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10 ***A device for interlocking two plate-like members***

FIELD OF THE INVENTION AND PRIOR ART

15 The present invention relates to a device for interlocking two plate-like members for forming sides of a container adjoining to each other through a corner, a first of said members having an edge frame extending along the edge thereof, which in the interlocked position shall adjoin to the second member.

20 "Container" is here to be given a broad sense and means that it is an object having limiting walls delimiting a volume to contain something, but it does not necessarily have to have a lid, and the bottom could for example be formed by a pallet.

25 The two plate-like members may be constituted by adjacent walls of the container as well as of a wall and a lid or a wall and a bottom. "The edge frame" is usually arranged for stiffening the edge region of the plate-like members in question.

30 Devices of this type are usually used for interlocking a number of plate-like members, which may be arranged tightly against each other in a flat package, for forming a container for packaging purposes. When the container has then been used for the transport object thereof, the device may be unlocked and the
35 plate-like members may be separated for getting disposed of or being sent back as a substantially flat package.

Devices of this type already known are based on the fact that the two plate-like members in the region close to the edge to be arranged adjacent to an edge of the other plate-like member are provided with a quite particular design for enabling the interlocking, for example by storing potential energy in a resilient clamp. It may then be a question of different types of preworked recesses in the two plate-like members and/or in said edge frame. Thus, these devices do not function on any container, but the plate-like members have to be carefully prepared for being able to be interlocked by means of such a device or they have to be made of such a material that any such interlocking engagement member of the device is able to penetrate into the very plate material.

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SUMMARY OF THE INVENTION

The object of the present invention is to provide a device of the type defined in the introduction, which has a simpler construction than devices already known by requiring a lower degree of particular preparations of the plate-like members without renouncing the reliability of the interlocking for that sake.

This object is according to the invention obtained by providing a device according to the appended claim 1.

By utilizing the edge frame of one of the plate-like members as engagement member in this way by letting the hook-like portions of the first leg grip behind it, no preparations of this plate-like member whatsoever are accordingly required for co-operation with the clamp, but in principle any plate-like members having an edge frame may be interlocked by said clamp. It has turned out that such a grip behind the edge frame being normally comparatively thin in combination with the pretension into which the clamp is brought for moving the hook-like portions over the

frame and therebehind results in a very safe and steady interlocking of the two plate-like members.

5 According to a preferred embodiment of the invention a male engagement member is arranged on one of the second plate-like member and the second leg of the clamp and a female engagement member on the other of the second plate-like member and the second leg of the clamp. Such a co-operation between a male and a female engagement member is advantageous for
10 giving, by simple means, the clamp required brace by the second leg against the second plate-like member so as to interlock this with the first one through said gripping behind the edge frame.

15 According to another preferred embodiment of the invention the second plate-like member comprises a female engagement member in the form of a through hole between the two large sides of the second plate member and the second leg comprises a male engagement member. Such a hole may easily, for example by drilling, be made in the second plate-like member, and
20 this enables achieving of another preferred embodiment of the invention, in which the second leg has a male engagement member arranged from the outside of the container introducible through said hole so as to grip behind portions of the second
25 plate-like member close to said hole for in the interconnecting position through potential energy stored in the clamp pressing the second plate-like member with respect to the first one outwardly opposite to the extension of the first leg from said corner over the frame. This means that the clamp does not only interlock the two plate-like members, but it also ensures that the
30 second plate-like member is not moving with respect to the first one towards the interior of the container, and a particularly steady construction may be obtained for such a container, should said edge frame of the first member be a bosom arranged to be applied with a part thereof externally of portions of
35 the second plate-like member close to the edge, and said male

engagement member of the second leg of the clamp is in the interlocking position arranged to press the second plate-like member against said edge frame part, as is the case in another preferred embodiment of the invention. This means for example
5 in the concrete case of a first plate-like member in the form of a lid that the lateral wall of the container (the second plate-like member) is prevented from being bent inwardly and is instead pressed outwardly against the frame formed by the edge frame of the lid.

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According to another preferred embodiment of the invention said male engagement member of the second leg of the clamp has a width substantially corresponding to the width of said hole and this male engagement member is in said interlocked position
15 adapted to substantially completely obstruct said hole. This embodiment is advantageous since the male engagement member of the second leg of the clamp gets a double function by both bracing against the second member and obstructing the hole towards the interior of the container and thereby function in particular as a protection of the interior of the container against introducing of tools or the like in the interior of the container,
20 which could damage objects present therein, or entrance of dust, impurities and the like in the interior of the container.

25 According to another preferred embodiment of the invention the hole has a substantially circular cross section. This is advantageous, since this puts a lower demand on an absolute precision with respect to the distance of the hole to the edge of the second plate-like member to be adjoined to the first plate-like member, since the roundness could mean a possibility to a certain
30 adaption of the clamp to this distance by the fact that the engagement member thereof has possibility to work itself inwardly somewhat into the delimiting walls of the hole, opposite to the case of for example a substantial rectangular cross section of
35 the hole, which would result in much more "rigid" walls of the

hole and increased demands on precision when positioning the hole.

5 According to another preferred embodiment of the invention said hook-like portions of the engagement member of the first leg are adapted to grip behind said frame along an elongated engagement region, which is advantageous for obtaining a stable interlocking of the plate-like members, and the device comprises advantageously a plurality of said clamps intended to be mutually
10 spaced along a longitudinal border line between the two plate-like members so as to further increase the stability of the interlocking.

15 Further advantages as well as advantageous features of the invention appear from the following description and the other dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

20 Fig 1 shows in perspective a clamp being a part of a device for interlocking two plate-like members according to a preferred embodiment of the invention,

25 Fig 2 is a perspective view of a part of a container with a clamp of the type shown in Fig 1 being on the point to be brought into a position for interlocking the plate-like members,

30 Fig 3 is a lateral cross section view of the plate-like members and the clamp in the position according to Fig 2,

Fig 4 is a view corresponding to Fig 3 of the clamp in the position interlocking the plate-like members, and

Fig 5 is a perspective view of a part of a container provided with a device according to the invention for interlocking plate-like members of the container.

5 DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

A clamp 1 being a part of a device according to the invention is illustrated in a perspective view in Fig 1 and has a first leg 2 and a second leg 3 connected thereto, which in a rest position of the clamp extend from a transition portion 4 therebetween while making an angle being less than 90° to each other. The clamp is made of one single piece of a band-like material, more exactly so that the two legs are resilient with respect to each other so as to be able to be moved from the rest position illustrated with respect to each other while storing potential energy. The clamp is preferably made of spring steel. The first leg 2 of the clamp has at the end thereof first engagement members in the form of hook-like portions 5 extending from the leg substantially perpendicularly with a function to be described further below.

Furthermore, the second leg 3 has at its free end a second engagement member of male type, more exactly a flat projection or tongue 6 intended to grip into a female engagement member of a plate-like member in the way described below. The projection 6 extends substantially in parallel with the rest of the second leg 3 but displaced with respect thereto through an intermediate portion 7 having a length substantially corresponding to the thickness of the plate-like member the projection 6 is intended to be introduced into.

Reference is now also made to the other Figures. The device according to the invention is intended to interlock two plate-like members 8, 9, of which parts are schematically shown in Fig 2 for forming sides of a container adjoining to each other through a corner 10, preferably a right-angled corner. A first 8 of the

members has an edge frame 12 extending along the edge 11 thereof, which in the interlocked position lies next to the second member 9. In the case shown the edge frame is a bosom arranged to be applied externally of portions 14 of the second plate-like member close to the edge through a part 13. The first member 8 is in the case shown a bottom or a lid of a container, while the second member 9 is a wall, but it would be well possible that both were adjacent walls of the container.

10 The length of the first leg 2 of the clamp 1 exceeds somewhat the width of the edge frame 12 on the first member 8. The second plate-like member 9 is provided with a through hole 15 having a circular cross section and a diameter substantially corresponding to the width of the projection 6 of the clamp.

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The function of the device according to the invention is as follows: When the two plate-like members are to be interlocked the first plate-like member 8 is laid upon the second one 9 with the edge frame part 13 externally thereof in the way shown in Fig 2.

20 The projection 6 of the clamp 1 is then introduced into and through the hole 15 in the plate-like member 9 so that it grips behind the inner side 16 of the plate-like member 9 in the way shown in Fig 3. The clamp is from this position then pivoted counter-clockwise as seen in Fig 3, preferably while pressing against the leg 3 until the position according to Fig 4 is obtained, in which the hook-like portions 15 grip in behind the edge frame 12. For obtaining this position it is required that the first leg 2 is bent somewhat away from the second leg while storing potential energy, so that the hook-like portions will under pretension (biasing) bear against the lateral edge 17 of the edge frame.

35 This pretension will in the position shown in Fig 4 also mean that the second leg 3 will through the projection 6 internally influence the second plate-like member outwardly towards the part 13 of the bosom, which is very positive, since this prevents the

second plate-like member from being bent inwardly and the container from receiving a shape not desired. An increased steadiness and stability of the container is at the same time obtained by this. The projection 6 and parts of the second leg 3, 5 connecting thereto will in this position efficiently obstruct the hole 15, so that no dirt, sticks, tools or other things that could hurt the contents of the container unintentionally enters the container. It is at the same time prevented that the content of the container may project through the hole. By the fact that the 10 hole has a substantially circular cross section the parts 18 connecting to the intermediate portion 7 and the intermediate portion 7 may "eat into" the plate-like member material to some extent should that be necessary for a perfect application of the clamp in the interlocked position, should the hole be somewhat 15 displaced positioned with respect to the optimum position.

It has turned out that the co-operation of the clamp 1 with the hole 15 and portions surrounding it as well as the lateral edge 7 of the edge frame 12 is able to interlock the two plate-like mem- 20 bers in an astonishingly safe and efficient way. Thus, an interlocking of the two members is hereby obtained by very simple means. The only modification required of standard members of a container of this type is the drilling of the hole 15.

25 The dimensions of the plate-like members, the edge frame, the clamp and the like may be arbitrary, but it should nevertheless be mentioned that in a preferred embodiment of the invention the thickness of the edge frame 12 is about 0.8 mm and the width of the same (the part extending on the first member) about 30 25 mm. The diameter of the hole 15 is in this case 12 mm and the thickness of the plate-like member about 8 mm.

It is advantageous, but not at all necessary that the plate-like members are mainly manufactured of wood, preferably plywood, 35 but also other materials, such as plastic, are conceivable.

It is shown in Fig 5 how advantageously a plurality of clamps 1 are intended to be mutually spaced along the longitudinal border line between the two plate-like members and it is here shown how the lid as well as the bottom of a container and the walls of the container are interlocked through clamps co-operating with holes and edge frames. It is then possible that the walls of the container are connected to each other through a hinge 19 for being foldable to a flat package. The container 4 has in the case shown walls, but other alternatives are also conceivable.

The invention is of course not in any way restricted to the preferred embodiments described above, but many possibilities to modifications thereof will be apparent to a person with skill in the art without departing from the basic idea of the invention as defined in the appended claims.

It would for example be possible to arrange another engagement member than a through hole in the second plate-like member, for example any type of frame provided with a recess, but it would also be possible to arrange a male engagement member on the second plate-like member and a corresponding female engagement member on the second leg of the clamp. The hole could have another cross section shape, for example square, even if the circular one will often be preferred.

Furthermore, the hook-like portions of the clamp intended to grip in behind the edge frame could be supplemented by a plurality of point-members adapted to grip into the plate-like member material somewhat for assisting the interlocking of the plate-like members, but the interlocking has nevertheless to take place mainly through the grip of the hook-like portions behind the edge frame.

Furthermore, hobblings outwardly could also be arranged on the portions of the edge frame intended to surround the clamp when

this is in place, so as to protect the clamp against outer physical influence.

5 The first leg of the clamp could be provided with a hole for inserting a tool for facilitating unlocking of the interlocking of the plate-like members by the device.

10 It would also be conceivable to equip the edge frame with a special hobbing, so that the hook-like portions could grip further in therebehind than shown in the Figures and the first leg may bear tightly against the edge frame.

15 "Edge frame" is to be given a broad sense and comprises all types of plate-like pieces arranged on the first plate-like member close to the edge thereof to adjoin to the second plate-like member, so that the hook-like portions may grip therebehind. Thus, it does not have to be a question about a piece extending along the entire edge but it could also have an extension along the edge delimited to the region for co-operation with the clamp.

20 It is a matter of course that an indefinite number of other variations of the device according to the invention are conceivable.

Claims

1. A device for interlocking two plate-like members (8, 9) for forming sides of a container adjoining to each other through a corner (10), a first (8) of said members having an edge frame (12) extending along the edge thereof, which in the interlocked position shall adjoin to the second member (9), **characterized** in that it comprises at least a clamp (1) of a type known per se having two legs (2, 3), which are resilient with respect to each other so as to be movable from a rest position with respect to each other while storing potential energy, and having a first engagement member of a first of the legs being movable into engagement with a first engagement member of the first plate-like member and a second engagement member (6) of the second leg being movable into engagement with a second engagement member (15) of the second plate-like member, so that the legs extend around said corner of the container when the clamp is arranged in a position for interlocking the plate-like members, and that the engagement member of the first leg comprises hook-like portions (5) adapted to be moved over said edge frame (12) through a movement of that leg (2) away from the second leg (3) creating storing of potential energy and grip behind this edge frame against the lateral edge (17) thereof so as to keep the plate-like members interlocked by engagement with the first plate-like member at least substantially through the grip of said hook-like portions behind the edge frame.

2. A device according to claim 1, in which said corner is substantially right-angled, **characterized** in that in a rest position of the clamp the legs (2, 3) of the clamp are adapted to extend from a transition portion (4) therebetween while making an angle to each other being less than 90°.

3. A device according to claim 1 or 2, **characterized** in that a male engagement member is arranged on one of the second plate-like element (9) and the second leg (3) of the clamp, and a

female engagement member is arranged on the other of the second plate-like member and the second leg of the clamp.

4. A device according to claim 3, **characterized** in that the second plate-like member (9) comprises a female engagement member (15) and the second leg (3) comprises a male engagement member.

5. A device according to claim 4, **characterized** in that the male engagement member is formed by a through hole (15) arranged between the two large sides of the second plate-like member.

6. A device according to claim 5, **characterized** in that the second leg (3) has a male engagement member (6) arranged from the outside of the container introducible through said hole (15) so as to grip behind portions (16) of the second plate-like member (9) close to said hole for in the interconnecting position through potential energy stored in the clamp pressing the second plate-like member with respect to the first one (8) outwardly opposite to the extension of the first leg (2) from said corner over the frame (12).

7. A device according to claim 6, **characterized** in that said edge frame (12) of the first member (8) is a bosom arranged to be applied with a part (13) thereof externally of portions (14) of the second plate-like member close to the edge, and that said male engagement member (6) of the second leg of the clamp is in the interlocking position arranged to press the second plate-like member (9) against said edge frame part.

8. A device according to any of claims 5-7, **characterized** in that said male engagement member (6) of the second leg of the clamp has a width substantially corresponding to the width of said hole (15), and that this male engagement member is in said interlocking position adapted to substantially completely obstruct said hole.

9. A device according to any of claims 5-8, **characterized** in that the hole (15) has a substantially circular cross section.

5 10 A device according to any of the preceding claims, **characterized** in that said hook-like portions (5) of the engagement member of the first leg are adapted to grip behind said frame (12) along an elongated engagement region.

10 11. A device according to any of the preceding claims, **characterized** in that the engagement member of the first leg of the clamp comprises at least one point-like member in said interlocking position adapted to grip slightly into the plate-like member material so as to assist the interlocking of the plate-like
15 members.

12. A device according to any of the preceding claims, **characterized** in that the clamp (1) is constituted by a substantially band-like material.

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13. A device according to any of the preceding claims, **characterized** in that the clamp (1) is made of spring steel.

14. A device according to any of the preceding claims, **characterized**
25 **in that** said first leg (2) of the clamp (1) has a hole for introducing a tool for unlocking the interlocking of the plate-like members (8, 9) of the device.

15. A device according to any of the preceding claims, **characterized**
30 **in that** it comprises a plurality of said clamps (1) intended to be arranged mutually spaced along a longitudinal border line between the two plate-like members (8, 9).

16. A device according to any of the preceding claims, **characterized**
35 **in that** said first plate-like member (8) is a lid of a container.

17. A device according to any of claims 1-15, **characterized** in that the first (8) as well as the second (9) plate-like member are intended to form a lateral wall of a container in said interlocked
5 position.

18. A device according to any of the preceding claims, **characterized** in that the plate-like members (8, 9) are substantially manufactured by wood, preferably plywood.
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19. A device according to any of claims 1-17, **characterized** in that the plate-like members (8, 9) are substantially manufactured by plastic material.