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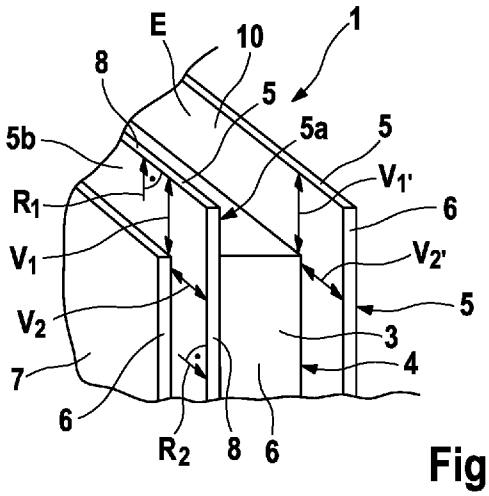

Fig. 1

(57) Abstract: The invention relates to a multi-layer wall element for building up drywalls (2) comprising an insulating ply (3) with two flat sides (5a; 5b) of heat or sound insulating material which have a large surface area relative to front sides (6), wherein a support layer (5) is placed with an inner flat side (5a; 5b) of the support layer (5) against each flat side (5a; 5b) of the insulating ply (3), wherein a cover layer (7) is placed against each outer flat side (5a; 5b) of the support layer (5), and wherein the support layer (5) is, along at least two directions (R1, R2) which are oriented parallel to a plane (E) of the support layer (5) and perpendicular to confining edges (8) of the support layer, offset relative to the cover layer (7) by a respective offset amount ($V_1/V_{1'}$; $V_2/V_{2,}$), wherein the support layer (5) forms a tongue (10) at least along a first confining edge (8) and along at least one opposite second confining edge (8) a groove (11) together with the insulating ply (3) and the cover layer (7).

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Description

Multi-Layer Wall Element for Building up Drywalls as well as Drywall Comprising the Wall Element

The invention relates to a multi-layer wall element for building up drywalls as well as to a drywall comprising at least one wall element.

WO 94/26992 discloses a connecting structure for sandwich panels. The sandwich panels have a mineral wool core provided with skin-like layers on both flat sides. At the front side, a groove and tongue structure is imparted in the mineral wool core, so that two such panels may be stuck together in the type of a groove and tongue joint. The dimensions of the groove and tongue joint are chosen such that, during the sticking together of two such panels, a compression of the mineral wool core takes place locally at the front side.

DE 20 2009 001 212 U1 discloses a heat insulating board, in particular a walkable, rectangular heat insulating board which is composed of three board. A core board is formed as a polystyrene hard foam board. A bottom-side board is also formed as a polystyrene hard foam board. A cover board is formed of a cover board that is thinner relative to the other boards and is in particular mineral-bound. The boards are arranged to be offset from each other such that a groove is formed at two sides and a tongue is formed at two sides.

DE 20 2004 010 695 U1 discloses a vacuum insulating panel which can be connected with other vacuum insulating panels in accordance with the groove and tongue principle. An evacuated interior serves as an insulation between two cover layers. The cover layers are interconnected by means of a frame and kept spaced apart from each other. Gaps produced between the cover layers when a plurality of such panels are stuck together may be bridged by means of inserts.

It is an object of the invention to indicate an easy-to-handle wall element for building up drywalls which has increased stability and good heat and/or sound insulating properties.

Furthermore, during the building of such a drywall from wall elements in accordance with the invention it is intended to be possible that at least two wall elements can be fixed in advance with little effort.

Moreover, an outer side of a drywall to be built up is intended to be workable with usual tools/materials for achieving its surface finish (finished surface quality).

Moreover, in a particular embodiment the multi-layer wall element is to be capable of providing predefined supply channels.

Moreover, it is intended to be possible that drywalls are built up with the multi-layer wall element in accordance with the invention without additional connecting elements apart from screws.

Furthermore, it is intended that the multi-layer wall element in accordance with the invention is easy and straightforward to process especially in the do-it-yourself field.

Furthermore, a drywall is to be indicated which can be built up in a simple and low-cost manner.

The above objects concerning the wall element are solved with a multi-layer wall element for building up drywalls with the features of claim 1. Advantageous embodiments are indicated in the subclaims.

The above objects concerning the drywall are solved with a drywall with the features of claim 18.

A multi-layer wall element for building up drywalls comprises: an insulating ply with two flat sides of heat or sound insulating material which have a large surface area relative to front sides, wherein a support layer is placed with an inner flat side of the support layer against each flat side of the insulating ply, wherein a cover layer is placed against each outer flat side of the support layer, wherein the support layer is, along at least two directions R1, R2 which are oriented parallel to a plane E of the support layer and perpendicular to confining edges of the support layer, offset relative to the cover layer by a respective offset amount V_1; V_2, wherein the support layer forms a tongue at least along a first confining edge and along at least one opposite second confining edge a groove together with the insulating ply and the cover layer.

With such a multi-layer wall element in accordance with the invention it is easily possible to implement a stable drywall which can be built up quickly by sticking together a plurality of multi-layer wall elements in the groove and tongue principle.

Furthermore, the wall elements, which each per se already form a piece of a completely finished drywall, may be processed without additional connecting elements. The awkward building up of a post and beam structure which is then finished to form a drywall by its facing with plasterboards and filling the cavity with insulation materials may be omitted.

Furthermore, it is possible to provide such prefabricated multi-layer wall elements in practically manageable sizes which are also good to handle and to use at narrow building site sections difficult to access.

With the multi-layer wall element in accordance with the invention it is thus possible to provide a simple possibility of building up drywalls without complex preliminary work which can especially be implemented in the do-it-yourself field with little technical knowledge.

It is particularly preferred that the offset amount $V_1/V_{1'}$ and the offset amount $V_2/V_{2'}$ are larger than zero, so that at least two tongues and at least two grooves are formed.

With the offset amounts $V_1/V_{1'}$ and $V_2/V_{2'}$ which are larger than zero, at two respective opposite confining edges of a multi-layer wall element, for instance, one groove and one tongue each are formed. Such wall elements can thus be stuck together in a simple manner. For the beginning of a drywall, i.e. for the lowermost row of multi-layer wall elements and/or for the elements adjoining an existing wall for building up a drywall it may be useful not to provide such an offset at least on one side, so that near the floor a confining edge of the drywall can be established where both the cover layers and the support layers and the insulating layer are flush with each other.

Alternatively, a multi-layer wall element comprising offset amounts $V_1/V_{1'}$ and $V_2/V_{2'}$ in both directions may, of course, also be reworked easily by cutting the corresponding regions to form a wall element that is flush on one side.

In a particular embodiment the offset amount $V_1/V_{1'}$ is larger than the offset amount $V_2/V_{2'}$.

In an embodiment in which one of the offset amounts $V_1/V_{1'}$ or $V_2/V_{2'}$ is larger than the other offset amount, tongues of different lengths will result (an offset amount with a larger amount results in a longer tongue than an offset amount with a lower amount). In correspondence therewith, the grooves opposing the corresponding tongues will also be of different depths.

If the offset amount $V_1/V_{1'}$, i.e. the offset amount defined as a vertical offset amount in the scope of this application, is larger than the horizontal offset amount, it may, for instance be achieved that a deeper slide-in mount and wider overlapping of two stacked wall elements along their horizontal joint may be achieved. Such enlarged or increased slide-in mount depth along the horizontal confining edges causes only little additional effort for the builder of a drywall since the weight of a wall element supports the mating in the vertical direction. Contrary to this, a weight support does not exist in the direction of vertical joints, so that a lower slide-in mount depth may be expedient there so as to keep the corresponding mating forces low.

The offset amount $V_1/V_{1'}$ may also be smaller than the offset amount $V_2/V_{2'}$.

If the offset amount $V_1/V_{1'}$ is chosen smaller than the offset amount $V_2/V_{2'}$, i.e. the vertical offset amount smaller than the horizontal offset amount, it is possible to build up drywalls which are particularly bulge-proof in the horizontal direction from multi-layer wall elements modified this way.

In a preferred embodiment the offset amount $V_1/V_{1'}$ is equal to the offset amount $V_2/V_{2'}$.

If the horizontal and vertical offset amounts are chosen to be equal, the slide-in mount depth is, for instance in the case of a square or a rectangular multi-layer wall element, especially with a square element, circumferentially the same, so that the orientation of the wall elements relative to each other need not necessarily be observed. In the case of a rectangular wall element it may, for instance, be expedient to raise one of the wall elements on edge, whereas other wall elements are arranged with the broadside down. Since all offset amounts $V_{1'}/V_{2'}$ are equal, the slide-in mount depths are equal everywhere.

In a further preferred embodiment the insulating ply, the support layer and the cover layer are square or rectangular in a viewing direction on flat sides of the plies/layers.

With such a cut geometry of the individual plies/layers it is possible to implement multi-layer wall elements which are particularly good to handle and to process.

Furthermore, it may be advantageous if at least the support layer and the cover layer are of equal size in a plan view on the flat sides thereof.

With such a design it is possible, when sticking together a plurality of multi-layer wall elements, to avoid joints both between the corresponding converging support layers and between the converging cover layers.

In a further advantageous embodiment the surface area of the insulating ply is, in the top view on the flat side thereof, of equal size or slightly larger than that of the support layer, i.e. with oversize. Thus, a form fit of the insulating ply is achieved when adjacent insulating plies are stuck together, so that acoustic bridges due to lack of contact of the insulating plies are avoided. The oversize has to be chosen such that, as a function of the bulk density and/or the elasticity of the insulating ply, a form fit of the support layer is achieved. Depending on the glue chosen the glue may bridge a small gap of 1-2 mm. An oversize of at most 5 mm, preferably of at most 3 mm, is preferred.

In a particularly preferred embodiment the support layer is formed as a fiber reinforced board, in particular as a plaster fiberboard.

As a support layer, in particular a fiber reinforced board, especially a support layer formed in particular as a plaster fiber board, has proven of value. Such a fiber reinforced board provides sufficiently high bulge-proofness and expansibility. Moreover, such a board may provide sufficient strength for stapling-screwing connections or for pre-assembly screwing connections which will be explained further below.

In a preferred manner the cover layer is formed as a paper or cardboard laminated plasterboard.

With such a paper or cardboard laminated plasterboard, which is also known as gypsum plasterboard in commerce, it is possible to achieve, in a simple manner, an appearance which is customary with respect to the surface finish and comparable to a conventionally built drywall lined with plasterboards.

In a further advantageous embodiment the insulating ply is formed of a fiber material, in particular a mineral fiber material or a glass fiber material, and as a board-shaped insulating ply which comprises, in a non-installed unprocessed state, a bulk density of 50 kg/m^3 or more, in particular of 60 kg/m^3 and more.

In this particular embodiment it was found that the insulating ply itself does not merely function as an insulating ply, but can also be provided for a strength-endowing layer being sufficiently pressure and/or tension-proof especially in the thickness direction.

With an above-mentioned bulk density of at least 50 kg/m^3 of the insulating ply it is possible to do without additional stiffening elements in the thickness direction of the drywall to be built, so that a drywall can do without additional connecting elements with the exception of appropriate connection chemicals such as explained further below, e.g. glue.

Alternatively, also hard foam insulating materials on the basis of expanded polystyrene (EPS), extruded polystyrene (XPS), polyurethane (PUR), or polyisocyanurate (PIR) may be employed as materials of the insulating ply.

In a particular embodiment the insulating ply is glued with the support layers over the full surface area or partially.

For supporting the above-mentioned tension proofness in the thickness direction, the insulating ply is glued with the support layers e.g. over the full surface area or over part of the surface area. This may especially also contribute to the fact that the multi-layer wall element can be provided as a single manageable component.

Preferably, the cover layers are glued with the support layers over the full surface area or partially. A gluing of the cover layers with the support layers over the full surface area or over part of the surface area or punctually may be particularly recommendable so as to obtain a compact wall element as a whole.

Alternatively, the cover layers may be connected mechanically with the support layers. Clamping is particularly preferred here.

In a particularly preferred embodiment front sides of the support layer contact each other and support themselves against each other in the stuck condition of two multi-layer wall elements.

In this preferred embodiment the cut geometry is chosen such that the support layers absorb and support the generated upsetting forces for a substantial part in particular in the vertical direction. With such a measure it may also be well possible to use, for instance, chemical binders between the corresponding support layers for the additional stiffening of a drywall to be built.

In a particularly preferred embodiment front sides of adjacent cover layers form a gap therebetween in the stuck condition of two wall elements.

With this measure it is possible to produce, in the case of a drywall composed of multi-layer wall elements in accordance with the invention, at the visible outer side thereof a defined joint image which can, in a known manner, be further refined and finished with appropriate spackles and/or their processing tools, i.e. with known technologies and materials. In defined joints indeed more spackle has to be applied, but this may promote higher stability of the joint and thus guarantee longer durability of the optical overall impression of the outer side.

In a further advantageous embodiment front sides of the insulating plies contact each other in the stuck condition of two wall elements.

If the front sides of the insulating plies contact each other in the stuck condition it is advantageous that no acoustic bridges in the form of gaps are formed between the insulating plies.

In a further preferred embodiment the multi-layer wall element is adapted with respect to its cut such that an individual element preferably weighs less than 25 kg, in particular preferably less than 20 kg.

With such a measure it is possible to provide, in particular in the do-it-yourself field, individual multi-layer wall elements which are good to handle and are transported or positioned well without complex lifting equipment.

Furthermore, it may be of advantage that the support layer and/or the insulating ply have groove-shaped channels for accommodating supply lines, e.g. electrical supply lines and/or water/heating supply lines.

With such channels it is possible to facilitate a subsequent installation of supply lines in a drywall built up with wall elements in accordance with the invention.

In the following, the invention will be explained in detail by way of example by means of the drawings. There show:

Figure 1: schematically a perspective view of a multi-layer wall element in accordance with the invention in a first embodiment;

Figure 2: schematically a cross-section through a drywall portion made of two multi-layer wall elements in accordance with the invention;

Figure 3: schematically a partially built drywall of two multi-layer wall elements in accordance with the invention pursuant to Figure 1.

A multi-layer wall element 1 in accordance with the invention (Figure 1) serves for building up a drywall 2 (cf. Figure 2). The construction of the wall element 1 in accordance with the invention will be explained in detail in the following by means of Figure 1.

The wall element 1 in accordance with the invention is formed in the embodiment pursuant to Figure 1 with multiple layers, in particular with 5 layers, and comprises a central insulating ply 3. A respective support layer 5 is positioned against flat sides 4 of the insulating ply 3, wherein an inner flat side 5a of the support layer 5 faces the flat side 4 of the insulating ply 3.

Flat sides are generally meant to be main sides of board-shaped elements whose surface area is distinctly larger in relation to front sides 6 of the board-shaped elements.

Respective cover layers 7 are placed against an outer flat side 5b of the support layers 5. In Figure 1 merely one of the cover layers 7 is illustrated. The other one is hidden due to the perspective illustration.

The support layer 5 and/or the support layers 5 is/are offset in at least two directions R1, R2. The directions R1 and R2 run parallel to or with parallel offset to an imagined plane E of the support layer 5 which in turn runs to one of the inner flat side 5a or the outer flat side 5b.

Furthermore, the directions R1 and R2 be defined as running perpendicular to confining edges 8. This results in an offset amount V_1 along the direction R1 and an offset amount V_2 along the direction R2 by which the support layer 5 is offset relative to the cover layer 7. In the present example an offset amount $V_1/V_{1'}$ equal according to amount and an offset amount $V_2/V_{2'}$ equal according to amount exists between the support layer 5 and the insulating ply 3. Due to an arrangement of this kind the support layer 5 forms, together with the remaining layers (insulating ply 3 and cover layer 7), a tongue 10 at the respective confining edges 8 illustrated in Figure 1 since it projects along the confining edges 8 over the insulating ply 3 and the cover layer 7. At the respective confining edges (not illustrated in Figure 1) opposite to the illustrated confining edges 8 the support layer 5, whose surface area has at least approximately the same, in particular the same, extension as the remaining layers (insulating ply 3 and cover layer 7), is recessed by the respective offset amounts V_1, $V_{1'}$, V_2, $V_{2'}$ relative to

the other plies (insulating ply 3 and cover layer 7), so that grooves 11 (see Figure 2) are formed there into which the tongues 10 of another wall element can be stuck.

The offset amount V_1 and the offset amount V_2 and correspondingly the offset amounts $V_{1'}$ and $V_{2'}$ are preferably larger than zero, so that at least two tongues 10 and at least two grooves 11 are formed per multi-layer wall element 1.

The offset amount V_1 may be larger according to amount than the offset amount V_2 (the same applies for the corresponding offset amounts $V_{1'}$, $V_{2'}$). The aforementioned offset amounts V_1, $V_{1'}$ may also be smaller than the offset amounts V_2 and $V_{2'}$. Likewise, they may be equal.

Due to differently high offset amounts it is possible to achieve different insertion depths in mating directions in a vertical and/or horizontal mating direction between two wall elements 1. For instance, by a larger offset amount $V_1/V_{1'}$ in the vertical mating direction of the drywall 2 to be built, a deepened slide-in mount of the tongues 10 in the corresponding grooves 11 may be achieved without the build-up of the drywall 2 being aggravated since in the vertical direction the weight of an upper wall element 1 relative to a lower wall element 1 facilitates their vertical mutual mating. In the horizontal direction this may possibly be more difficult under building site conditions, so that a smaller vertical offset V_2, $V_{2'}$ in the horizontal direction relative to the offset amounts V_1, $V_{1'}$ (vertical direction) might be useful. In the horizontal mating direction no supporting gravity exists, so that in this mating direction a smaller slide-in mount may possibly provide the facilitating of assembly during the building up of a drywall 2.

In particular in the case of equal offsets $V_{1'} = V_{2'}$ and $V_1 = V_2$ and a square board cut of the different layers (insulating ply 3, support layer 5, and cover layer 7) a predetermined orientation of the boards is irrelevant, so that a positioning effort of a wall element during the building up of a drywall 2 is avoided. Matching wall elements can always be stuck on top of each other or into each other.

A smaller offset amount ($V_1/V_{1'}$) in the vertical direction as compared to the horizontal offset amount V_2 and/or $V_{2'}$ may, for instance, be useful in the case of a plurality of wall elements 1 mated in advance in the horizontal direction, so that a smaller slide-in mount depth in the vertical direction facilitates the placing of a "row of wall elements" of a plurality of wall elements 1 mated in advance in the horizontal direction.

In a viewing direction on flat sides of the plies/layers (3; 5; 7) they are preferably of rectangular or square design. Any other outside cuts that may be mated to full-faced walls without gaps are theoretically also imaginable. Hexagonal edge cuts may, for instance, also be imaginable, whereas square or rectangular elements should probably be the ones that can best be handled in practice.

If a plurality of wall elements 1 are stacked as intended (cf. Figure 2), the dimensions of the individual layers (5, 7) and plies (insulating ply 3) are coordinated such that the support layers 5 of two adjacent wall elements 1 contact each other both in the horizontal and in the vertical directions, wherein preferably a material bonded connection, especially a gluing 12, is provided for building up a drywall 2.

Both in the horizontal and in the vertical directions it may be expedient that a gap 13 is provided between the cover layers 7 of adjacent wall elements 1, so that the dimensions of the cover layers 7 are expediently chosen to be somewhat smaller for achieving this object than the extension in terms of surface area of the support layers 5. The gap 13 may be expedient so that, for instance, during the jointing of the drywall 2 the achieving of the desired finished surface quality is somewhat easier to accomplish with a gap and/or the jointing material is retained better in the gap 13. Between the insulating plies 3 of two adjacent wall elements 1 a gap 13a may also be provided. It is, however, preferred that adjacent insulating plies 3 of adjacent wall elements 1 contact each other so as to avoid possible acoustic bridges due to gaps 13a generated.

As materials for the above-mentioned plies/layers come into account:

- For the insulating ply 3 in a particularly preferred manner a fiber material, in particular a mineral fiber material or a glass fiber material. In particular so as to achieve required bulge proofness of built drywalls 2 and to also achieve a sufficiently rigid design in a thickness direction of the drywall 2 to be built, it is particularly expedient to select such fiber materials, in particular mineral fiber materials or glass fiber materials, having in the unprocessed state a bulk density of 50 kg/m^3 or more, in particular of 60 kg/m^3 or more. The bulk density here means the bulk density that is usually indicated for the fiber plies in the delivery state.

If, during the construction of the wall elements 1 in accordance with the invention there may occur slight compressions (in the thickness direction) or expansions (in the thickness direction), the density of the fiber material available in a finished wall element 2 may deviate both to the top and to the bottom. During the manufacturing of a wall element 1 in accordance with the invention it is, however, an object to incorporate the insulating ply 3 both in the thickness direction and in two-dimensional directions of the insulating ply 3 preferably unbraced, i.e. preferably with unchanged bulk density, so that usually the indicated bulk density of, for instance, 50 kg/m^3 or 60 kg/m^3 or more is approximately maintained.

The insulating ply 3 is glued with the support layers 5 at the flat sides 4 thereof. Specifically if, as mentioned above, the required minimum bulk densities of the fiber materials are used, it is surprising that such gluing between the support layers and the insulating ply does not necessitate an additional stiffening of the wall element 1 in the thickness direction if a suitable insulating material (fiber material) is chosen. The bearing capacity of the insulating ply 3 itself is already sufficient in such a case for avoiding undesired compressing in the thickness direction in the degree required.

- The support layers 5 are formed in particular as fiber reinforced boards, in particular as plaster fiberboards, and comprise the highest compression strength

and/or tensile strength and/or bending strength as compared to the other layers/plies.

- The cover layer 7 is formed as a paper or cardboard laminated plasterboard and forms the outermost layer of the wall element 1. Due to such a choice of material, a usual spackle material as well as a usual tool employed in drywall installation is readily usable for a further surface sealing and/or surface deflection (e.g. spackling of the surface). In other words, a drywall built up with the wall elements 1 in accordance with the invention behaves with respect to the further processing steps like a drywall with external paper or cardboard laminated plasterboards built up conventionally in post and beam structure.

It is recommended to choose the cut of the wall elements 1 such that an individual band element does not weigh more than 25 kg, preferably not more than 20 kg, so as to render its manageability on a building site, especially also in constricted environments such as, for instance, in the case of renovations of old buildings, easy to handle.

In the do-it-yourself field it is also often expedient to provide smaller, but in turn a plurality of individual elements which are good to handle since exactly in the do-it-yourself field lifting equipment required for large elements is often not available.

Since the front sides 8 of the support layers 5 of two adjacent wall elements 1 contact each other, the intended gluing 12 contribute substantially to the overall stability of the drywall 2 built.

Until a possibly applied glue, which may, for instance, be an epoxy resin glue, an acrylic glue, or another suitable glue which is especially suited for fiber boards, has hardened it is expedient to care for advance assembly when building up a drywall 2. For this purpose it lends itself, for instance, with suitable drywall connecting elements, such as e.g. screws 15, to connect two adjacent wall elements 1 in the groove and tongue

region thereof with one another, wherein the screws 15 offer good support in the higher-strength material of the support layer 5 relative to the material of the cover layer 7.

In particular Figure 3 illustrates such an assembly situation by way of example in a direction extending in the horizontal direction (offset V_1).

Figure 3 also illustrates by way of example an embodiment (upper wall element 1) in which the offset amount V_2 is smaller in the horizontal direction than in the vertical direction.

Furthermore, Figure 3 illustrates an embodiment in which, for instance, a channel 16 is formed in one of the insulating plies 3 which may, for instance, be provided for the laying of cables or other supply lines (e.g. water lines).

It is to be understood that such a channel 16 may also be provided in other plies, for instance, in the support layer 5, which is, however, not shown in the Figures.

List of reference numbers

1	wall element
2	drywall
3	insulating ply
4	flat side
5	support layer
5a	inner flat side
5b	outer flat side
6	front side
7	cover layer
8	confining edge
10	tongue
11	groove
12	gluing
13, 13a	gap
15	screw
16	channel
E	plane
R1, R2	directions
V_1, V_2	offset amount
$V_{1'}$, $V_{2'}$	offset amount

Claims

1. A multi-layer wall element for building up drywalls (2)
   - comprising an insulating ply (3) with two flat sides (4) of heat or sound insulating material which have a large surface area relative to front sides (6),
   - wherein a support layer (5) is placed with an inner flat side (5a) of the support layer (5) against each flat side (5a; 5b) of the insulating ply (3),
   - wherein a cover layer (7) is placed against each outer flat side (5b) of the support layer (5), wherein

   the support layer (5) is, along at least two directions (R1, R2) which are oriented parallel to a plane (E) of the support layer (5) and perpendicular to confining edges (8) of the support layer, offset relative to the cover layer (7) by a respective offset amount ($V_1/V_{1'}$; $V_2/V_{2'}$), wherein the support layer (5) forms a tongue (10) at least along a first confining edge (8) and along at least one opposite second confining edge (8) a groove (11) together with the insulating ply (3) and the cover layer (7).

2. The multi-layer wall element according to claim 1, **characterized in that** the offset amount ($V_1/V_{1'}$) and the offset amount ($V_2/V_{2'}$) are larger than zero, so that at least two tongues (10) and at least two grooves (11) are formed.

3. The multi-layer wall element according to any of the preceding claims, **characterized in that** the offset amount (V_1) is equal to the offset amount (V_2).

4. The multi-layer wall element according to claim 1 or 2, **characterized in that** the offset amount ($V_1/V_{1'}$) is not equal to the offset amount ($V_2/V_{2'}$), i.e. the offset amount ($V_1/V_{1'}$) is larger or smaller when compared to the offset amount ($V_2/V_{2'}$).

5. The multi-layer wall element according to any of the preceding claims, **characterized in that** the insulating ply (3), the support layer (5) and the cover

layer (7) are, in a viewing direction on flat sides (4; 5a; 5b) of the plies/layers, square or rectangular.

6. The multi-layer wall element according to any of the preceding claims, **characterized in that** at least the support layer (5) and the cover layer (7) are of equal size in a top view on the flat sides thereof.

7. The multi-layer wall element according to any of the preceding claims, **characterized in that** the insulating ply (3) has, in the top view on the flat side (4) thereof, the same size as the support layer (5) or an oversize relative to the support layer (5).

8. The multi-layer wall element according to any of the preceding claims, **characterized in that** the support layer (5) is formed as a fiber reinforced board, in particular as a plaster fiberboard.

9. The multi-layer wall element according to any of the preceding claims, **characterized in that** the cover layer (7) is formed as a paper or cardboard laminated plasterboard.

10. The multi-layer wall element according to any of the preceding claims, **characterized in that** the insulating ply (3) is formed of a fiber material, in particular a mineral fiber material or a glass fiber material and comprises, as a plate-shaped insulating ply (3) in a non-installed unprocessed state, a bulk density of 50 kg/m^3 or more, in particular of 60 kg/m^3 and more.

11. The multi-layer wall element according to any of the preceding claims, **characterized in that** the insulating ply (3) is glued with the support layers (5) over part of the surface area or over the full surface area.

12. The multi-layer wall element according to any of the preceding claims, **characterized in that** the cover layers (7) are glued with the support layers (5)

over part of the surface area or over the full surface area or mechanically connected therewith, in particular clamped.

13. The multi-layer wall element according to any of the preceding claims, **characterized in that** front sides (6) of the support layer (5) are formed and designed such that they contact each other and support themselves against each other in the stuck condition of two multi-layer wall elements (1).

14. The multi-layer wall element according to any of the preceding claims, **characterized in that** front sides (6) of adjacent cover layers (7) are formed and designed such that they form a gap therebetween in the stuck condition of two wall elements (1).

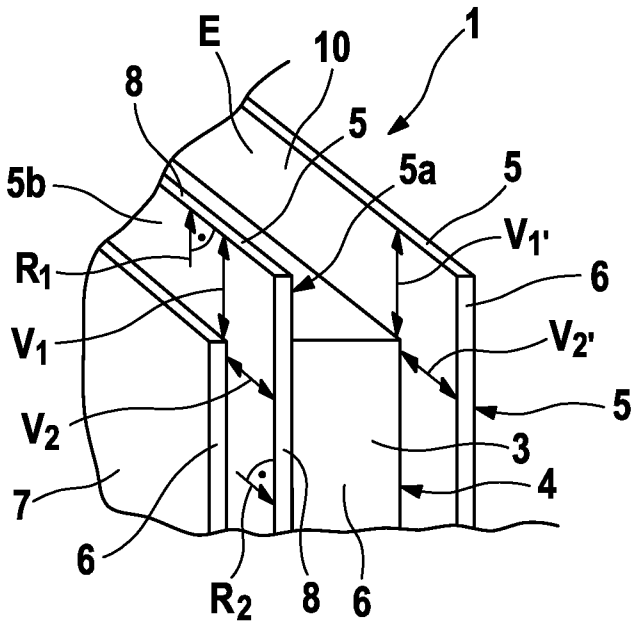
15. The multi-layer wall element according to any of the preceding claims, **characterized in that** front sides (6) of the insulating plies (3) are formed and designed such that they contact each other in the stuck condition of two wall elements (1).

16. The multi-layer wall element according to any of the preceding claims, **characterized in that** the multi-layer wall element (1) is adapted such with respect to its cut that an individual element preferably weighs less than 25 kg, in particular preferably less than 20 kg.

17. The multi-layer wall element according to any of the preceding claims, **characterized in that** the support layer (5) and/or the insulating ply (3) have groove-shaped channels for accommodating supply lines, e.g. electrical supply lines and/or water/heating supply lines.

18. A drywall comprising at least one multi-layer wall element according to any of claims 1 to 17.

Fig. 1


E
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1
8
5
5b
5a
5
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R_1
6
V_1
$V_{2'}$
5
V_2
3
4
7
6
R_2
8
6

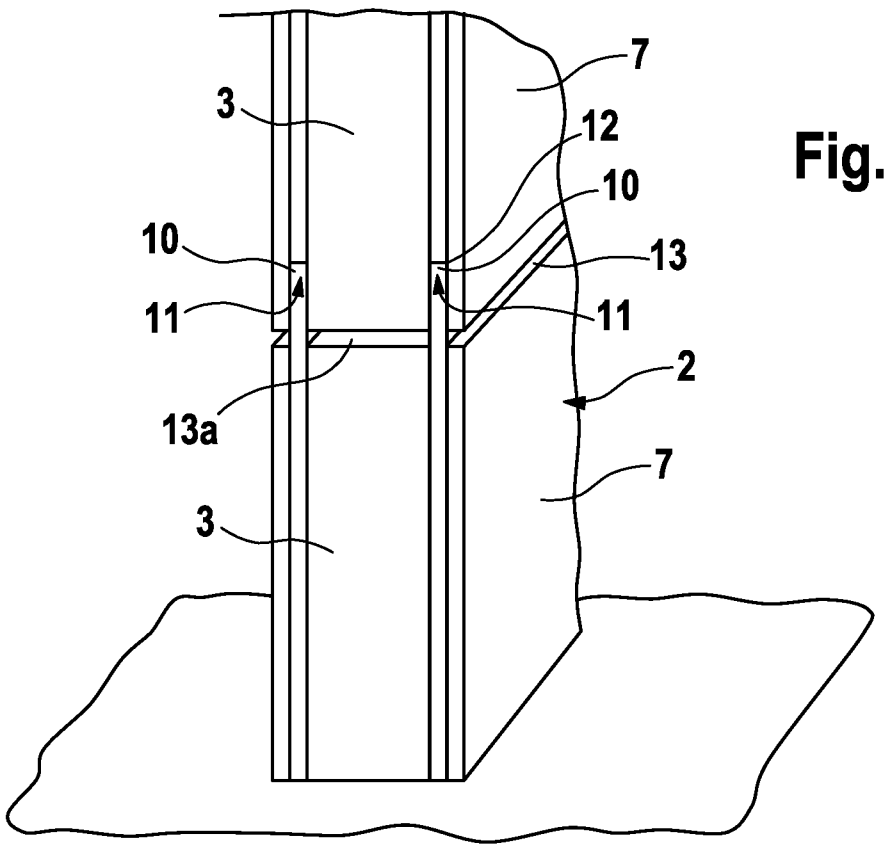
7
3
12
10
10
13
11
11
2
13a
7
3

Fig. 2

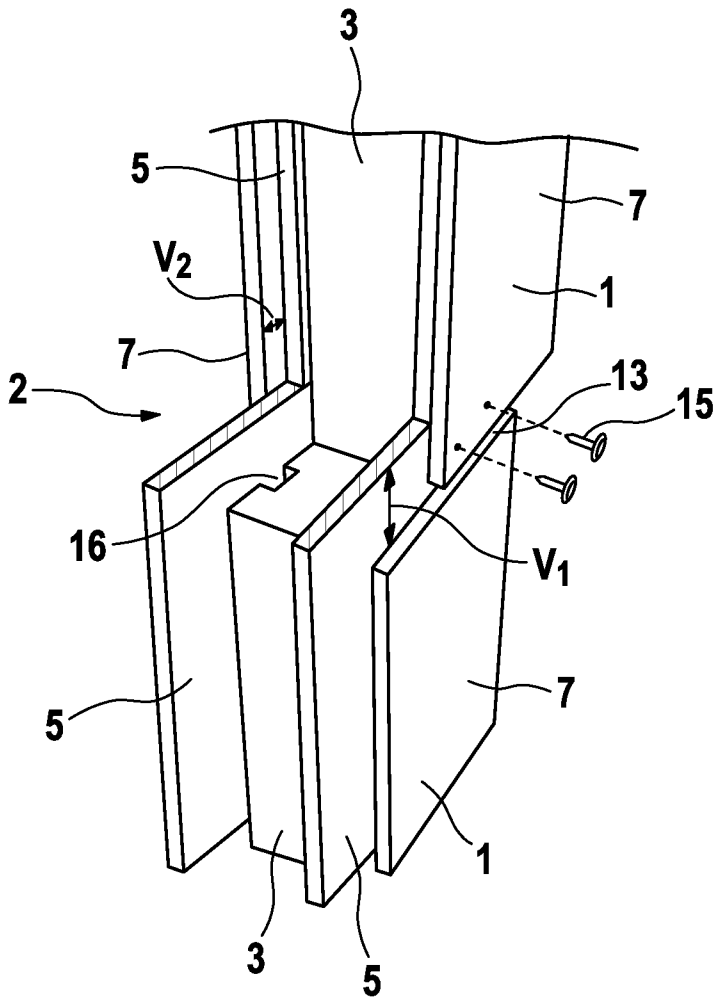

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2021/069476

A. CLASSIFICATION OF SUBJECT MATTER
INV. E04C2/24 E04C2/52 E04C2/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E04C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011/203193 A1 (ROBERTSON RODNEY REYNAUD [US] ET AL) 25 August 2011 (2011-08-25) paragraph [0024] paragraph [0027] figures 2, 3	1-18
A	WO 2014/033333 A1 (TABICLICK S L [ES]; BALDOMIR VEIGA FRANCISCO [ES]) 6 March 2014 (2014-03-06) figure 5 page 7, line 16 - page 15, last line	1-18

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 September 2021	14/10/2021

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Durrenberger, Xavier

1

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 466 128 A (HOWARD JAMES [IE]) 16 June 2010 (2010-06-16) See especially the stacked layers of figure 3; page 4, line 1 - page 8, last line figures -----	1-18
A	US 2016/273217 A1 (HUNTZINGER SCOTT L [US] ET AL) 22 September 2016 (2016-09-22) paragraph [0063] figures 4-6 -----	1-18

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2021/069476

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011203193 A1	25-08-2011	NONE	
WO 2014033333 A1	06-03-2014	AR 090264 A1	29-10-2014
		UY 34711 A	31-03-2014
		WO 2014033333 A1	06-03-2014
GB 2466128 A	16-06-2010	NONE	
US 2016273217 A1	22-09-2016	US 2016273217 A1	22-09-2016
		WO 2016160352 A1	06-10-2016