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FD2	1 of 24	54%

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TITLE

A frame for determining pallet defects, and a method of use thereof. 1

TECHNICAL FIELD

The present invention relates to a frame for determining pallet defects, and a method of use thereof. In particular, the present invention relates to a frame for determining pallet defects, capable of indicating deflections of a face (or equally, a side) of a pallet relative to a supporting surface of the frame. The present invention also relates to a method for using the frame, to determine pallet defects. 1

BACKGROUND

Wooden pallets are cheap and plentiful, and millions are in use globally every day. A known pallet 1 is shown in Fig. 1. Pallets are typically made from three to six planks 2 of wood arranged in the same lengthways direction forming an upper face 3 on which one may place or stack goods which one wants to transport. There are around three to six planks 2 making a lower face 4, generally parallel to the planks 2 of the upper face 3. The faces 3, 4 are separated with thicker wood beams 5 which create sides to the pallet. The planks 2 are nailed to the beams 5 which makes them easy to repair, and thanks to the beams 5 there is space 6 between the faces 3, 4 which allows the forks of forklift trucks to be inserted, to allow the pallet 1 to be lifted and carried around with ease. Which means one can load items on the upper face 3 and carry them with ease.

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Pallets are made to an agreed international standard to ensure things that carry them, such as lorries and containers for cargo ships, can carry a known number of them, the standard requiring a pallet to be 120cm long, 120cm wide, and sides a maximum of 20cm high. Of course, pallets may be made from materials other than wood (for example, plastics).

Over time, wood can warp (meaning it twists), usually because it gets wet or carries too heavy a load too often, or get damaged through misuse. While planks 2 or beams 5 can be replaced, over time, replacing them stops being effective, and warped or damaged (generally, "defective") pallets risk a load being unbalanced, and when goods need to be tightly packed into lorries and the like, one cannot afford to have them not on substantially flat bases. And a warped or damaged face may well not be substantially flat.

Known techniques to address this problem include a technique in which users simply visually inspect pallets and can see if damage or warping is too great. But that approach is not scientific, so pallets with life left in them can be disposed of too soon, or sometimes they are kept for too long.

In another known technique, if the one thinks a pallet is twisted, warped or damaged, one user will stand on a corner of a pallet, while another looks to see if any of the other corners are raised from a flat level surface 7. If they think there is too big a gap from the floor, they will dispose of the pallet.

In yet another known technique, more recently, people have been using simple triangular door wedges 8, and with a user standing on a corner, another tries to push the wedge 8 under a different corner. If the triangular door wedge 8 goes under the pallet too far, the pallet is too warped. "Too far" in this context means

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either, the wedge goes to or beyond a threshold marking made by a user part way up the angled surface of the wedge - meaning the marking cannot be seen, or the whole wedge 8 can travel under the pallet. This known technique is shown in Fig 2.

However, the known techniques for determining pallet defects are not consistent.

The inventors have come to the realisation that it is therefore desirable to have techniques (and/or devices) which consistently enable the user to determine defects in pallets.

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SUMMARY OF INVENTION

According to a first aspect of the invention, there is provided a frame for determining pallet defects. The frame comprises a flat supporting surface, configured to, in use, support a pallet. The frame also comprises securing means, configured to, in use, releasably secure the pallet against the supporting surface. The frame also comprises alignment means comprising at least two indicators, each configured, in use, to check for deflection of the supporting surface. The frame also comprises measuring means, configured to, in use, act as an indicator of deflection of a side of the pallet relative to the supporting surface.

The frame provides a device capable of consistently indicating deflection of a side of the pallet (or, equally, deflection of a face of the pallet).

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Generally, frames are known to people who work with pallets, and therefore the frame of the present invention is a simple, recognisable device, which does not

present difficulties in use. Moreover, the frame does not present difficulties in terms of training individuals to use the device. This is particularly advantageous in such settings as warehouses, where several thousands of pallets may be used every day.

The flat supporting surface is substantially flat.

The releasable securing means, in combination with the supporting surface of the frame, ensures that the pallet remains fixedly accommodated within the frame during defect (deflection) determination. Any portion of the pallet may be releasably secured within the frame, however it is particularly advantageous to secure a (at least one) corner of the pallet. 1/2

The alignment means (that is, means of alignment of the frame itself) is able to provide assurance to the user that the frame is not itself warped and is in good order. If the frame was itself warped, the frame may only accommodate comparison of a warped pallet with a warped frame. Thus, the alignment means ensures reliability of the frame and repeatability of measurements thereof.

The alignment means is able to check for deflection of the supporting surface. That is, deflection of the supporting surface relative to some predetermined threshold. For instance, the predetermined threshold may be the levelness of a known flat surface.

The measuring means check the deflection of one or more edges or corners of the pallet compared to the flat supporting surface.

Optionally, the frame accommodates, in use, at least one corner of the pallet. With one corner accommodated (and secured), one user can inspect the two

corners connected to the secured one, and see if the edge or the face(s) of the pallet deflects away from the flat line of the frame (or flat securing means thereof).

Optionally, the frame accommodates, in use, at least three corners of the pallet. With three corners accommodated, multiple corners may be checked at a time. Thus, timely operation of the frame may be possible, which is advantageous in large settings with many pallets in need of assessment.

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Optionally, the frame accommodates, in use, the entire face of the pallet. That is, the frame accommodates all corners of a pallet. Again, this allows multiple corners to be checked at a time.

Optionally, the securing means is configured, in use, to secure a corner of the pallet against the supporting structure. That is, rather than a side of the pallet, the frame may secure a corner of the pallet; the former option still allows for detection of defects, however, in securing a corner, the frame is simple to use and results are repeatable.

Optionally, the securing means is configured, in use, to secure at least two corners of the pallet.

Optionally, the securing means comprises a first securing means to, in use, releasably secure a first corner of the pallet, and a second securing means to, in use, releasably secure a second corner of the pallet.

Optionally, the securing means is a clamp. Clamps are particularly advantageous due to their low maintenance requirements. Again, this is a benefit for large

settings with many pallets in need of assessment, where the securing means will be used frequently. 1

Optionally, the measuring means comprises a wedge. This may be a known wedge (e.g., a door wedges), which – when capable of travel all the way under the pallet – is indicative of pallet defects (e.g. warping).

Optionally, the wedge comprises at least one threshold marking on an angled surface of the wedge. This further helps one user see how much deflection there is. 1/2

Optionally, the measuring means comprises an upright and a marker. This enables the user to make sure the amount of deflection considered is consistent. This upright may be positioned at a location that is, when the device is in use, alongside the pallet. Preferably however, the upright may be positioned at a corner adjacent a corner where the securing means is positioned. The upright, preferably, is at substantially 90 degrees to the (flat) supporting structure. The marker acts as a visual indicator of deflection. 1/2

Of course, a frame comprising both a wedge and an upright and marker may be used.

Optionally, the marker is movable relative to the upright and releasably securable. This ensures that the level of deflection is easy to see (e.g., from different viewpoints of different users). Further, this provides the user the ability to move the marker up and down as the user requires, thereby accommodating different tolerances for different users and/or uses of the pallets. 1

Optionally, the indicators of the alignment means are spirit levels. A spirit level is a tool for checking if an item is level. The spirit level comprises a tube part filled with a thick liquid leaving a bubble in it and there are marks on the tube. When the spirit level is held against a level item, the bubble will sit between the marks. As these are known, the frame is therefore simple to use to determine any pallet defect, thereby improving consistency of measurement. 1/2

Optionally, the indicators of the alignment means are laser levels. A laser level is a laser source and distal target, which are installed at known points on a level surface and provided the laser hits the target a user can be sure the surface they are on is level (or, at least, within a threshold). Laser levels provide very accurate results (not reliant on the human eye) and are therefore particularly advantageous in situations where high accuracy is required (for instance, if it is important that the intended load of a pallet is maintained at a horizontal level). 1/2

Optionally, the material of at least the supporting surface of the frame is a substantially rigid material. The frame, preferably, is light so one person can use it, but strong so it does not warp or deflect itself. For instance, steel (or a composite thereof) is largely rigid and therefore provides a suitable material. Further, steel (or a composite thereof) is easily available.

Optionally, the frame accommodates, in use, a pallet of an agreed international standard size. That is, the dimensions of the frame are suitable for accommodating a pallet of the agreed international standard size (120cm long, 120cm wide, and sides a maximum of 20cm high). This ensures that vehicles in which the pallet is to be loaded are able to carry a known number of pallets –

important in terms of logistical planning. Further, this ensures that conventional forks of a forklift truck are able to access the space between the faces of a pallet.

According to a second aspect of the invention, there is provided a method for determining pallet defects using the frame. The method comprises inserting a pallet into the frame, such that the pallet is supported by the supporting surface. The method also comprises releasably securing the pallet in the frame against the supporting surface using the securing means. The method also comprises determining any deflection of a face of the pallet relative to the supporting surface using the measuring means.

The method provides the user with the ability to consistently (reliably and repeatedly) determine defects in pallets. 1

Optionally, prior to determining any deflection of the face of the pallet, the method further comprises determining any deflection of the supporting surface relative to a predetermined threshold. In this way, the user may be sure that the supporting surface (used in the determination of any deflection of the pallet) is itself flat (in respect of a predetermined threshold). This calibration step allows for improved reliability in the results. This is particularly advantageous where the supporting surface is likely to attract defects, such as in warehouses where the frame is in repeated heavy use.

Optionally, following determining any deflection of the face of the pallet, the method further comprises: releasing the pallet from the frame; rotating the pallet within the frame; releasably securing the pallet in the frame in a rotated position; and repeating the determination of any deflection of the face of the pallet, for the rotated position. That is, the user may repeat the deflection determination while

securing alternative corners of the pallet. Of course, the user may rotate the pallet substantially 90 degrees (or 270 degrees), such that an adjacent corner may be fixed. Alternatively, the user may rotate the pallet substantially 180 degrees, such that an opposing corner may be fixed.

Optionally, following determining any deflection of the face of the pallet, the method further comprises: releasing the pallet from the frame; flipping the pallet within the frame; and releasably securing the pallet in the frame in a flipped position; and repeating the determination of any deflection of the face of the pallet, for the flipped position. That is, the user may repeat the deflection determination following flipping the pallet. This process captures scenarios where some measuring means are not able to show deflection – for instance, where an entire edge of a pallet is "bowed", such that two adjacent corners both make contact with the (flat) supporting means, but the edge between the corners is raised. In this way, accuracy of detection of defective pallets is improved.

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BRIEF DESCRIPTION OF FIGURES

Embodiments of the present invention will now be described, purely by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a known pallet;

Fig. 2 is a known method for determining defects in pallets;

Fig. 3 is a frame for determining defects in pallets according to an embodiment;

Fig. 4 is a frame according to an embodiment, in use determining defects in a pallet in a first position;

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Fig. 5 is a frame according to an embodiment, in use determining defects in a pallet in a second, flipped, position.

DETAILED DESCRIPTION

Fig. 3 is a depiction of a frame for determining pallet defects according to an embodiment.

The frame 9 comprises a substantially square, large flat surface (supporting means) 10 on to which a pallet 1 can be placed. In one corner of the surface 10, there is provided a clamp (securing means) 11. When a pallet 1 is accommodated by the frame 9, the clamp 11 winds down and (releasably) secures a corner of the pallet 1. The surface 10 of the frame 9 is arranged such that only a fraction of the base of the pallet is supported; the surface 10 includes a hollow void between four structural edges

The frame 9 is about the same size as a conventional pallet (with sizes determined by an international agreed standard), so with one corner clamped, one user can inspect the two corners connected to the clamped one. The user may then see if the edge of the pallet deflects away from the flat line of the frame 9 (or, in particular, the surface 10), which shows if the pallet 1 is warped.

If it is too warped, so that there is too much deflection away from that flat line of the frame, the pallet 1 can be sent for repair or thrown away.

To make sure the amount of deflection considered is consistent, at a different corner to the clamped one (namely, an adjacent corner) the frame 9 provides an upright 12 at substantially 90 degrees to the surface 10. On this upright 12 there

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is a marker 13, which acts as a visual indicator of deflection, which the user can move up and down as they need and lock in position. Together, the upright 12 and marker 13 are an example of measuring means. Different users will have different tolerances, and the upright 12 and marker 13 makes the level of deflection easy to see.

Further, the frame 9 also includes a wedge 8. This is similar to the known door wedge, to which a user can add one or more threshold markings. The wedge 8 is located at the same corner as the upright 12 and marker 13. This wedge 8 further helps one user see how much deflection there is.

The frame 9 is light, such that one person can use it, but also strong so it does not warp or deflect itself. Steel or composite are easily available and largely rigid materials. With the surface 10 including a hollow void between four structural edges, unnecessary weight is not included.

In this regard, the user may need some assurance the frame 9 is not itself warped and is in good order, or they may be comparing a warped pallet with a warped frame. The frame 9 therefore includes alignment means in the form of two spirit levels 14. The sprit levels 14 are positioned on an edge of the frame 9 opposing the edge between the corner in which the clamp 11 is positioned and the corner in which the upright 12 and marker 13 are positioned. The spirit levels 14 are spaced apart along such edge.

Of course, the frame depicted in Fig. 3 is large enough to accommodate a whole face of the pallet 1, so that a user is able to check more than one corner at a time. The skilled reader will appreciate that the frame 9 could omit the corner opposing the clamp 11 and still be capable of accommodating a whole face of

the pallet 1. Moreover, the skilled reader will appreciate that the clamp 11 need not be positioned at a corner. For instance, consider a frame 9 that releasably clamps a pallet approximately halfway along the pallet edge. The measuring means will still provide an indication of deflection of the pallet.

Moreover, the skilled reader will appreciate that the frame 9 does not need to accommodate the full pallet to perform its function of determining deflection of a face (or edge) of a pallet. For instance, consider a compact frame 9 that accommodates a single corner of a pallet, where the upright 12 and marker 13 are located such that they are positioned approximately halfway along the pallet edge. The measuring means will still provide an indication of deflection of the pallet (albeit measured at a point halfway along the pallet edge).

Of course, as an alternative to or in addition to a spirit level 14, a laser level may be used for alignment purposes. A laser level is a laser source and distal target, installed at known points on a level surface and provided the laser hits the target a user can be sure the surface they are on is level.

Fig. 4 is a depiction of a pallet 1, accommodated within a frame 9 during a method of use according to an embodiment.

Here, a corner of the pallet 1 is secured against the surface 10 at a corner of the frame by the clamp 11. At an adjacent corner of the frame, the upright 12 and marker 13 provide an indicator of deflection of the pallet edge or, equally, face relative to the surface 10.

To use the device 9, a user takes a pallet, inserts it into the frame 9, and releasably secures one corner. The user may then use upright 12 and marker 13

(measuring means) to check the deflection of one or more edges or corners of the pallet 1 compared to the flat surface. For instance, the bottom edge of the corner of the pallet 1 nearest the upright 12 raises to the (preconfigured) height of marker 13, thereby indicating deflection of the edge/face of the pallet 1 relative to surface 10 beyond a degree of acceptance. Such a pallet may then be disregarded or sent for repairs as necessary.

Sensibly, the user would then take the pallet 1 out, turn it through perhaps 90 degrees, or more, and check a different corner. Of course, the user may turn it through 180 degrees or 270 degrees also.

If, however, one edge of a pallet is curved in a bow-like manner (such that two adjacent corners are at a same height relative to a flat surface), some measuring means are not able to show deflection, which is of course wrong.

Fig. 5 is a depiction of the same pallet 1 as depicted in Fig. 4, accommodated in a flipped orientation within a frame 9 during a method of use according to an embodiment.

In this flipped orientation, one sees that the bottom edge of the corner of the pallet 1 nearest the upright 12 does not raise to the (preconfigured) height of marker 13, rather it meets the surface 10. This thereby, incorrectly, indicates no deflection of the edge/face of the pallet 1 relative to surface 10. Similarly, a wedge (as an alternative to in addition to upright 12 and marker 13) would not go under the corner of the pallet being measured

For this reason, it is advantageous for the user, when using the device 9, to flip the pallet over, then re-secure the pallet at the same or a different corner.

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With the same pallet inserted but when turned over (as in Fig. 4), one clearly sees there is deflection along that edge of the pallet at a different corner, and one may imagine a wedge would go a long way under the corner - perhaps the whole way.

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CLAIMS

1. A frame for determining pallet defects, the frame comprising:

a flat supporting surface, configured to, in use, support a pallet;

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securing means, configured to, in use, releasably secure the pallet against the supporting surface;

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alignment means comprising at least two indicators, each configured, in use, to check for deflection of the supporting surface; and

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measuring means, configured to, in use, act as an indicator of deflection of a side of the pallet relative to the supporting surface.

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2 The frame according to claim 1, wherein the frame accommodates, in use, at least one corner of the pallet.

3. The frame according to claim 1 or claim 2, wherein the frame accommodates, in use, at least three corners of the pallet.

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4. The frame according to any preceding claim, wherein the frame accommodates, in use, the entire face of the pallet.

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5. The frame according to any of claims 2 to 4, wherein the securing means is configured, in use, to secure a corner of the pallet against the supporting structure.

6. The frame according to any of claims 2 to 5, wherein the securing means is configured, in use, to secure at least two corners of the pallet.

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7. The frame according to claim 6, wherein the securing means comprises a first securing means to, in use, releasably secure a first corner of the pallet, and

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a second securing means to, in use, releasably secure a second corner of the pallet. 1

8. The frame according to any preceding claim, wherein the securing means is a clamp. 1/2

9. The frame according to any preceding claim, wherein the measuring means comprises a wedge. 1

10. The frame according to claim 9, wherein the wedge comprises at least one threshold marking on an angled surface of the wedge. 1

11. The frame according to any preceding claim wherein the measuring means comprises an upright and a marker. 1

12. The frame according to claim 12, wherein the marker is movable relative to the upright and releasably securable. 1

13. The frame according to any preceding claim, wherein the indicators of the alignment means are spirit levels. 1/2

14. The frame according to any of claims 1 to 12, wherein the indicators of the alignment means are laser levels.

15. The frame according to any preceding claim, wherein the material of at least the supporting surface of the frame is a substantially rigid material, for instance steel or a composite thereof. 1.5

16. The frame according to any preceding claim, wherein the frame accommodates, in use, a pallet of an agreed international standard size.

17. A method for determining pallet defects using the frame according to any preceding claim, the method comprising:

inserting a pallet into the frame, such that the pallet is supported by the flat supporting surface;

releasably securing the pallet in the frame against the supporting surface using the securing means;

determining any deflection of a face of the pallet relative to the supporting surface using the measuring means. 3

18. The method according to claim 17, further comprising, prior to determining any deflection of the face of the pallet:

determining any deflection of the supporting surface relative to a predetermined threshold.

19. The method according to claim 17 or claim 18, further comprising, following determining any deflection of the face of the pallet:

releasing the pallet from the frame; 1

rotating the pallet within the frame; 1

releasably securing the pallet in the frame in a rotated position; and 1

repeating the determination of any deflection of the face of the pallet, for the rotated position. 2

20. The method according to any of claims 17 to 19, further comprising, following determining any deflection of the face of the pallet:

releasing the pallet from the frame;

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flipping the pallet within the frame; 1

releasably securing the pallet in the frame in a flipped position; and 2

repeating the determination of any deflection of the face of the pallet, for the flipped position.

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ABSTRACT

A frame for determining pallet defects, and a method of use thereof.

[Fig. 3]

A frame 9 and method of use thereof that releasably secures a pallet 1 to a flat supporting surface 10 using securing means 11; the frame comprises 9 alignment means 14 to check for deflection of the supporting surface 10; the frame 9 comprises measuring means 8, 12, 13 to act as an indicator of deflection of a face of the pallet 1 relative to the supporting surface 10.

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FIGURES

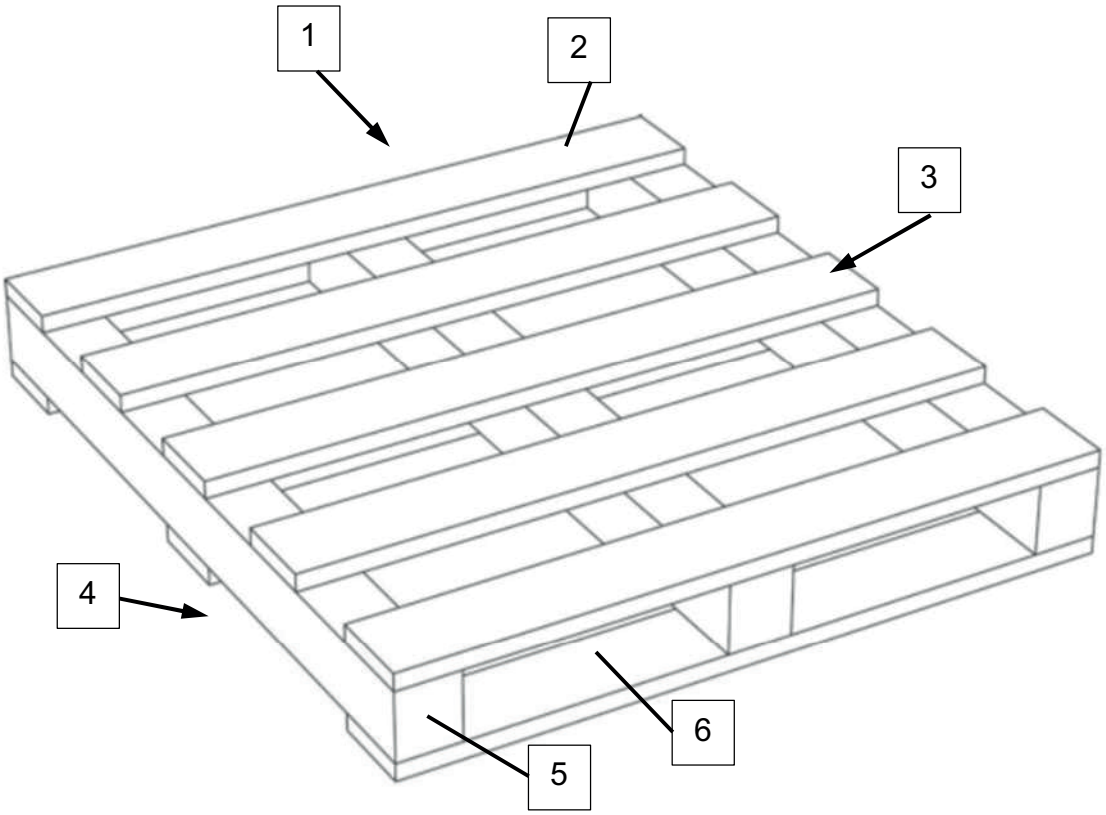

FIG. 1

Prior art

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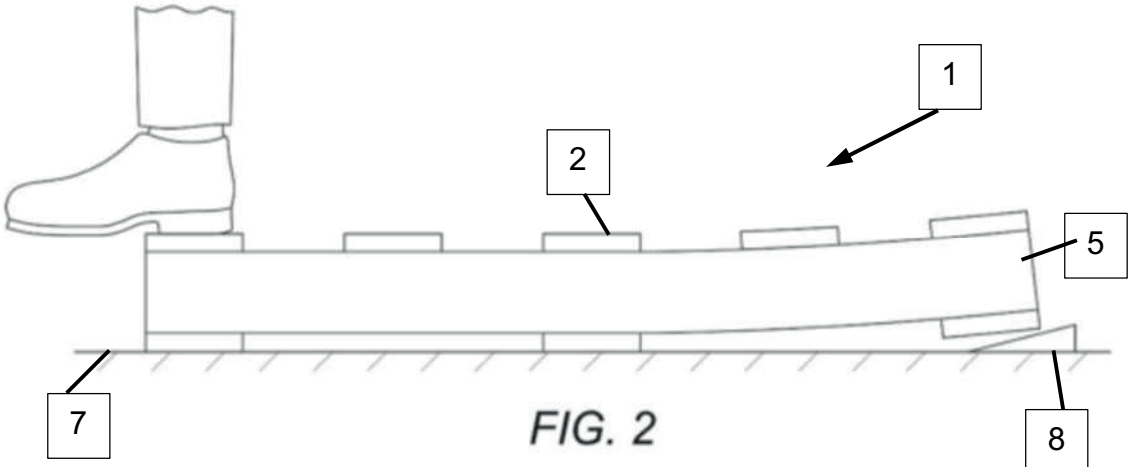

FIG. 2

Prior Art

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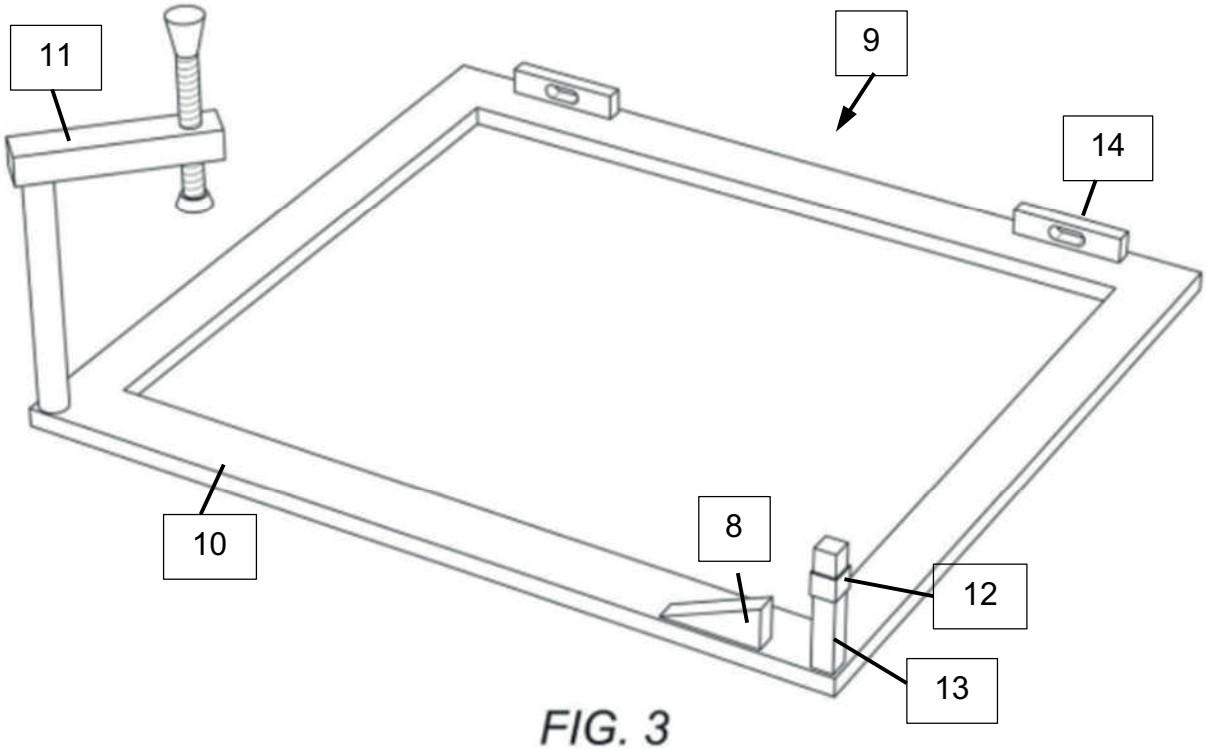

FIG. 3

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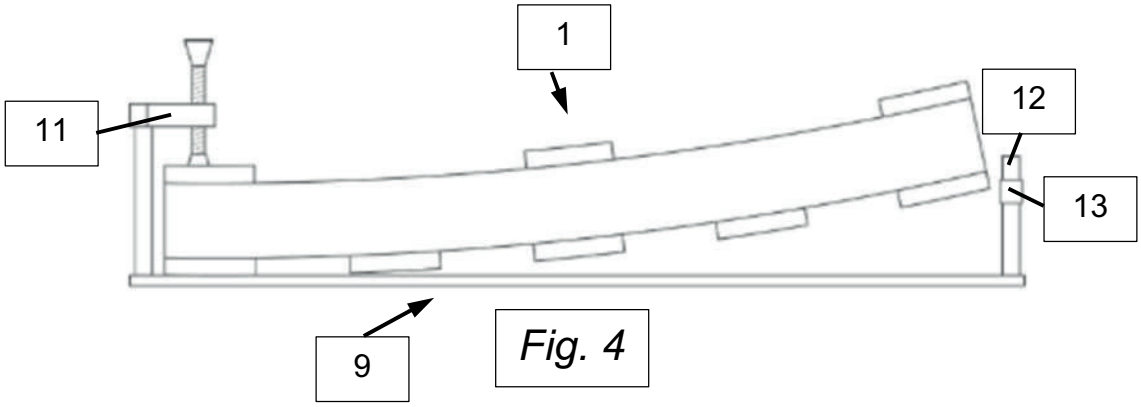

Fig. 4

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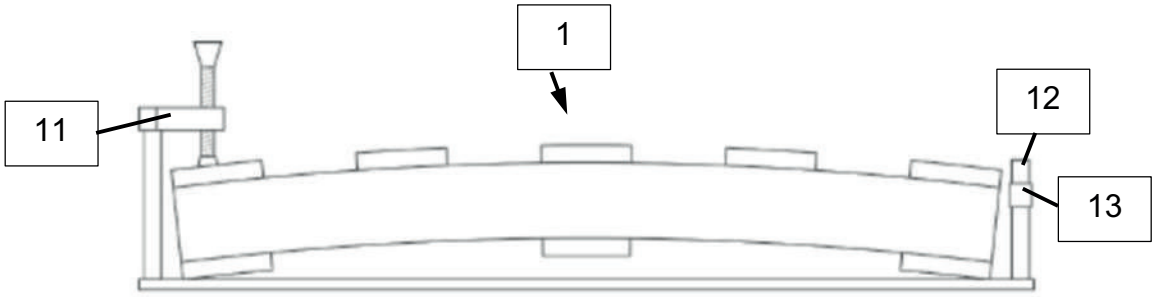

Fig. 5

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