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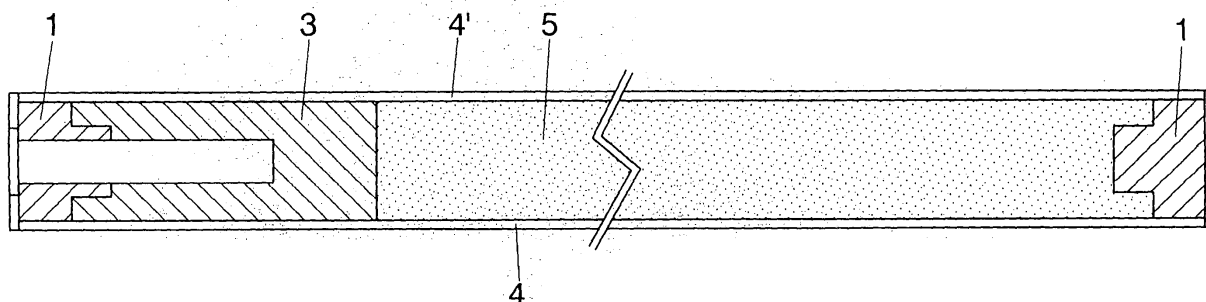
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(54) **DOOR PRODUCTION METHOD AND DOOR THUS OBTAINED**

(57) Specially designed for wooden doors structured from a framework which is configured by a rectangular frame coinciding with the perimeter of the door, to which are fixed two wooden panels or sheets (4-4') of reduced thickness, forming an initially empty internal chamber, the invention procedure consists of subjecting the aforementioned pieces of wood to a vacuum process, inside

a vacuum chamber with a pressure sufficiently low to ensure the detachment of the wood dust residues adhering to the faces of the aforementioned pieces, after which the door is assembled and its hollow interior filled with a mass (5) of polyurethane foam, which adheres closely to interior surface of the aforementioned wooden pieces, acting as a connecting join between them and giving the door as a whole a notable structural solidity.



**FIG. 2**

## Description

### OBJECT OF THE INVENTION

[0001] This invention refers to a new procedure for the manufacture of doors, specifically for the manufacture of wooden doors, of the type structured using a rectangular perimeter frame, coinciding with the perimeter of the door, to which two sheets of wood are attached which enclose the hollow interior of the door.

[0002] The object of the invention is to allow the interior of the door to be filled with polyurethane foam, to improve both the consistency and the insulation of the door, and more specifically to obtain a perfect adhesion of the aforementioned foam to the wooden structure.

### BACKGROUND TO THE INVENTION

[0003] Although solid wooden doors exist, their high cost means that very frequent use is also made of hollow wooden doors, made of a perimeter frame, with reinforcement or thickening at the level where the lock is installed, with this frame allowing the insertion of one or more cross-pieces and the door being completed in all cases with a pair of thin wooden panels, generally of a thickness between 1 and 3 millimetres, which constitute the visible faces of the door and which are interconnected by means of the aforementioned frame, and, when installed, the intermediate cross-pieces.

[0004] The aforementioned wooden panels tend to become deformed, which is why use is generally made of cellular cardboard structures, which fill the hollow interior of the door and which act as connecting links affecting the whole surface of the exterior wooden panels, preventing them from moving, and to which they are generally fixed using adhesive.

[0005] This solution is complicated and unsatisfactory, and it is much more practical to fill the hollow interior of the door with polyurethane foam, as for example is done in hollow metal panel doors.

[0006] Until now it has not been possible to use polyurethane foam in hollow wooden doors, due to the fact that there is practically no adhesion between the polyurethane and the wood, which means that the core of foam only acts as a means of contention against forces which tend to deform the wooden panels of the door inwards, but allows the free deformation of the same outwards, with frequent formation of "pockets", which have a very negative repercussion on the aesthetics of the door, and make them practically unacceptable.

[0007] This problem of lack of adhesion, which not only occurs between the polyurethane foam and the panels or sheets of wood which correspond to the largest faces of the door, but also with regard to the battens which configure the perimeter of the same and which connect the aforementioned panels, is due to the fact that, during the machining of all the wooden elements, a large quantity of dust is generated. A considerable part of this dust

remains incrustated on the surface of the wooden pieces, and when the foam is applied it adheres to the dust and this dust then constitutes a barrier between foam and wood, which prevents direct, solid fixing between these elements, which would be necessary for the door to have the required mechanical consistency.

### DESCRIPTION OF THE INVENTION

[0008] The procedure which the invention proposes allows the manufacture of hollow wooden doors, filled with polyurethane foam, in optimum conditions of adherence of this foam to the wood.

[0009] For this to occur, and more specifically, the aforementioned procedure consists of introducing the constituent parts of the door, prior to assembly of the same, into a vacuum chamber at a pressure sufficiently low to allow the absorption of the residual dust which might have remained integrated in these wooden pieces.

[0010] Once the aforementioned pieces have been duly cleaned by the effect of the vacuum, they are assembled to obtain the door, into which is injected the polyurethane foam, by any suitable conventional means, achieving perfect adhesion of the foam to each and every one of the wooden pieces, with optimum solidity or structural rigidity for the door and its whole.

[0011] Logically, a door obtained with the invention procedure is a door with a wooden perimeter frame, to which are suitably fixed two panels or sheets, also made of wood or synthetic laminate, forming a flat, enclosed prismatic-rectangular receptacle, the interior of which is wholly occupied by polyurethane foam.

### DESCRIPTION OF THE DIAGRAMS

[0012] To complement the description being made, and in order to assist with a greater understanding of the characteristics of the invention, in accordance with a preferred example of practical embodiment of the same, included as an integral part of the aforementioned description is a set of diagrams in which, with illustrative and non-restrictive character, the following has been represented:

Figure 1. — Shows, according to a schematic representation in perspective, the basic elements of a conventional, hollow wooden door, duly broken down into its parts.

Figure 2. — Shows a cross-sectional detail of the door in the previous figure, duly finished after the application of the invention procedure.

### PREFERRED EMBODIMENT OF THE INVENTION

[0013] In view of the described figures, and particularly figure 1, it can be observed that the invention procedure is applicable to wooden doors formed of a framework

consisting of a perimeter surround or frame based on vertical posts (1) and horizontal crosspieces (2), optionally assisted by intermediate crosspieces, not represented in the aforementioned figure (1), generally with a substantial reinforcing block (3) at the level where the lock is to be installed and to house the latter, with this framework (1-2) complemented with a pair of panels or sheets of wood, wood fibre or synthetic laminates (4-4'), of reduced thickness, interconnected via the framework itself (1-2) and forming the largest visible faces of the door.

**[0014]** In accordance with this structuring, the invention procedure consists of subjecting both the framework (1-2) and the panels or sheets (4-4'), inside a vacuum source, to a pressure sufficiently low for all the residual dust which might impregnate these pieces of wood to be separated from the same, with the latter remaining perfectly clean, and in conditions where, after the assembly and fixing of the panels (4-4') onto the framework (1-2), as shown in figure 2, the hollow interior of the door can be filled with a mass of polyurethane foam (5). This foam fills the hollow interior completely, adhering perfectly to the internal surfaces of the repeatedly aforementioned wooden pieces, acting moreover as a connecting join between them, giving the door as a whole a great structural solidity, with no appreciable increase in its weight, as well as the insulation properties, both thermal and acoustic, inherent in the material which constitutes its core, i.e. the polyurethane foam.

a reinforcement (3) for insertion of a lock, and the aforementioned framework (1-2) complemented with a pair of wooden sheets or panels (4-4'), of reduced thickness, which are joined to each other with interposition of the aforementioned surround or framework configuring a completely enclosed chamber occupied by a mass of polyurethane foam (5) closely fixed to the internal surfaces of the framework (1-2) and the panels or sheets (4-4').

## Claims

1. Procedure for manufacture of doors, specifically hollow wooden doors, of the type constituted by means of a framework which configures a perimeter frame to which are attached two panels or sheets, also of wood, wood fibre or synthetic laminates, forming the visible faces of the door. The procedure is **characterised** because it consists of introducing the aforementioned wooden framework (1-2), either in pieces or after assembly, together with the wooden panels or sheets (4-4') which constitute the main faces of the door, inside a vacuum chamber where these pieces of wood are subjected to a pressure sufficiently low to produce in the same the complete removal of the residual wood dust which initially impregnated their surfaces. After this vacuum cleaning phase, the wooden structure of the door is definitively assembled and the hollow interior of the same filled with a mass (5) of polyurethane foam which adheres closely to the corresponding surfaces of the framework (1-2) and the panels or sheets (4-4').
2. A door obtained with the procedure in the first claim, **characterised** because it incorporates a framework which takes the form of a rectangular frame based on a pair of vertical posts (1) and a pair of horizontal crosspieces (2), with one of the vertical posts having

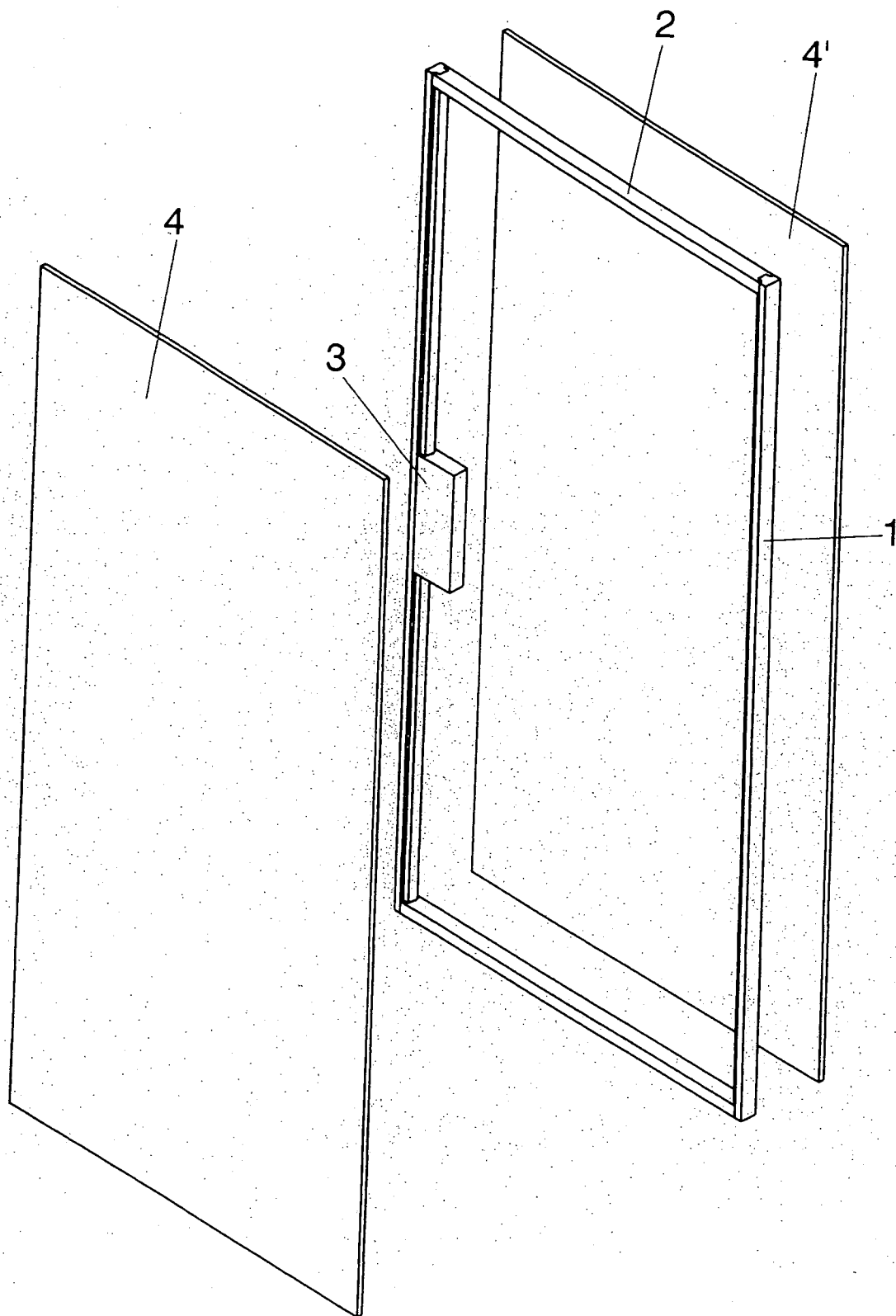


FIG. 1

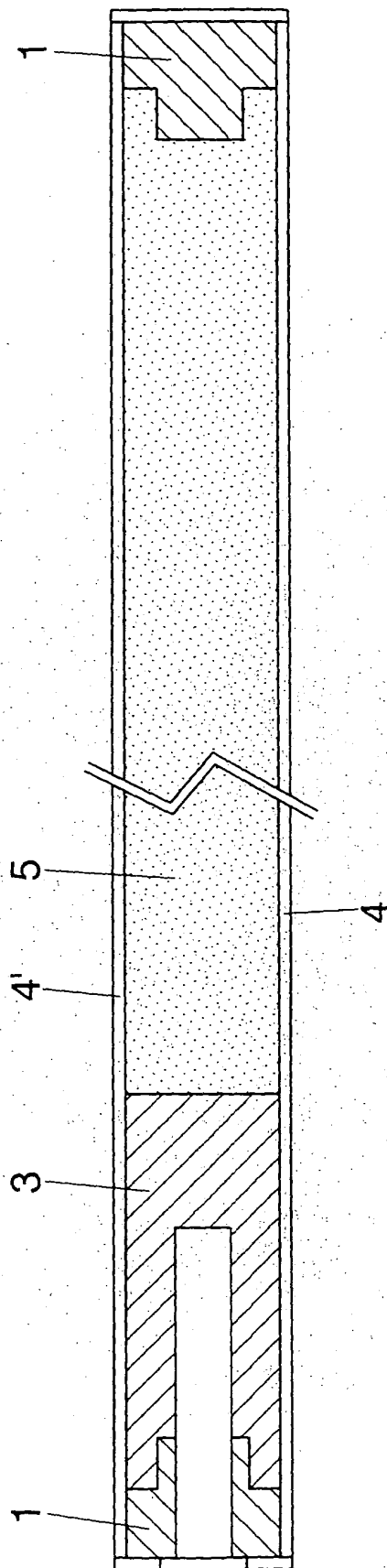


FIG. 2

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/ ES 2006/000659

## A. CLASSIFICATION OF SUBJECT MATTER

**E06B 3/72** (2006.01)

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)

E06B 3/70,E06B 3/263

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)

CIBEPAT,EPODOC,WPI

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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| Y         | page 13, lines 7-13; lines 22-25; figures 10,11.                                                                              | 1                     |
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| Y         | ES 1014889 U (TABLEROS DEL SUR S.A. TABLESUR) 01.05.1991, the whole document.                                                 | 2                     |
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| A         |                                                                                                                               | 1                     |

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

|                                                                                                                                                                         |     |                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| * Special categories of cited documents:                                                                                                                                | "T" | later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention                                         |
| "A" document defining the general state of the art which is not considered to be of particular relevance.                                                               |     |                                                                                                                                                                                                                                         |
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| "O" document referring to an oral disclosure use, exhibition, or other means                                                                                            | "Y" | document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents, such combination being obvious to a person skilled in the art |
| "P" document published prior to the international filing date but later than the priority date claimed                                                                  |     |                                                                                                                                                                                                                                         |
|                                                                                                                                                                         | "&" | document member of the same patent family                                                                                                                                                                                               |

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## INTERNATIONAL SEARCH REPORT

International application No.

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| C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                                    |                       |
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**EP 1 965 014 A1**

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### Information on patent family members

International application No.

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