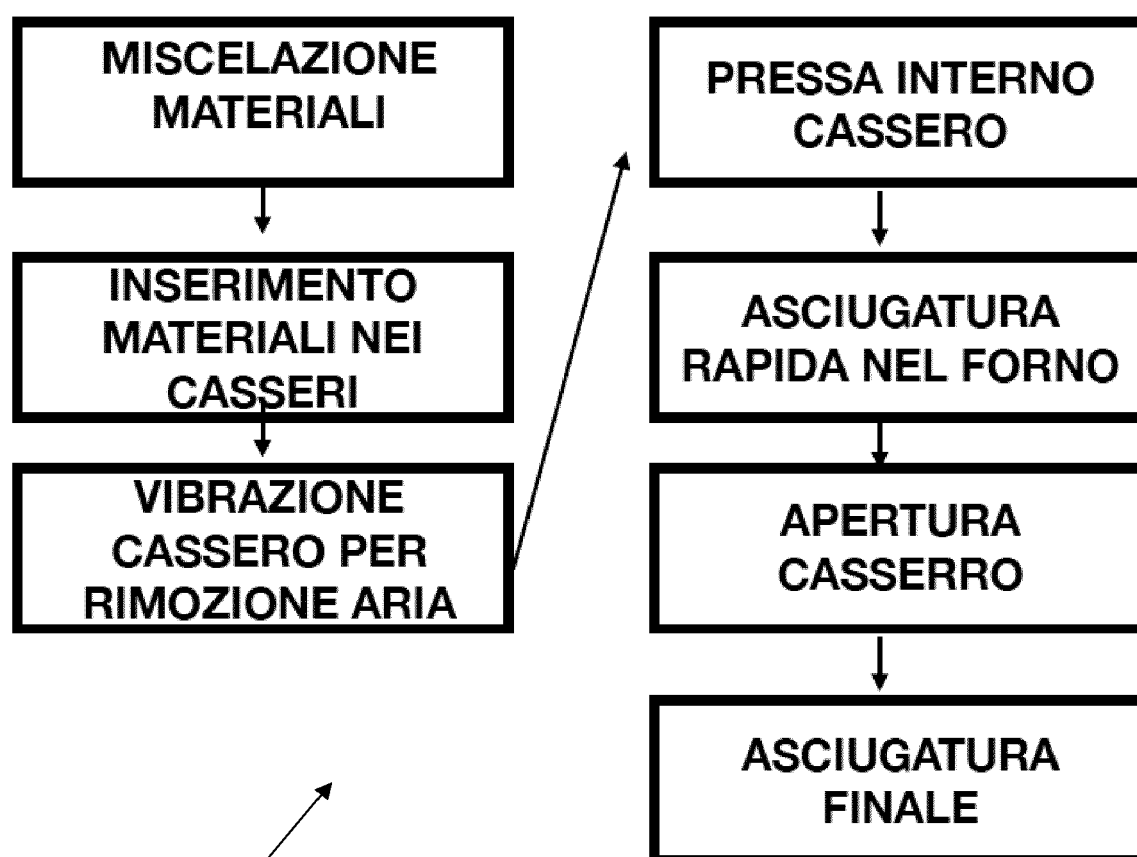


Fig. 2





EUROPEAN SEARCH REPORT

Application Number
EP 21 02 0426

5

10

15

20

25

30

35

40

45

50

55

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	IT PR20 120 097 A1 (BADARI ANDREA; CASARI DARIO) 29 June 2014 (2014-06-29)	1,3,4	INV. E04C2/16
Y	* the whole document *	2	E04B1/80
X	DE 100 17 202 A1 (FASA GMBH [DE]) 21 September 2000 (2000-09-21) * paragraph [0001] * * paragraph [0003] - paragraph [0006] * * paragraph [0011] - paragraph [0013]; figure 1 *	1	ADD. E04B1/74
Y	US 5 177 924 A (KAKUK STEFAN [DE]) 12 January 1993 (1993-01-12) * column 5, line 27 - line 60 *	2	
A	EP 3 778 522 A1 (RICEHOUSE SRL [IT]) 17 February 2021 (2021-02-17) * the whole document *	1-4	
A	EP 2 784 233 A1 (ORGANOID TECHNOLOGIES GMBH [AT]) 1 October 2014 (2014-10-01) * paragraph [0049] - paragraph [0051] *	1-4	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04C E04B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 October 2021	Examiner Giannakou, Evangelia
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 21 02 0426

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.

13-10-2021

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
IT PR20120097 A1	29-06-2014	-----	-----
DE 10017202 A1	21-09-2000	AT 316178 T	15-02-2006
		DE 10017202 A1	21-09-2000
		DK 1143082 T3	20-03-2006
		EP 1143082 A2	10-10-2001
		ES 2257352 T3	01-08-2006
US 5177924 A	12-01-1993	NONE	
EP 3778522 A1	17-02-2021	NONE	
EP 2784233 A1	01-10-2014	AT 514179 A1	15-10-2014
		EP 2784233 A1	01-10-2014
		-----	-----