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(54) **PROFILED ELEMENT FOR ESTABLISHING TONGUE AND GROOVE CONNECTIONS, AND LAMINATE THEREOF**

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(57) **ABSTRACT**

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The invention relates to profiled elements (P) for the interior and exterior mounting, each element comprising at its lateral edges connection portions (10, 20) for establishing tongue and groove connections, and the connection portions (10, 20) comprising co-ordinated bulges (14, 24, 25) and recesses (12, 13, 22, 23) to provide a multi-level engaging of the tongue (10) into the groove (20). At least the groove (20) is comprising at each of its bottom and top sides (U, O) two bulges (24, 25) and/or recesses. The bulges (14, 24, 25) and recesses (12, 13, 22, 23) are symmetrically formed towards the transverse axis of the profiled element. The tongue (20) comprises a notch, in particular a V-shaped groove (27), which takes up the bolt head of a mounting screw (M). Thus the elements can be assembled and installed more easily and fast. Laminates or composites made of that elements are very flexible to compensate material-conditioned dimension changes caused by varying temperature and dampness.

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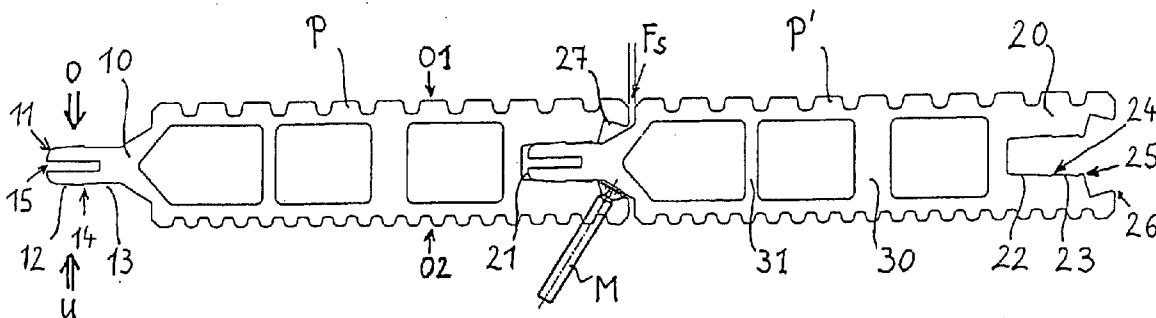
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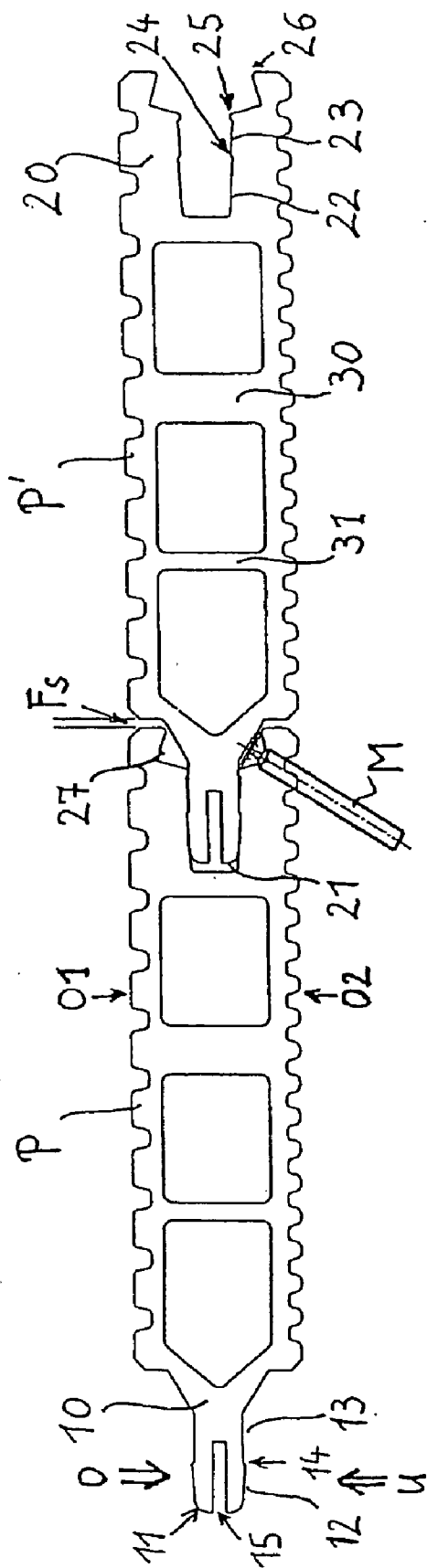


Fig. 1

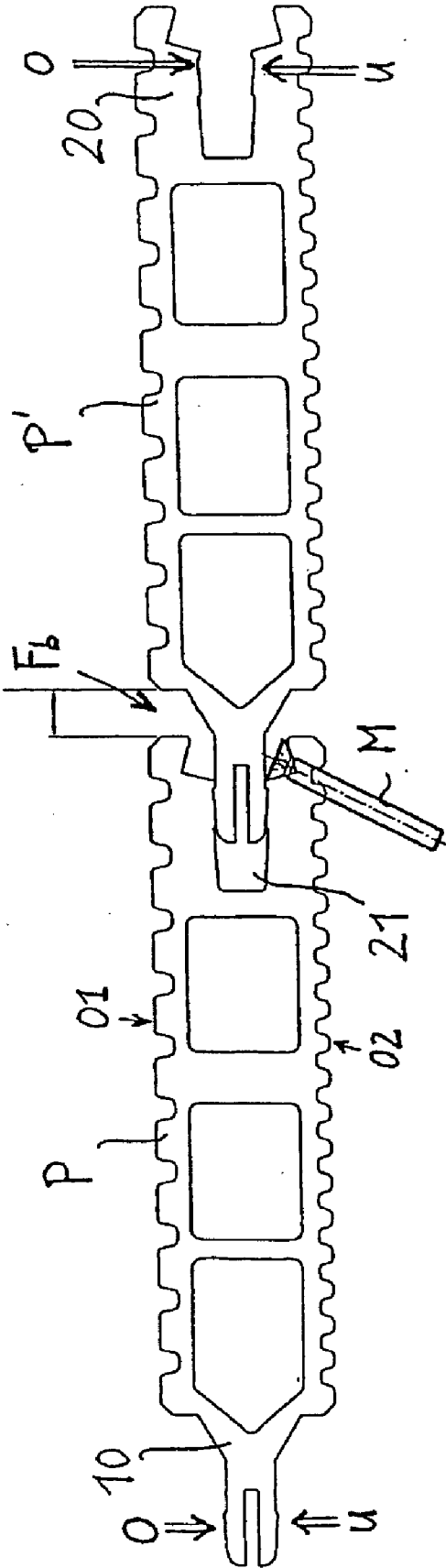


Fig. 2

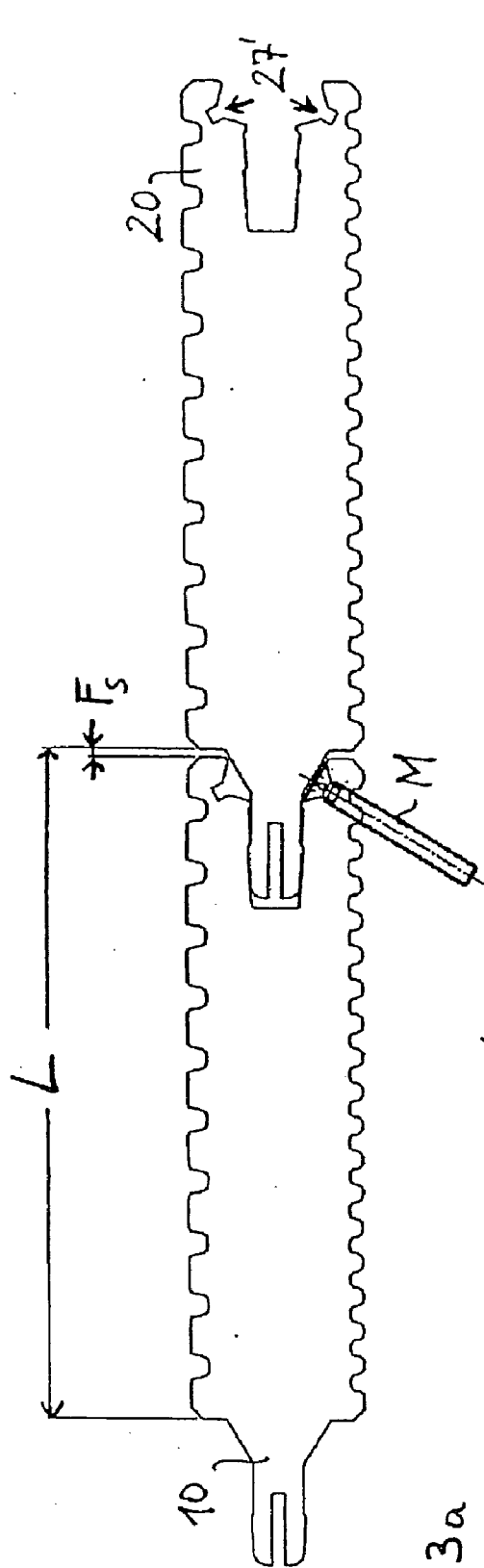


Fig. 3a

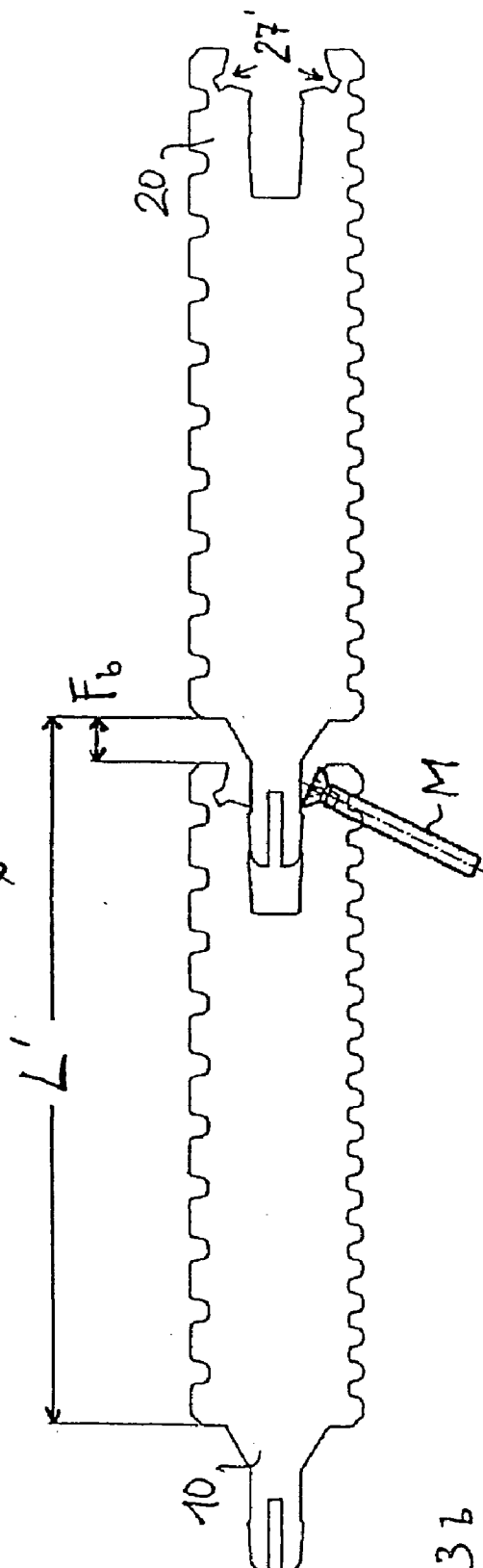


Fig. 3b

**PROFILED ELEMENT FOR ESTABLISHING
TONGUE AND GROOVE CONNECTIONS, AND
LAMINATE THEREOF**

FIELD OF THE INVENTION

[0001] The invention is related to a profiled element for the interior and exterior mounting having at its lateral edges attached thereto connection portions for establishing tongue and groove connections with adjacent profiled elements according to the preamble of claim 1.

[0002] Further the invention is related to a mechanical tongue and groove connection of profiled elements as well as to a laminate or composite of profiled elements, in particular to a decking profiled laminate, according to the preamble of one of the independent claims.

BACKGROUND OF THE INVENTION

[0003] In the field of the profiled elements which are used e.g. as wall and floor elements for interior and outside applications, it is well-known to interconnect profiled elements without glue and to join them to a composite, laminate or group. For example there are to mention oblong profile boards, planks, panels, but also rectangular and square profile plates having at their lateral edges a groove and a tongue respectively which both interlock with each other and thus establish a connection laminate or composite between the profiled elements. It is desirable to provide with these tongue and groove connections fast assembly and reliable adjustment of the profiled elements. There are modern connections for laminates, in particular tongue and groove connections for floor laminates, which are designed as so-called clicking connections. With these clicking connections the tongue is inserted into the groove, where it then engages form fit and/or force fit. Thus a joint and stuck press connection is provided which holds the profiles very strongly together. This however leads to the consequence that these clicking connections are also very firm and inflexible in relation to material-conditioned dimension changes. In particular these clicking connections can merely compensate material expansions and tensions which may occur due to variations in temperature and changes of the material dampness.

[0004] Conventional designed profiled elements are known e.g. from DE-A-3512206 or from DE-U-29822341. Moreover from DE-A-10051404 there is known a clicking connection having profiled elements, namely floor and wall panels, comprising a locking device mechanism formed by a tongue and groove connection. The grooves and tongues are formed by recesses and bulges having a bottom and a top side. As being described there with reference to the **FIGS. 8 and 10**, one of these sides may even have two recesses and bulges. The connection portions, i.e. the grooves and tongues, may be designed such that in the assembled arrangement at they are aligned to each other by an offset. Once the tongue snaps into the groove there will be established a very firm and close tongue and groove connection. However this connection is quite rigidly and therefore less suitable to absorb and to compensate material tolerances.

[0005] This means that there are well-known profiled elements for the interior and exterior mounting which have at their lateral edges attached thereto connection parts to establish tongue and groove connections with adjacent pro-

filed elements, the respective profiled element having at one of its lateral edges at least one tongue and having at the opposite lateral edge at least one groove which is insertable into the tongue of the adjacent profiled elements, the connection parts each having a bottom surface and a top surface with aligned bulges and recesses. However these well-known profiled elements have the above-mentioned disadvantages.

OBJECT OF THE INVENTION

[0006] Therefore it is an object of the invention to suggest profiled elements which can be assembled together and can be installed easily and fast by means of tongue and groove connections. Laminates or composites being assembled from such profiled elements may be flexible regarding the material-conditioned dimension changes which can particularly occur at varying temperature and material dampness.

SHORT DESCRIPTION OF THE INVENTION

[0007] The object of the invention is solved by a profiled element having the features according to claim 1. Further the object is solved by a laminate of profiled elements, in particular by a decking laminate, and also by a tongue and groove connection of profiled elements with the features according to one of the independent claims.

[0008] Accordingly a profiled element is presented which provides a multi-level engaging of the tongue into the groove, the tongue comprising on its lower side and on its top side bulges and recesses which are symmetrically designed to the transverse axis of the profile, and the groove comprising on each of its lower and top sides a notch, in particular a V-shaped groove, which takes up the bolt head of a mounting screw.

[0009] Because of this symmetrical and multi-level design a very fast and easy assembly of the profiled elements is achieved as well as a multi-step clickwise joining of the profiled elements. Thus one could also call this connection a "multiple clicking connection" or "multi-step snap fitting". Among other advantages the suggested symmetrical structure has the big advantage that the assembly of the profiled element laminate, in particular the installation, is very flexible. In addition to this the suggested laminate is very durable and tolerant in relation to disturbing material influences by temperature and humidity or similar effects.

[0010] Some embodiments having further advantages are defined in the subclaims, i.e.:

[0011] According to one embodiment it is advantageous that the profiled element is completely symmetrically designed and is having two identical sides. Thus the assembly can be performed even faster, since the profiled elements always fit to each other irrespectively from their adjustment. This is because there is no orientation to be noticed when assembling the profiled elements, in particular there is no upper or lower side to which the adjacent profile element must be aligned.

[0012] Another advantage results if inside the profiled element a symmetrically designed core is arranged, but outwardly two different surfaces are provided. Thus the profiled elements can be joined in any arbitrary orientation. Since the profiled surfaces can differ according to structure, coating, color or the like, it is possible to arrange a large

variety of laminate assemblies without complexity and it is possible to vary the appearance of the laminate as a whole or in sections or even from one profiled element to the adjacent one.

[0013] It is also advantageous if the tongue and the groove comprise two corresponding faces both tapering off and contacting each other within the at least two snap-in positions. Thus two precisely defined end stop surfaces are created which determine for each snap-in position a corresponding distance between the profiles. Therefore a constant stability of the connection is achieved though the laminate can be assembled and mounted with at least two different joint widths.

[0014] In this context an outstanding advantage results if the tongue comprises a cone end having a longitudinal slot whereby the tongue for insertion into the groove becomes resilient snapable within at least two stages. Thus the installation is considerably facilitated and clamping resulting from changes in temperature or dampness is compensated.

[0015] Moreover it is advantageous if the surface of the tongue and/or groove comprise compressible desired dents. Thereby further changes in dimension are compensated throughout the profile width whereby in the moment of assembling the compressible desired dents define an exact fixing of the profiles.

[0016] Beyond this an outstanding advantage results if the groove comprises a remaining cavity when the tongue is completely introduced, whereby changes in dimension are very well compensated in longitudinal direction.

[0017] A further advantage results if the groove comprises at both of its bottom and top side a recess respectively, in particular a V-shaped groove, for receiving a head of a mounting screw. By this measure, an invisible fixing of the profiles is provided. And further mounting elements, like e.g. distance clamps, are not required.

SHORT DESCRIPTION OF THE FIGURES

[0018] These and even more advantages will become more apparent by the following description of two embodiment of the invention. Therefore reference is taken to the enclosed schematic drawings:

[0019] **FIG. 1** that shows a cross-section of two cavity-profiled elements being joint together, whereat the connection parts are snapped together at a small distance.

[0020] **FIG. 2** that shows a cross-section of these two cavity-profiled elements, whereat the connection parts are snapped together at a broad distance.

[0021] **FIG. 3a** that shows in a cross-section two solid-material profiled elements, whereat the connection parts are snapped together at a small distance.

[0022] **FIG. 3b** that shows in a cross-section two solid-material profiled elements, whereat the connection parts are snapped together at a broad distance.

DESCRIPTION OF SOME EMBODIMENTS

[0023] The **FIG. 1** shows the fundamental construction of a laminate (composite) of two profiled elements P and P' according to the invention which is advantageously embod-

ied as decking profiled laminate (to express that the laminate can preferably be used on a deck or a floor). Each of the profiled elements P and P' have at their respective side borders, i.e. at their longitudinal edges, attached thereto connection portions **10** and **20** that serve as tongue and groove connections. This means that at least one feather or tongue **10** is provided which has at its longitudinal edge a cone-shaped tip or cone end **11**. At the opposite side, i.e. the other longitudinal edge, at least a groove **20** is provided to receive the tongue **10** of the adjacent profiled element P', whereby bulges and/or recesses are foreseen which are aligned to each other, so that at least a two-step engagement of the tongue **10** into the groove **20** is possible. This can be realized e.g. in the form of distinct groove cheeks or flakes, noses, notches, and the like.

[0024] In the example of the **FIG. 1** the tongue **10** has the form of the cross-section of a dowel profile with tapered of faces **12** and **13** that are equipped with a bump or elevation **14** having defined rising and descent angles. The rising angle is in the direction of insertion more flatly designed than the descent angle in the opposite direction. Thus a click-connection is provided which can be established easily but also can be closed safely. The feather or tongue **10** is constructed as tip or cone end **11** at one of its longitudinal edges of the profiled elements P and has in its center part an ablong slot **15** which provides an elastic or resilient effect when the tongue **10** is introduced into the groove **20** of the adjacent profiled element P'.

[0025] The groove **20** is constructed correspondingly to the cross-section form of the tongue **10** as a counterpart and has correspondingly tapered of faces **22** and **23** that serve as leading and back stop faces. In order to enable an two-step sapping or engaging there are attached to the faces **22** and **23** of the groove **20** two bulges **24** and **25** in a pre-defined distance, whereby the first bulge, bump or elevation **25** also serves as a predetermined dent. Both elevations **24** and **25** in the groove **20** interact with the depressions or recesses **12** and **13** as well as with the elevation **25** of the tongue **10** and thus fix the assembled profiled elements P and P' in the desired one of the two snap-in positions. In the drawing of **FIG. 1** this is the second, narrower position, in which a small gap remains between the profiles P and P', namely a distance joint Fs of about 2 mm.

[0026] In addition to the above mentioned abut surfaces **22** and **23** the predetermined dent **25** and a further predetermined dent **26** cause a precise fixing of the profiles thus facilitating the mounting. The groove-tongue-connection is fully symmetrically designed with respect to the profile axis. Therefore no differently formed top and bottom sides exist and thus there is no need to pay attention to the alignment of the grooves and tongues during the mounting. This is of high advantage and results when the core part of the profile is symmetrically designed and when also the surfaces of the profile are similar on both sides. In this special case any notice of top and lower side becomes superfluous when mounting the elements.

[0027] To say it in other words: What is presented by the invention is a snap fitting for linking decking elements having symmetrical grip flanges and grooves (**10**, **20**) on the long edges of the elements. The flanges have two or more grip ridges (**14**) which engage corresponding grip grooves (**24**) inside the connecting grooves on adjacent elements.

The grip flanges are split (15) to provide a spring effect. The decking elements have different profiled outer surfaces (O1, O2) and can be laid either way up. The elements may be secured onto the support structure by threaded fasteners (M) set through the lower lips of the fitting grooves via countersunk holes. The decking elements provide an improved fitting grip without undue increase in manufacturing cost. The elements are preferably used for wall and floor cladding.

[0028] In the example presented in FIG. 1, each of the shown profile elements P and P' is indeed constructed symmetrically in the core part, but is having two surfaces O1 and O2 with different corrugation. In this example there are shown chequered surfaces, namely a coarse chequered top side O1 and a fine chequered lower side O2. Thus a fine chequered as well as a coarse chequered laminate can be laid by simply turning the profiles when mounting the elements. Likewise the profile elements can be turned alternately to get a design of optical special impression. Beside the possibility to have differently structured surfaces there can also be used differently arrangements in color or even in surface coating. The possible field of application is extremely versatile.

[0029] In addition to this there are further possibilities of very functional designs which can result from the multi-stage engagement, i.e. in this example of the two-step engagement and fixing of the elements. This means that the profiled laminates or composites can be assembled with different joint widths very easily and quickly, whereby the whole composite can get a consistent appearance or can also change alternating from profile to profile.

[0030] In the FIG. 2 a similar arrangement like that which is shown in the FIG. 1 is represented here, but being different in that the profiles P and P' are now connected to each other such that the first position of engagement is established. That means that a wider joint or gap Fb of about 10 mm results. Although this wider gap and thus a larger distance is established, the reached fixing of the profiles is precise and secure.

[0031] The profile being here described by reference to the FIGS. 1 and 2 provides six different types of laying the elements to a composite laminate having:

- [0032] i) a fine corrugation with a wide gap laying
- [0033] ii) a fine corrugation with a small gap laying
- [0034] iii) a coarse corrugation with a wide gap laying
- [0035] iv) a coarse corrugation with a small gap laying
- [0036] v) a combined (altering) corrugation with a wide gap laying
- [0037] vi) a combined (altering) corrugation with a small gap laying

[0038] Independent of that type of laminate the composite is always dense because of the inventive construction of the laminate. In particular there are no gaps left through which objects may drop or weeds may grow when the composite is used as a floor laminate.

[0039] Further to this the construction may be used as a wall element as blinds to screen from view and further to protect from rain and wind etc.

[0040] It is also to mention that the slot 15 being centered in the middle of the head section provides an elastic effect. This eases the joining of the elements and compensates any tensions which may occur because of temperature- or damp-

related changes of the dimension. Further the cavity extending in the longitudinal direction 21 also serve to absorb dimension changes caused by temperature or damp.

[0041] And further to this the small gap Fs which remains after the element are closely joint together can also sufficiently absorb dimension changes in the laminate plane. The dead stop areas 12 and 13 or 22 and 23 respectively serve to fix the composite and to guarantee an optimal guidance when connecting the elements in vertical and horizontal direction. That also applies for the status when the elements are joint at the more open position, i.e. when essentially the dead end area 12 of the tongue 10 interacts with the dead end area 23 of the groove 20.

[0042] Because of the predetermined dents 25 and 26 which are compressible, again further changes of dimension coming from variation in temperature or damp and moisture can be compensated, now along the entire length of the profile. While assembling the elements the predetermined dents further provide an exact fixing of the profiles towards each other.

[0043] The angle of the dent areas and the elevations are designed such that the assembly of the elements is made more easily than the disassembly. Thus the mounting is eased and the absorption of tensile stress in the laminate plane is compensated. Therefore any warping of the profile which could result from partial changes in dimension is successfully suppressed. However the possibility to the simple disassembly the elements still remains.

[0044] Because of the V-shaped groove 27 which provides the reception of mounting screws M the fixing of the elements is kept invisible and can be realized without the use of other or further mounting means (e.g. distance clamps). The design of the groove having a V-shaped form defines an exact mounting point, it eases the right positioning of the screw, it supports the grip of the worm without the need to prepare a whole for insertion of the screw and it receives the head of the screw such that the connecting elements (fasteners) are not affected. Instead of using a V-form as shown here, also other forms and designs can be meaningfully depending on the shape of the used mounting screws.

[0045] The tip 15 of the flexible fastener (tongue 10) is formed such that, while mounting the both elements, the joining is automatically centered without any jam or stuck.

[0046] The connection is especially meant to be used for profiles made of composite material containing about 30 or more percent of cellulose natural fibers or chips as well as containing about 20 or more percent of thermosetting or thermoplastic binding agents.

[0047] The surfaces of the profile elements can be uncoated, the core can have natural color or can be dyed, varnished or coated with thermoplastic or thermosetting surfaces.

[0048] By having provided a center support or bar 30 within the cavity (hollow chamber) of the profile, the profile element can be separated very simply in its middle part and thus can be used as end profile or termination profile, e.g. when being used in the field of laminate floors. The placing of the elements can be made without additional mounting means or parts, also when placing the elements with a larger distance gap.

[0049] In the FIGS. 3a and 3b a corresponding arrangement is presented, wherein no profiles with hollow chambers are used, but rather profiles of massive material are used.

Moreover these profiles represented here are having in their outward portions a groove 20 having differently designed recesses, cut-outs or notches 27' to receive mounting screws M. In this example, the recess 27' has a V-shaped basic design, but the recess meets a straight slot. This slot eases the screwing during the mounting and reduces the risk that material tensions will appear which could cause this portion of the groove to break away while tightening the screw. In the narrower snap-in position (see FIG. 3a) a smaller joint gap Fs of 2 mm remains and the distance interval from one profile front edge to the next one will be L=146 mm. In the next plug-in position (see FIG. 3b) a wide joint gap Fb of 10 mm remains and the distance interval from one profile front edge to the next one will be L'=154 mm.

[0050] The present invention suits both for oblong profile elements, especially for floor profile planks and wall panels, as well as for profile plates or slabs which preferably have a quadratic form. In this case only two of the four side edges, namely the two opposite side edges, need to have connection means, i.e. grooves or feather. However all four side edges can be equipped with connecting means according to the invention, thus further increasing the belting effect of the profiled laminate.

1. Profiled element for the interior and exterior mounting, the profiled element comprising at its lateral edges connection portions for establishing tongue and groove connections with adjacent profiled elements, each profiled element comprising at one of its lateral edges at least one tongue and at the opposite lateral edge comprising at least one groove, wherein the tongue of the adjacent profiled element being insertable, and the connection portions each with a bottom side and a top side comprising coordinated bulges and recesses to provide a multi-level engaging of the tongue into the groove, and at least one of the connection portions is comprising at each of its bottom and top sides at least two bulges and/or recesses,

characterized in that

the bulges and recesses at the bottom side and at the top side are symmetrically formed towards the transverse axis of the profiled element, and that the tongue comprises at its bottom and top side a notch, in particular a V-shaped groove, which takes up the bolt head of a mounting screw.

2. Profiled element as cited in claim 1, characterized in that the V-shaped groove is meeting a straight slot.

3. Profiled element as cited in claim 1, characterized in that the profiled element is comprising at least inwardly a symmetrically designed core portion, and that the bulges and recesses at the bottom side and at the top side are symmetrically formed towards the transverse axis of the profiled element and that at least the tongue is having faces tapering off with rising angles towards the direction of insertion being more plain than the decent angles towards the opposite direction.

4. Profiled element as cited in claim 1, characterized in that the entire profiled element is symmetrically designed and is comprising two equal surfaces.

5. Profiled element as cited in claim 1, characterized in that the profiled element is inwardly comprising a symmetrically designed core portion, but is outwardly comprising two different surfaces.

6. Profiled element as cited in claim 1, characterized in that the recesses of the tongue and the recesses of the groove

are comprising two faces tapering off and being slopingly truncated, thus the faces at least in the snap-in position are lying against to each other and are directly contacting each other.

7. Profiled element as cited in claim 1, characterized in that the tongue comprises a cone end having a longitudinal slot, whereby the tongue for the insertion into the groove becomes resilient snapable within at least two-stages.

8. Profiled element as cited in claim 1, characterized in that the bulges of the groove and/or of the tongue comprise compressible desired dents.

9. Profiled element as cited in claim 1, characterized in that when the tongue is totally inserted into the groove comprises a remaining excavation and/or a remaining gap joint between the profiled elements.

10. Profiled element as cited in claim 1, characterized in that the profiled element is a prolate profiled blank or a rectangular, in particular quadratic, profiled plate.

11. Tongue and groove connection of profiled elements for the interior and exterior mounting, the profiled elements having at their lateral edges attached thereto connecting portions, each profiled element comprising at one of its lateral edges at least one tongue and at the opposite lateral edge comprising at least one groove, thus the tongue of the adjacent profiled element being insertable therein, and the connecting portions each comprising a bottom side and a top side with co-ordinated bulges and recesses to provide a multi-level engaging of the tongue into the groove, and at least one of the connecting portions is comprising at each of its bottom and top sides at least two bulges and/or recesses,

characterized in that

the bulges and recesses at the bottom side and at the top side are symmetrically formed towards the transverse axis of the profiled element, and that the tongue comprises at its bottom and top side a recess, in particular a V-shaped groove, which takes up the bolt head of an mounting screw.

12. Laminate of profiled elements, in particular a decking profile laminate, having profiled elements for the interior and exterior mounting, the profiled elements having at their lateral edges designed connecting portions for establishing a tongue and groove connection with adjacent profiled elements, each profiled element comprising at one of its lateral edges at least one tongue and at the opposite lateral edge having at least one groove, thus the tongue of the adjacent profiled element being insertable therein, and the connecting portions each comprising a bottom side and a top side with co-ordinated bulges and recesses to provide a multi-level engaging of the tongue into the groove, and at least one of the connecting portions is comprising at each of its bottom and top sides at least two bulges and/or recesses,

characterized in that

the bulges and recesses at the bottom side and at the top side are symmetrically formed towards the transverse axis of the profiled element, and that the tongue comprises at its bottom and top side a recess, in particular a V-shaped groove, which takes up the bolt head of an mounting screw.