



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
17.08.2016 Bulletin 2016/33

(51) Int Cl.:
B65B 13/06 (2006.01) **B65B 59/00 (2006.01)**
B65B 65/00 (2006.01)

(21) Application number: **16154763.3**

(22) Date of filing: **09.02.2016**

(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:
MA MD

(72) Inventors:
• **AGOSTINI, Marco**
47053 MARANELLO MO (IT)
• **GALLI, Alberto Luigi**
47053 MARANELLO MO (IT)
• **MARTINELLI, Silvano**
47053 MARANELLO MO (IT)
• **ROSSI, Gianluigi**
47053 MARANELLO MO (IT)

(30) Priority: **11.02.2015 IT MI20150029 U**

(71) Applicant: **MARPAK-OMS GROUP S.r.l.**
41053 Maranello (MO) (IT)

(74) Representative: **Faggioni, Carlo Maria et al**
Fumero S.r.l.
Pettenkoferstrasse 20/22
80336 München (DE)

(54) **IMPROVED PALLETIZING SYSTEM, ESPECIALLY IN TILE PRODUCTION PLANTS**

(57) A pallettisation system is disclosed comprising a processing path (L), along which a plurality of wrapping stations (Sn) is provided, meant to house a plurality of pallets (P) supporting products (SP) to be wrapped, at least a gripping head (TP) movably mounted on guiding means along said processing path (L), between a drawing station of said products (SP) and one as chosen of said wrapping stations (Sn), control means for controlling the movements of said gripping head (TP) in the transfer and deposit of said products (SP) to form a load with a preset order, and strapping means for performing a horizontal binding in correspondence of at least one of said

wrapping stations, the strapping means comprising at least one strapping head and a respective launching and guiding track (1) of a strap (2), wherein said strapping means comprise a plurality of strapping heads (R), with respective annular launching and guiding track (1), installed in the proximity of each one of said wrapping stations (Sn), with each one of said strapping heads (R) there is associated a respective strap feeding assembly (A), and said strapping heads (R) and relative feeding assemblies (A) are arranged on a first side of said wrapping stations (Sn) which is parallel to said processing path (L).

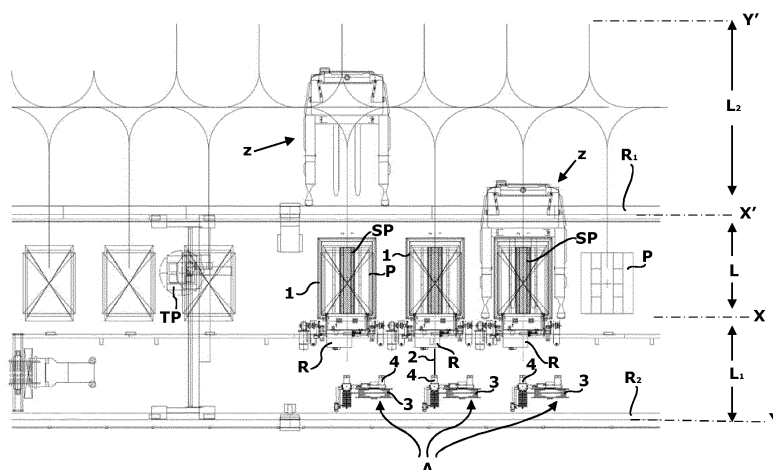


Fig. 1

Description

Field of the Invention

[0001] The present invention relates to an improved palletting system, in particular a palletting system suitable to consolidate wrapping pallets for large tiles.

Background Art

[0002] As known, a palletiser is an apparatus which serves to distribute and stack on pallets a series of products - coming from a production line - for the subsequent packaging.

[0003] The transfer operation of a plurality of products from a production line to a pallet, with an orderly and optimised stacking (based on dimensions, batches, weights, destination, ...), can be very time consuming and burdensome if carried out by hand. Therefore, the known art already offers complex automated systems, wherein a drawing/releasing and transfer head is driven into motion on suitable rails (typically in the form of an overhead crane) according to an operation mode determined by an automation logic, which can take into account the products which arrive on an end-of-line conveyor belt and suitably distributes them onto a plurality of pallets available in respective holding stations.

[0004] In the sector of ceramic tiles, in particular, each product consists of a box containing a plurality of tiles, which must be taken individually and transferred onto one of a plurality of loading pallets, these pallets being different one from the other, for example depending on the destination, the batch and/or the size of the product. In order to ease operations, the different pallets waiting to be loaded are linearly distributed in a certain area around the terminal of the operating line, which implies non negligible displacements: the drawing/releasing head of the palletising system is hence of a significant sturdiness and power and moves at high speeds backwards and forwards on guiding rails.

[0005] In the last few years very large tiles, that is large-surface tiles, are experiencing commercial success. These tiles present problems peculiar of this sector, which impose to identify fully original technical solutions. In particular, they are wrapped in boxes in groups of few pieces, because the "covering surface" available in each box must not exceed values which represent a commercially exploitable limit.

[0006] These boxes cannot be stacked with the larger surface on a plane (that is horizontally), because excessive pressures would originate which would tend to break the fragile tiles (of a modest thickness).

[0007] An original wrapping way of these boxes on a pallet is described in Italian patent IT1408944, in the name of the same Applicant. A specific application of this methodology, in connection with palletising systems, is instead described in Italian utility model application no. MI2014U000191 in the name of the same Applicant and

to which explicit reference is hereby made for a better understanding of the field of the invention.

[0008] In this last application an arrangement is illustrated wherein a plurality of pallets are arranged in preset locations along a rectilinear main path, and a gripping and distribution head is movable above said main path; this head draws the products to be wrapped, coming from a conveyor belt, and transfers and delivers them in the provided sequence on the different pallets. A strapping head is furthermore provided, equally movably mounted along an auxiliary path, parallel to said main path, and which passes in the proximity or in correspondence of said preset locations: a strapping head is configured to wind at least a horizontal loop of strap around at least one array of the products deposited on the pallet. The operating mode provides that the strapping head consolidates the products on the pallets and/or completes the wrapping process taught in IT1408944.

[0009] This arrangement, despite a highly effective operation with respect to the specific palletising requirements of tile boxes, has improvement margins.

[0010] As a matter of fact, it must be noted that the movements of the gripping head and of the strapping apparatus head are potentially mutually interfering, so that it is necessary to provide a certain coordination in the automation logics and which limits the opportunity for movement. In some conditions, for example for high productivity (wherein the production speed of the boxes is higher than the intervention speed of the strapping apparatus), that may represent an unacceptable limit.

[0011] Moreover, when the strapping head is inoperative, for example for maintenance operations and/or replacement of the strap supply bobbin, the entire system remains inoperative, despite the gripping head being perfectly functional.

[0012] These difficulties are the more felt the more the palletising system is meant to a high-pace production and in particular for the processing of large-sized tiles. It is reminded here that, when large-sized tiles are mentioned, it is today meant to refer to tiles which may reach a size of 100 x 300 centimetres.

Summary of the Invention

[0013] The object of the present invention is therefore to propose a system which solves the above-mentioned problems and allows a high palletising speed of ceramic tiles, in particular also large-sized tiles.

[0014] These objects are achieved with a system having the features mentioned in claim 1. The dependent claims describe other preferential features of the invention.

Brief Description of the Drawings

[0015] Further features and advantages of the invention are in any case more evident from the following detailed description of a preferred embodiment, given pure-

ly as a nonlimiting example and illustrated in the attached drawings, wherein:

fig. 1 is a schematic top plan view of the system according to the invention; and

fig. 2 is a schematic side elevation view of a portion of the drawing of fig. 1.

Detailed Description

[0016] A palletising system, in a way already known per se, firstly comprises a processing path L which, in the top plan view of fig. 1, can be considered limited by two border lines X-X' which determine the lateral bulk thereof and the safety borders for any operators.

[0017] Distributed along path L a plurality of deposition stations S, S1, S2, ... Sn is provided, on each of which a pallet P for the stacking of products SP to be wrapped is located; in the case under examination, products are boxes of large-sized ceramic tiles which, as known, are arranged on the pallet in a vertical attitude for a better impact resistance.

[0018] Along path L, at a certain height above the top of the loads on the pallet, a carriage C slides which carries a gripping and transfer head TP for the products SP to be stacked on pallets. This head TP moves between a drawing station ST of the products SP - typically the terminal portion of a conveyor belt N - and one as chosen of said stations Sn where to transfer and position on the respective pallet the transported product SP.

[0019] This head TP is furthermore mounted vertically movable on carriage C, so that it can, on the one hand, descend and draw a product SP from said drawing station ST, then rise to transport it above a preselected pallet and, on the other hand, descend onto this pallet in deposition station Sn for depositing there the transported product in a preselected position of the stacking pile. For such purpose, head TP is movably mounted, on carriage C, crosswise to processing path L and, in turn, carriage C is translatably mounted, parallel to the processing path L, on a pair of suspended rails or guides R₁ and R₂.

[0020] The movements of head TP, for the drawing and the positioning of the products SP on pallets, are controlled by a logical automation unit, which acts in coordination with the information relating to the batches of material produced and delivered at drawing station ST.

[0021] According to a first important feature of the present invention, in correspondence of each one of stations Sn a strapping unit is arranged with an annular track for the strap guide arranged according to a horizontal plane.

[0022] Each strapping unit typically comprises at least a strapping head R - by which the strap launch and withdrawal are carried out, as well as the welding and the cutting - and an annular launch track 1, in which the wrapping strap is slidably guided. The annular track 1 runs along a generally rectangular plan path, with two first minor sides opposite and parallel and two second major

sides opposite and parallel.

[0023] As can be detected from the top plan view of fig. 1, each annular track 1 of the strapping units is arranged so as to surround, in plan view, the pallet P of the relative deposition station Sn, so as to allow the application of a strapping loop, in the horizontal plane, around the load of pallet-stacked products.

[0024] The strapping unit is furthermore mounted vertically movable, so that it can perform a strapping loop at the desired height on the pallet-stacked load.

[0025] According to a further inventive aspect, all the strapping heads R of the strapping units are arranged on one of the two sides of processing path L, typically on the first minor side of launching track 1 of the strap. In fig. 1, in particular, the strapping heads are all arranged on the same side. That allows twofold advantages. A first advantage is that of being able to better mutually compact the deposition stations Sn, saving the space occupied by the system. The second advantage derives from the synergistic arrangement with the palletiser supply device, which is described here in the following.

[0026] At each strapping unit a respective supply assembly A of strap 2 is associated, provided with an interchangeable supply bobbin 3, and with supply means 4, which provide to the withdrawal of strap 2 from bobbin 3 and to forward it to strapping head R.

[0027] According to an original feature of the invention, supply assembly A, with the relative bobbin 3 and supply means 4, are positioned in a first corridor L₁ - comprised between two limiting lines X-Y in the drawing - which is parallel and adjacent to the processing path L of the system, outside the radius of action of gripping head TP.

[0028] In particular, supply assembly A is at a "safety" distance from the strapping head, such distance being the minimum one necessary to avoid any interference with the admissible movement trajectory of gripping head TP.

[0029] As is clear also from the drawing, an operator in charge of the system can freely access corridor L₁, with no risk whatsoever of accidental interference with gripping head TP. Therefore, even during the standard operation of the system, the operator can access supply assemblies A for maintenance operations, of which the most frequent and important one is that of replacement of an exhausted strapping bobbin 3. This replacement operation can hence occur at any time, without danger of interference with the processing under way on processing line L. In particular, the replacement of the bobbin can occur in the step immediately subsequent to the time when a pallet with its completed load is taken by a pallet truck Z, for example as represented in station S₁, and immediately preceding the time when a pallet truck Z brings back into station S₁ an empty pallet, taking into account that pallet trucks move in a second corridor L₂ opposite to the first one L₁, without any interference with the operators who move in the first corridor L₁.

[0030] For greater clarity, it must be pointed out that the second corridor L₂ is on the opposite side to first

corridor L_1 , with respect to processing path L , and is defined by two limiting lines $X'-Y'$ in the upper part of the drawing of fig. 1.

[0031] This second corridor L_2 has preferably a width sufficient to allow, on the one hand, the free removal of a pallet - with or without load - from a respective station S_n and, on the other hand, the movement of one or more pallet trucks Z , also with mutual crossing, in opposite directions (as shown by the movement lines in the drawing).

[0032] The operation of the described system occurs as follows.

[0033] In a first step, with station S_n empty and strapping head R fully raised (fig. 2), a pallet truck or other self-propelling machine Z_1 delivers an empty pallet and positions it on the ground in the station S_n ; then it draws itself out of the station or in any case moves away for other operations.

[0034] In a second step, strapping head R with the relative launching track 1 descends and positions itself at the bottom of the pallet, so as not to interfere with gripping and loading head TP , leaving fully free the loading and stacking operations of the products on the pallet.

[0035] In a third step, the gripping head TP picks up the products, that is, the individual boxes of tiles SP , arriving from a conveyor belt, and transfers them one by one onto the respective target pallet.

[0036] It must be pointed out here that with gripping head TP a computerised control system, known per se, is normally associated, which is capable of recognising the arriving products on the conveyor belt - even mutually different each time - and to transport them towards the pallet to which they are assigned, as well as to position them in the provided stacking location. It must be noted, as a result, that gripping head TP does not necessarily operate univocally with a single station S , until load completion, but it can serve multiple different stations based on the features of the product arriving on the conveyor belt each time.

[0037] In a fourth step, once one pallet load has been completed, or a first box has been deposited according to the method described in IT1408944, strapping head R is caused to ascend up to the desired level and at least a first strapping loop is performed. The choice of applying a single strapping loop, or multiple strapping loops at mutually height-distanced levels depends on the nature and size of the products or on the wrapping method employed and is entrusted to the same computerised control system.

[0038] In case one wishes to perform the wrapping of boxes of large-sized tiles - which must be deposited maintaining them on a vertical plane, as described in IT1408944 - the original configuration according to the invention allows to implement a singular wrapping mode. As a matter of fact, since the strapping head is preferably on the first minor side of the rectangular launching track 1, the mutual binding process between the boxes of tiles is carried out starting from the pallet central symmetry

axis and continues outwards. In other words, as can be seen also in fig. 1, the first boxes are deposited vertically in the central part of the pallet, on the central symmetry axis which is aligned with strapping head R . The subsequent boxes are deposited adjacent to the left and to the right of the central one. In order to maintain in equilibrium the first boxes in a central position, as suggested also in IT1408944, movable retaining means (not shown) are provided which maintain the central boxes upright as long as necessary to complete the tie between a first group of boxes, with a fast-print surface wide enough to independently maintain the equilibrium.

[0039] In a fifth step, after the load has been completed and suitably tied with a strap, the strapping unit is caused to ascend back up to the uppermost position thereof, above the top of the load. In this position, pallet truck Z can intervene - coming from second corridor L_2 - and draw the pallet complete with the relative load, for example to transfer it to a further wrapping station (not shown) or a warehouse.

[0040] As can be understood, with the system of the invention the objects set forth in the premises are perfectly achieved.

[0041] A highly efficient configuration has been provided, since it does not provide any significant idle time for the ordinary maintenance of the strapping units. As a matter of fact the operator can act also during the ordinary operation of the palletiser and it is necessary only a very short operation break for inserting the new strap from the feeding assembly A to the strapping head R . If one of the strapping units has a fault, the palletiser system can operate all the same exploiting the other deposition stations S_n .

[0042] However, it is understood that the protection of the invention described above is not limited to the particular configuration illustrated, but extends to any other equivalent construction variant which falls in the definition of the attached main claim.

[0043] For example, it is not ruled out that the strapping heads, with the relative supplying units, can be arranged alternatively on the two sides of the transport path L , instead of on the same side. Such choice hence depends in particular on the configuration of the palletiser and on the specific access spaces which exist in the system installation area.

Claims

1. Palletising system comprising a processing path (L), along which a plurality of wrapping stations (S_n) is provided, meant to house a plurality of pallets (P) supporting products (SP) to be wrapped, at least a gripping head (TP) movably mounted on guiding means along said processing path (L), between a drawing station of said products (SP) and one as chosen of said wrapping stations (S_n), control means for controlling the movements of said gripping head

(TP) in the transfer and deposit of said products (SP) to form a load with a preset order, and strapping means for performing a horizontal binding in correspondence of at least one of said wrapping stations, the strapping means comprising at least a strapping head and a respective launching and guiding track of a strap (2), **characterised in that** said strapping means comprise a plurality of strapping heads (R), with respective annular launching and guiding track (1), installed in the proximity of each one of said wrapping stations (Sn), with each one of said strapping heads (R) is associated a respective strap feeding assembly (A), and said strapping heads (R) and relative feeding assemblies (A) are arranged on a first side of said wrapping stations (Sn) which is parallel to said processing path (L).

2. Palletising system as in 1, wherein said processing path (L) is adjacent to at least a first service corridor (L₁) located along said first side, said feeding assemblies (A) being in said service corridor (L₁) at a safety distance from the respective strapping heads (R).
3. Palletising system as in 1 or 2, wherein said strapping heads (R) and the respective feeding assemblies (A) are on the same side of said wrapping stations (Sn) with respect to said processing path (L).
4. Palletising system as in 3, wherein said processing path (L) is adjacent to a second service corridor (L₂), on the opposite side to said first service corridor (L₁), which gives access to transport means, or pallet trucks, for the drawing/deposition of pallets (P) at said wrapping stations (Sn).

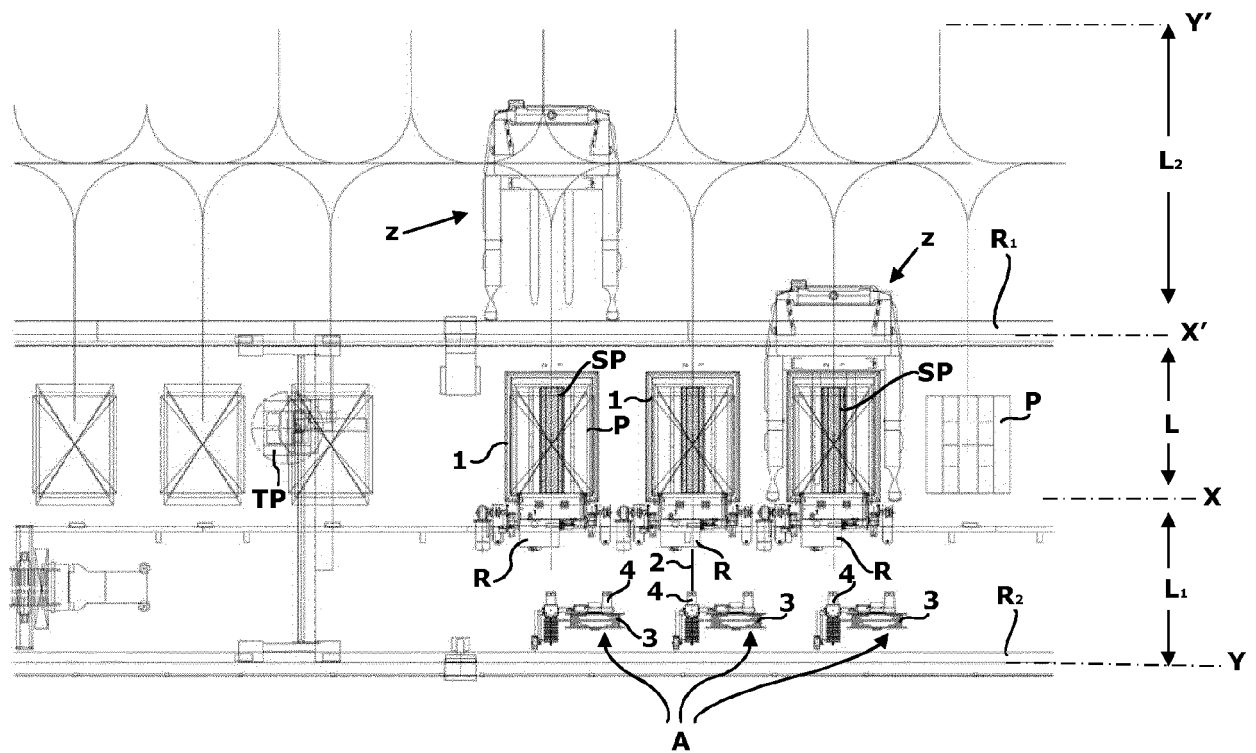


Fig. 1

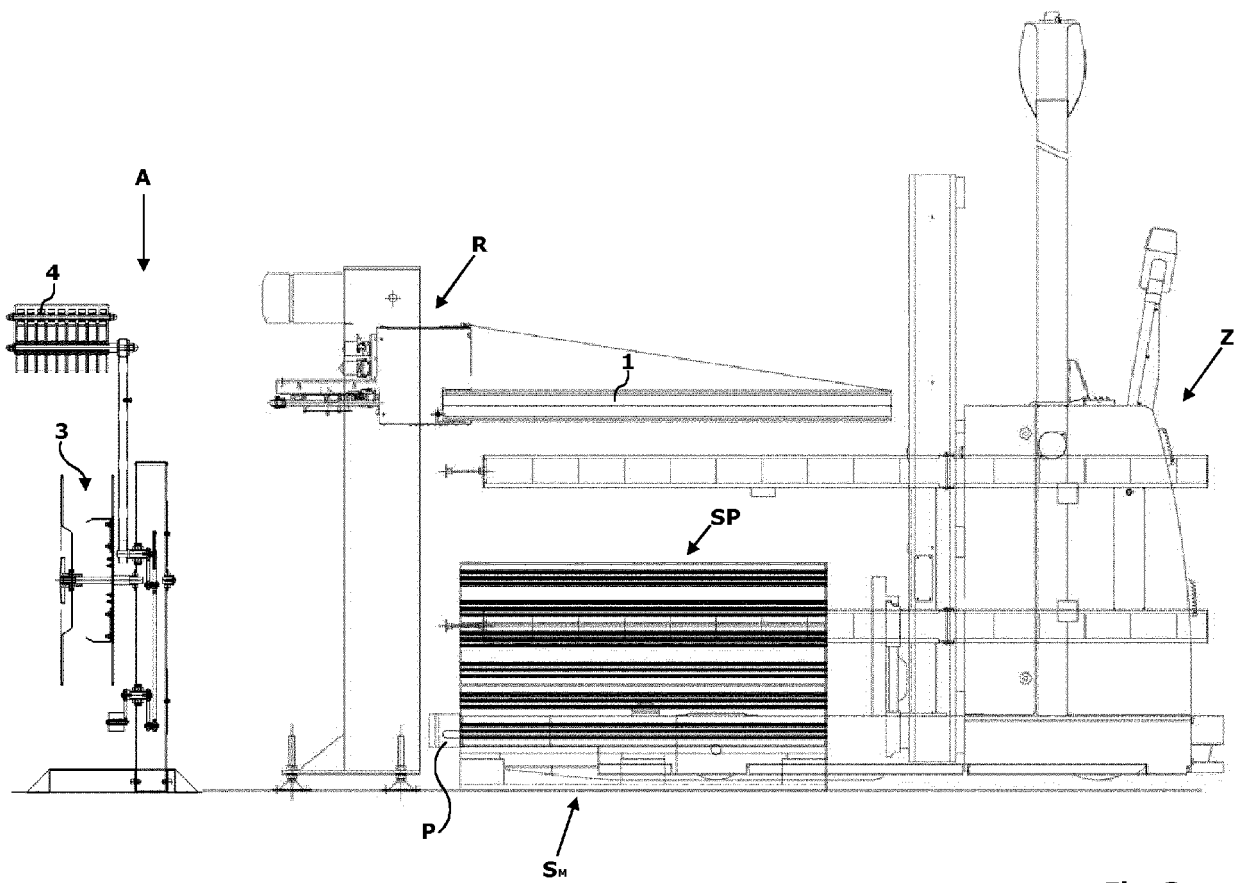


Fig. 2



EUROPEAN SEARCH REPORT

Application Number
EP 16 15 4763

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)
Y	US 2010/018165 A1 (KUDIA STEPHEN FRANCIS [US]) 28 January 2010 (2010-01-28) * the whole document *	1-4	INV. B65B13/06 B65B59/00 B65B65/00
Y	WO 00/20309 A1 (MCNEALL IND TECHNOLOGIES PTY L [AU]; MCNEALL RICHARD K [AU]) 13 April 2000 (2000-04-13) * the whole document *	1-4	
Y	EP 2 397 412 A1 (RODA IBERICA S L U [ES]) 21 December 2011 (2011-12-21) * the whole document *	1-4	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 June 2016	Examiner Yazici, Baris
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			

 1
EPO FORM 1503 03/02 (P04C01)

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

EP 16 15 4763

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.

29-06-2016

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010018165 A1	28-01-2010	NONE	
WO 0020309 A1	13-04-2000	NONE	
EP 2397412 A1	21-12-2011	EP 2397412 A1	21-12-2011
		ES 2351002 A1	28-01-2011

15

20

25

30

35

40

45

50

55

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- IT 1408944 [0007] [0008] [0037] [0038]
- IT 2014000191 U [0007]