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(71) Applicant: **Berrocal Gonzalez, Jesus**  
**28770 Colmenar Viejo Madrid (ES)**

(72) Inventor: **Berrocal Gonzalez, Jesus**  
**28770 Colmenar Viejo Madrid (ES)**

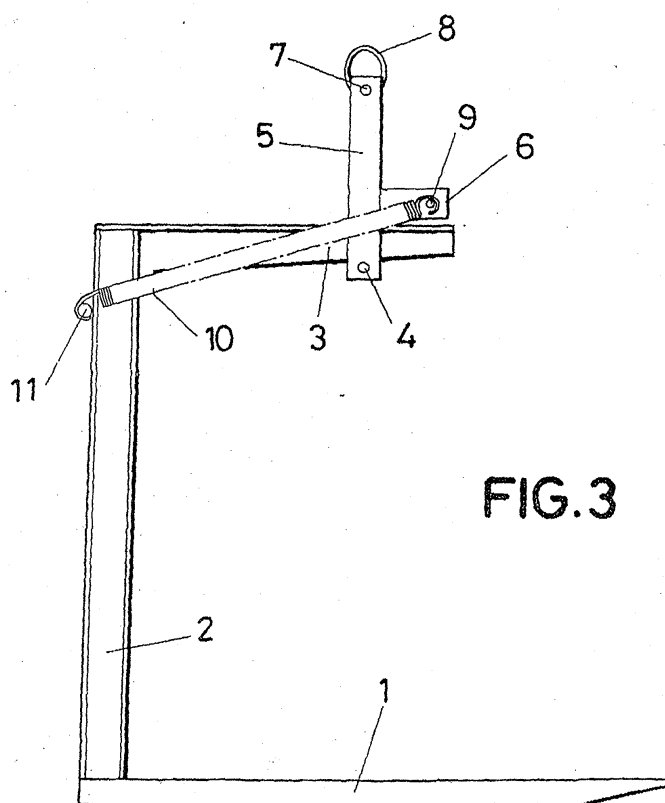
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(74) Representative: **Civanto Villar, Alicia**  
**Juan Ramon Jiménez, 22, esc. A, 1o dcha.**  
**28036 Madrid (ES)**

(54) **Lifting fork comprising a balancing device for transporting pallets with a crane**

(57) Lifting fork comprising a balancing device for transporting pallets with a crane, composed of two parallel arms (1) suitable for connection to the pallet and secured to vertical section (2) of a U-shaped profile structure, which converges upward with a triangular shape that receives an arm (3), connected to device, composed of two parallel arms (5) in symmetric T-shape (6) interconnected by an articulated transversal tilting

axis (4) and transversal pin (7), joined the T-shape parts (6) by a stud (9) with a ring (8) on the pin (7) for fastening the crane hook, having the stud (9) grooved ends for attaching the hooking ends of springs (10) connected at other end to a stud (11), the spring (10) facilitating tilting movement of rods (5,6), the spring tautness (10) greater or less than the weight of the empty pallet or the loaded pallet, respectively.



**FIG. 3**

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## Description

### Purpose of the invention

[0001] This invention refers to a device to be fitted to the arms used to handle pallets (pallet holder), by means of which, with the assistance of a crane, the loading, unloading and transport operations of the pallets can be easily, conveniently and safely carried out, avoiding any risk or danger to the people who may be involved in the above indicating handling operations.

[0002] The purpose of the invention, after it is installed on a conventional pallet holder, is to succeed in making it automatically adopt the most suitable working position, both with load and in idle (empty) state.

### Background of the invention

[0003] one of the classic forms of handling pallets with a load is by means of a crane or derrick, such as the one some trucks have built onto their trailers for product loading and unloading. A metal arm or pallet holder is normally used for these handling operations, with U-shaped profiles formed and joined so that they provide practically complete security and stability.

[0004] Such a pallet holder consists of two parallel arms, placed at a suitable distance to fasten to the base of the pallet. These arms are joined at the back to a metal structure with U-shaped profiles, the middle section of which has a triangular shape and on whose upper vertex a metallic structure is incorporated and to which a round profile is secured. This is where a ring is included for attaching the crane hook to be able to manipulate the load.

[0005] Although this solution is valid in terms of the result achieved, it involves a fundamental problem, which is that the operator handling the crane needs to be very skilled; a significant amount of time is also lost, since on many times, while one person is operating the crane, another operator has to manually handle the crane hook to change its position and insert the pallet holder profiles in the respective pallet. The invention proposed herein helps to resolve this problem.

### Description of the invention

[0006] The device proposed in this invention fully and successfully solves the above mentioned problem, as it automatically solves the potential problems of location of the hook with respect to the pallet holder, as well as the fitting and leveling of the pallet holder before, during and after handling.

[0007] To do so, and based on a conventional pallet holder, the proposed device is easily connected to the upper arm of any pallet holder. In this way, it is not necessary for the arm to have a built-in rod, with different shapes in front and in back, for the ring to which the crane hook is attached. This rod is made unnecessary

by the device proposed in this invention, as it has two connecting rod type arms, in asymmetric T-shape, and is joined to the upper arm of the pallet holder, with the particularity that the axis of counterbalance of this connecting rod is located appreciably in correspondence with the vertical that passes through the center of gravity of the pallet holder, whereas the upper asymmetric part of the connecting rod, to which the suspension ring is associated, is oriented towards the vertical and middle section of the pallet holder, tending towards the limit situation of approach to this vertical section by the action of coils or springs with which it is provided, which run between the lateral prolongation of the connecting rod and the vertical section of the pallet holder.

[0008] In practice and for reasons of symmetry and stability, two connecting rods will be attached to the pallet holder, with their corresponding coils or springs that are suitably interrelated and located on both sides of the upper arm of the pallet holder.

[0009] In accordance with another feature of the invention, the above mentioned coils or springs are joined to the vertical section of the pallet holder structure by means of the hook shape provided at the ends of these springs. These act by pressure on their connecting ends, in the form of studs with grooved ends on which the connection is made.

[0010] In all cases, these springs keep the suspension ring of the pallet holder in a situation of maximum proximity to the vertical section of the structure, when the pallet holder is empty and even when it is suspended from this ring, and the pallet holder adopts an inclined position that favours penetration of its arms underneath a loaded pallet after the pallet holder is secured to the pallet. When the crane initiates the lifting movement and due to the weight of the load, the double connecting rod tilts counter to the springs that assists it until a limit situation is reached in which this double connecting rod is located vertically, in correspondence with the vertical passing through the center of gravity of the load, thereby providing maximum stability.

### Description of the drawings

[0011] To complement the description provided and to help better understand the features of the invention, in accordance with a preferential example of practical execution of the device, a set of drawings is attached as an integral part of this description. These drawings are for illustrative purposes and include, but are not limited to, the following:

Figure 1: shows a perspective view of a conventional pallet holder for handling pallets, on which the proposed device is installed;

Figure 2: shows a side view of the empty pallet holder, and

Figure 3: shows a drawing similar to Figure 2 but with the pallet holder in loaded position.

### Preferred execution of the invention

**[0012]** Looking at the above mentioned Figures, the arrangement of the device to be fitted to a pallet holder, mounted on a conventional pallet holder, can be observed. These show a pair of parallel, lower arms (1), of a suitable length and a suitable distance for connection to the pallet and rigidly secured to the vertical section (2) of a U-shaped profile structure, which converges in an upwards direction with an isosceles triangular shape that receives, on this upper end, an arm (3) that completes the structure's U-shaped profile.

**[0013]** The device proposed in this invention is fitted onto the arm (3); this device consists of a set of two parallel arms or connecting rods (5) in asymmetric T-shape (6), interconnected by two different, distinct elements, i.e. an articulated transversal tilting axis (4) and transversal pin (7). The upper parallel parts of the T (6) are interconnected by a pin or stud (9); a ring (8) is fixed to the pin (7) for attaching the crane hook.

**[0014]** The pin or stud (9) that joins the upper parts of the connecting rod has grooved ends to be able to fit onto these grooves the hooked ends of the coils or springs (10), which are fitted at their other end onto another pin or stud (11), which is also grooved at its ends, and that will be secured to the vertical section (2) of the pallet holder at the back.

**[0015]** The above mentioned coils or springs (10) are the elements that, when suitably and completely tightened, allow and facilitate the tilting movement of the connecting rods (5), (6) against the upper arm (3) of the pallet holder.

**[0016]** In accordance with this structure and due to the action of the suitably calibrated coils or springs (10), the assembly adopts the position shown in Figure 2 when the pallet holder is empty, as the springs tautness (10) is greater than the weight of the pallet holder in an empty state, so that the suspension point is markedly off center with respect to the vertical of the assembly's center of gravity; this makes the structure tilt and the lower arms (1) slant downwards, thus facilitating penetration of the pallet holder underneath the loaded pallet. The springs tautness (10) is less than the weight of the loaded pallets, so that once the pallet is loaded onto the pallet holder and the crane hook, hooked onto the ring (8), is lifted and pulled in an upwards direction, the springs (10) slacken and make the connecting rod (5), (6) adopt a practically vertical position coinciding with the vertical of the center of gravity of the assembly formed by the pallet holder and loaded pallet.

**[0017]** Finally, the loaded pallet will be hoisted up to its destination under optimal conditions of stability and security because, as the device connected to the pallet holder and its load is automatically aligned/unaligned, these effects are also automatically achieved between the center of gravity of the pallet holder and that of the load to be transported, in keeping with the objective of the proposed invention.

### Claims

1. Device to be fitted to a pallet holder, mounted on a conventional pallet holder, composed in general of a pair of parallel, lower arms (1), of a suitable length and at suitable distance for connection to the pallet and rigidly secured to the vertical section (2) of a U-shaped profile structure, which converges upwards with a triangular shape that receives, on this upper end, an arm (3), **characterised by** the fact that this arm is connected to the device, which is composed of a set of two parallel arms or connecting rods (5) in symmetric T-shape (6), interconnected by two elements, i.e. an articulated transversal tilting axis (4) and transversal pin (7); the upper parts of the T (6) are joined together by a pin or stud (9) and with a ring (8) on the pin (7) for fastening the crane hook that will hoist the pallet holder, and the stud (9) has grooved ends for attaching the hooked ends of the coils or springs (10), which are connected at their other end to another pin or stud (11) that will be secured to the vertical section (2) at the back; the suitably tightened springs (10) will facilitate the tilting movement of the connecting rods (5), (6) against the upper arm (3) of the pallet holder.
2. Device to be fitted to a pallet holder, according to the first claim, **characterised by** the fact that the spring tautness (10) is greater than the weight of the pallet holder in empty state, so that the suspension point is suitably off center with respect to the vertical of the assembly's center of gravity; this makes the structure tilt and the lower arms (1) slant downwards, thus facilitating penetration of the pallet holder underneath the loaded pallet.
3. Device to be fitted to a pallet holder, according to the preceding claims, **characterised by** the fact that the spring tautness is less than the weight of the loaded pallet, so that once the pallet is loaded onto the pallet holder and the crane hook, hooked onto the ring (8), is lifted and pulled in an upwards direction, the springs slacken and make the connecting rod (5), (6) adopt a practically vertical position coinciding with the vertical of the center of gravity of the assembly.

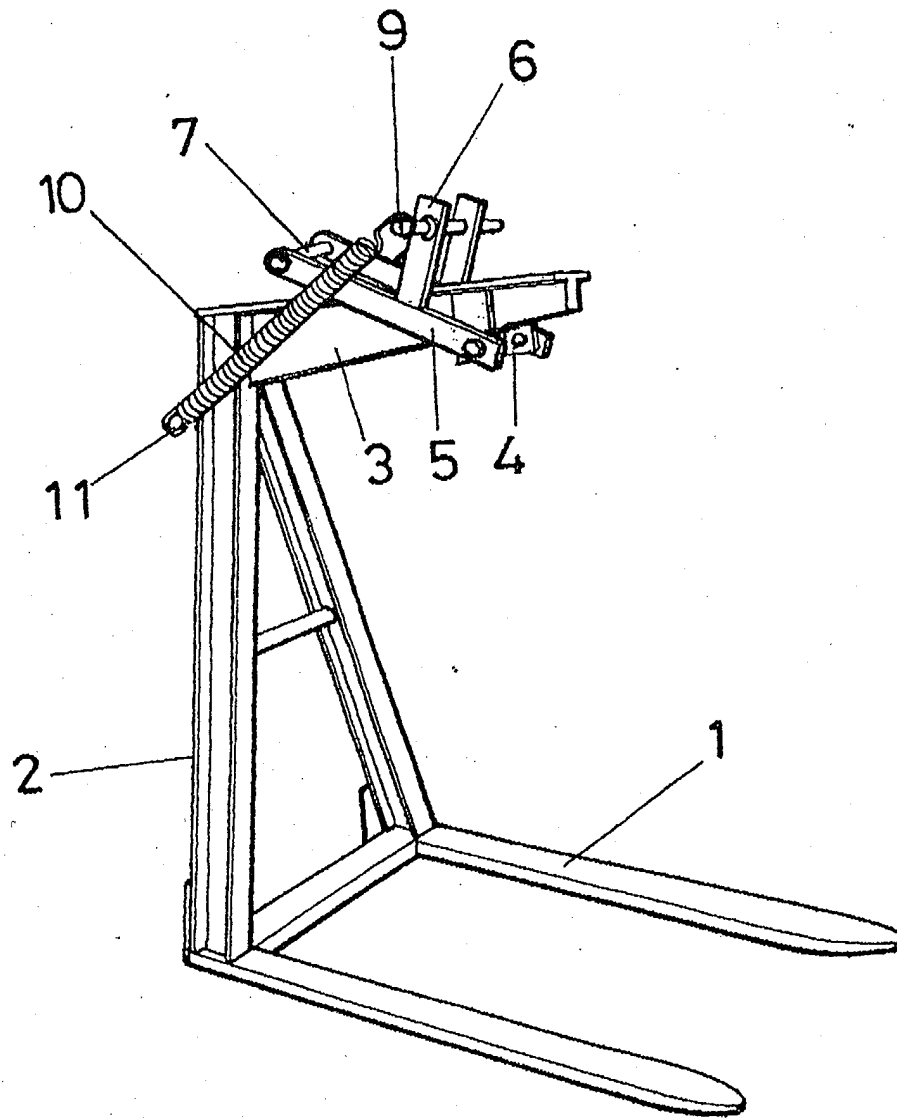
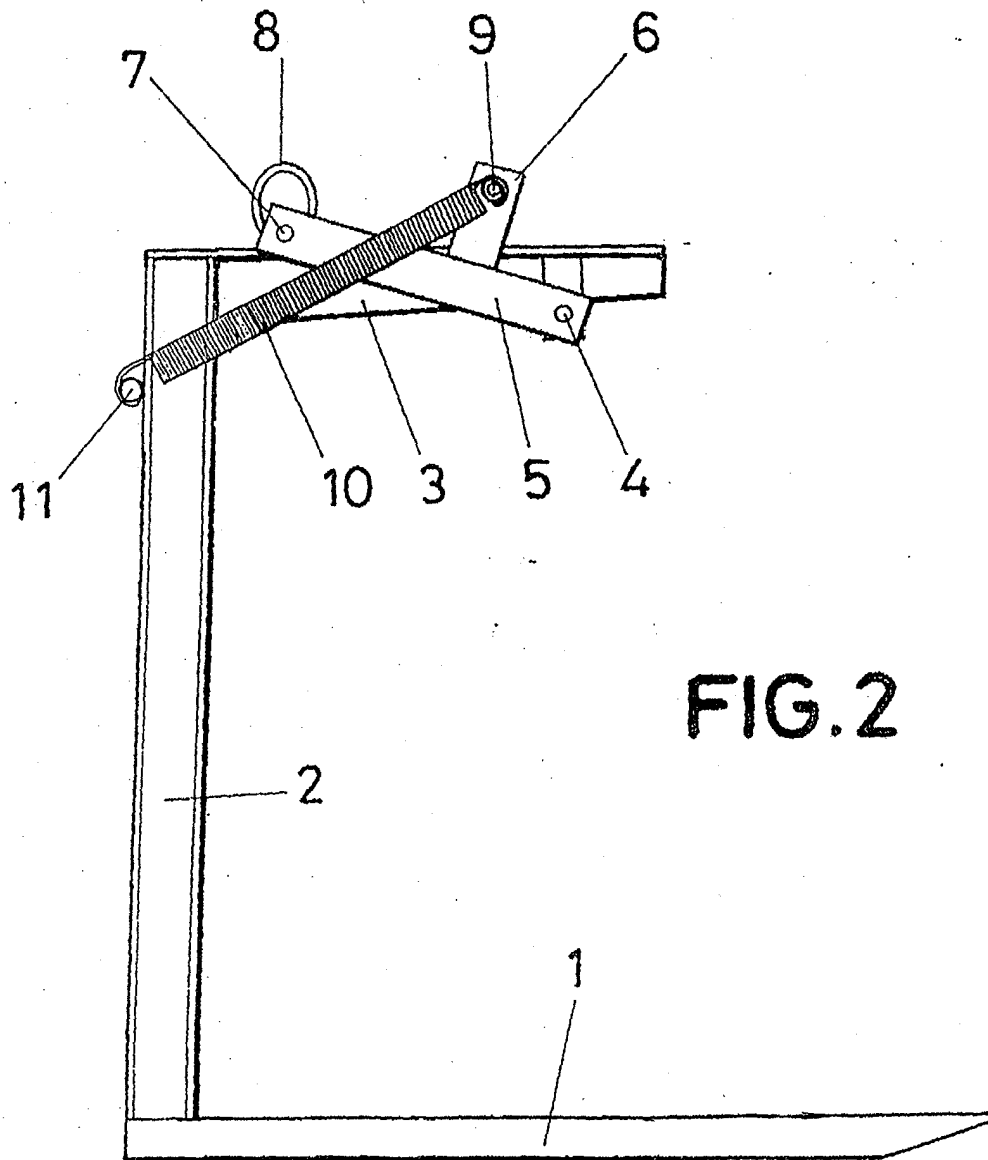


FIG.1



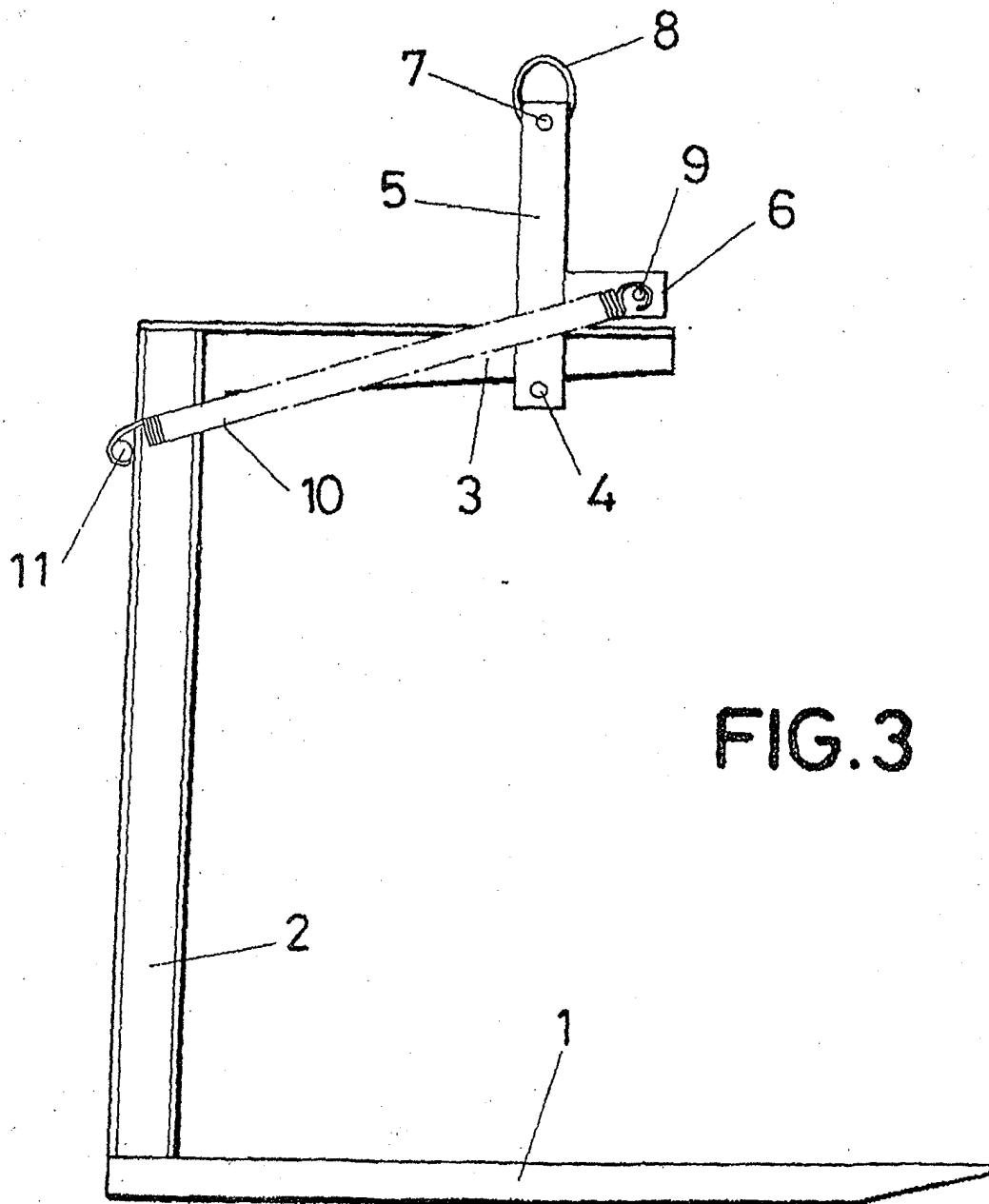


FIG.3



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Application Number  
EP 04 38 0149

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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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Place of search		Date of completion of the search	Examiner
Munich		1 October 2004	Masset, M
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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