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(54) **Concrete casting mold system**

(57) The invention relates to a concrete casting mold system including a base plate (1), a number of edge plates (2) that are perpendicular to the base plate and delimit the mold being cast on the base plate and a number of support members (3) being fastened on the base plate and supported to the edge plates outside the mold to be cast for supporting the edge plates and holding them in place for the duration of the casting and curing thereof. According to the invention, the concrete casting

mold system includes an angular support (4) constituting a rigid body in connection with each support member (3), with a fastening part (5) that is perpendicular to the base plate (1) and fastened to the outer surface of the edge plate (2) in the direction thereof and a support part (6) that is perpendicular to the base plate and to fastening part and supported by the lower edge on the base plate. In addition, the lower part of the angular support includes a support shoulder (7) to which the support member can be supported.

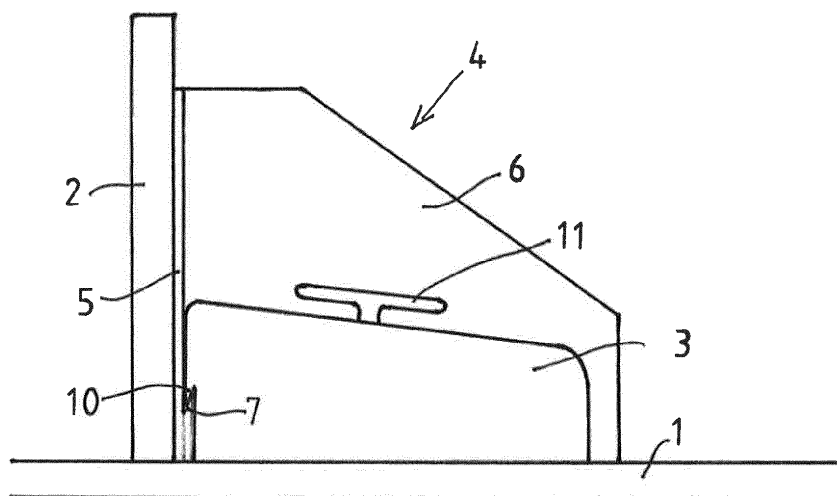


Fig 2

Description

FIELD OF THE INVENTION

[0001] The invention relates to the concrete casting mold system defined in the preamble of claim 1.

BACKGROUND OF THE INVENTION

[0002] In the industrial production of concrete elements, it is common to cast the elements on a large casting floor. The edges of the molds that delimit the element as well as any openings, such as the doors and windows of wall elements, are built on the casting floor. Traditionally, this has been made by building them from plates and lumber; however, such a method is slow and expensive and produces large amounts of disassembling waste. It is common to use both wood plates and metal plates as the casting floor. Molds can be supported and fastened on the wooden casting floor by nails, screws and the like as known per se. In connection with the metal floors, magnets are used instead to support the edges of the mold onto the metal floor.

[0003] One example of prior art is disclosed in patent publication EP1075917. In the publication, the mold is supported by a magnet to a lower metal plate. The lower part of the outer surface of the mold is provided with an upwardly directed projection and the magnetic piece has a downwardly directed complementary projection. This way, the projections can be locked to one another in such a way that the magnet supports and presses down the mold and keeps it in place when locked onto the metal plate. The projection being used for locking may be provided in the mold itself or it is possible to fasten a rail or other profile over the length of the outer surface of the mold to provide said projection.

[0004] In principle, the system according to the publication is functional and easy to use. However, it has certain defects and drawbacks. Casting molds of different sizes are continuously made and disassembled at the production plant, so the same parts of the mold are always reused with appropriate sizing. For this reason, the molds must be made of suitable machineable material, such as strong plywood plate. As the density of magnetic support and magnetic locking varies for example depending on the height of the casting mold, the locking projection must extend over the entire width of the mold so as always to provide the support to the appropriate location. If the locking projection is made in the mold, the mold becomes relatively expensive, particularly as the molds constitute in any case wearable articles that must always be sawn to suit new casting projects. On the other hand, if the locking projections are made for example in a separate aluminum profile fastened to the outer surface of the mold, the profiles must also be cut.

[0005] Further, problems are caused in the known solution by vertical support for the molds. The magnets and their support surfaces against the mold have a specific

height. If the height of the mold is much greater than that of the magnetic piece, separate diagonal supports must still be built for the mold or, as another alternative, a sufficiently high support structure would have to be built between the mold and the magnet for preventing the upper part of the mold from tilting.

[0006] Problems are also produced in the casting molds in which through holes must be made to the edge of the mold for example for a variety of rebars. As the entire length of the outer surface of the mold is provided with different support structures or profiles, they become obstacles for the through holes. On the other hand, cutting the support structures at the through holes weakens the support structures over their entire length.

[0007] Similar problems as described above are also encountered in systems using a wood plate, most often a plywood plate, as a casting floor. Different mold structures and support structures are built on the floor and disassembled after use, i.e. the casting of the element. The pieces of plate and bits of plank and board with nails and concrete, partly broken during disassembling of the molds, go usually entirely to waste, i.e. to be chipped for use as fuel. New molds are then made from new and clean materials. To disassemble the old molds carefully without breaking them and remove the nails and concrete would be too expensive.

OBJECTIVE OF THE INVENTION

[0008] The objective of the invention is to remedy the above-mentioned defects of the prior art. In particular, the objective of the invention is to disclose a novel casting mold structure system to speed up the mold building work and the assembly and disassembly work and allow reuse of the mold structures.

SUMMARY OF THE INVENTION

[0009] The concrete casting mold system according to the invention includes a base plate and a number of edge plates that are perpendicular to the base plate and delimit the mold being cast on the base plate. In addition, the mold includes a number of support members being fastened on the base plate and supported to the edge plates outside the mold to be cast for supporting the edge plates and keeping them in place for the duration of the casting and curing. According to the invention, the concrete casting mold system includes an angular support, constituting a rigid body, in connection with each support member. The angular support has a fastening part that is perpendicular to the base plate and fastened to the outer surface of the edge plate in the direction thereof and a support part that is perpendicular to the base plate and to the fastening part and supported by the lower edge on the base plate. Further, a support shoulder is provided to the lower part of the angular support, i.e. close to the lower edge thereof, for supporting the support member. In this case, the position of the support shoulder in the angular

support is determined by a complementary shoulder provided in the support member and by the position thereof, such that the support member would tightly lock the angular support in place while the support member itself is fastened in place on the base plate.

[0010] In one embodiment of the invention, the base plate is made of metal of suitable magnetic material, in which case the support member includes a strong magnet for fastening the support member in place in an immobile fashion.

[0011] In another embodiment of the invention, the base plate is made of a wood-based plate, such as strong plywood, in which case the support member can be screwed, nailed, bolted or fastened in any other manner known per se in place to the base plate in such a way as to hold the angular support in place, which in turn will hold the edge plate of the mold in place and in an upright position. Of course, also other base plate materials that allow screwing, nailing, bolting and any suchlike fastening may be considered, such as different plastic-based plates.

[0012] In one embodiment of the invention, the support shoulder is provided to the lower edge of the fastening part of the angular support. In this case, the magnet or other support member locks the fastening part of the angular support being fastened to the edge plate of the mold in place while the support member may give, depending on its structure, also vertical support for the edge plate.

[0013] In another embodiment of the invention, the support shoulder is provided to the lower edge of the support part. In this case, the angular support is fastened to the edge plate by the fastening part and the support part of the angular support gives vertical support for the edge plate as it is supported to the base plate. The support member thus locks and presses the support part of the angular support in place against the base plate, preventing it from moving.

[0014] In a preferred embodiment of the invention, the support shoulder is provided to the lower edge of the fastening part and the support part both. Preferably, the fastening part and the support part are identical plates. Thus, the angular support is formed by two identical plates that are perpendicular to one another. In this case, a magnet or other support member can always be fastened alternatively to either one of the parts as required by the existing space and support needed. In the same way, either one of the plates can be freely selected as the support part and as the fastening part in the angular support, meaning that the angular support can be fastened to the edge plate of the mold by either one of the parts, while the other part acts as the support part that is perpendicular thereto.

[0015] In a preferred embodiment of the invention, the angular support is made by bending a straight steel sheet into a rectangular shape in such a way that the fastening part and the support part are provided perpendicular to one another and consist of straight and uniformly thick plates. The thickness of the steel plate being used pref-

erably ranges from 5 to 10 mm but of course may vary according to the need for support.

[0016] A simple, secure and easy to use way of fastening the angular support to the edge plate of the mold is screwing. Thus, a number of holes are preferably provided to the fastening part of the angular support, for example with suitable spacing over the entire area thereof. This way, it is always possible to select a sufficient number of holes for fastening in suitable positions for screwing.

[0017] In terms of durability, rigidity, reusability and affordability, the best material for the edge plate of the mold is plywood. For example, when approximately 30mm thick plywood is used, the sufficient density for the angular supports is approximately 1m. Plywood is rigid and allows cleaning and washing as well as several times of screwing so that the same plywood can be used a number of times in different molds just by sizing and sawing it to the dimensions of the new mold.

[0018] Preferably, the lower edges of the fastening part and the support part of the angular support that has been bent out of a single plate or welded together out of two plates are aligned straight edges so as to have the angular support supported tightly and without play for the entire length of the lower edge thereof directly on the base plate. This way, it provides the best support for the edge of the mold.

[0019] Preferably, the support member has a complementary shoulder that corresponds to the support shoulder of the angular support. Suitably, their shapes correspond to one another in such a way that the complementary shoulder of the support member can be installed on the support shoulder of the angular support provided in place on the base plate. Thus, the support shoulder and the complementary shoulder tightly lock to one another, so that in fastening the support member to the base plate, the angular support is also fastened in place rigidly.

[0020] Preferably, the angular supports may have different heights and widths as required by the dimensions of the mold being used. Thus, the height of the angular support is appropriately at least half of the height of a corresponding edge plate, preferably substantially equally high as the corresponding edge plate. Accordingly, its length extending out of the mold being supported becomes appropriately greater as the mold becomes higher.

[0021] The concrete casting mold system according to the invention provides considerable advantages as compared with the prior art. The angular support of the concrete casting mold is very simple to fasten and use. Likewise, it can be quickly disassembled. It can be fastened to a freely selected place and with a freely selected density. The angular support provides effective support for the edge plate of a casting mold in the length direction, transverse direction and circular direction of the mold. For example, when molding window openings in the middle of the mold, the saving of time achieved by the invention is approximately 80% in comparison to the traditional

mold-making. The structure permits to support the inner corners of the mold simply by a single angular support. The structure practically entirely eliminates the production of waste material in disassembling the molds because the angular supports, support members and any fastening screws or the like needed are completely reusable and, when cleaned and washed, the edge plates of the molds constitute plate material that is as good as new when the new molds are made.

LIST OF FIGURES

[0022] Below, the invention will be described in detail with reference to the accompanying drawings, in which

Fig. 1 illustrates one angular support according to the invention,

Fig. 2 illustrates supporting of the casting mold according to the invention on a metallic base plate,

Fig. 3 illustrates one application of the invention,

Fig. 4 illustrates the system according to the invention on a wood-based base plate,

Fig. 5 illustrates a detailed view of the support member of Fig. 4 and

Fig. 6 illustrates one application of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0023] Fig. 1 illustrates one angular support 4 according to the invention that is applicable for the concrete casting mold system according to the invention. It has been bent out of a single steel plate into a rectangular shape in such a way as to consist of a fastening part 5 and a support part 6. In this embodiment, the fastening part and the support part are identical plates in terms of their shape and size. The fastening part 5 has a number of holes 8 for screwing the angular support onto the edge plate of the mold. Further, a wide opening 9 extends into both of the parts of the angular support over the angle so as to act as a gripping handle for facilitating the handling of the angular support and also to have a structurally lightening effect. In addition, a rail having an upwardly sloping angle is fastened to the lower edge of both of the parts 5 and 6 of the angular support so as to form a support shoulder 7 to the upper edge thereof, allowing the downward fastening in place of the support shoulder by a permanent magnet and by a complementary shoulder provided therein.

[0024] Fig. 2 illustrates a more detailed view of the use of the angular support 4 according to Fig. 1 in a concrete casting mold. The concrete casting mold includes a steel base plate 1 on which the shape of a piece to be cast is delimited by edge plates 2. In order to hold the edge plates 2 in place and straight during the casting, they are supported vertically by angular supports 4. The angular support 4 is placed on the base plate 1 in such a way that a plate-type fastening part 5 is provided against the edge plate 2. At the same time, a plate-type support part

6 of the angular support extends perpendicularly outward from the edge plate while being supported on the base plate. The fastening part 5 is screwed by screws through holes 8 provided therein onto the plywood edge plate.

5 This having been performed, a fastening magnet 3 equipped with a permanent magnet is provided and raised against the fastening part 5 of the angular support 4 in such a way that a complementary shoulder 10 in the magnet is disposed on a support shoulder 7 in the fastening part 5. They have been sized in such a way as to tightly fit against one another while the base of the magnet 3 stably rests on the base plate 1. After this, by pressing a button 11 provided on the magnet 3 in a manner known per se, the permanent magnet contained therein is pressed downward and strongly attached to the base plate 1, preventing the magnet 3 and consequently the angular support 4 and consequently the edge plate 2 from moving in any direction. The locking of the magnet is so strong that it is impossible to be released without a long-armed pry bar upwardly of the button 11.

20 **[0025]** Fig. 3 illustrates one preferred embodiment of the invention. For example wall molds often have, in the middle of the mold that is delimited by edge plates, auxiliary molds for windows or doors that must be supported from the inside, unlike the edge plates that are supported from the outside. In this case, for example for a sufficiently small window mold, it may suffice that the angular supports 4 be screwed onto the corners of the mold and then fastened to the base plate 1 with a magnet by the support shoulder 7 at the lower edge. Such a mold with openings is extremely simple to manufacture, to lock in place and to remove after curing of the cast.

30 **[0026]** Fig. 4 and 5 illustrate an embodiment of the invention wherein a metal plate is not used as the base plate 1, in which case a magnet cannot be used as a support member. The base plate 1 may be plywood, particle board, any other wood-based plate, a plate based on plastic material etc. In this case, the angular support 4 according to Fig. 1 is fastened by the fastening part 5 to the edge plate 2 supported to the base plate 1, while the support part 6 extends perpendicularly away from the edge plate 2. The support member 11 used for the angular support is a structure bent out of a metal plate, wherein a straight plate-type part 14 provided with a number of fastening sockets, i.e. holes 12, is screwed or nailed to the base plate 1. One edge 15 of the plate-type part is upwardly bent at a right angle so that the edge extends over the support shoulder 7 of the angular support 4. In this area, the edge is slopingly bent down in such a way that a slopingly down extending tongue, i.e. a complementary shoulder 13, is formed to the upper part of the edge 15. The complementary shoulder 13 suitably corresponds to the support shoulder in shape in such a way that, when set against one another, the angular support 4 is locked in place while the support member 11 is fastened to the base 1. Sufficient rigidity and locking is achieved by selecting a sufficiently rigid and thick metal plate as manufacturing material for the support member

11.

[0027] Above, one support member 11 applicable to the system according to the invention has been presented in a case where the base plate 1 is for example a wood-based plate. It is very simple and easy to make and gives good support for the angular support. However, it is clear that the support member used may be, in terms of shape and material, a piece or structure of even great variation with the common feature of having a complementary shoulder that corresponds to the support shoulder 7 and can be attached thereto, and being able to be fastened, such as screwed, nailed, bolted, stably in place to the base plate next to the angular support.

[0028] Fig. 6 illustrates one embodiment of the invention wherein, for example, the edges of a window opening in an element being made are provided on a slight slant. In principle, it would be possible to make slanted angular supports, but it is simpler always to use the same straight angular supports 4 and install an adjustment piece 16, i.e. for example a small piece of plywood, close to the upper edge of the angular support between the fastening part 5 of the angular support and the edge plate 2 of the mold. As the angular support is always straight relative to the base plate, the adjustment piece suitably turns the edge plate to a slightly slanted angle. And if the fastening part 5 is further screwed to the edge plate 2 through the adjustment piece, the adjustment piece will stay in place for the duration of casting.

[0029] The invention is not limited merely to the examples referred to above; instead, many variations are possible within the scope of the inventive idea defined by the claims.

Claims

1. A concrete casting mold system including a base plate (1), a number of edge plates (2) that are perpendicular to the base plate and delimit the mold being cast on the base plate and a number of support members (3,11) being fastened on the base plate and supported to the edge plates outside the mold to be cast for supporting the edge plates and holding them in place for the duration of the casting and curing thereof, **characterized in that** the concrete casting mold includes an angular support (4), constituting a rigid body, in connection with each support member (3,11), with a fastening part (5) that is perpendicular to the base plate (1) and fastened to the outer surface of the edge plate (2) in the direction thereof and a support part (6) that is perpendicular to the base plate and to the fastening part and supported by the lower edge on the base plate, and that the lower part of the angular support includes a support shoulder (7) to which the support member can be supported.

2. The concrete casting mold system according to claim

1, **characterized in that** the base plate (1) is metallic, in which case the support member (3) includes a magnet for effecting the fastening of the support member to the base plate.

3. The concrete casting mold system according to claim 1, **characterized in that** the base plate (1) is wooden, in which case the support member (11) includes fastening sockets (12), such as holes or the like, for fastening, such as screwing, the support member to the base plate.

4. The concrete casting mold system according to any one of claims 1 to 3, **characterized in that** the support shoulder (7) is provided to the lower edge of the fastening part (5).

5. The concrete casting mold system according to any one of claims 1 to 3, **characterized in that** the support shoulder (7) is provided to the lower edge of the support part (6).

6. The concrete casting mold system according to any one of claims 1 to 3, **characterized in that** the support shoulder (7) is provided to the lower edge of the fastening part (5) and the support part (6) both.

7. The concrete casting mold system according to any one of claims 1 to 6, **characterized in that** the fastening part and/or support part are straight and uniformly thick plates.

8. The concrete casting mold system according to any one of claims 1 to 7, **characterized in that** the fastening part of the angular support includes holes (8) in order to be screwed onto the edge plate of the mold.

9. The concrete casting system according to any one of claims 1 to 8, **characterized in that** the support member (3,11) includes a complementary shoulder (10,13) to be fitted on the support shoulder (7) of the angular support (4) for locking the angular support in place when the support member (3,11) is being fastened to the base plate (1).

10. The concrete casting mold system according to any one of claims 1 to 9, **characterized in that** the height of the angular support is at least half of the height of a corresponding edge plate, preferably substantially equally high as the corresponding edge plate.

11. The concrete casting mold system according to any one of claims 1 to 10, **characterized in that** the angular support (4) is made by bending a straight length of plate to be rectangular.

12. The concrete casting mold system according to any

one of claims 1 to 11, **characterized in that** an adjustment piece (16) is included between the upper edge of the angular support (4) and the edge plate (2) for turning the edge plate to a slanted position in the casting mold.

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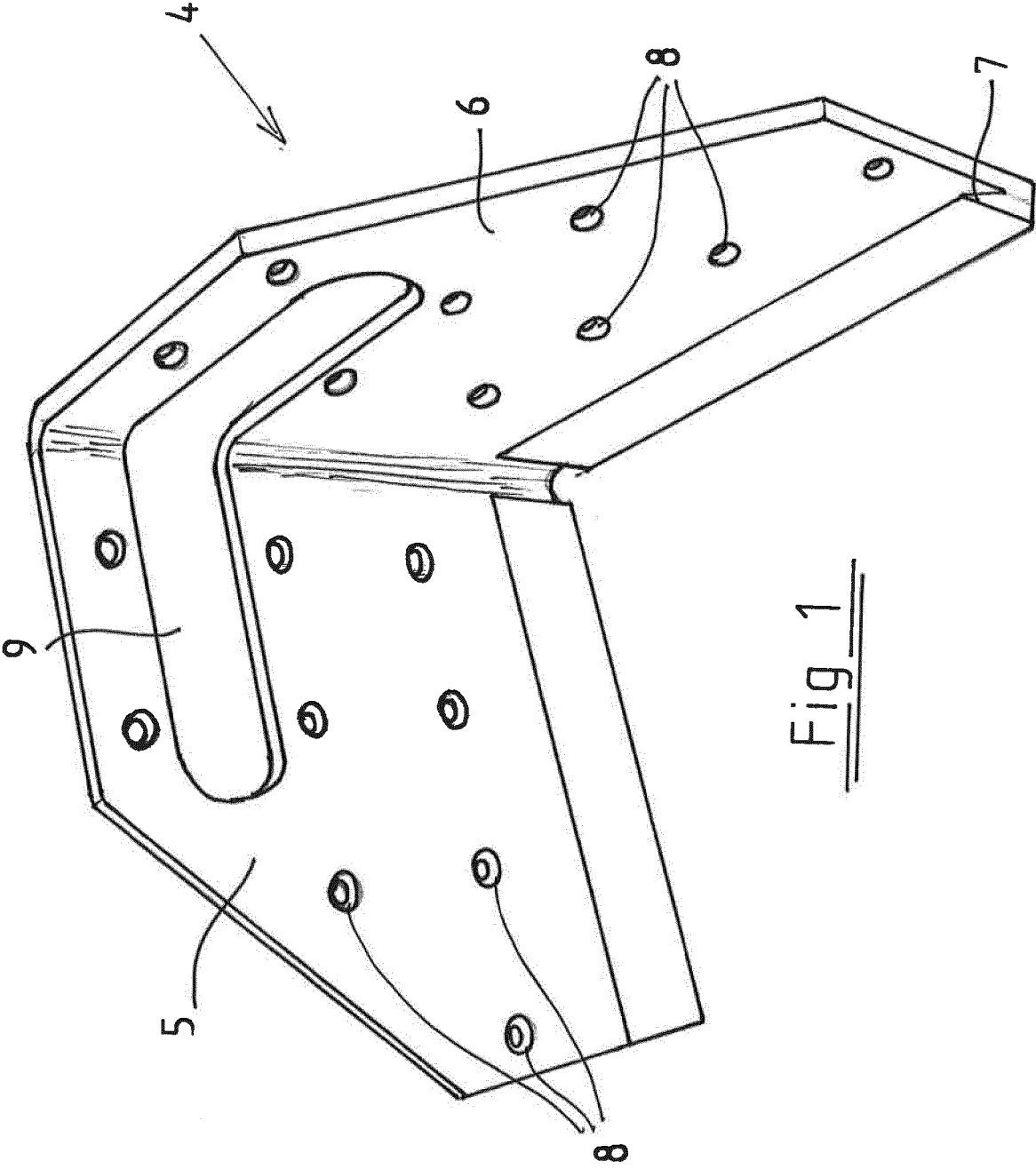
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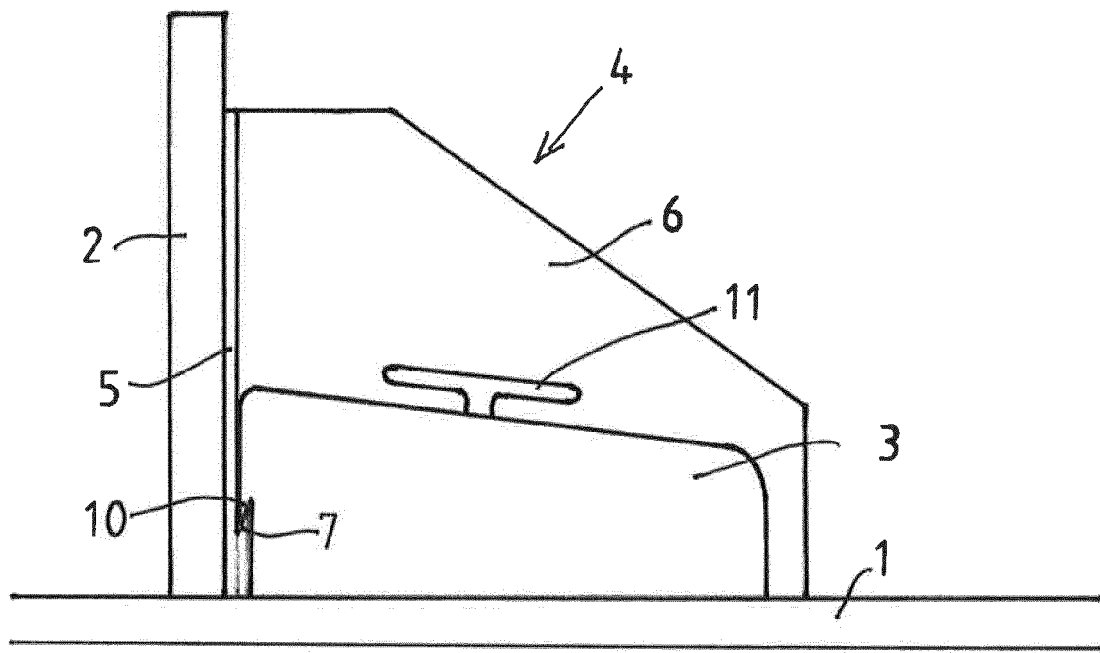


Fig 2

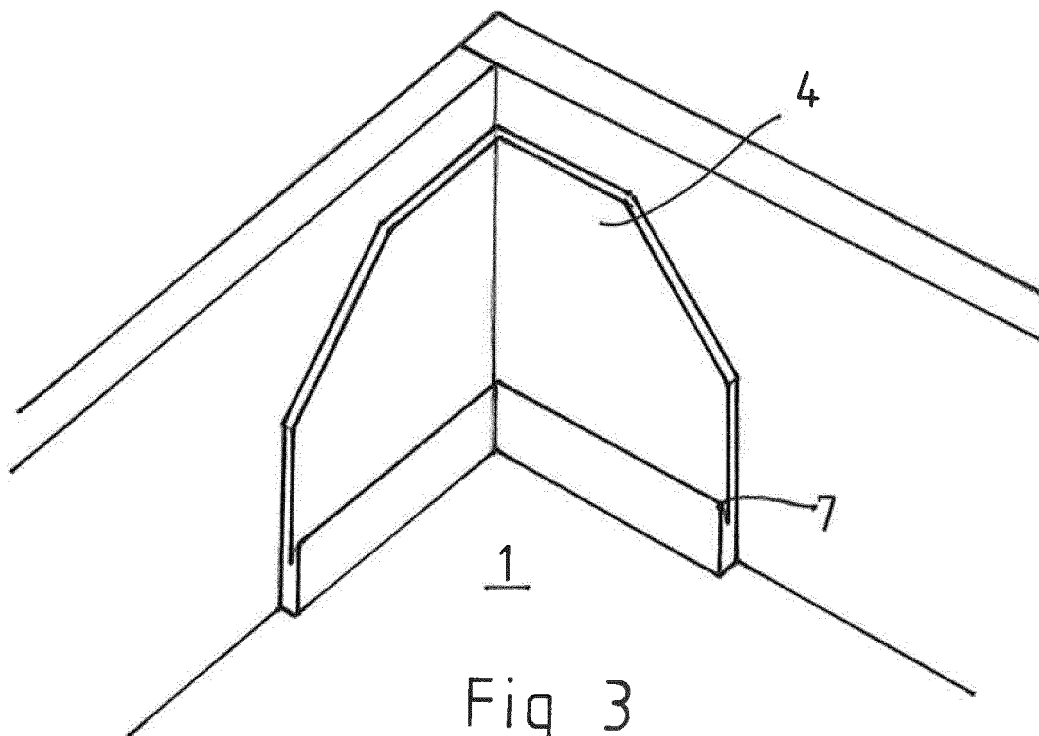


Fig 3

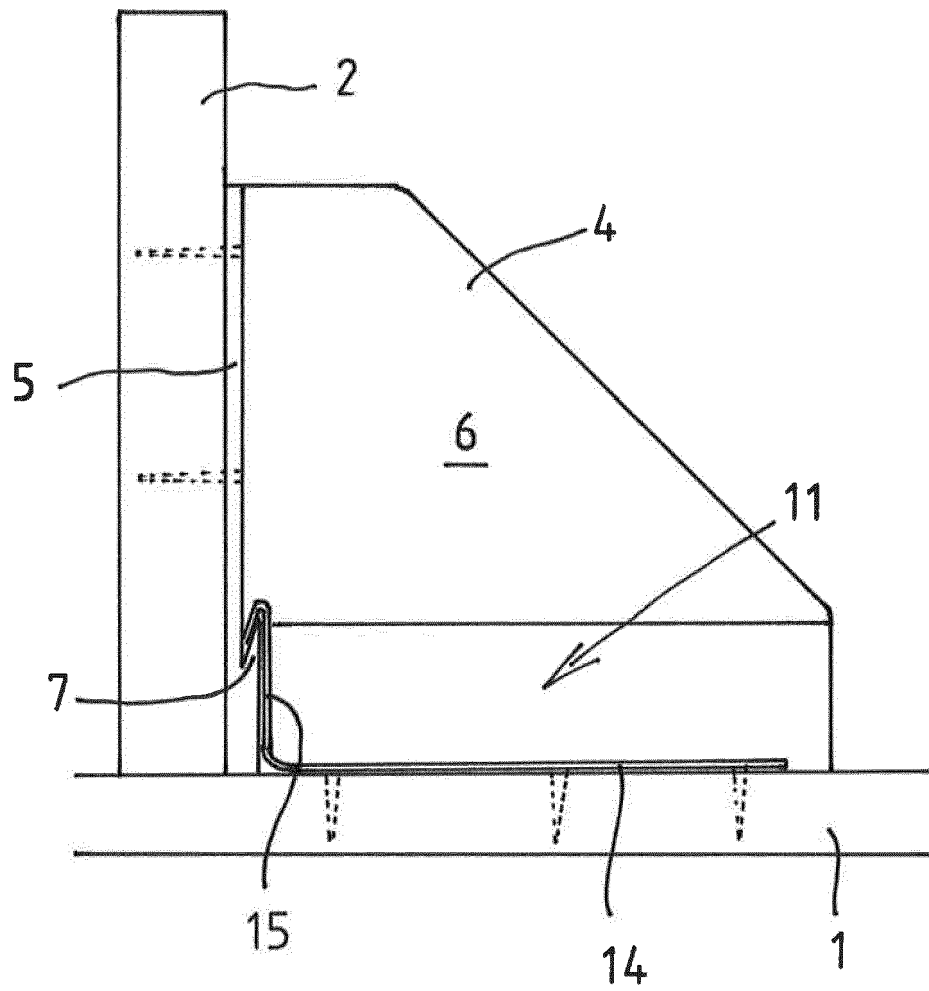


Fig 4

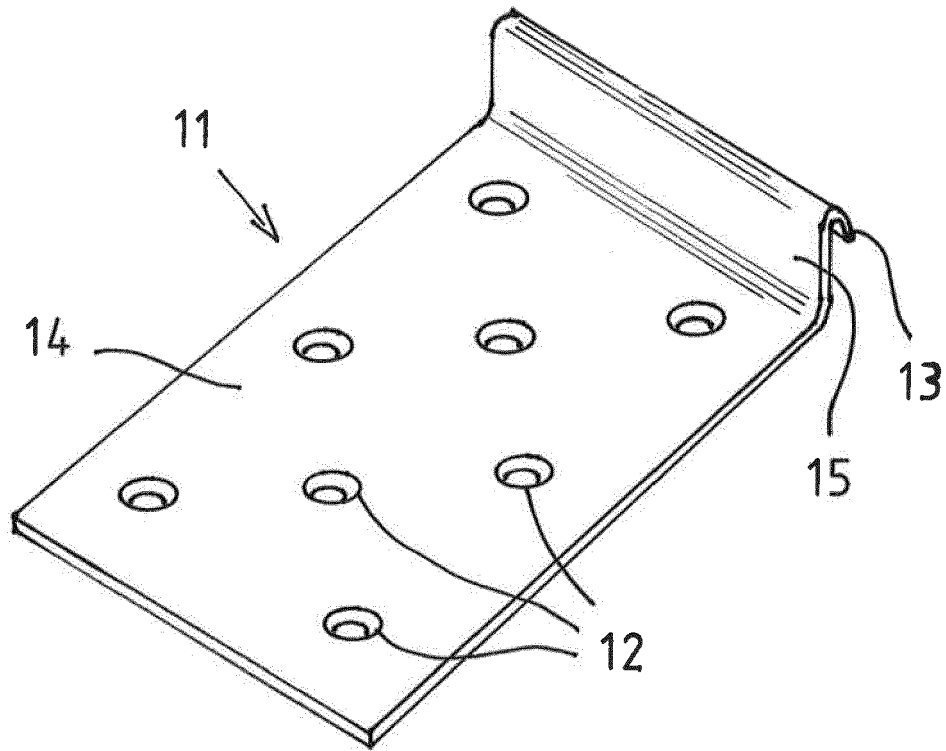


Fig 5

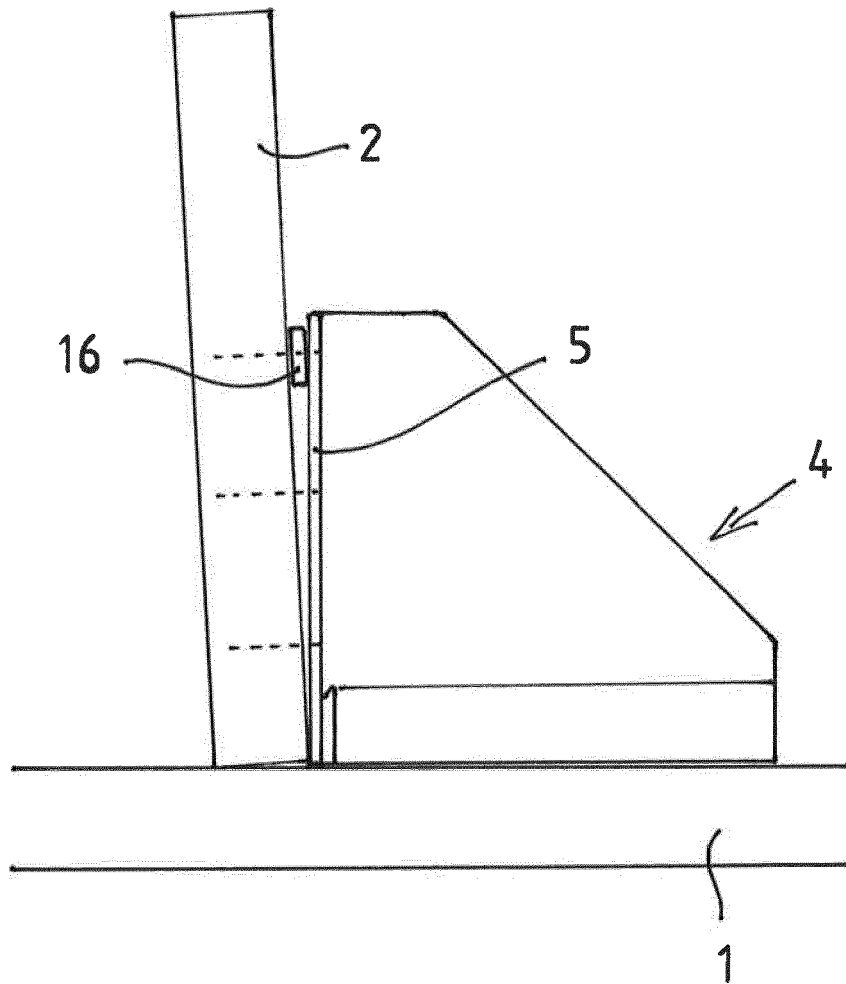


Fig 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1075917 A [0003]