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(54) **BUILDING SYSTEM COMPRISING A PLURALITY OF ELEMENTS**

(57) The present invention relates to a building system (1) for defining a part of a building structure, wherein the building system (1) comprises at least two building elements (10, 20) which through coupling means (11, 21) are interconnected so as to form a unique building structure.

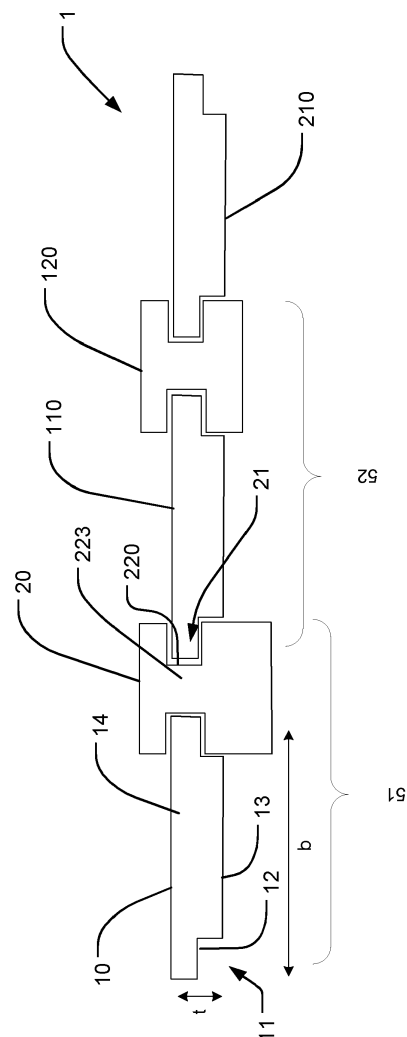


Fig. 1

EP 3 088 630 A1

Description

[0001] The present invention relates to a building system for defining a part of a building structure, wherein the building system comprises at least two building elements which through coupling means are interconnected so as to form a building structure.

[0002] A building system of this kind is commonly seen in wooden houses, where building elements of wood are interconnected to form a building system. Such building system often has a supporting function, an isolating function and is constructed to be coinciding with health and fire legislations. Furthermore, the building systems provide a building structure with an inner side facing the interior of a building, for example a room, and an exterior side that is intended to form a facade that is visible from an outside observer.

[0003] The interconnection between building elements in such building systems is generally done in a horizontal or vertical direction, depending on the design and requirements to the building construction. The facade provided from such building system often, from the perspective of an outside observer, appears to have a flush exterior, and may give the impression of a rather ordinary exterior design, which of course is a problem for architects, carpenters or private house builders trying to make a unique and beautiful facade exterior.

[0004] This problem has been tried solved by using wood which may differ in origin and/or post and pre-treatment. By using different wood species or different treatments of the wood, it is possible to create a facade where the individual building elements differ in glossiness, colour, uniformity etc. Hence, contributing to a more unique and beautiful overall finish of the facade. A problem related to such solution is, however, that it is very tedious to find the right wood before building the house and/or selecting the right building elements during construction to achieve the desirable finish.

[0005] Another problem related to such solution is the lack of economy of scale, because each house project is very individual leading to a low output and a limited potential of scale of operation. Thus, the production of specifically designed building elements is likely more expensive than prefabricated building elements, which does not provide for the possibility of creating a unique design of a building facade.

[0006] It is therefore the object of the invention to provide a building system that enables the possibility for designing and building a more unique and beautiful facade of a building structure, as seen from the perspective of an outside observer. Additionally, to provide a building system that forms a part of the building structures in such way that it has a supporting function, an isolating function, and be manufactured to coincide with health and fire safety legislations. Furthermore, the building system is easily scalable and easily mountable. Hence, a building system that enables the costumer to get a desired end product, while ensuring a profitable business for everyone in the

supply chain.

[0007] This is in a first aspect achieved by a building system of the kind mentioned in the introduction, wherein the building system comprises at least two building elements of which a first building element is provided with a first type coupling means, and a second building element is provided with a second type coupling means, the second type being configured essentially as a H-profile, wherein the first type of coupling means is shaped complementary to the second type coupling means, so that the first and second type of coupling means in a mounted condition of the building system are interconnected to form a structure comprising the first and second building elements, wherein the coupling means of the first and second building elements are configured such that a further first and second building element can be coupled to said structure, and wherein the second building element is configured to provide the structure with a shape variation in the surface of the structure.

[0008] With a building system of this kind, a plurality of building elements, where at least two building elements differ in shape and/or dimension from each other, are coupled together to define a structure, especially a structure of a facade of a building.

[0009] The first and second building elements are designed with coupling means, which always fit to each other, irrespective of the remaining dimensions, such as breadth, length or thickness or geometrical shape of the building elements.

[0010] In this way when a second element is configured to provide a structure with a shape variation in the surface of the structure, it is to be understood that one of the dimensions e.g. breadth, length and/or thickness of the second building element is different from the first building element and/or a portion of the first and second building visible from the exterior side of a building facade have different geometrical shapes, such as rounded, oval, circular etc. The difference in dimension or geometrical shape of the second building element and the first building element will provide the surface of for example a building facade with a shape variation. For instance if the first and second building element differs in thickness, so as the second building element extends a distance from the first building element in the direction towards the exterior side of the building facade, the second building element provides a protrusion in the building facade. Hence, an observer standing on the exterior side of the building looking at the building facade may observe the shape variation provided by the building system.

[0011] Hence, the shape variation may in an embodiment comprise a geometrical and dimensional variation.

[0012] In an embodiment of the invention where the building system comprises at least two structures it is preferably the second building element of two structures that varies in shape. A structure should be construed as comprising a first and second building element coupled together, wherein the first and second building elements comprises different types of coupling means. A structure

thus defines a block structure within a building system defining a building wall. The second building element is intended to be construed as a building block of the structure, which may be chosen depending on the wanted variation in the surface of the structure, i.e. the facade of the building. Thus, a series of different shaped second building elements, may be used in order to provide a variation in the surface of the facade making the design of the facade unique for a certain construction.

[0013] Thus, according to the invention, the building system may comprise at least four different building elements, of which at least two are configured as the first building element and at least two are configured as the second building element, wherein at least one of the first building elements and one of said second building elements defines a first structure, and a second of said first building element together with a second of said second building elements defines a second structure, wherein said second building elements of said two structures differs in breadth and/or thickness. Within the meaning of this disclosure the breadth of the building element should be understood as the length of the shorter side of a building element, the length should be understood as the longer side of a building element, and the thickness is defined as the third dimension. Especially the thickness should be construed as the amount of material provided in the third dimension of a building element. With regards to the shape variation provided by the second building element, a protruding distance should be understood as the thickness of the material of the second building element which protrudes from the surface of the first building element in a mounted condition.

[0014] In an embodiment of the invention, the shape variation in the surface of a building facade is provided by having at least three building elements of which one building element is configured as a first building element and two building elements configured as second building elements, wherein in the one first building element and the two second building elements defines a first structure, wherein said second building elements of said first structure differ in breadth and/or thickness.

[0015] The first building element may therefore also vary in shape, however, preferably only in the breadth of the building element.

[0016] For creating the building system of building elements, the first and second structure, in a mounted condition, are coupled to each other through at least one of said second building elements. Thus, a series of building structures, comprising at least one of the first and second building elements may be coupled together to define a building system, especially a building system with a unique facade, due to the variation in especially the second building element.

[0017] The building system is thus in one embodiment constructed so that the first building element comprises an interior side and an exterior side, said interior side being intended to face the interior of a building and said exterior side being intended to form a facade of the build-

ing system, wherein at least one side of the first building element comprises the coupling means having a substantially L-shaped protrusion, which in a mounted condition couples to said H-profile of said second building element. By providing the building elements with coupling means which fits uniquely between the first and second building elements, the remaining design of the building elements, especially the breadth and/or thickness of the second building element may be varied independently thereof. Especially the choice of an L-shaped protrusion of the first building element is also a preferred choice from a manufacturing point of view, since it is easy to manufacture such building profiles in a plurality without changing manufacturing techniques. The combination of a L-shaped protrusion and a H-profile of the second building element provides a tight fit, which holds the building elements in place when mounted. Furthermore, it provides a substantially even interior side.

[0018] Preferably, the H-profile of the second type coupling means of the second building element comprises a first and a second flange interconnected by a middle section, so as to provide for a U-shaped groove of said H-profile, intended to receive said L-shaped protrusion of said first building element. The U-shaping of the H-profile thus provides the second type coupling means with flanges holding the L-shaped protrusion of the first type coupling means in place. In this way, the first building element does not easily loosen from the second building element, and thus the structures are easily connected to each other. Thus, two structures at least comprising four building elements, may easily be combined without any effort to keep an already assembled structure in place.

[0019] In one embodiment the first and second flange protrudes from said exterior and/or said interior side of said first building element with a distance, defined by the thickness of the protruding part of the second building element, wherein the distance defining the shape variation in the surface of the structure. Preferably, at least a first flange extends a distance from the first building element in a direction towards the exterior, defined as the exterior side of a building, in this way providing a variation in the facade of the building as seen from the outside. A second flange, however, may extend a distance on the interior side as well, which may provide for an abutment surface on the interior side of the building system. Such an abutment surface could for example be used as an installation surface, during insulation of a building. The second building element may therefore have the additional effect of providing support means during insulation of a building.

[0020] In an embodiment the surface of at least one flange of the second coupling means facing the exterior surface may be provided with a pattern, such as a pattern of geometrical shapes chosen from circular, oval, round, triangular or may be uniform along the length of said flange. That is the flange of the second building element, which extends a distance from the first building element towards the exterior, thereby making up the shape vari-

ation in the facade of the building, may along the length of the second building element be provided with a pattern. That is, not only may differences between two different second building elements provide the façade with a unique design, but also a single second building element, could in itself be provided with a unique pattern.

[0021] The first and second building elements are preferably made out of wood, preferably the building elements are made out of wood treated with a weather resistant material, or otherwise impregnated. However, it could be contemplated that the building elements may be made out of another material, such as metal, concrete, or any other suitable material used for providing building elements.

[0022] In a second aspect of the invention a method of assembly of a building system is provided, wherein the method comprising the steps of providing at least two building elements, of which a first building element is provided with a coupling means of a first type, and a second building element is provided with a coupling means of a second type, connecting said first building element to said second building element, by coupling said first type coupling means to said second type coupling means, so that said first and second type coupling means interconnects to form a first structure, providing a further first and second building element, wherein said further second building element is of a different thickness and/or breadth from said second building element of said first structure, connecting said further first and second building element having said first and second type coupling means, so as to form a second structure, and connecting said first and second structure through coupling of at least one first type coupling means to one second type of coupling means of said first and second structure, respectively, and repeating the above mentioned steps a plurality of times to provide a wall of the building system.

[0023] In general the first and second building elements provided for the method of assembly should be construed as having the design, shape and construction as described in previous part of this disclosure, so as to provide a shape variation in the surface of the structure of the building system.

[0024] In the following the invention will be described in further details with reference to the accompanying drawings, where

Fig. 1 illustrates an embodiment of a building system from a top view, wherein a plurality of building elements is coupled together,

Fig. 2 illustrates an embodiment of a building structure from a top view, where a second building element according to the invention, is provided with an oval shape and is coupled to a first building element, Fig. 3 illustrates a top view of an embodiment of a second building element having a rectangular

shape,

Fig. 4 illustrates a top view of a second building element, according to an embodiment of the invention, the second building element having a trapeze shape, Fig. 5 illustrates a top view of an embodiment of a building system with a second building element having a rounded shape, said second building element being coupled to a first building element of a length smaller than the first building element of Fig. 2,

Fig. 6 illustrates a top view of an embodiment of a second building element with a quadratic shape similar to the building element of Fig. 3, however having different dimension with regards to thickness and breadth,

Figs 7 and 8 illustrates two further embodiments of the second building from a top view,

Fig. 9 illustrates a further embodiment of a building structure with a second building coupled to first building element, the second and first building element having different dimension in breadth and thickness compared to Figs 2 and 5,

Fig. 10 illustrates a further embodiment of a building structure with a second building coupled to first building element, the second building element have a protruding part on the interior side of the building having an oval shape

Fig. 11 illustrates a further embodiment of a building structure with a second building coupled to first building element, the first and second element forms a flush surface on the interior side of the building structure

Fig. 12 illustrates a further embodiment of a building structure with a second building coupled to first building element, the first and second element forms a flush surface on the interior side and the second building element provides a protruding part on the exterior side of the building structure having an oval shape.

Fig. 13 illustrates a side view of an embodiment of a building system, where the shape variation of the exterior side of the building system is seen,

Fig. 14 illustrates a front view of an embodiment of a building system according to Fig. 10. Fig 1 illustrates a building system 1 having an interior side 14 facing the interior of a building and exterior side 13 facing the exterior of a building to provide a facade. Although not illustrated it is also contemplated that the exterior side could face the interior of a building, so as to provide a unique surface on the inside of the building.

[0025] A first building element 10 comprises a first type coupling means 11 which is suitable to engage with a second type coupling means 21 of a second building element 20. In the building system 1, the first building element 10 comprises an L-shaped protrusion 12 as the first type coupling means 11, the L-shaped protrusion is, as may be seen from the figures, be provided in both

ends of the first building element 10. In this way at least one of the two L-shaped protrusions 12 can couple with the second type coupling means 21 of the second building element 20. However, both L-shaped protrusions are intended to be coupled with the second type coupling means so as to form a building system.

[0026] In this particular embodiment the second building element 20 has an H-profile 22, which comprises two U-shaped grooves 220 being connected by a middle section 223, as illustrated in especially Fig. 6. The U-shaped grooves 220 provides for coupling between at least one of the U-shaped grooves 220 with one of the two L-shaped protrusions 12 of the first building element 10, thereby providing a first structure 51 comprising the two building elements. The first structure 51 can be further coupled with a second structure 52 by the coupling means of at least a first and second building element. The second structure 52 comprises a first building element 110 coupled to a second building element 120, wherein the first structure 51 and second structure 52 are coupled by engaging the free L-shaped protrusion 12 of the first building element 110 with the free U-shaped groove 220 of the second building element 20. In the embodiment of Fig. 1, the second building elements 20 and 120 differ in their protruding distance from the exterior side 13 of the building system 1. That is the second building element 20 extends a distance away from the exterior side of the first building element 13, so that an observer looking at the building may observe a protrusion in the surface of the building wall, provided by the building system. Furthermore, the second building element 120 of the second structure 52 in a similar manner extends a distance away from the exterior surface of the first building element 110, so as to provide for a further variation in the surface of the building wall provided by the building system. With this configuration the building system provides for an opportunity to provide a unique looking facade for an observer standing on the exterior side of the building side and looking at the facade.

[0027] In another embodiment the assembly of such building system could be done by adding a first or second building element to a complementary coupling of a first or second building element, instead of assembling the building system by coupling at least two structures comprising at least two building elements.

[0028] Thus, the building system provides for a block system, with which a user, such as an architect or carpenter, may assemble the first and second building element to a series of structures being assembled, so as to provide a building system with a facade having a variation in structure, when looking at it from the outside of the building.

[0029] From Figs 2 to 9 it is seen that two or more second building elements may not only differ in protruding distance from the exterior side of the second building element as in Fig. 1, but may also differ in the geometrical shape and/or in the dimensional shape such as the breadth and/or thickness. Accordingly, the second build-

ing element 21 is essentially in all embodiments provided with an H-profile. The H-profile comprises a first flange 221 and a second flange 222 combined by a middle section 223, especially illustrated in Fig. 6. Together, the flanges 221, 222 with the middle section 223, defining the U-shaped groove used as the second type coupling means. In a mounted condition, as illustrated in any one of Figs. 1, 2, 5, and 9, the second flange 222 constitutes a protruding part, which in a mounted condition protrudes from the exterior side of the first building element. The shape of the protruding element may be provided with a pattern of geometrical shapes chosen from circular, oval, round, triangular or may be uniform along the length of said flange. Thus enabling the opportunity for providing an unique looking facade for an observer standing on the exterior side of the building side and looking at the facade.

[0030] Referring now to Figs. 10 and 11, which show examples of the flexibility in assembling a building system according to the invention. Fig. 10 is an embodiment showing how the second building element 20 may provide the interior side 14 of the building structure with a protruding part having an oval shape. From a manufacturing point of view it does not matter whether a protruding part having an oval shape are provided on the exterior side such as shown in Fig. 2 or on the interior side as shown in Fig. 10, because the second building elements 20 according to the invention are adapted to fit the first element independently on the direction of the protruding part. Hence, the building system may be installed with a high degree of freedom and still allow an effective production of the first and second building elements 10, 20.

[0031] Fig. 11 is comparable with the structure shown in Fig. 9 in that the L-shaped protrusions 12 of the first building element 10 and the U-shaped grooves of the second element 20 are not changed. In Fig. 11 the first building element 10 is turned compared to the first building element 10 in Fig. 9, so as the second element 20 does not protrude in a distance away from the first building element 10 on the interior side 14 of the building structure i.e. the surface on the interior side 14 of the building structure is flush. It should be noted that the turning of the first building element 10 does not affect the coupling of the L-shaped protrusions 12 and the U-shaped grooves of the first and second building element respectively. Hence, the first and second building element 10, 20 still fit together irrespective of the first building structure 10 is installed to provide a flush surface on the interior side 14 of the building structure 10 or not.

[0032] Figure 12 shows an embodiment where the first building element 10 is coupled to the second building element 20, the first and the second element 10, 20 forms a flush surface on the interior side 14 of the building structure. Furthermore, the second building element 20 is provided with oval shaped protruding part that protrudes in a distance from the surface of the first building element on the exterior side 13 in the exterior direction.

[0033] Further variations and combinations are envisioned and within the scope of the invention. Figures 13

and 14 show an example of such unique facade seen from the exterior side of a building system, i.e. seen from a view point of an observer standing outside the building and looking in towards the façade. In this embodiment the building is made from wood. It is clear to see from Fig. 13, that the second building elements 20 and 120 add a unique variation in the façade. In this particular embodiment the second building elements provides rectangular protrusions with different protruding distances. In another embodiment it could be contemplated that the second building elements are provided with differences in shape or combinations of variations, especially any of the shapes of the second building elements illustrated in Figs 3 to 8 could have been used.

[0034] From Fig. 14 it is clear that both second building elements 20, 120 are formed in wood, which in another embodiment can be optionally impregnated before use.

[0035] In a further embodiment it is easy to imagine that the second building elements can be formed in various materials such as metals, plastic, concrete or similar as long as the second building can be uniquely coupled to the first building element. Additionally one could imagine that material of the first building element may also be manufactured from various materials, but still with a unique coupling to the second building element.

[0036] In Figures 13 and 14 it can be seen that the first building elements 10 and 110 have the same breadth. This of course provides some symmetry to the façade, but the inventive concept is not limited to such symmetry, and the first building elements could easily have had different breadth, as is illustrated in Figs. 2, 5 and 9, wherein the breadths of the first building elements differ. Thus, providing a lot of customization and freedom when designing a façade for a building system and at the same time using a system having these elements, which are simple to manufacture.

[0037] It is within the general concept of the invention when a building system is comprised of more than one of the second building elements at least two of them differ in either protruding distance away from the surface of the first building element towards the exterior side building system and/or the shape of the protruding part of the second building element facing the exterior side of the building.

[0038] In a building system where at least two of the second building elements differ as described above, it is further within the general concept of the building system that the second flange, i.e. constituting the protruding part of the second building element and facing the interior side of a building, may vary in the protruding distance as well. Thereby providing an abutment surface on the interior side of the building, which can be used for example for the purpose of insulating the building. That is the protrusion on the interior side, provided by the second building element, may provide for an abutment surface onto where insulating materials, mounting and/or fitting of electronics, pipes, etc, may be applied. Despite how the protruding distance of the second flange on the interior

side and protruding part on the exterior side is shaped, it is within the gist of the invention that the first and second coupling means of the first building element and second building element respectively does not change. Thus providing a unique coupling of the first building element and the second building element despite of the protruding distances and/or shape of the second flange on the interior side and the protruding element on the exterior side of the second building element.

[0039] From this, it follows that a first building element can vary in the breadth or length, but may only vary as long as the unique coupling between the first building element and the second building element does not change. In one embodiment this would mean that the L-shaped protrusions of the first building element do not change when varying the length and/or the breadth of the first building element. The second building element can vary in thickness and in length, but may only vary in breadth as long as the unique coupling between the first and the second building element does not change. In one embodiment this would mean that the dimensions of the U-shaped grooves in the H-profile of the second building element does not change when varying the length, thickness and/or breadth of the second building element.

Claims

1. A building system comprising at least two building elements of which a first building element is provided with a coupling means of a first type, and a second building element is provided with a coupling means of a second type, said second type being configured essentially as a H-profile, wherein said first type coupling means are shaped complementary to said second type coupling means, so that the first and second type coupling means in a mounted condition of said building system are interconnected to form a structure comprising said first and second building elements, wherein the coupling means of the first and second building elements are configured such that a further first and second building element can be coupled to said structure, and wherein the second building element is configured to provide the structure with a shape variation in the surface of the structure.
2. A building system according to claim 1 comprising at least four building elements, of which at least two are configured as the first building element and at least two are configured as the second building element, wherein at least one of the first building elements and one of said second building elements defines a first structure, and a second of said first building element together with a second of said second building elements defines a second structure, wherein said second building elements of said two structures differ in breadth and/or thickness.

3. A building system according to claim 2, wherein said first and second structure in a mounted condition is coupled to each other through at least one of said second building elements. 5
4. A building system according to any one of the previous claims, wherein said first building element comprises an interior side and an exterior side, said interior side intended to face the interior of a building and said exterior side intended to form a facade of said building system, wherein at least one side of said first building element comprises said coupling means having a substantially L-shaped protrusion, which in a mounted condition couples to said H-profile of said second building element. 10
5. A building system according to claim 4, wherein said second coupling means of said second building element comprises a first and a second flange interconnected by a middle section, so as to provide for a U-shaped groove of said H-profile, intended to receive said L-shaped protrusion of said first building element. 15
6. A building system according to claim 5, wherein said first and second flange protrudes out from said exterior and/or said interior side of said first building element with a distance, said distance defining said shape variation in the surface of said structure. 20
7. A building system according to any one of claims 5 to 6, wherein said flanges of said second coupling means on said exterior surface is provided with a pattern, such as a pattern of geometrical shapes chosen from circular, oval, round, triangular or is uniform along the length of said flange. 25
8. A building system according to any one of the previous claims, wherein said first and second building elements are made out of wood, preferably said building elements are made out of wood treated with a weather resistant material. 30
9. A method for assembly of a building system, said method comprising the steps of 35
 - i) providing at least two building elements, of which a first building element is provided with a coupling means of a first type, and a second building element is provided with a coupling means of a second type, 40
 - ii) connecting said first building element to said second building element, by coupling said first type coupling means to said second type coupling means, so that said first and second type coupling means interconnects to form a first structure, 45
 - iii) providing further first and second building element, wherein said further second building element is of a different thickness and/or breadth from said second building element of said first structure, 50
 - iv) connecting said further first and second building element having said first and second type coupling means, so as to form a second structure, and
 - v) connecting said first and second structure through coupling of at least one first type coupling means to one second type of coupling means of said first and second structure, respectively; and 55
10. A method of assembly of a building system according to claim 9, wherein said second building element of said first and second structures comprises an H-profile having a first and second flange, said flanges in a mounted condition protruding out from said first building element with a distance, said distance defining a shape variation in the surface of said structure.
11. A method of assembly of a building system according to claim 10, wherein said distance of protrusion of said second building elements is different for the first and second structure.

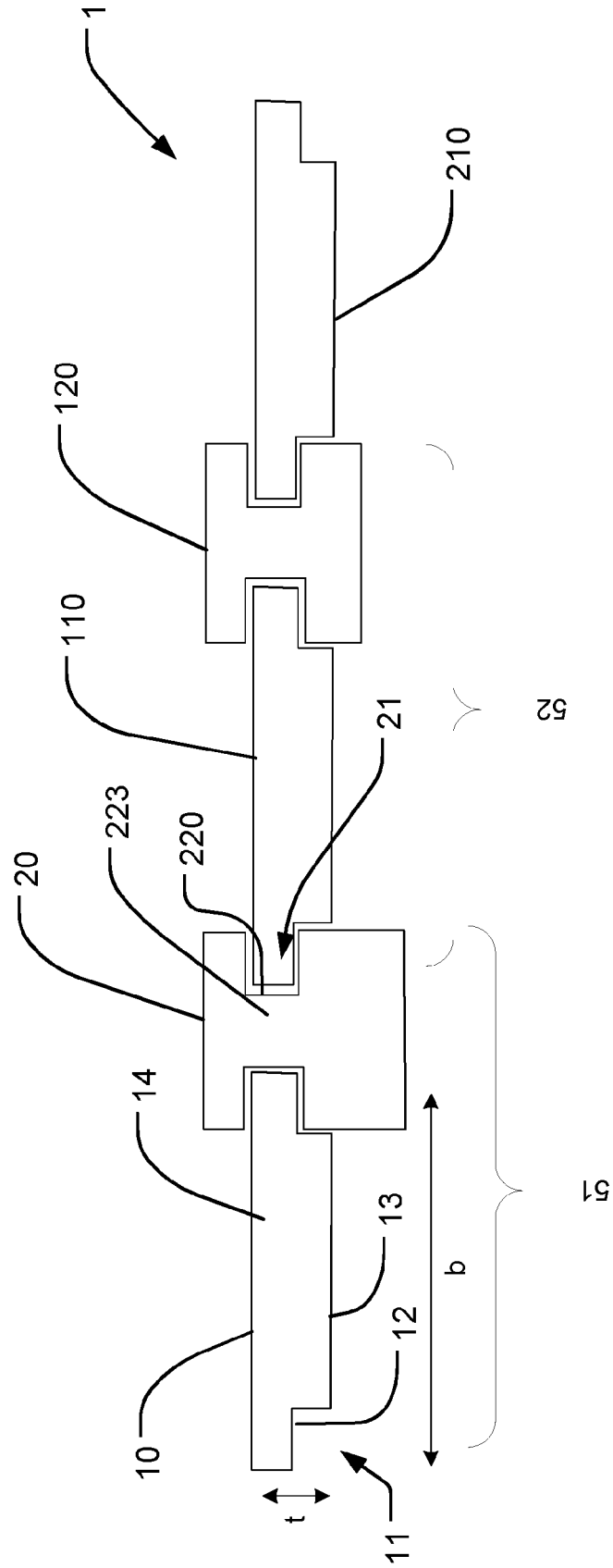
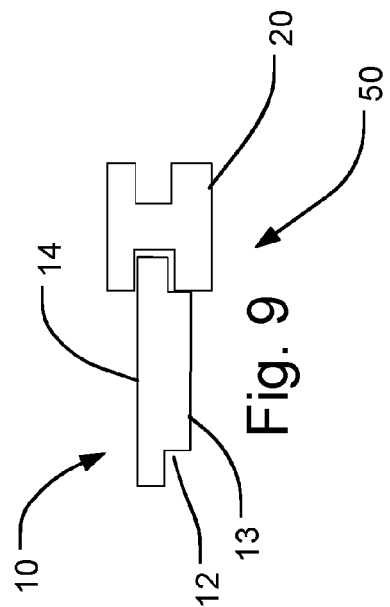
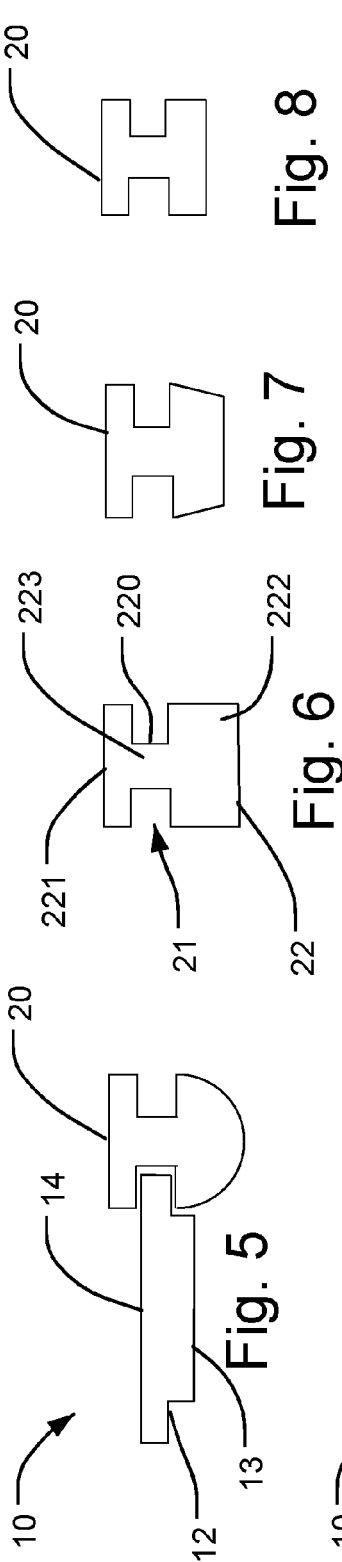
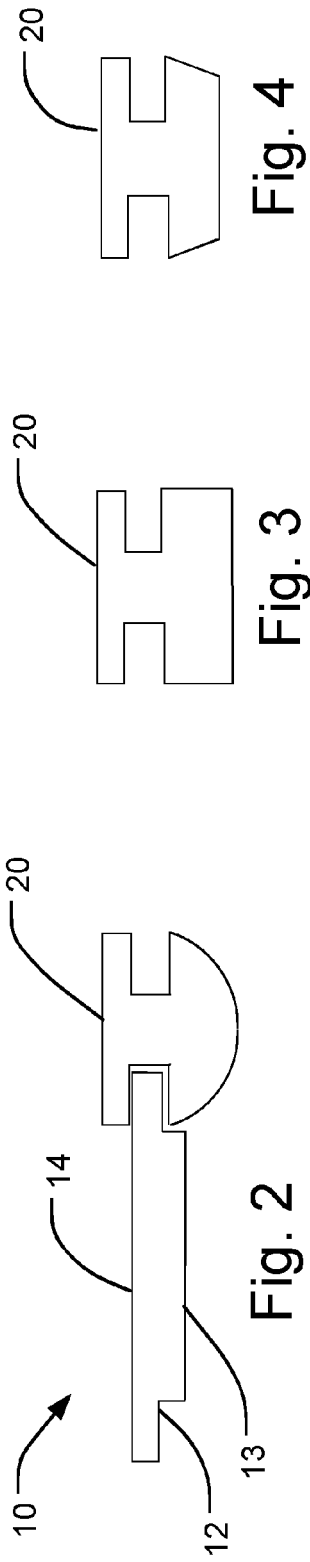
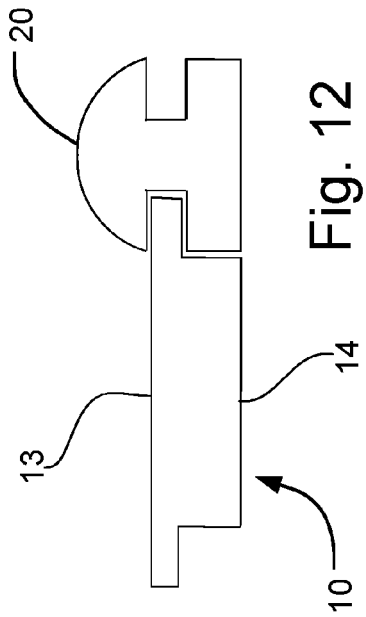
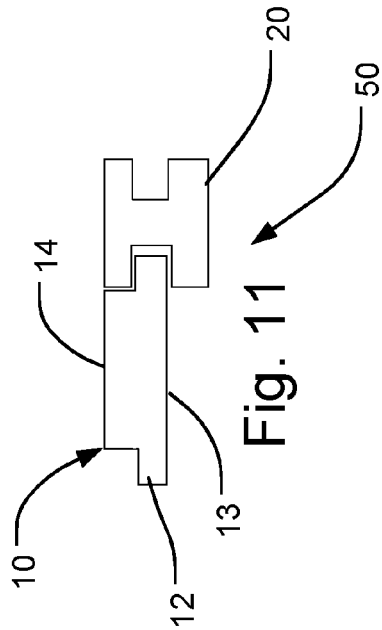
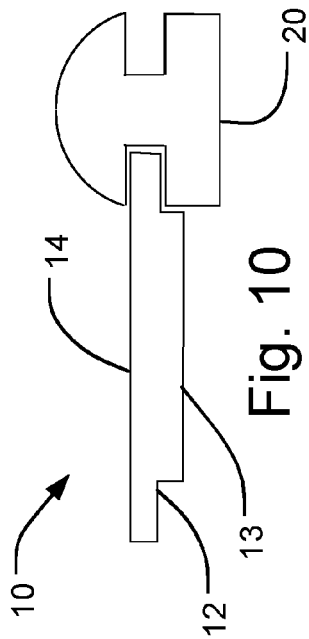


Fig. 1





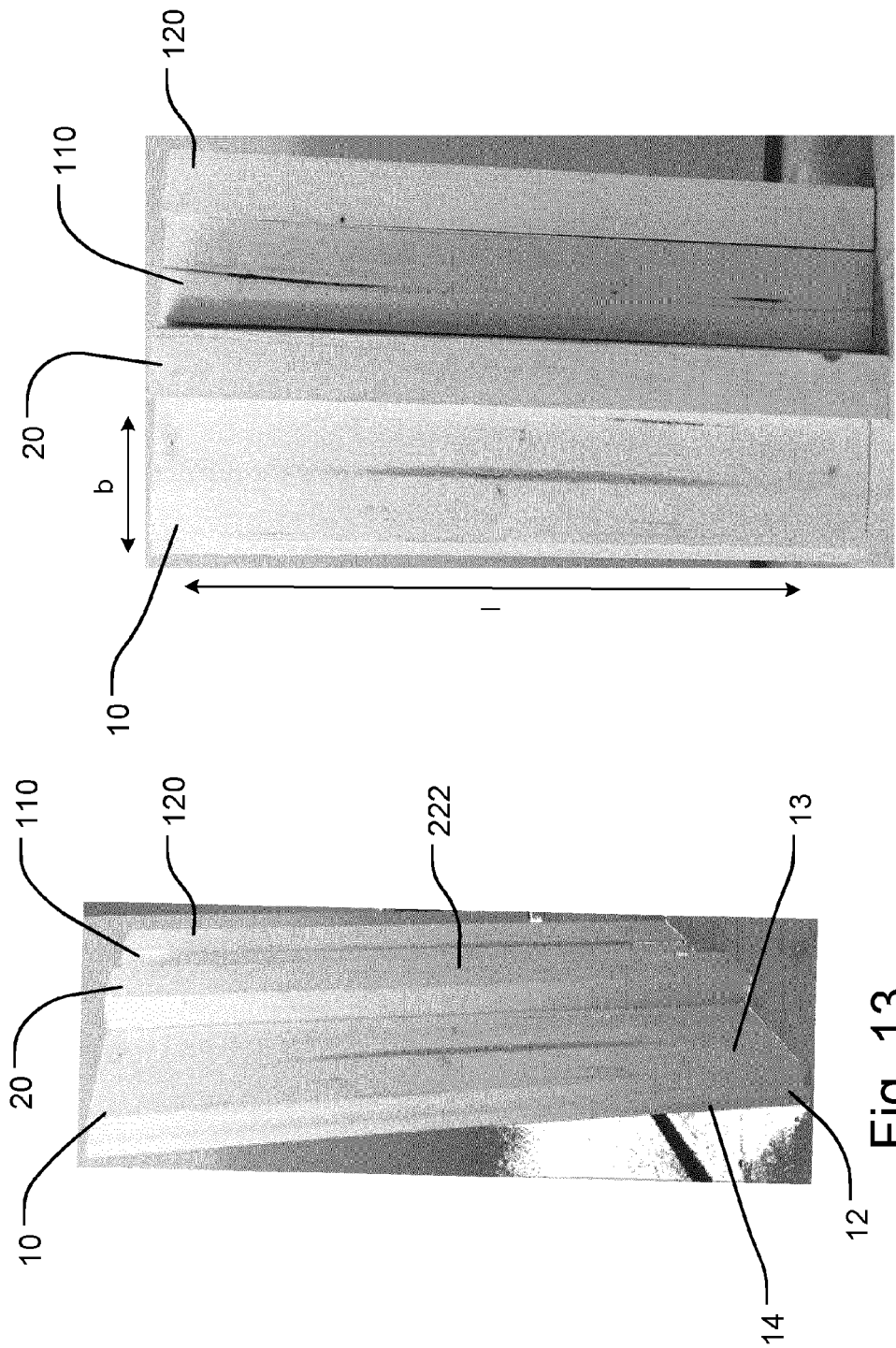


Fig. 14

Fig. 13



EUROPEAN SEARCH REPORT

 Application Number
 EP 16 16 7358

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 30 41 179 A1 (ALEKTA AB [SE]) 14 May 1981 (1981-05-14)	1-8	INV. E04F13/10 E04B2/70
Y	* page 4, paragraph 1 * * page 6, paragraph 6 - page 7, paragraph 3 * * page 9, paragraph 2; figures 1-4 *	9-11	
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Y	* column 1, line 5 - line 7 * * column 2, line 18 - column 4, line 3; claim 1; figures 1-4 *	9-11	
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