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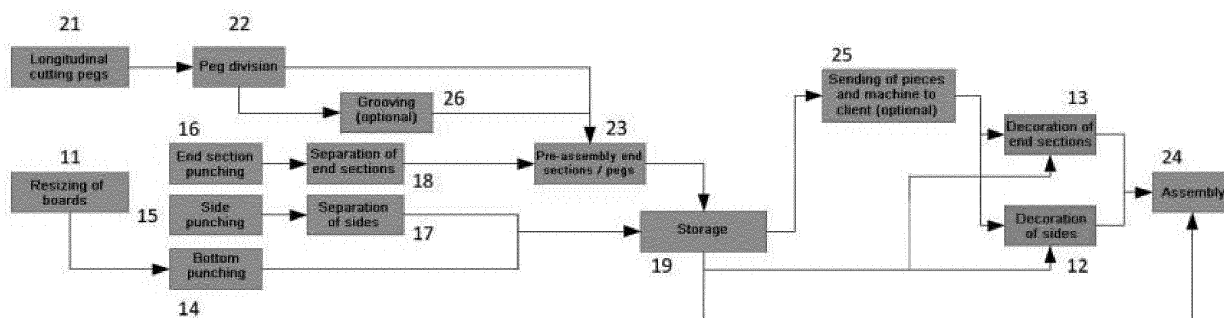
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(54) **METHOD FOR PRODUCING A BOX THAT CAN BE DISASSEMBLED AND STACKED**

(57) A manufacturing process of a removable and stackable box in which the box is rectangular at the bottom and comprises two opposite sides; two opposite end sections; a bottom and four triangular pegs or dowels comprising: (i) an initial process for shaping the sides, ends and bottoms comprising the stages of: (a) sizing certain boards; (b) punching, stamping, or a combination of punching and stamping of parts from the boards; (c)

separation and storage of the sides, ends and bottoms; and (d) decoration of at least one of the sides, ends or bottoms by means of self-adhesive labels; and (ii) in parallel to the first process, a second process for shaping the pegs comprises the stages of: (a) cutting square pieces to a length equal to the height of the pegs; and (b) division of the quadrangular pieces cut into two equal parts; and (iii) a final process in which the box is formed.



**FIG.1**

## Description

### Technical Field

[0001] The invention presented herein refers to a manufacturing process of a removable and stackable box made of wood, MDF (medium density fibreboard), or a combination of both.

### Prior state-of-the-art

[0002] Currently, the machines known for assembling boxes contain a structure that supports, in theory, the different pieces separately so that, subsequently, these are brought to a shaping station where the box is assembled using different mechanisms and devices such as in WO03095166.

[0003] On the other hand, the Spanish utility model ES1073141U describes a container that comprises a box that includes a bottom and four side walls: two end sections or shorter sides and two broadsides, longer sides—these pieces being independent elements—so that the bottom is provided with perimeter tabs into which grooves established in the lower part of the sides and ends are fitted, the ends having end tabs which, in turn, fit into recesses set in proximity to the ends of the sides.

[0004] For the assembly of this type of boxes, the company OBEIKAN applied for the patent ES2568233T3 that describes a procedure and a machine to assemble boxes that comprise a bottom, two sides and two end sections as described in ES1073141 U. To achieve this, the box is assembled by first fitting two opposite side walls, moving them in perpendicular planes with respect to the bottom, which is kept in a static position during the coupling of these two first opposite side walls, which will also move in planes perpendicular to the bottom plane that still remains in a static position.

[0005] In general, these systems require great precision in the cutting of the pieces, which is done using laser cutting systems due to the geometry of the boxes. Conversely, the personalisation of the product must always be carried out before the cut, meaning that storage problems can be generated if, finally, not all the personalised boards are used before the final cut of the pieces that comprise the box.

### Explanation of the invention

[0006] The purpose of this invention is to present a new manufacturing procedure that solves the problems indicated in the state-of-the-art. This solution is achieved with the characteristics of the method of the first claim that accompanies this specification. Additional features and particular embodiments of this invention are indicated in dependent claims.

[0007] Currently, agricultural MDF boxes are manufactured using staples, like conventional wooden boxes, by laser cutting, in boxes of the type described in

ES1073141U. The innovation provided through this invention, however, lies in manufacturing the containers by punching and/or stamping that allow for easier and cheaper subsequent assembly. The fact that it is a productive model through stamping means that productivity is higher than with processes that use laser cutting and with less need for staples in its assembly.

[0008] In this invention, there are external elements that must be made by stamping and other internal elements, which must be manufactured using punching methods. In any case, not the entire perimeter of each piece will be stamped, but there will be a combination of cut and die techniques. The punching must be performed after the cutting process, although it could take place beforehand. This is necessarily linked to the design of a box with wide mechanical tolerances and without the need for great assembly accuracy as, for example, in the box described in document EP16382470.9.

[0009] Furthermore, in known mounting systems, such as that described in the state-of-the-art, the material of the box is first customised and then the box is assembled. This makes it necessary to store each personalised item, with the risk that this entails, especially in a sector such as agriculture, where the variability of time is constant. This invention solves that problem by carrying out the customisation process just at the end of the production process, meaning that the generic material is stored so that, according to the final needs, the established orders can be personalised. In other words, the storage of material would be performed without customisation, which would be carried out at the last moment, meaning that it is possible to pre-produce non-personalised materials, avoiding the problems arising from having a warehouse of already customised material, as has been done up to now.

[0010] More specifically, the process of the invention comprises at least the steps of (a) sizing boards; (b) punching, stamping, or a combination of punching and stamping of parts from the boards; and (c) separating the pieces and palletising. Furthermore, this invention comprises a parallel stage for obtaining pegs, where they are cut to the necessary height and divided into two for subsequent assembly. Additionally, the process includes a secondary stage of grooving of pegs and a process of fixing one of the pairs of pieces, sides or end sections, to the pegs. The process has the particularity of incorporating in the final assembly process of the box, a decoration stage through the application of self-adhesive labels.

[0011] Self-adhesive label applications are placed after the stamping and storage stage, and even after the pre-assembly process of the pegs. This process features the advantage of being able to pre-produce all the parts that make up a box without the need to customise them, so that it reduces the delivery times of the material in case of emergency.

[0012] Throughout the description and claims the word "comprises" and its variants are not intended to exclude

other technical characteristics, additives, components or steps. For those skilled in the art, other purposes, advantages and characteristics of the invention will emerge partly from the description and partly from the practice of the invention. The following examples and drawings are provided as an illustration and are not intended to restrict this invention. Furthermore, the invention covers all possible combinations of particular and preferred embodiments indicated here.

### Brief description of the drawings

**[0013]** A series of drawings are briefly described below that help to better understand the invention and are explicitly related to a realisation of this invention that is presented as a non-limiting example thereof.

**FIG .1** shows a block diagram of a first practical embodiment of the invention.

**FIG .2** shows a block diagram of a second practical embodiment of the invention.

### Explanation of a detailed embodiment of the invention and examples

**[0014]** As has been indicated throughout this specification, the invention's purpose is a manufacturing process of a removable and stackable box that comprises two sides or broadsides, being, in any case, synonymous expressions to refer to the larger sides of the rectangular end of the box, facing each other; two opposite ends; a bottom and four pegs with a triangular plan connected to each other, either internally, with the sides and end sections integrally with the pegs, or externally, by means of flanges on the sides and end sections insertable in at least one slot fitted to the pegs, as described, for example, in EP16382470.9.

**[0015]** The manufacturing process of the box, forming the basis of this invention, begins by supplying and/or resizing the boards. Subsequently, depending on the choice made, the boards can be provided in the final sizing or provided as larger sheets and trimmed to the desired size in the plant.

**[0016]** Once the sheets are ready, they will go through a stamping or die-cutting process, where the key geometries of the pieces will be formed. The pieces for the bottoms will be stamped, either grouped together or separately, depending on the most efficient way to consume the raw material. The pieces for the sides and ends will be formed through a punching process, grouping the pieces in pairs, so that this punching process is balanced, thus making it more efficient. The pieces, once punched, will be duly separated. This process can be performed in a line, at the exit of the punching machine or as an external process, meaning the punched plates must be stored in an intermediate process.

**[0017]** Once all the pieces are formed, each group of

pieces is stored independently: sides, bottoms and ends, each one individually. From there, the bottoms will be considered finished parts, ready for assembly, being transferred to the warehouse. In the case of the sides and ends, it will be necessary to distinguish the parts to be pre-assembled and those that are ready to be stored. The decoration process using self-adhesive labels is always carried out after storage, before final assembly (see example 1) or before pre-assembly of the sets (see example 2). This allows the customer or the assembly centre to decorate the pieces themselves according to the demand of each of the models for consumption, thus adapting much more suitably to the real demand of the sector for which the boxes are intended.

**[0018]** The pair of pieces to be subjected to the peg assembly process are considered as pieces to be pre-assembled, which may be both sides and ends, with the pre-assembly of the end sections being considered preferable. Those parts thus pre-assembled will be referred to as "sets".

**[0019]** Parallel to these processes, the pegs are obtained, which provide vertical resistance to the boxes and serve as a connection link for the sides and ends. The process of obtaining the pegs starts from a conventional process, where they are cut to the desired height that the box will have and, afterwards divided by means of a circular saw. This process is integrated as an initial part of the process for assembling the "sets".

**[0020]** In the event that one wishes to obtain a "standard" model box, that is, with the pegs inside the ends and sides of the box, the "set" assembly machine feeds the parts to be pre-assembled, sides or ends, prepared beforehand, having been punched and separated. These pieces will be attached to the split pegs using a standard stapling process.

**[0021]** On the other hand, to make the boxes with the pegs on the outside of the sides and ends, there are two types of processes, depending on the finish intended for the box: finishing with points or staples; or *mono-material* finishing using wooden pins.

**[0022]** In the *finishing process using points or staples*, where once the pegs are divided, two grooves will be made in the face that makes up the hypotenuse of the peg block, which features a triangular structure. In these grooves or slats, a series of tabs are housed made in the pieces during the punching process. The introduction of these tabs in the pegs will be performed in a linear process, whereby guiding the pegs while they advance in the assembly line, the pieces are joined. Once the tabs of the pieces have been inserted into the pegs and their position has been secured, all the elements are fixed by means of points or clips, which may be made from wire, shaped steel points or clips or of plastic materials.

**[0023]** In the *finishing process using wooden pins*, in the event that it is required to fix the pieces using wooden pins, to achieve a *mono-material* union, the stapling or nailing process is replaced by drilling, to make holes where the wooden pins are housed. Once the drilling

process has been completed, said wooden pins are inserted into the housings made.

[0024] Once the end-peg set is fitted in place, they are stored for subsequent assembly. In this assembly stage, a distinction is made between external and internal assembly. Internal assembly refers to on-site assembly, while the external assembly is carried out either at the customer's premises or in assembly centres devoted to this type of task.

[0025] For scenarios involving external assembly, the necessary material is collected from the warehouse and sent to the destination. The destination where it is to be delivered is equipped with the machinery dedicated to the assembly of these boxes. Once all the material has been shipped to the destination, the assembly process may commence. Conversely, in the internal assembly the process will be the same, with the exception that the shipment of the material and the machine to the customer's facilities is not required. However, the machinery used for internal assembly may be both the same as for external assembly or involve the use of other more complex and productive machines and may be integrated into the box manufacturing process.

[0026] Finally, the invention process optionally comprises additional processes for decorating the pegs, which may be carried out on all or only some of these. These additional processes or stages are as follows:

A *staggered process* that replaces the standard cut of the peg with a cut where a step is made at the top and bottom of the pegs, thus facilitating the stacking process of the boxes.

A rounding or chamfering process prior to cutting, where an edging process is performed on the pegs so that the cutting corner is avoided when the peg is placed on the outside of the sides and end sections.

A process of *creating edges* using existing technologies on the market, prior to cutting the pegs and after rounding or chamfering, where, in addition, a process of decorating the pegs is carried out by applying decorative paper or painting.

#### Example 1 of practical embodiment of the invention

[0027] Figure 1 shows a block diagram of a practical embodiment of the manufacturing process as per the terms of this invention. Thus, this invention comprises two parallel processes: (i) a process for shaping the pegs, which comprises the steps of cutting the length, at the desired height, of the pegs (21) and the division of the pegs (22) in two equal triangles, since the pieces are quadrangular and the cut is made through its bisector; and (ii) a process of forming the sides, end sections and bottom of each of the boxes.

[0028] This last process of forming the sides, ends and

bottom, comprises the steps of resizing the boards (11) - the boards are, therefore, the raw material; the stages of die-cutting of bottoms (14), sides (15) and end sections (16), the sides (17) being separated from the end sections (18) and all the pieces being stored (19) separately.

[0029] The process ends with the pre-assembly (23) of pegs and end sections, the decoration of sides (12) and end sections (13) through the application of self-adhesive labels and the final assembly (24). This assembly can be internal or external, with the separate parts and machines sent to the customer (25). Additionally, there is the possibility of grooving the pegs (26).

#### Example 2 of practical embodiment of the invention

[0030] Figure 2 shows a block diagram of a practical embodiment of the manufacturing process as per the terms of this invention. Thus, this invention comprises two parallel processes: (i) a process for shaping the pegs, which comprises the steps of cutting the length, at the desired height, of the pegs (21) and the division of the pegs (22) in two equal triangles, since the pieces are quadrangular and the cut is made through its bisector; and (ii) a process of forming the sides, end sections and bottom of each of the boxes.

[0031] This last process of forming the sides, ends and bottom, comprises the steps of resizing the boards (11) - the boards are, therefore, the raw material; the stages of die-cutting of bottoms (14), sides (15) and end sections (16), the sides (17) being separated from the end sections (18) and all the pieces being stored (19) separately.

[0032] The process ends with the decoration of sides (12) and end sections (13) by applying self-adhesive labels, the pre-assembly (23) of pegs and end sections, and the final assembly (24). This assembly can be internal or external, with the separate parts and machines sent to the customer (25). Additionally, there is the possibility of grooving the pegs (26).

#### Claims

1. A manufacturing process of a removable and stackable box where the box is rectangular and comprises two sides opposite each other; two ends opposite each other; a bottom and four block pegs with a triangular base that make up four support pillars of the box; and where the sides, the end sections, the bottom and the pegs are jointly connected to each other; and where the manufacturing process is **characterised by** comprising, at least:

A box shaping process comprising: (a) a stage of decorating at least one of the sides, end sections or bottoms by means of self-adhesive labels, after the side, ends, bottom and peg forming processes; and (b) the union of two opposite ends of each other; the union of two opposite sides of each other, a bottom and four pegs.

2. The manufacturing process contained in claim 1, further comprising:

A first process of forming the sides, ends and bottoms comprises the steps of: **(a)** dimensioning of some boards; **(b)** punching, stamping, or a combination of punching and stamping of parts from the boards; **(c)** separation and storage of the sides, end sections and bottoms;  
 In parallel to the first process, a second process of shaping the pegs comprises the steps of: **(a)** cutting square pieces to a length equal to the height of the pegs; and **(b)** division of the quadrangular pieces cut into two equal parts.

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3. The manufacturing process contained in claims 1 or 2 comprising a step of grooving the pegs.

4. The manufacturing process contained in claim 1 or 2 or 3 where the box shaping process comprises a pre-assembly process that consists of fixing one side and one end piece to a peg.

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5. The manufacturing process contained in any one of the preceding claims, comprising a step of carrying out a staggered section in the upper and lower part of the pegs.

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6. The manufacturing process contained in any one of the preceding claims, which comprises a process of edging the pegs in such a way that the cutting corner is avoided when the peg is placed on the outside of the sides and end sections.

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7. The manufacturing process contained in any one of the preceding claims, which comprises a process of decorating the pegs by applying decorative paper or by painting.

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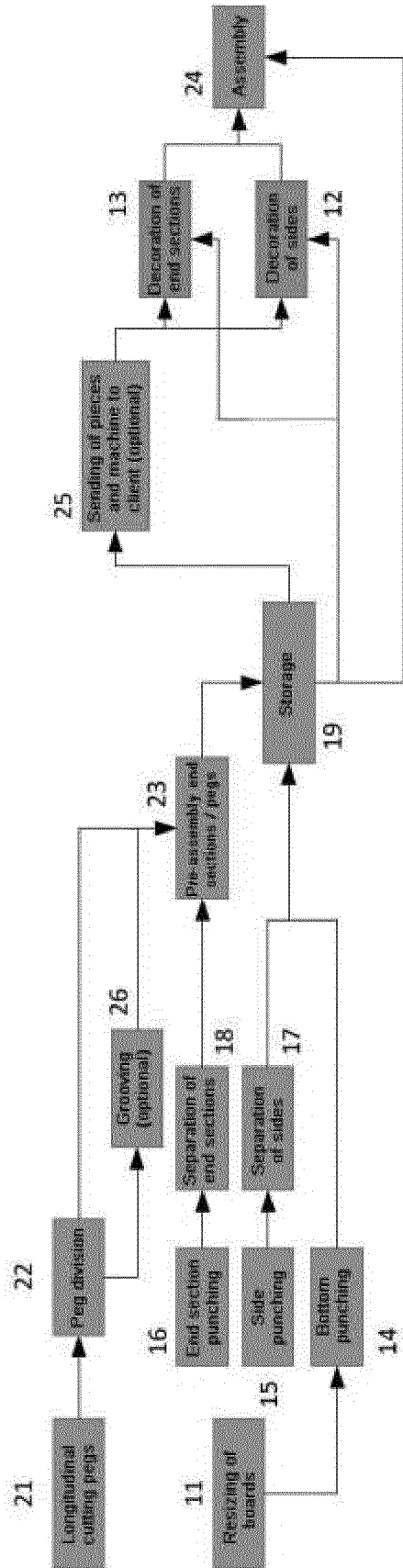


FIG.1

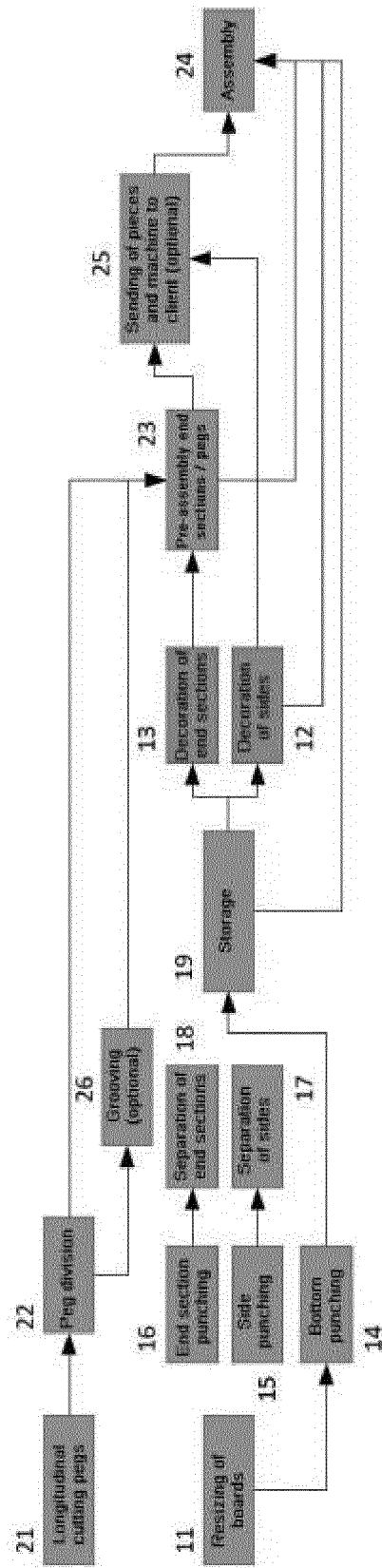


FIG.2

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/ES2018/070805

## A. CLASSIFICATION OF SUBJECT MATTER

**B27M3/34** (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)

**B27M**

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)

**EPODOC, INVENES**

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ES 2568233 T3 (OBEIKAN MDF ESPAÑA) 30/03/2016, The whole document (cited in the application)	1-7
A	WO 03095166 A1 (DANBOX INTERNATIONAL APS) 20/11/2003, Abstract; figures	1-7
A	US 2015246743 A1 (BECK) 03/09/2015, Abstract; figures	1
A	WO 2008051096 A2 (J.J. Warburton) 02/05/2008, Abstract; figures	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

Date of the actual completion of the international search  
**04/03/2019**

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**(08/03/2019)**

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## INTERNATIONAL SEARCH REPORT

International application No.

Information on patent family members

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**REFERENCES CITED IN THE DESCRIPTION**

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