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(54) **A clamp and a container**

(57) A clamp (1) is designed to interlock on one hand a second member (10) of a container having an edge frame (11) bent to extend at a distance to and along an edge region of a first member (14) while creating a gap (15) between the edge frame and this member in an interlocked position, said edge frame being provided with an aperture (16) in a bent region thereof opening into said gap, and on the other a first member (14) of a container having a first engagement member (17). The clamp has engagement members (8, 9) engaging said first engagement member (17) and the edge frame while storing potential energy in said interlocked position.

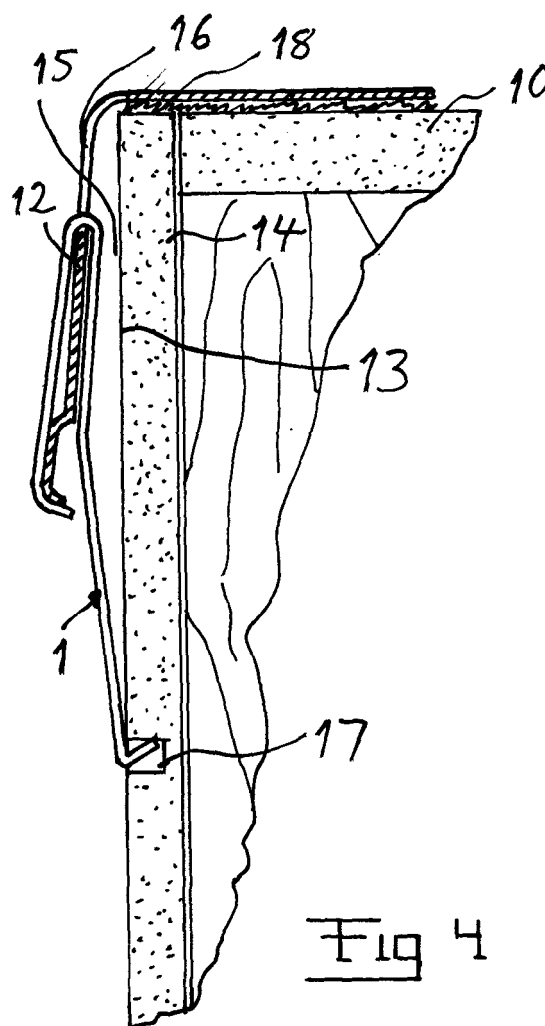


Fig 4

Description

FIELD OF THE INVENTION AND PRIOR ART

[0001] The present invention relates to a clamp for interlocking two plate-like members forming walls of a container according to the preamble of appended claim 1 as well as a container having at least two walls thereof interlocked by at least one such clamp.

[0002] "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. "Wall" is in this disclosure defined to include all members delimiting the inner volume of a said container, such as lateral walls, bottom and lid of the container. Thus, the two plate-like members may be constituted by any adjacent such walls of a said container. "The edge frame" is usually arranged for stiffening the edge region of the plate-like members in question.

[0003] Clamps of this type are usually used for interlocking a number of plate-like members, which may be arranged tightly against each other, for forming a container for packaging purposes. When the container has then been used for the transport object thereof, the clamps may be unlocked and the plate-like members may be separated for getting disposed of or being sent back as a substantially flat package.

[0004] Some related containers known have tongues extending from one plate-like member and introduced into apertures in a said edge frame of another plate-like member and bent around a portion of said edge frame for interconnecting the two plate-like members. Such containers are simple and may by that be produced to a low cost, but these tongues may in the case when an object located in a plastic bag or foil is introduced through an opening of the container cut through this bag or foil and partly destroy it. However, this problem may be solved by utilising a clamp of the type defined in the preamble of appended claim 1 and known through for example WO 01/98154. The clamp disclosed in that document is as such advantageous, but it does mostly require an arrangement of prefabricated holes in a second of said plate-like members to be interlocked, and such holes are in some cases not acceptable. In the case of a said plastic bag or foil discussed above the leg of the clamp introduced into said hole may also cause damage to the plastic material.

SUMMARY OF THE INVENTION

[0005] The object of the present invention is to provide a clamp for interlocking two plate-like members forming walls of a container of the type defined in the preamble of appended claim 1 being improved in at least some aspect with respect to such clamps already known.

[0006] This object is according to the invention ob-

tained by providing a clamp according to the appended claim 1.

[0007] Such a clamp may very easily be moved into said interlocking position by displacement inside said gap between the first plate-like member and the edge frame of the second plate-like member and pressing it to engage the end of the edge frame as well as said first engagement member of the first plate-like member while storing potential energy keeping the clamp in place. Accordingly, no sharp tongues project in the joining region of the two plate-like members before joining them and the clamp does not have to grip into the container but only engage said first engagement member, which for example may be a recess, such as a groove or slot, in said first plate-like member in the interlocking position.

[0008] According to an embodiment of the invention said distance of said first engagement member of the first plate-like member from said end of the first plate-like member exceeds the length of said bent first portion of the edge frame designed to extend along said first plate-like member, and said first leg is longer than the second leg. This means that the leg of the clamp introduced into said gap will come out of said gap and be visible in said interlocking position, which will then be easily obtained, and it will be easy to check that the engagement is correct and also get access to the clamp for unlocking it when desired.

[0009] According to another embodiment of the invention said two legs of the clamp are joined in a bent transition portion, and the length of the legs are dimensioned so that said bent transition portion is adapted to bear under pretension on portions of said edge frame delimiting said aperture in said interlocking position of the clamp. This means that the clamp may firmly and reliably keep the two plate-like members together in said interlocked position minimizing the risk of vibrations of these members with respect to each other.

[0010] According to another embodiment of the invention said first leg has two consecutive sections extending from a bent transition portion of the clamp in which the first and second legs are joined, said sections are substantially straight while making an angle with respect to each other through a bent, when introducing the first leg in said gap the first section of the first leg adjoining to the second leg with respect to the extension thereof from said second leg towards said second section is pointing away from said first plate-like member when keeping the other, second section of the first leg in parallel with said first plate-like member, and the lengths of the legs of the clamp are so dimensioned with respect to the position of said first engagement member of the first plate-like member and the length of said first edge frame portion that said two sections of the first leg will in the interlocked position be bent to reduce said angle with respect to said rest position for storing potential energy in the clamp in said interlocked position. This design of said first leg and way of storing potential energy in the interlocking position of the clamp results in a firm and secure maintaining of

the clamp in the interlocking position.

[0011] According to another embodiment of the invention said angle between said first and second sections of the first leg is in the rest position of the clamp 10°-40°, preferably 20°-35°. It has turned out that an angle within these ranges is suitable for obtaining a storage of sufficiently potential energy in the interlocking state of the clamp for safely maintain the clamp in that state.

[0012] According to another embodiment of the invention the length of the first leg of the clamp is adjusted to the position of said first engagement member on a said first plate-like member to be joined to a second plate-like member, so as to obtain a reduction of said angle made between said first and second sections of the first leg of more than 5°, advantageously more than 10°, more advantageous more than 15°, and preferably 16°-30°, when transferring the clamps from the rest position into said interlocking position. It has turned out that a change of said angle by these values results in an efficient interlocking of said two plate-like members by means of a clamp according to the present invention.

[0013] According to another embodiment of the invention said first section of the first leg adjoining to the second leg extends substantially in parallel with said second leg in said rest position of the clamp.

[0014] According to another embodiment of the invention said first leg is substantially longer than said second leg, such as more than 50% longer, preferably approximately 100% longer. This result in the advantages mentioned above of making the location of the engagement of the first engagement member of said first leg with the recess of said plate-like member visible.

[0015] According to another embodiment of the invention the length of the second leg is 80-150%, preferably 100-130%, of the length of said first section of the first leg. This means that said first section of the first leg may form a support for said second leg on the opposite side of said first edge frame portion with respect to said second leg.

[0016] According to another embodiment of the invention said first engagement member of said first leg is a hook-like member. According to another embodiment of the invention said second engagement member of said second leg is a hook-like member adapted to grip around said end of said first edge frame portion in said interlocking position of the clamp. Such engagement members are preferred, since they may easily be brought into engagement and kept in engagement by the potential energy stored in said clamp in said interlocking position.

[0017] According to another embodiment of the invention the clamp is made in one piece of a band-like material with said legs being plate-like. This means that the clamp may very easily be produced by conventional manufacturing techniques to a low cost. Such a clamp may also thanks to the plate-like character thereof reliably fulfil the interlocking function thereof. The band may be of any steel, metal or alloy of metals. However, the invention also comprises other materials, such as plastic being re-

silient and by that being able to store potential energy while being deformed.

[0018] The invention also relates to a container having at least two walls thereof interlocked by at least one clamp according to the present invention. At least one wall of the container may then be provided with a said first engagement member, for instance in the form of a slot on the outside of the wall extending substantially in parallel with an end of this wall adjoined to another wall of the container through at least one said clamp. A recess for a number of such clamps arranged to interlock two said walls of the container may in this way easily be obtained.

[0019] 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

[0020] With reference to the appended drawings, below follows a specific description of a clamp according to an embodiment of the present invention.

[0021] In the drawings:

Fig 1 is a perspective view of a clamp for interlocking two plate-like members according to an embodiment of the invention,

Fig 2 is a side elevation of the clamp shown in fig 1,

Fig 3 is a perspective view illustrating a clamp according to fig 1 and 2 in a position ready for interlocking two plate-like members and a portion of one of these members,

Fig 4 is a cross-section view illustrating the clamp according to fig 1 and 2 in a position in which it interlocks two plate-like members as well as a part of these members, and

Fig 5 is a perspective view of a part of a container according to the present invention having a lid thereof secured to the adjacent walls of the container by clamps according to fig 1 and 2.

DETAILED DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

[0022] A clamp 1 according to the present invention is illustrated in a perspective view in fig 1 and in side elevation in fig 2. This clamp has a first leg 2 and a second leg 3 connected thereto, which are joined in a bent transition portion 4. The first leg 2 is substantially longer, approximately 100% longer, than the second leg 3 and has two consecutive sections 5, 6 extending from said bent transition portion 4. These sections are substantially straight while making an angle α with respect to each other of approximately 25° through a bent 7 of the first leg.

[0023] The second leg 3 extends substantially in par-

allel with the first section 5 of the first leg 2 and has substantially the same length as this first section, more exactly a length being about 120% of the length of the first section.

[0024] The clamp is made of one single piece of a band-like material, more exactly so that the two legs 2, 3 and the two sections 5, 6 of the first leg 2 are resilient with respect to each other so as to be able to be moved from the rest position illustrated in fig 1 and 2 while storing potential energy. The clamp is preferably made of spring steel.

[0025] The first leg 2 of the clamp has at the end thereof a first engagement member in the form of a hook-like portion 8 extending from the leg while making an angle of more than 90° therewith. The second leg 3 has at its free end a second engagement member, also in the form of a hook-like portion 9 extending from the second leg substantially perpendicularly thereto.

[0026] It is shown in fig 1 how the first leg 2 of the clamp is provided with a hole 20 for inserting a tool for facilitating unlocking of the interlocking plate-like members as will be understood from the description below.

[0027] The function of the clamp according to the invention will now be explained while making reference also to fig 3 and 4. The clamp is adapted to interlock two plate-like members forming walls of a container, in which a second 10 of said members has an edge frame 11 extending along the edge thereof. The plate-like members are mostly of wood but may be of any material, and is here made of plywood, and said edge frame is made of steel sheet. The edge frame is bent in a bent region thereof to extend with a first portion 12 thereof at a distance to and along an edge region 13 of a first plate-like member 14 while creating a gap 15 between said first edge frame portion 12 and the first plate-like member 14 in an interlocked position of the two members 10, 14.

[0028] Furthermore, the edge frame 11 is provided with an aperture 16 in the bent region thereof opening into said gap 15. This aperture 16 is designed to be able to receive the first leg 2 of the clamp. The first plate-like member 14 has a recess 17 in the form of a slot (see also fig 5) extending substantially in parallel with the end 18 of the first member 14 to be adjoined to the second member 10.

[0029] The lengths of the legs of the clamp 1 are adjusted to the location of the recess 17 with respect to the aperture 16 in the edge frame of the two walls to be interlocked by the clamp. More exactly, this is done for obtaining the following function: when said two members 10, 14 are to be interlocked the second member 10 is laid upon the upper edge of the first member 14 through portions of the edge frame as shown in fig 4. The first leg 2 of the clamp is then introduced into said gap 15 through the aperture 16 in the edge frame and displaced inside this gap along the first plate-like member while simultaneously displacing the second leg 3 along the first edge frame portion 12 on the opposite side thereof with respect to said gap to a position in which the hook-like engage-

ment 8 of the first leg 2 engages into the recess 17 and the hook-like second engagement member 9 of the second leg grips around the end of said first edge frame portion 12 for interlocking the two plate-like members 10, 14. When doing this the first leg 2 has to be partly straightened out, so that the angle α made between the two sections 5, 6 thereof will be reduced, in this case by approximately 20°, while storing potential energy in this first leg 2 with respect to the rest position thereof shown in fig 2. The clamp will in this way be firmly held in the interlocking position, since the mutual location of the aperture 16 and the recess 17 forces the bent transition portion 4 of the clamp to bear under pretension on portions of the edge frame delimiting the aperture while keeping the first leg straightened out with respect to the rest position.

[0030] 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 an embodiment of the invention the thickness of the edge frame 12 as well as of the clamp is about 0.8 mm, and the thickness of the plate-like member about 8 mm.

[0031] A container according to an embodiment of the invention is schematically shown in fig 5. This figure illustrates how a second plate-like member in the form of a lid 10 is interlocked with respect to a lateral wall 14 of a container by means of four clamps 1 according to fig 1 and 2 engaging the edge frame 11 of the lid 10 as well as the slot 17 in the lateral wall 14. Only two of the clamps are visible in fig 5, whereas the other two are arranged on the opposite side of the lid. It is shown how other walls of the container are interconnected by tongues 21 as discussed in the introduction of this disclosure, but it is within the present invention to replace some or all the tongues by clamps according to the present invention.

[0032] The invention is of course not in any way restricted to the preferred embodiment described above, but many possibilities to modifications thereof would 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.

[0033] "Edge frame" is to be given a broad sense and comprises all types of plate-like pieces arranged on the second plate-like member close to the edge thereof to adjoin to the first plate-like member, so that the clamp may cooperate therewith. 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 the cooperation with the clamp.

[0034] The claim definition that said first and second legs extend in the rest position thereof substantially in the same direction is to be interpreted broadly and include not neglectable deviations from a parallel extension thereof.

[0035] Although the first engagement member of said first plate-like member has been shown as a recess in the form of a slot in said first plate-like member this engagement member may be of another type, so that the

first engagement member of the first leg of the clamp is for example designed to grip around and behind a small steel sheet plate secured on the outside of said first plate-like member.

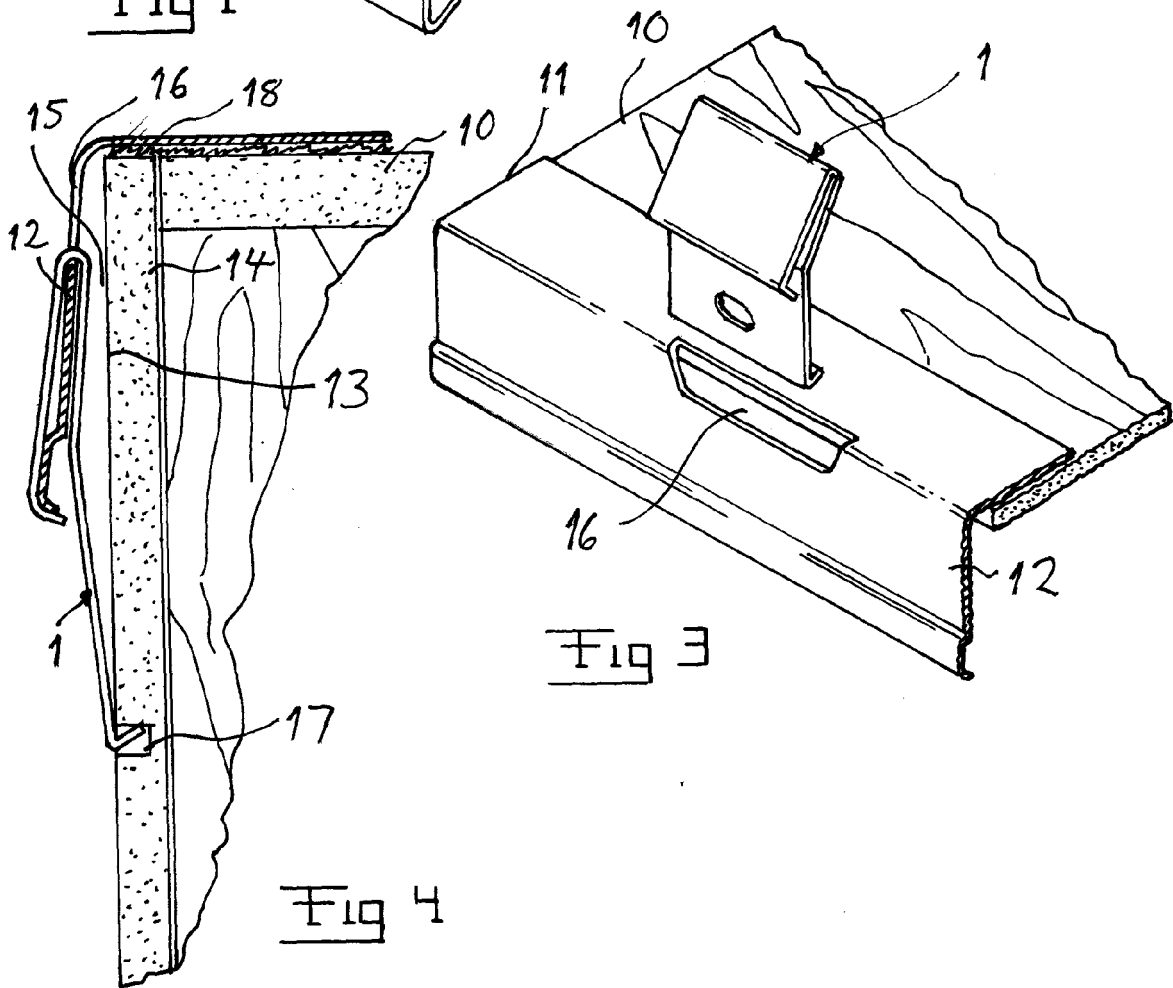
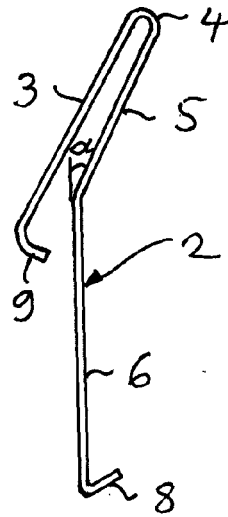
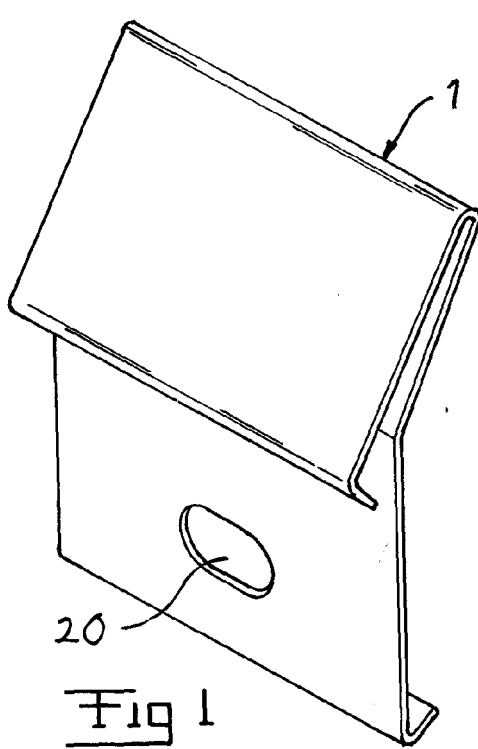
Claims

1. A clamp for interlocking two plate-like members (10, 14) forming walls of a container, a second (10) of said members having an edge frame (11) extending along the edge thereof, which in the interlocked position shall adjoin to a first (14) of said members, walls being here defined to include lateral walls as well as bottom and lid of said container, said clamp having two legs (2, 3), which are resilient with respect to each other so as to be moveable from a rest position with respect to each other while storing potential energy, and said clamp having a first engagement member (8) of a first (2) of the legs being moveable into engagement with a first engagement member of the first plate-like member and a second engagement member (9) of the second leg (3) being moveable into engagement with a second engagement member of the second plate-like member, **characterized in that** said clamp is designed to interlock on one hand a second plate-like member having a said edge frame bent in a bent region thereof to extend with a first portion (12) thereof at a distance to and along an edge region of a said first plate-like member (14) while creating a gap (15) between said first edge frame portion and said first plate-like member in said interlocked position, said edge frame (11) being provided with an aperture (16) in said bent region opening into said gap, and on the other a first plate-like member having a said first engagement member (17) at a distance from an end thereof to be adjoined to said second plate-like member, that said first and second legs (2, 3) of the clamp extend in said rest position substantially in the same direction, and that the first leg (2) is designed to be introduced into said gap (15) through said aperture (16) and displaced inside this gap along the first plate-like member while simultaneously displacing the second leg (3) along said first edge frame portion (12) on the opposite side thereof with respect to said gap to a position in which said first engagement member (8) of the first leg enters into engagement with said first engagement member (17) of said first plate-like member and said second engagement member (9) of the second leg grip around an end of said first bent portion of the edge frame for interlocking said two plate-like members while storing potential energy.
2. A clamp according to claim 1, **characterized in that** said distance of said first engagement member (17) of the first plate-like member from said end of the first plate-like member (14) exceeds the length of

said bent first portion (12) of the edge frame designed to extend along said first plate-like member, and that said first leg (2) is longer than the second leg (3).

3. A clamp according to claim 1 or 2, **characterized in that** said two legs (2, 3) thereof are joined in a bent transition portion (4), and that the length of the legs are dimensioned so that said bent transition portion is adapted to bear under pretension on portions of said edge frame delimiting said aperture (16) in said interlocking position of the clamp.
4. A clamp according to any of the preceding claim, **characterized in that** said first leg (2) has two consecutive sections (5, 6) extending from a bent transition portion (4) of the clamp in which the first and second legs are joined, that said sections are substantially straight while making an angle (α) with respect to each other through a bent (7), so that when introducing the first leg in said gap (15) the first section (5) of the first leg adjoining to the second leg with respect to the extension thereof from said second leg (3) towards said second section is pointing away from said first plate-like member when keeping the other, second section (6) of the first leg in parallel with said first plate-like member (14), and that the lengths of the legs of the clamp are so dimensioned with respect to the position of said first engagement member of the first plate-like member and the length of said first edge frame portion that said two sections (5, 6) of the first leg will in the interlocked position be bent to reduce said angle with respect to said rest position for storing potential energy in the clamp in said interlocked position.
5. A clamp according to claim 4, **characterized in that** said angle (α) between said first and second sections of the first leg (2) is in the rest position of the clamp 10°-40°, preferably 20°-35°.
6. A clamp according to claim 4 or 5, **characterized in that** the length of the first leg (2) of the clamp is adjusted to the position of said first engagement member (17) on a said first plate-like member (14) to be joined to a second plate-like member (10), so as to obtain a reduction of said angle (α) made between said first (5) and second (6) sections of the first leg of more than 5°, advantageously more than 10°, more advantageous more than 15°, and preferably 16°-30°, when transferring the clamps from the rest position into said interlocking position.
7. A clamp according to any of claims 3-5, **characterized in that** said first section (5) of the first leg (2) adjoining to the second leg (3) extends substantially in parallel with said second leg in said rest position of the clamp.

8. A clamp according to any of the preceding claims, **characterized in that** said first leg (2) is substantially longer than said second leg (3), such as more than 50% longer, preferably approximately 100% longer. 5
9. A clamp according to any of claims 4-7, **characterized in that** the length of the second leg (3) is 80-150%, preferably 100-130%, of the length of said first section (5) of the first leg (2). 10
10. A clamp according to any of the preceding claims, **characterized in that** said first engagement member (8) of said first leg (2) is a hook-like member. 15
11. A clamp according to any of the preceding claims, **characterized in that** said second engagement member (9) of said second leg (3) is a hook-like member adapted to grip around said end of said first edge frame portion (11) in said interlocking position of the clamp. 20
12. A clamp according to any of the preceding claims, **characterized in that** said first engagement member (8) of said first leg (2) is adapted to grip into a first engagement member of a said first plate-like member in the form of a recess (17) therein. 25
13. A clamp according to any of the preceding claims, **characterized in that** it is made in one piece (1) of a band-like material with said legs being plate-like. 30
14. A container having at least two walls thereof interlocked by at least one clamp according to any of claims 1-13. 35
15. A container according to claim 14, **characterized in that** at least one wall (14) thereof is provided with a said recess (17) in the form of a slot on the outside of the wall extending substantially in parallel with an end of this wall adjoined to another wall (10) of the container through at least one said clamp (1). 40
16. A container according to claim 15, **characterized in that** said other wall has a said edge frame (11) with more than one said aperture (16) for adjoining said two walls through a plurality of said clamps. 45
17. A container according to any of claims 14-16, **characterized in that** said second plate-like member (10) is a lid of the container. 50
18. A container according to any of claims 14-17, **characterized in that** more than two walls of the container are connected to other walls of the container by means of a clamp according to any of claims 1-13. 55



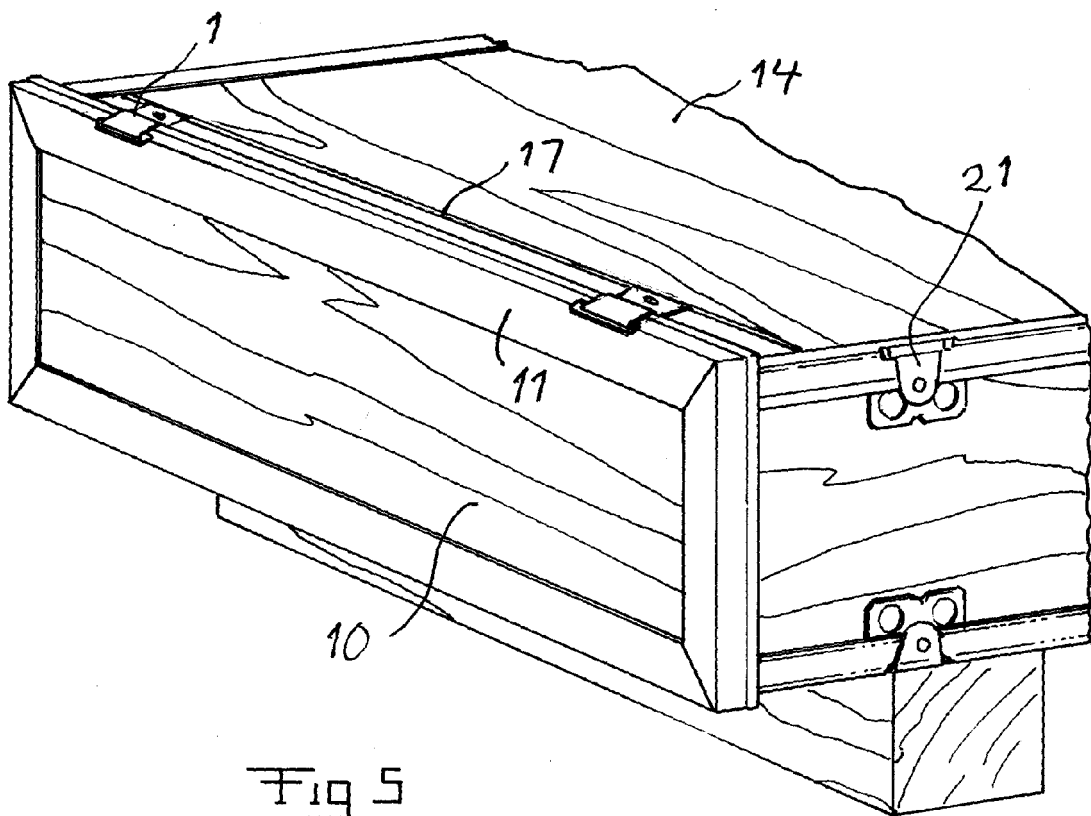


Fig 5



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EUROPEAN SEARCH REPORT

Application Number
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Place of search		Date of completion of the search	Examiner
Munich		23 June 2006	Augustin, W
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