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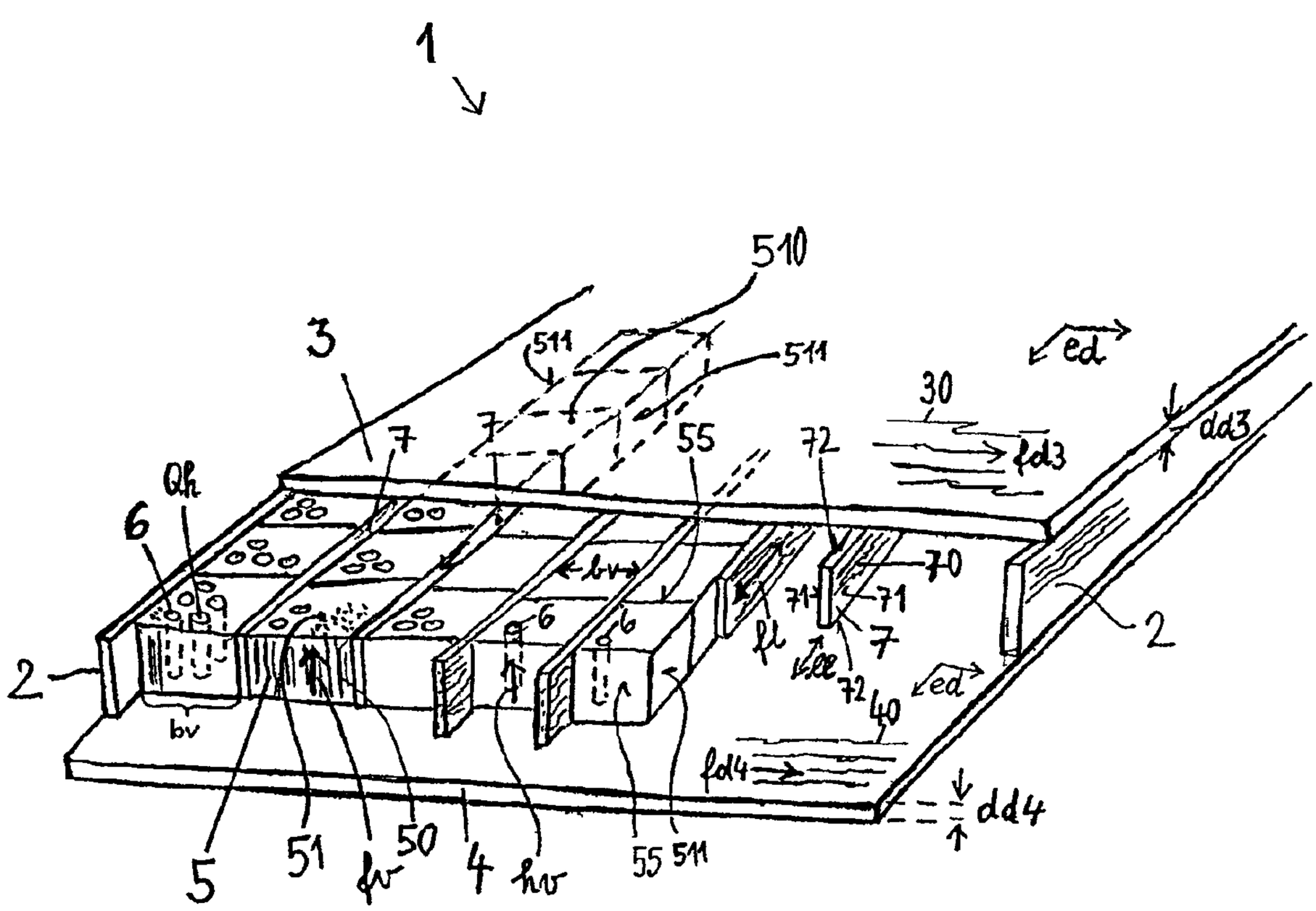
(54) Titre : PANNEAU DE CONSTRUCTION, ELEMENT DE CONSTRUCTION OU SIMILAIRE
(54) Title: BUILDING BOARD, BUILDING ELEMENT OR THE SIMILAR



(57) Abrégé/Abstract:
The invention relates to a building board or a building element having a multilayer structure, preferably wood-based and consisting of at least three bonded to each other layers, wherein a layer (5) is made of a material, preferably wood-based, which consists of vertically oriented (fv) vertical fibres (50) and is formed as a core layer between two covering layers (3, 4) made of a layer, preferably wood-based, material, the vertical fibres (50) are oriented substantially in a vertical direction with respect to the main extension (ed) of the covering layers (3, 4), in the preferred embodiment, the vertical fibre layer (50) comprises a plurality of vertical cavities (6) which completely transverse said layer and are oriented in a direction (hv) in conformity with the vertical orientation (fv) of the vertical fibres (50) of the material, preferably wood, of which said layer (5) is made. A method for producing the inventive building boards and elements is also disclosed.

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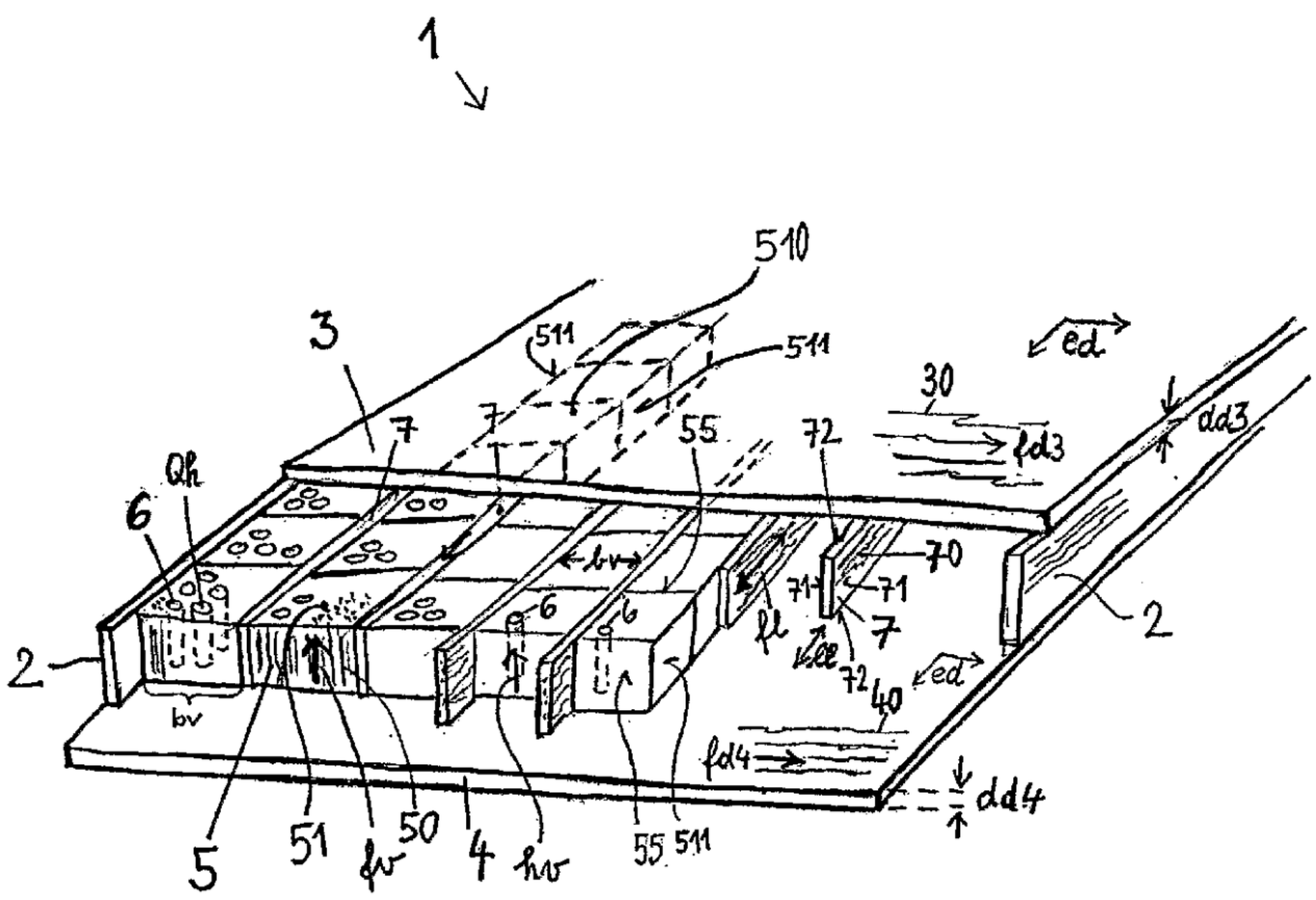
(54) **Title:** BUILDING BOARD, BUILDING ELEMENT OR THE SIMILAR

(54) **Bezeichnung:** BAUPLATTE, BAUELEMENT OD. DGL.



(57) **Abstract:** The invention relates to a building board or a building element having a multilayer structure, preferably wood-based and consisting of at least three bonded to each other layers, wherein a layer (5) is made of a material, preferably wood-based, which consists of vertically oriented (fv) vertical fibres (50) and is formed as a core layer between two covering layers (3, 4) made of a layer, preferably wood-based, material, the vertical fibres (50) are oriented substantially in a vertical direction with respect to the main extension (ed) of the covering layers (3, 4), in the preferred embodiment, the vertical fibre layer (50) comprises a plurality of vertical cavities (6) which completely transverse said layer and are oriented in a direction (hv) in conformity with the vertical orientation (fv) of the vertical fibres (50) of the material, preferably wood, of which said layer (5) is made. A method for producing the inventive building boards and elements is also disclosed.

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Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

(57) Zusammenfassung: Die Erfindung betrifft eine Bauplatte bzw. ein Bauelement mit Mehrschichtaufbau, vorzugsweise auf Basis von Holz, welche(s) mit zumindest drei aneinander gebundenen Schichten gebildet ist, wobei vorgesehen ist, dass zwischen zwei - mit einem Schichtmaterial, insbesondere auf Holzbasis gebildeten Deckschichten (3, 4) als Kernschicht eine Vertikalfaserschicht (5) aus einem Vertikalfasern (50), mit Vertikalausrichtung (fv) enthaltenden Material, vorzugsweise aus Holz, gebildet ist, wobei die Vertikalfasern (50) im wesentlichen im rechten Winkel zur Haupterstreckung (ed) der beiden Deckschichten (3, 4) ausgerichtet sind und bevorzugterweise vorgesehen ist, dass die Vertikalfaserschicht (50) mit einer Vielzahl von dieselbe voll durchsetzenden, mit der Vertikalausrichtung (fv) der Vertikalfasern (50) des diese Schicht (5) bildenden Materials, vorzugsweise Holzes, im wesentlichen übereinstimmende Ausrichtung (hv) aufweisenden Vertikalhohlräumen (6), ausgebildet ist. Sie betrifft weiters Verfahren zur Fertigung der neuen Bauplatten bzw. Bauelemente.

Building Board, Building Element Or The Like

The present invention relates to a new building board or a new building element, in particular a support element, structural element, wall element, facing element or the like, having a multilayer structure, preferably wood-based or consisting of wood materials, which consists of at least three bonded layers, plies, boards, sheets or the like, in particular having two covering layers which are spaced from one another and parallel to one another and having a core layer arranged between them and connected with them.

A great number of essentially lamellar and/or beam-like building, structural, support, wall and/or facing elements, constructed according to various principles, for various purposes, as have become known for building elements for installation in already existing building structures or the like with a multilayer structure for new buildings, extensions, redevelopment, furnishings or the like of buildings, structures, and the like as well as for mobile structures, partition elements or the like, as used e.g. for exhibitions, fairs, presentations, markets or the like, and furthermore, in particular, for boards for outfitting buildings and for partitions in buildings, with heat insulating and sound insulating panelling or the like, for the furniture and exhibition construction sector and for panelling and lining elements in vehicle and boat or ship building, for outfitting trailers, mobile homes or the like or also for auxiliary devices used in the building and construction industry, such as boarding in highrises and the like, and used widely nowadays to an ever increasing extent.

Based on concrete experiences obtained in practice and expanded series of experiments within the scope of correspnding development work, it has now been found successful to create new

building boards or building elements or the like of the aforementioned type with substantially improved strength, sound and heat insulating values as well as other advantageous physical, constructional, physical and biological properties which are furthermore distinguished by high quality of use and environmental friendliness and, furthermore, by biological degradability and thus high waste disposal quality, in particular when they - as preferably provided - are produced or predominantly produced with biogenic materials, i.e. in particular with natural, i.e. gown, wood or based on such wood materials.

The object of the invention now is the aforementioned building boards or building elements, such as in particular support elements, structural elements, wall elements, boarding elements or the like according to the preamble of claim 1 which have the features or combination of features disclosed in the characterizing part of this claim.

By orienting the fibres or grains of the core layer diagonally, which is imperatively provided according to the invention, i.e. at least essentially at a right angle to the main extension of the new building boards, a structurally physically and biologically valuable, compensating diagonal diffusion of moisture and the like is made possible while fully maintaining the high mechanical strength and resistance, vibration absorbing and heat insulating properties and, at the same time, a high mechanical load capacity and load-carrying capacity of the new building elements or, in particular, also surface load capacity in the new building boards, is ensured.

The tendency of wood to shrink or expand in fibre direction is, e.g. when the ambient moisture changes, very low and is at most about 1%, with which an almost constant thickness of the vertical fibre core layer is ensured, preferably having a substantially higher thickness than the covering layers, and consequently

essentially of the entire building element or the entire new building board.

To a large extent, the new building board or the new building element or the like enables the use of even inferior quality wood, waste wood and, in particular, also light-weight wood in a conventional and in as cost-efficient manner possible in accordance with market conditions for the core layer, i.e. vertical fibre layer, occupying relatively thick and thus a relatively high portion of the overall volume thereof in comparison to its covering layer, as a result of which substantial costs can be saved in each case without having to accept losses with respect to stability and strength of the new building elements.

An essential further advantage is that, as a result of the "vertical orientation" of the fibres or grains in the vertical fibre layer, even woods having a slight thickness and/or lateral strength can be used which are, however, nevertheless definitely sufficiently stable in direction of the wood grain against the effect of pressure in direction of grain, with which mechanically stable building boards having thusfar unattainable volumetric density can be obtained, whereby the material thickness of the new boards, supports and the like can also be kept low, if required. At this point, it should be noted that the term "building boards" which is used often here in no way relates only to structural, boarding and facing boards for buildings, but that this also generally includes boards for various other purposes, such as e.g. for outfitting buildings, for the furniture and installation industry as well as for various support and dividing elements and the like for building and other purposes.

According to the embodiment especially preferred within the scope of claim 1, in particular in the sense of of a substantial reduction of the weight or mass of the new building boards or building elements or the like increasingly demanded nowadays and

a consequently substantially improved handling ease and mobility thereof with definitely high stability and mechanical strength, it is provided that the vertical fibre layer, which is preferably formed with wood, with a plurality of vertical cavities, recesses, millings, bores or the like which traverse said vertical layer, with the essentially vertical orientation of the vertical fibres or grains of the material forming this layer, preferably wood, having at least essentially corresponding orientation, in particular parallel thereto.

The advantage of this embodiment, which is especially preferred within the scope of the invention, is based on the fact that it was found that a substantial reduction of the weight of the new building board can be obtained by the vertical cavities in the vertical fibre layer, oriented in conformity with the direction of the fibres, which does not, however, in any way dramatically lower the strength as could perhaps be expected, however, wherein transverse (moisture) diffusibility and moisture compensation are substantially increased.

Further particulars regarding the embodiments preferred for the properties of the new building boards or building elements within the scope of the invention, the advantageous design and distribution of the vertical cavities and the dimensional ratios between vacuum volumes and wood mass in the vertical fibre layer can be found in claims 2, 3 and 4.

When using wood in the building industry, it is quite essential that great attention be given to fire prevention.

With the coating of the inner walls of the vertical cavities with an intumescent polymer substance described in claim 5, which can be easily applied in a thin layer thickness, preferably by spraying from nozzles temporarily installed in these cavities during the production process, a highly secure fire-retardation is obtained by filling the cavities with the polymer which foams

in the heat in the case of a fire, in particular, by preventing any air suplayer.

Furthermore, an embodiment of the new building boards or the like according to claim 6, which comprises at least essentially corresponding covering layers with respect to their materials and/or material properties, is preferred.

An advantageous embodiment of the vertical fibre layer of the building board according to the invention, in particular along the lines of high production savings, can be found in claim 7.

To further increase the mechanical strength and resistance to distortion, claims 8 to 11 disclose advantageous embodiments of the new building board or the like in which stiffening or reinforcing strips are arranged that increase the strength and preferably consist of wood and which are "upright" within the vertical fibre layer, i.e. also "vertical", and increase the strength, however, for which other materials can also be used, e.g. plastics or metals.

In addition to the two embodiments of the building boards according to claim 8, it should also be noted that boards according to the first variant noted there are primarily provided for the furniture and interior furnishings industry, and that boards according to the second variant are primarily suitable for supporting components, i.e. for example for ceilings.

An especially preferred embodiment according to the invention for the new building boards with stiffening strips can be found in claim 12, said embodiment being distinguished by especially high mechanical stability, strength and constancy of shape.

Claims 13 and 14 disclose advantageous embodiments of the covering layers and, having regard to as high a reduction in weight as possible, advantageous materials for the vertical fibre

layer of the new building board, of the new building element or the like.

Claim 15 relates to a special embodiment of the vertical fibre layer which is preferably formed from or with individual vertical fibre bodies laterally bonded to one another over their vertical lateral side.

In particular with respect to a cost-effective production, the use of embodiments of the vertical fibre body, as described in detail in claims 16, 17, 18 and 19, is especially preferred for forming the vertical fibre layer of the new building boards, building elements or the like.

Claim 20 provides detailed information about the lateral covering, i.e. the covering of the narrow sides of the new building boards or building elements or the like.

A special building board or the like which is either curved or perhaps even arched according to a further embodiment of the invention can be found in claim 21, which is suitable e.g. for facing components with correspondingly curved or arched "topography".

Furthermore, the invention is in no way restricted to boards or the like for the most varied purposes, it is also directed to supporting elements, girders or the like in the building industry, i.e. to predominantly longitudinally extending building elements having a support function, which inherently combine the advantages of high mechanical strength with the other advantageous characteristic properties of wood. An especially preferred construction and embodiment of such a supporting element, girder support or the like according to the invention is disclosed in claim 22. It should be emphasized that every type of design of such supporting elements are possible here when only the basic principle of the construction according to the

invention is retained.

In total, claims 23 and 24 disclose four forms of the new building boards or building elements or the like which are specifically directed to the object and which fulfil the object and which can be used, on the one hand, as sound-absorbing elements or boards and, on the other hand, as sound-generating, amplifying or resonance elements in the sound equipment and instrument building industry and, furtheremore, for a completely different purpose, namely for highly stable door plates of burglar-proof doors or the like.

Since sound-absorbing boards according to claim 23 are installed in residential and work rooms, e.g. studio rooms, and since the preferred material for this is wood, the greatest attention should be paid to fireproofing: It was now found that a thin coating on the inner walls of the vertical cavities of the vertical fibre layer with a fire-protection polymer is quite adequate, even when the thickness of the board consisting completely of wood is only 2 cm and, accordingly, its vertical cavities ultimately only have a depth of about 1.5 cm, in order to obtain a problem-free fire-retarding effect, which corresponds in any case to the fireproof class F90 (at least 90 min fire-retarding effect, however, whereby this value of F90 is exceeded by far in most cases.

Therefore, if, for example, the ceilings in a building are made with building boards made exclusively of wood according to the invention, e.g. multilayer in sandwich form, then it is sufficient (as tests have shown) to place a thin board having the basic construction of the invention and coated with the fire-retarding polymer in the vertical cavities, as just described, on the side in question or endangered by a possible fire, i.e. for example in ceilings, mostly on the face or underside, and, in this simple way, it is made fully fireproof, although the wood building boards which form the ceiling in several layers, e.g.

laminated to one another, do not themselves have any fireproof coating or the like. Of course, fireproof boards provided with the fire-retarding polymer can also be placed on both sides of a ceiling, as just described.

With respect to the special embodiment of the new building boards noted in the second part of claim 24, it is especially suitable for supporting floors, ceilings, wall elements and the like, in which increased fire protection is required. Boards of this type can be used e.g. in railroad construction, vehicle construction, ship and aircraft construction, furthermore for installation in traffic construction, e.g. tunnels, for safety door plates and the like.

Claim 25 relates to a completely new embodiment of the new building board which can be used as an actively heating module heating wall, as a ceiling heating element or directly as a heating module or structural heating element, even though it consists predominantly of wood or of a wood material.

Claim 26 relates to an especially preferred embodiment of the invention for wall, partition, ceiling elements or the like having a high heat insulating and sound insulating effect using the building boards of the invention, in particular in its basic form.

Within the sense of the above comments regarding obtaining the highest fire-protection safety, an embodiment of the building boards, building elements or the like according to claim 27 is especially preferred, wherein the fireproof values required according to "F90" are in any event always attained, however, exceeded by far most of the time, so that any concerns against the basic material wood, on which the new building boards or building elements are based, are dispelled. With respect to the wood which is not easily flammable and combustible and can be advantageously used according to this claim, the advantage is

here given that it is quite sufficient to use fireproof wood, e.g. oak, for the vertical fibre layer, which can definitely be of a lower quality and which could thusfar practically find no use otherwise and which can therefore be obtained at a very low cost.

Claims 28 and 29 relate to further advantageous embodiments which are each directed to special types of uses in construction, for wall elements, ceiling elements or the like according to the invention using the new building boards.

A mechanically especially stable, structure-forming building element furnished with the building boards according to the invention comprises the high sound and heat insulating properties can be found in claim 30.

The subject of claims 31 and 32 are wall or ceiling elements or boards or the like, as described above, in which a stable connection to the supporting concrete or the like is ensured and which, furthermore, can be provided with a plaster layer in a conventional manner or already provided with a finished plaster coating.

Claim 33 relates to wall elements or the like furnished with building boards having a heat and sound insulating effect which can be used and set up in situ, i.e. directly, at the installation site, or already produced as finished elements.

Claims 34 and 35 relate to easy-to-handle wall elements, wall boards or the like which are distinguished by low weight and are especially suitable for light construction, installations in buildings, for exhibition purposes, for fair construction and the like, and whose face or top surface structure is formed with conventional means or in a known manner.

Furthermore, within the scope of the invention, claims 36 to 38

relate to especially advantageous methods distinguished by an economic manufacturing mode for the production of two advantageous main embodiments of the new building boards, namely for the especially preferred cases of the invention that they are formed completely or at least predominantly with wood. It should now be briefly mentioned here that the method according to claims 36 and 37 is nevertheless distinguished by especially high manufacturing economy in spite of the apparently expensive, multi-step processes, since all procedural steps can be fully automated without difficulty and thus minimize the staff expenditure.

Claims 39 to 46 relate to the most important fields provided according to the invention for aplayering or using the new building boards, building elements or the like for which they are especially suitable. However, this does not in any way exclude other or further application sectors.

On the whole, it should be noted that the new building boards, building elements or the like are distinguished by low weight with simultaneously high mechanical bending strength, torsional strength and compressive strength, in particular due to the "cross connection" provided according to the invention of covering layers and core layer which have relatively different, in particular vertical orientation of the fibres or grains and due to possible reinforcing strips, and by high heat and sound insulating properties, furthermore, by high economy especially with respect to the (wood) material used for producing them which includes essentially cost-effective economically useable wood, as well as especially with respect to the type of production itself which can be automated without difficulty. With respect to the economic efficiency, it should furthermore be pointed out that e.g. wood scraps resulting during milling of the grooves for the vertical fibre bodies can be used for producing the covering layer boards of the new building boards made from this waste wood or generally for chipboards, furthermore, for the direct energy

recovery by burning for recovery of wood distillate products, melamine raw materials and the like.

By no means last, reference is made to the aspect of the high environmental friendliness of the new building boards made preferably of natural wood without treating with chemicals or the like within the scope of the invention, which are ultimately biodegradable without difficulty and can be returned into the natural cycle or are energy recyclable without generating fossil CO_2.

The invention will be described in greater detail with reference to the drawings:

Fig. 1 shows a partially cut open building board according to the invention in an diagonal view; Fig. 2 shows an especially preferred embodiment of the vertical fibre body provided for the formation of the vertical fibre layer in an diagonal view; Fig. 3 shows a vertical fibre body strip formed with the vertical fibre bodies with reinforcing strips bonded to their lateral sides interconnected with further vertical fibre bodies; Fig. 4 shows a schematic diagonal view of a beam provided with grooves which forms the initial component for producing the vertical fibre bodies, also interconnected with further beams of this type; Figs. 5 to 7 show a similar variant for the production of the new building boards with another design of their vertical fibre layer; Fig. 8 shows a wall element furnished with the new building boards on both sides in a diagonal view; Fig. 9 shows a sectional view through a wall piece produced on site using the new building board in the production phase; Fig. 10 schematically shows the on-site production of a concrete cover furnished from the start with the new sound and heat insulating building boards according to the invention, in accordance with the principle of the lost facing; Figs. 11 and 12 show two partition elements based on the new building board; Fig. 13 shows a three-layer wall element produced with the new building boards in section; in a

diagonal view, Fig. 14 shows a building board formed as a sound-absorbing board according to the invention; Fig. 15 schematically shows a building board formed as a heating element; Figs. 16 and 17 show quasi photographic views of two building boards partially robbed of their face-sided covering layer which is made completely of wood; Figs. 18 to 20 illustrate an especially preferred type according to the invention for producing the new building board; Fig. 21 shows one of the possible embodiments of a support built according to the same basic principle as the building board; and Fig. 22 shows a building board according to the invention having a curved shape.

The building board 1 shown in a diagonal view in Fig. 1 comprises as main components a first covering layer 3, joined together by heat sealing or the like and having a thickness dd3, and a covering layer 4, arranged at a distance thereform and parallel thereto, having a thickness dd4, and a vertical fibre layer 5, arranged between these two covering layers 3 and 4 as a core layer and having fibres 50 or grains in direction fv at a right angle to the two-dimensional extension ed of the covering boards 3 and 4. This layer 5 is formed with vertical fibre bodies 51 which is here parallelepiped in shape, with a width bv, and arranged in a row behind one another to the linear straight vertical fibre body lines or strips 510, bonded together via their opposite lateral sides 55.

In the embodiment shown here, upright reinforcing or stiffening strips 7, each adjoining their vertical longitudinal lateral sides 511, with narrow rectangular cross section having an upper and lower narrow side 72 and vertical side surfaces 71 on both sides, between vertical fibre body strips 510 adjacent to one another and directed toward the observer. The reinforcing or stiffening strips 7 are here also formed with wood, whereby the direction fl of their fibres 70 corresponds to the longitudinal direction of extension II of these reinforcing strips 7.

It is especially preferred within the scope of the invention and for the structural strength of the new building board 1 if the wood grain 70 of the reinforcing strips 7 extends in a direction f1 which runs at a right angle to the fibres 30, 40 of the wood forming the two covering surfaces 3 and 4 which have flow directions fd3, fd4 that correspond to one another or are parallel to one another, i.e. when a "crossed" run of the fibres 30, 40 of the covering surfaces 3, 4 is provided relative to the fibres 70 of the reinforcing strips 7.

It should be clearly pointed out at this point that not every vertical fibre body strip 50 must be accompanied by a reinforcing strip 7 adjoining it, but, depending on the required strength and (torsion) rigidity of the new building boards in the vertical fibre layer 5, two or more vertical fibre strips 510 can be arranged horizontally without reinforcing strips 7 arranged between them, i.e. directly along one another, so that e.g. a reinforcing strip 7 only follows after two or more directly adjacent vertical fibre body strips 510 and then again two or more directly adjoining vertical fibre body strips 7 without interposed reinforcing strips 7, etc.

Furthermore, it should be clearly noted that, in particular when new building boards 1 are subjected to relatively slight or almost no loads, i.e. when they are provided e.g. for heat or sound insulating facings without a substantial support function, of course, no reinforcing strips at all can be provided between the vertical fibre body strips 510, i.e. that these strips 510 all directly adjoining one another longitudinally form an ultimately uniform vertical fibre body layer 5 without interruption by reinforcing strips. In this case, it is especially advantageous if the covering layers 3 and 4 are not formed of grown wood but as homogeneous chipboards which do not have a distinct grain direction and which are direct and compact and have a quite thin material thickness, e.g. between 3 and 55 mm.

It is provided within the scope of the invention in an especially preferred manner, in particular for reasons of a substantial reduction of the weight of the building boards 1, that the vertical fibre layer 5 or the vertical fibre bodies 51 forming it is or are traversed by a plurality of advantageously simlayer shaped cross sections Qh, e.g. having a rectangular, parallelepiped, U-shaped or circular cross section (as shown in Fig. 1) which run parallel to one another and are preferably distributed in a uniform manner, extending in direction fv of the fibres 50 of the vertical fibre bodies 51, passing through the vertical fibre layer 5 completely from covering board 3 to cover board 4, in vertical cavities 6 oriented in vertical direction hv, i.e. by channels, bores, through holes or the like.

Furthermore, it should be clearly noted at this point that the covering layers 3 and 4 do not have to be made of wood or wood materials, e.g. homogeneous boards, but may be made of the most varied materials, e.g. of plastics reinforced with fibres having a uniform orientation and/or longitudinally extended, of metals, paper and cardboard, of textile fleeces, woven fabrics, foils or the like, however, it is preferred if these materials have an essentially intrinsically inherent parallel fibre structure, as is the case especially preferred in wood or e.g. also in greatly elongated plastics. Furthermore, plastics reinforced with silicate or carbon fibres having an essentially uniform orientation can be used as material for the covering layers 3 and 4.

With respect to the aforementioned stiffening strips 7 in the vertical fibre layer 5, the same applies more or less for the materials forming them, as just described for the coverung surfaces 3 and 4, they also advantageously have longitudinal fibres of longitudinal fibre reinforcement, as is especially the case in wood.

It is especially preferred if the vertical fibre layer 5 is

formed with conventional wood or light wood within the scope of the present invention, whereby it is almost of no consequence for the stability and strength of the new building boards if this wood only has average quality or in many cases even below average quality, which contributes substantially to lowering the costs of the new building boards 1 without disadvantageously affecting their quality.

On its lateral sides, the vertical fibre layer 5 of the new building board 1 is advantageously covered toward the outside with side strips 2 or the like.

With otherwise the same reference numbers, Fig. 2 shows one of the vertical fibre bodies 51, bonded together, and a plurality of which form the vertical fibre layer 5 shown in Fig. 1: In the form shown here, it has an essentially basic parallelepiped form with a width bv. The height hk of the body 51 is variable, depending on the overall thickness of the building board 1 desired. The vertical fibre body 51 has an approximately ridge-like cross-sectional form with a basic or ridge beam 53 and tooth extensions 52 protruding at a right angle away from them and ending freely, formed the same here with end faces 521. In this case also, uniformly shaped notches or tooth spaces 54 are placed between the tooth extensions 52, which ultimately form the vertical cavities 6 in the vertical fibre layer 5 according to Fig. 1. The ridge beam 52 has a width bb, the tooth extensions 52 have the width bz and the tooth spaces 54 between them the width br. Optionally, the just noted widths bb, bz and br can be the same. The overall cross-sectional area of the wood mass of the vertical fibre body 51 is designated with Qm. The width of the vertical fibre body strips 510 is here designated with bl and equal to the width bv of the vertical fibre body 51 shown in Fig. 1.

Fig. 3 shows (with otherwise the same reference characters) shows a vertical fibre body strip 510 with its vertical lateral sides

511, present in association with additional similar vertical fibre body strips 510, formed with several ridge-like vertical fibre bodies 51 which are each joined together over their tooth end faces 521 and their basic beam 53. The vertical fibre strip 510 is joined on both sides with similar vertical fibre strips 510, optionally with the insertion of a stiffening or reinforcing strip 7 each, said vertical fibre strips as a whole forming the vertical fibre layer 5 of the new building board 1.

By joining the vertical fibre bodies 51 to form the vertical fibre body 510, the tooth spaces 54 of the vertical fibre bodies 51 (as shown in Fig. 2) form the vertical cavities 6 here having an elongated rectangular cross section. The ratio of its longitudinal side to its broadside is, for example, in the extreme (1:10) to (1:1) and advantageously about (2:3) to (3:4).

With respect to an especially preferred method for producing the vertical fibre layer 5 of the new building boards 1 or the vertical fibre body 51 provided for forming it within the scope of the present invention, which is distinguished by its high economic efficiency, Fig. 4 provides further details in association with Figs. 2 and 3 (with the same reference characters):

Fig. 4 shows several longitudinally extending wood beams 58 which are arranged above one another, each connected on the top and bottom adjoining one another to form a strip body 580, into each of which a number of parallel longitudinal grooves 60 have been milled corresponding to the cross sectional form of the individual vertical fibre body 51 shown in Fig. 2, in a prior first procedural step I not shown separately here.

By means of cuts S extending at a right angle to the longitudinal direction of extension 1b of the grooved beams 58, each corresponding to the desired thickness of the vertical fibre layer 5 in the building board 1, at the same distance as from one

another, the beams 58, which are fist provided with the grooves 60 are divided into the individual vertical fibre body strips 510 in a second step II, as shown in Fig. 3, even if still temporarily in another position.

In the transition from the second step II to the third step III of the manufacturing process, these vertical fibre body strips 510 are turned by 90° into the position of Fig. 3 and a number of them arranged in a row beside one another. Together with the reinforcing strips 7 each arranged laterally between them, the vertical fibre body strips 510 are glued together laterally on both sides so as to adjoin one another and ultimately form the vertical fibre layer 5. After gluing its lower side, the vertical fibre body strips 510 thus joined to form the layer 5 are placed on the lower covering layer 4 made of wood and bonded to it.

It is especially effective for the case that reinforcing strips are to be provided in the vertical fibre layer 5 to proceed in such a manner that, before the strip body 580 in the vertical fibre body strips 510 thereon is opened, a board whose thickness corresponds to the thickness of the desired reinforcing strip 7, and with grains extending at a right angle here, is glued to the strip body 580. Vertical fibre body strips 510 are obtained by the cuts S, also in vertical direction, which are also connected with the reinforcing strip, resulting together with it from the cut S, at least on one side.

Finally, in step IV, the upper covering layer 3 is attached from the other, here upper side, after the upper side of the vertical fibre body layer 5 has been glued, after which all the aforementioned components are joined under the application of pressure and perhaps heated to form the complete building board 1.

Figs. 5 to 7 show another type of production of the new vertical

fibre body layer 5 with the otherwise same reference characters:

In a first step, in the same manner as in Figs. 3 and 4, parallel grooves 60 are worked into longitudinally extending strips, boards, beams 58 or the like in longitudinal direction and grain direction, the grooved beams 58 thus obtained are then glued together, side by side, i.e. not on top of one another, but beside one another, as will be shown directly in the following Fig. 6, so that the grooves 60 of said beams are open toward one side, toward the top in Fig. 6. A wood board which covers the open grooves 60 of the adjacent grooved beams 58, can then perhaps be glued onto the freely upwardly protruding tooth extensions 52 or onto their ends 521, the grain of said wood board being at a right angle to the run of the grooves 60, from which ultimately the reinforcing strips 7, as previously described, would be produced, as indicated in Fig. 7 by broken lines.

According to Fig. 6, this does not occur, however, cuts S which extend at a right angle to the run of the grooves 60 are made in the grooved beams 58 which are bonded side-by-side and on the whole form an essentially board-like strip body 580, as symbolized by a saw blade in Fig. 6, and the strip body 580 is opened in this way into the individual vertical fibre body strips 510.

Subsequent thereto, as indicated by an arrow between Figs. 6 and 7, the vertical fibre body strips 7 are tilted by 90° and are then deposited adjacent to one another on the first covering layer 4, namely such that they each adjoin one another in the arrangement tooth extension 52 of a strip 510 / ridge beam 53 of the adjacent strip 510, whereby the vertical fibre layer 5 is simultaneously bonded to the lower covering layer 4. Finally, the vertical fibre layer 50 is glued on the upper side and the second, i.e. here upper covering layer 3 attached to it and bonded to it, usually by means of (hot) press under pressure.

With otherwise the same reference characters, Fig. 8 shows, in a diagonal view, the formation of a wall element 9 with two building boards 1 and 1' which adjoin said wall element and function as facing, in particular as heat-insulating boards, as described above.

The two building boards 1, 1' are stabilized in position at a distance from one another, whereby the space 90 between them is traversed by spacer elements 91 which are uniformly distributed, bridge them and essentially adjoin the building boards 1, 1' here functioning for the first time as planking boards on the inside, said spacer elements 91 here being formed with tubular pieces, made e.g. of plastic. Reinforcing bars 92 are installed in the spaces 90.

On the inside, the building boards 1, 1' can be provided with a moisture-repelling, yet preferably steam-permeable adhesion-promoting layer 19, e.g. based on epoxy resin with a sanding.

Light-weight concrete 95, for example, is then poured into the spaces 90 between the two building boards 1 and 1', whereby the spacer tubular pieces 91 remaining free on the inside are recast and the concrete 95 binds to the building boards 1, 1' forming the so-called one "lost boarding".

After the concrete 95 has hardened, a wall piece provided with finished heat and sound insulating facing boards 1, 1' on both sides or a finished wall element 9 of this type is obtained. On the outside, the boards 1, 1' can also be provided with a coating carrier 181, e.g. with a coating net, or directly with a finished coating 18.

The design of the spacer elements 91 as tubular pieces that are empty on the inside has the advantage that steam diffusion can occur there diagonally through the wall 9. Of course, any other type of spacer element 9 can also be used.

With otherwise the same reference characters, Fig. 9 schematically shows the actual procedure in on-site construction of a wall or wall piece 9' corresponding the the wall element shown in Fig. 6. It is shown there that the two building boards 1, 1', which first serve as sheathing boards and finally form the facing of the wall piece are held in position on the outside against deformation, in particular bulging, by means of supporting beams 901 and 902 or the like and continuous screw shafts 903 with butterfly nuts 904, before the space 90 between the boards 1 and 1' housing the reinforced irons 92 is filled with concrete 95.

With otherwise the same reference characters, Fig. 10 schematically shows the production of a cover 9" by pouring the cover 9" with concrete 95 on an again "lost boarding" formed according to the invention, supported by means of screw bolts 905 and supporting beams 901 after the reinforced irons 92 have been laid. After solidification thereof, the support construction 901, 905 is removed and a finished concrete cover 9", provided e.g. with a sound insulation or acoustic lining on the ceiling.

With otherwise the same reference characters, Fig. 11 shows a further wall element 9"' which is formed with a building board 1 and conventional gypsum boards 190 bonded to it on both sides.

Instead of the gypsum boards 190, highly fireproof fire-retarding mineral fibre boards can be attached and a wall with F90 fire-retarding effect can be produced in this way.

The two covering layers 3, 4 are themselves immediately formed with the gypsum board 190 or the like in the building board 1 which is constructed even more simlayer and can be used directly as such e.g. as a partition element 9^{IV} (shown in Fig. 12 with otherwise the same reference characters).

With otherwise the same reference characters, Fig. 13 shows a

wall element 9^{V} formed with three building boards 1, 1' 1" which are arranged parallel to one another at a distance from one another, in which spacer elements 91 are arranged in the two spaces 90 between two boards 1, 1', 1" each, said spacers 91 bonded together e.g. from several vertical fibre bodies 51 which are shown in principle in Figs. 1 and 2, and designed appropriately simpler.

With otherwise the same reference characters, Fig. 14 shows a building board 1 made as an acoustic of sound-absorbing facing board for acoustically neutral areas, said building board differing above all from the building board 1 shown e.g. in Fig. 1 in that the same continuous, here oval sound-absorbing openings 41 are made in the covering layer 4 facing the sound generator, which releases the access of the sound to the vertical fibre layer 5 visible due to the openings 41 with the vertical cavities 6 which are here functioning as sound-absorbing cavities that nullify sound energy by the multiple reflection.

With otherwise the same reference characters, Fig. 15 schematically shows an embodiment of the new building board 1 designed and usable as a modular board heating element 9^{VI} or directly as a heating unit or the like:

Copper heating pipes 76 or plastic heating tubes, through which a heating medium, e.g. hot water, can flow, are here placed in grooves 75 having an appropriately sized cross section on the upper side of correspondingly wide reinforcing strips 7 of the vertical fibre layer 5. The heating medium is, for example, brought to the desired preliminary temperature by means of electrical heating elements and circulated through the heating pipes 76 by means of an electrically operated pump.

The building board designed in this way for heating purposes can be developed alone or together with further heating building plates 9^{VI} of this type to form a type of furnace body having any

shape desired and with, for example, a tile covering on the outside, which is either designed "self-sufficient" and mobile and requires only one branch connection, plug cable or the like, or is attached via pipes or tubes to a heating thermal spring and supplied by it with heating medium.

These can also be heating plates for hot pressing which are highly heat-insulated toward the back and supplied with heat by means of a medium which is heated higher or by electrical heat conductors that are essentially built in the same way as the heating building boards 9^{VI} just described; these heating plates are used e.g. for veneer pressing in the wood-processing and furniture industry.

Furthermore, with otherwise the same reference characters, Figs. 16 and 17 show photo-like 1:1 pictures of building boards 1 which are partially stripped of their upper covering layer 3 and free the view onto the vertical fibre layer 5.

In the embodiment of Fig. 16, the vertical fibre bodies 51 are formed from elongated individual elements bonded together,having vertical cavities 6 that are made therein and a U-shaped cross sectional design Qh, whereby two rows each of these individual elements are joined and an intermediate strip 7° is fastened between two individual elements joined in this way and here "symmetrically" arranged to one another.

In the variant according to Fig. 17, vertical fibre bodies 51, which each have protruding "teeth" on both sides and vertical cavities 6 each with a rectangular cross section Qh formed between them, thus having a more or less "double ridge" cross sectional design, form the vertical fibre layer 5. In this case also, "vertically grained intermedite strips" 7° are also fastened between these vertical fibre bodies 51 daigonally to the reinforcing strips 7.

With otherwise the same reference characters, Figs. 18 to 20 schematically show an especially preferred type of production of an advantageous embodiment of the new building board 1, *inter alia*, for economical production reasons:

The fundamental module for the vertical fibre layer 5 of the new building board 1 shown here are advantageously elongated boards 58', as shown in Fig. 18, into which parallel grooves 60' which each have the same cross sectional form, in this case parallelepiped, which are milled in direction of extension of the wood grain 55'.

Several of these boards 58' are placed "side by side", with their longitudinal sides 55' adjoining one another, on a thin-layered strip plate 700', provided ultimately for forming the reinforcing strips 7 of the building board 1, in a first partial layer TL1, see Fig. 19, whereby a lateral bonding of the boards 58' to one another on the longitudinal side and their flat bonding to the strip plate 700 is ensured by corresponding application of an adhesive.

A second, similar partial layer TL2 of grooved boards 58' is bonded to the first partial layer TL 1 of grooved boards 58', whereby however the lateral sides 55' of the boards 58' of the partial layer TL2 are laterally offset vis-à-vis those of the boards 58' of the partial layer TL1.

A third partial layer TL3 of boards 58' are bonded to the second partial layer TL2 and finally, to the same, a strip plate 700 similar to the aforementioned lower strip plate 700 having the same grain direction.

A sandwich board 580' is then obtained, which is divided by parallel cuts S (symbolized by a saw blade), to form vertical fibre body strips 510' which are laterally flanked by reinforcing half-strips led at a right angle to the run of the grooves 60'

and for the longitudinal extension and the grain of the boards 58' in the partial layers TL1, TL2 and TL3 and in direction of the grain of the strip plates 700', spaced equidistantly as from one another.

After a corresponding 90 degree swing of the "three-layer" vertical fibre body strips 510 thus formed, they are attached to the lower covering layer 4 adjacent to one another with their reinforcing (half) strips 7', whereby the vertical fibre body strips 510 are glued thereto and via which reinforcing half-strips 7' flanking them are formed while forming reinforcing strips 7.

Finally, the core or vertical fibre layer 5 forming the flat bond of the second covering layer 3 to the core or vertical fibre layer 5, which is formed with all of the vertical fibre body strips 510, forms the building board 1.

With otherwise the same reference characters, Fig. 21 shows an advantageous embodiment of a supporting or girder element 1^x built according to the same principles as the building board just described. A vertical fibre layer 5 formed with vertical fibre body strips 510 is formed in the same way as in the building board 1 according to the invention between two lateral covering layers 3 and 4 which are here each formed with at least two layers of wood, with the grain oriented at a right angle to one another, whereby a stiffening strip 7 is here not arranged between each vertical fibre board strip 510, but only after each second one. The direction of its grain is both vertical to the direction of the grain in the vertical fibre layer 5 and also to the direction of the grain in one of the two layers of the two covering layers 3 and 4.

The new support element 1^x differs from the previously described "conventional" building board 1 in that it has a predominantly longitudinal extension in one direction and that the load,

tension or the like thereof does not occur in direction of the grain in the vertical fibre layer 5, but at a right angle thereto.

Fig. 22 schematically shows a curved embodiment of the new building board 1. In this case, the vertical fibre body strips 510 are arranged adjacent to one another along the generator of the lower covering layer 4 curved convexly upward in the manner of a cylinder jacket surface in such a way that they contact one another along their lower longitudinal edges.

Due to the convex curvature of the contact surface which this covering layer 4 offers, wedge-like or gusset-like longitudinal spaces 560 form between the vertical fibre body strips 510 that extend along them, expanding upward, which do not however, as was unexpectedly shown, exert any negative influence on the mechanical and other properties of the curved new building board 1, as described here, as long as its wedge angle is in the range of up to about 5°. The vertical fibre body layer 5 is covered toward the top with a second covering layer 3 which is curved accordingly and bonded to it.

The spectrum of the use of the new building board 1 is substantially expanded, in that it can be especially well adapted to architectural detail solutions with this curved embodiment.

Patent Claims:

1. A new building board or a new building element, in particular a structural element, wall element, facing element, support element or the like, having a multilayer structure, preferably wood-based or consisting of wood materials, which consist(s) of at least three bonded layers, layers, boards, sheets or the like, preferably having two covering layers which are spaced from one another and parallel to one another and having a core layer between them and connected with them,
characterized in
that covering layers (3, 4), optionally multilayer, are formed between two, each with a flat, preferably compact, laminated, plate or sheet material, in particular from the group comprised of wood, wood materials, such as laminated wood, layerwood, wood chip material, metals, textiles and fibrous materials, cardboard, papers, plastics, fibre-reinforced plastics, mineral-based building materials, stone, artificial stone and composites of two or more of the aforementioned materials, as a core layer, containing a vertical fibre layer (5) comprised of vertical fibres (50), vertical filaments or the like with an essentially uniform vertical orientation (fv) or formed with them or a material of this type having a grain or fibre structure of this type, preferably of wood, whereby the vertical fibres (50) or the grains of the vertical fibre layer (5), preferably wood vertical fibre layer, is or are oriented essentially vertically or at a right angle to the main extension (ed) of the two covering layers (3, 4), and
- wherein it is preferably provided,
that the vertical fibre layer (50), preferably a wood vertical fibre layer, is formed with a plurality thereof fully traversing them, with the vertical orientation (fv) of the vertical fibres (50) or grains of the material

forming this layer (5), preferably wood, vertical cavities (6), recesses, millings, bores or the like having essentially corresponding or vertical orientation (hv) thereto or parallel to one another.

2. The building board or building element or the like according to claim 1, characterized in that the vertical cavities in the vertical fibre layer (5) have the same area and/or cavity cross sections (Qh) having a geometric form.

3. The building board or building element or the like according to claim 1 or 2, characterized in that the vertical cavities (6) in the vertical fibre layer (5) or in the vertical fibre bodies (51) forming them, are arranged in a matrix or grid-like manner and are preferably uniformly distributed.

4. The building board or building element or the like according to any one of the claims 1 to 3, characterized in that the ratio of the totality of the cross-sectional areas (Qh) of the vertical cavities (6) in the vertical fibre layer (5) to the totality of the cross-sectional area(s) (Qm) of the vertical fibre material, preferably wood, forming the same, is between 5:1 and 1:5, preferably between 2:1 and 1:2.

5. The building board or building element or the like according to any one of the claims 1 to 4, characterized in that the inner walls, and preferably also the base, of the vertical cavities (6) of the vertical fibre layer (5) are coated with an intumescent fireproof or fire-propagation retarding polymer substance, e.g. based on silicates containing structure water, which expand under the effect of heat in the case of fire and fill the vertical cavities (6).

6. The building board or building element or the like according to any one of the claims 1 to 5, characterized in
- that the covering layers (3, 4) are formed with the same materials between them, preferably with identical wood and/or with the same material thicknesses (dd3, dd4), or
- that the covering layers (3, 4) are formed with various materials, as in particular with various types of wood and/or with various material thicknesses (dd3, dd4), however with essentially the same, physical, optionally orientation-controlled, same variation behaviour or the like when environmental conditions change, as e.g. with changes in temperature, humidity or the like.

7. The building board or building element or the like according to any one of the claims 1 to 6, characterized in that the vertical fibre layer (5) is formed with a plurality of vertical fibre bodies (51), preferably of wood, which are arranged adjacent to one another with at least two of their flank surfaces (55) having an orientation that corresponds to the vertical oientation (fv) of its vertical fibres (5) or grains and preferably bonded together so as to seal the material.

8. The building board or building element or the like according to any one of the claims 1 to 7, characterized in that the vertical fibre bodies (51) formed with the vertical cavities (6) in the vertical fibre layer (5) are designed as vertical fibre body molds or strips (51) which are arranged in a row in a linear straight manner, preferably having the same width (bv),
- which are arranged so as to be either directly longitudinally adjacent to one another and preferably bonded to one another,
- whereby it is preferred in this case that the two

covering layers (3, 3) are formed from compact wood chipboards or homogeneous boards without a distinct grain orientation, or

- that, between adjacent strips (510) of this type, reinforcing or stiffening strips (7) are each arranged, adjoining their vertical longitudinal flank sides (511) facing one another, preferably bonded to them, and extending parallel to one another,

- whereby, in this latter case, it is preferred if the two covering layers (3, 4) made of wood, whose grain or fibres is or are oriented parallel to one another, yet at a right angle to the direction of the grains extending in longitudinal direction (II) of the reinforcing strips (7).

9. The building board or building element or the like according to any one of the claims 1 to 8,
characterized in
that the reinforcing or stiffening strips (7) have an elongated rectangular cross section and, in the event that they essentially have the same physical property-varying behaviour when the environmental conditions change in a direction at a right angle to the main extension (ed) of the covering surfaces (3, 4) as the vertical fibre body strips (510) or the vertical fibre layer (5) formed with them are bonded to the covering layers (3, 4) so as to seal the material with their upper and lower narrow edges (72).

10. The building board or building element or the like according to any one of the claims 1 to 8,
characterized in
that the reinforcing or stiffening strips (7) have an elongated rectangular cross section and, in the event that they have the physical property-varying behaviour when the environmental conditions change in a direction at a right angle to the main extension (ed) of the covering surfaces (3, 4) or to their grains (70) other than the vertical

fibre bodies (51) or the vertical fibre strips (510) or the vertical fibre layer (5) formed with them, they do adjoin the vertical fibre body strips (510) on both sides with their longitudinal side surfaces and are preferably bonded to them, however, they do not adjoin the covering surfaces (3,4) on the inside with their two narrow side surfaces (72) and are not bonded to them and their narrow side surfaces (72) are spaced from the covering surfaces (3, 4) to such an extent in the diagonal to the grain expansion or the like when environmental conditions change to an extent corresponding to said strips.

11. The building board or building element or the like according to any one of the claims 1 to 10,
characterized in
that the reinforcing or stiffening strips (7) are formed from a material, preferably wood, having fibres (70) or grains with an essentially uniform orientation (fl) in direction of the longitudinal extension (II), formed with said orientation of its grains, which is essentially at a right angle to the direction of the fibres or grains of the vertical fibre layer (5).

12. The building board or building element or the like according to any one of the claims 1 to 11,
characterized in
that, in the preferred case, their two covering layers (3, 4) are formed with essentially the same orientation or parallel to one another (fd3, fd4) of the fibres (30, 40) or grains of the material forming them, preferably the wood forming them - the reinforced or stiffening strips (7) in the vertical fibre layer (5) noted in claims 8 to 11 are arranged in their direction of longitudinal extension (II) such that the fibres (7) or the grains of the material forming them, preferably wood, extend or extends essentially at a right angle to the orientation (fd3, fd4)

of the fibres (30, 40) or grains of the two covering layers (3, 4).

13. The building board or building element or the like according to any one of the claims 1 to 12,
characterized in
that the two covering layers (3, 4) are formed with essentially the same or parallel orientation (fd3, fd4) of the fibres (30, 40) or grains of the material forming them, preferably wood.

14. The building board or building element or the like according to any one of the claims 1 to 10,
characterized in
that the vertical fibre layer (5) or the vertical fibre bodies (51) or vertical body strips (510) forming it is/are formed from or with a conventional wood, e.g. oak, of or with a wood of this type with lower quality or of or with a light wood, e.g. balsa and okume wood, with a density in the range of 0.1 to 0.8 g/cm^3.

15. The building board or building element or the like according to any one of the claims 1 to 11,
characterized in
that the vertical fibre bodies (51) forming the vertical fibre layer (5) are formed with the same size and/or form and/or from or with the same materials, in particular from or with the same type of wood or wood of uniform quality.

16. The building board or building element or the like according to any one of the claims 1 to 15,
characterized in
that the vertical fibre layer (5) is formed with vertical fibre bodies (51) arranged over their vertical sides (55) adjoining one another, in particular bonded to one another, each with an essentially ridge-like cross-sectional form

with a ridge beam (53) and tooth extensions (52) projecting away from it, preferably at a right angle, whereby the tooth spaces (54) between them form the vertical cavities (6) of the vertical fibre layer (5).

17. The building board or building element or the like according to claim 16,
characterized in
that the tooth spaces (54) of the vertical fibre bodies (51) are configured as grooves, channels or the like which are parallel to one another, preferably formed by milling, preferably having essentially the same depth, size or width or cross-sectional area and/or form.

18. The building board or building element or the like according to claim 16 or 17,
characterized in
that the tooth spaces (54) of the vertical fibre bodies (51) or the vertical cavities (6) of the vertical fibre layer (5) essentially have an elongated rectangular cross-sectional shape, optionally with a rounded base, whereby the rectangular length is in a ratio to the width (5:1) to (1:1), preferably (5:2) to (4.3).

19. The building board or building element or the like according to any one of the claims 16 to 18,
characterized in
that, in the case of the ridge-like form of the cross section of the vertical fibre bodies (51), the width (br) of the tooth spaces (54) is half to double the width (bz, bb) of the tooth extensions (52) and/or the ridge beam (53), however, that the just noted widths (br, bb, bz) are preferably essentially the same.

20. The building board or building element or the like according to any one of the claims 1 to 19,

characterized in
that it is sealed on at least two opposite narrow side flanks, preferably on all, with cover moldings (2), preferably made of wood.

21. The building board or building element or the like according to any one of the claims 1 to 20,
characterized in
that it is curved or arched, whereby the vertical fibre bodies (51), optionally arranged in more than one layer on top of one another, or the vertical fibre body strips (51) formed with them are bonded with their upper and lower sides to the first or lower curved covering layer (4) and to the second or upper covering layer (3) and vertical fibre bodies (51) or vertical fibre body strips (510) which are adjacent to one another - with a convex curvature or arching of the first covering layer (4) thereto - are arranged directly adjoining or adjacent with their lower longitudinal edges lying on this covering layer (4) and spread apart to the second or upper covering layer (3) at an acute angle, whereby elongated vacuums or gusset-like spaces expanding in a wedge-like manner to the second upper covering layer (3) are formed between them.

22. The building element, in particular a light-construction support, beam, girder or the like according to any one of the claims 1 to 21,
characterized in
that the building element, in particular the support (1^x) has essentially the same basic structure with covering layers.(3, 4) and, between them, vertical fibre layer (5), optionally arranged in several layers, with vertical cavities (6) as the building boards (1),
- whereby it is preferable that each of the covering layers (3, 4) is formed with at least two covering layers made of wood and bonded together so as to be flat, the at least one

layer of which is formed with an orientation of the fibres of the wood forming it in direction of the longitudinal extension of the support (1^X) or the like and the other layer of which is formed with an orientation of the fibres of the wood forming it in direction diagonally or at a right angle to the longitudinal extension of the support (1^X) or the like,

- wherein it is preferably further provided that the vertical fibre layer (5) is formed with vertical fibre body strips (50) extending essentially at a right angle to the longitudinal extension of the support (1^X), and wherein a stiffening or reinforcing strip (7) which extends from covering surface (3) to covering surface (4), and with grains in vertical direction to the longitudinal extension of the support (1^X) arranged between each of these strips (50) or between at least two layers of two or multiple strips formed from strips (50) of this type which are arranged adjacent to one another and on top of one another.

23. The building board or building element or the like according to any one of the claims 1 to 20,
characterized in

- that it is formed as a sound-absorbing or acoustic board, preferably made of wood, and either does not essentially have a covering plate toward the sound source or that its covering layer (4) facing the sound source is made with sound-transmitting openings (41) which passes through it, preferably arranged and formed corresponding to the respectively desired design and the vertical fibre layer (5) and its vertical cavities (6) are directly sound-accessible through these openings (41), whereby, for safety reasons, it is preferred if the inner walls of the vertical cavities is coated with a fireproof polymer substance that expands under the effect of heat in case of fire or is intumescent, or
- that the building board (1) is configured as a vibration

and resonance board, e.g. for floors and ceilings of sound-generating or sound-projecting equipment, as in particular speaker boxes, musical instruments or the like, whereby one of its covering surfaces (3, 4) can be optionally provided with sound-projecting openings and the vertical fibre layer (5) and its vertical cavities (6) are sound-radiating effective through these openings.

24. The building board or building element or the like according to any one of the claims 1 to 20,
characterized in
that it is configured as a safety building board, e.g. as a door plate, with two covering layers (3, 4), made for example of wood or in particular of a wood material, and that the reinforcing or stiffening strips (7), preferably in hand, in the vertical fibre layer (5), preferably formed with wood, consist of metal, preferably steel, arranged at a distance from one another parallel to one another, and/or
- that a metal plate, sheet or the like is glued to at least one of the wood covering layers (3, 4) on the outside, or that, in place of the wood covering layers, a metal plate, sheet or the like is directly bonded to the vertical fibre layer (5) in each case, whereby it is preferable that the metal plate, sheet or the like is bonded by means of an adhesive which is intumescent or expands under the influence of heat in the case of fire.

25. The building board or building element or the like according to any one of the claims 1 to 20,
characterized in
that it is made as a heat-insulated heating building element (9^{VI}) on the back, having heating pipes (76), tubes, conductors or the like on one side through which a heating medium can flow and which are installed in heating grooves (75) that are worked into the vertical fibre layer (5) formed with wood, preferably primarily in its reinforcing

and stiffening strips (7), and extending along it, whereby the said grooves (75) and the heating pipes (76) or the like placed in them are covered toward the outside with the covering layers (3, 4).

26. The building board or building element or the like, in particular wall, partition or covering element or board with high heat, sound and footfall sound-absorbing action for new constructions, expansions and rehabilitation of buildings, rooms or the like,
characterized in
- that it is formed with at least two building boards (1, 1') which are essentially identical to one another in their basic construction, are spaced from one another by means of spacers (91), preferably made of wood, and arranged parallel to one another according to any one of the claims 1 to 23, preferably formed with building boards (1, 1') of the type whose two covering layers (3, 4) are made of wood, laminated wood, layerwood, wood chip material or the like and whose vertical fibre layer (5) also consists of wood, or
- that it is formed with at least two building boards (1, 1') which are essentially identical in their basic construction and directly joined together via their respective main surfaces, preferably by flat glueing, according to any one of the claims 1 to 20, preferably with building boards (1, 1') of the type whose two covering layers (3, 4) consist of wood, laminated wood, layerwood, wood chip material or the like and whose vertical fibre layer (5) also consists of wood.

27. The building board or building element or the like according to any one of the claims 1 to 26,
characterized in that it is made with a preferably load-bearing building board (1) or with more than one building board (1) of this type bonded together so as to be flat

according to any one of the claims 1 to 20, to which a fire-retarding board (1) with two covering layers (3, 4) built in a similar manner on at least one side to obtain the highest fire safety, is bonded and with a vertical fibre layer (5) with vertical cavities (6) is formed between them, preferably with a not easily inflammable and burnable wood, e.g. oak, however, of low strength or thickness, in particular with 2 to 5 cm thickness, whereby the inner walls and possibly also the base of the vertical cavities (6) of the vertical fibre layer (5) are coated with a fireproof polymer substance which expands under the effect of heat in case of fire or is intumescent.

28. The building board or building element or the like, in particular a wall, partition or cover element or board according to claim 27,
characterized in that it is designed with three building boards (1, 1', 1") according to any one of the claims 1 to 20, each of which is spaced from one another by means of spacers (91), essentially as designed according to this claim, and at least basically arranged as noted there.

29. The building board or building element or the like, in particular a wall, partition or cover element or board according to claim 28,
characterized in that the spacers (91) in the vacuums or spaces (90) between the building boards (1, 1') are each formed with one or more bonded vertical fibre bodies (51) having the vertical cavities (6) and vertical fibres (50) or grains, preferably made of wood, and that they are arranged such that its grains also run essentially at a right angle to the main extension of the building boards (1, 1').

30. The building board or building element or the like, in particular wall, partition or cover element or board with

high heat, sound and footfall sound-absorbing action for new constructions, expansions and rehabilitation of buildings, rooms or the like,
characterized in
that it is formed with at least two building boards (1, 1') which are essentially identical to one another in their basic construction, are spaced from one another by means of spacers (91), preferably made of wood, and arranged parallel to one another according to any one of the claims 1 to 20, preferably formed with building boards (1, 1') of the type whose two covering layers (3, 4) are made of wood, laminated wood, layerwood, wood chip material or the like and whose vertical fibre layer (5) also consists of wood, whereby the spacers (91) are formed by bodies having an open pore structure or free cavities, in particular by mineral or plastic-based foam or pore bodies or preferably by pipe pieces preferably oriented diagonally to the main extension (ed) of the covering layers (3, 4), and that the space (90), which is optionally provided with a steel reinforcement (92), is filled with a mineral-based, hardening or hardened bonding agent, in particular concrete, light-weight or cellular concrete (95) or the like between the building boards (1, 1').

31. The building board or building element or the like, in particular wall, partition or cover element or board according to claim 30,
characterized in
that the surfaces of the covering layers (3, 4) thereof which face the space (90) between the building boards (1, 1') are provided with an adhesion-promoting layer (19), sanding, foil, net or the like for the adhesive connection of the binding agent, concrete, light-weight concrete or the like with the building boards (1, 1') introduced into the space (90).

32. The building board or building element or the like, in particular wall, partition or covering element or board (9) according to any one of the claims 26 to 31, characterized in that at least one of the covering layers (3, 4) of the building boards (1, 1') according to any one of the claims 1 to 21 is provided with a plaster-based layer, sheet, net (181) or the like on the outside which at least repels moisture, but preferably permits steam diffusion, in particular based on a plastic, e.g. an epoxy adhesive, with adhesion-increasing sanding or the like.

33. The building board or building element or the like, in particular wall, partition or covering element or board according to any one of the claims 26 to 30, characterized in that it is built directly at the building or installation site on site as a wall, partition or ceiling, the two building boards (1, 1') according to any one of the claims 1 to 21 being positioned as, connected to one another via the spacers (91) and planking boards of a "lost boarding" with a steel reinforcement inserted in the space (90) between them and the said space (90) is filled with concrete, light-weight concrete (95) or the like and at least one of the building boards (1, 1') can be or is provided with a plaster and facing plaster layer (18).

34. The building board or building element or the like, in particular wall, partition or cover element or board (9"') characterized in that it is formed with a building board (1) according to any one of the claims 1 to 21, that an (inner) lining layer (190), preferably formed with at least one light-construction board, in particular with a gypsum board or a water or fire-resistent mineral board, optionally having fire-retarding and/or moisture and water-repelling properties, is joined to its at least one covering layer, preferably to its two covering layers (3,

4) on the outside.

35. The building board or building element or the like, in particular wall, partition or covering element or board, characterized in that it is formed with a building board (1) according to any one of the claims 1 to 21, whose (inner) finishing layer (190) is provided with a plaster base (181) or with a finished plaster layer (18) comprising one.

36. A method for producing a building board or a building element or the like according to any one of the claims 1 to 21, characterized in
- that, in a first step, parallel longitudinal grooves (60), extending in direction of the grain, are worked in longitudinally extending beams (58), steps, boards or the like made of wood or light wood, preferably corresponding to the ridge-like cross-sectional form of the vertical fibre bodies (51) with the vertical cavities (6) traversing them and provided for their formation, and the grooved beams (58) or the like thus obtained are each arranged in the arrangement or sequence: tooth extension (52) - ridge beam (53) or side-by-side longitudinal flank - longitudinal flank adjacent to one another, joined together so as to seal the material to form vertical fibre body boards (580),
- that, in a second step, the vertical fibre body boards (580) thus obtained are divided into a number of vertical fibre body strips (510) with the vertical cavities (6) or tooth spaces (54) that are open to one side by cuts (S) that lead diagonally to the extension of the longitudinal grooves (60), each corresponding to the desired thickness of the vertical fibre layer (5) uniformly spaced from one another,
- that, in a third step - optionally or if desired after arranging the reinforcing or stiffening strips (7) between them - the vertical fibre body strips (510) are turned by

90° and either laterally adjoining one another with their longitudinal sides (511) or adjoining the tooth extension (52) - ridge beam or, after application of an adhesive, bonded to one another and placed on a first layer (4) of the covering layers (3, 4) and bonded to it in such a way that the vertical cavities (6) and the vertical fibres (50) are oriented essentially at a right angle to the extension (ed) of this covering board (4), and
- that, in a fourth step, the covering layer (3) still missing after an adhesive has been applied and bonded to the vertical fibre layer (5) is placed on the e.g. vertical fibre layer (5) which is still open to the top on one side with the cavities (6) there which are also still open.

37. A method for producing a building board or a building element or the like according to any one of the claims 1 to 21, characterized in
- that, in a first step, parallel longitudinal grooves (60'), extending in direction of the grain, are worked into longitudinally extending boards (58'), beams, steps, or the like made of wood or light wood, preferably corresponding to the ridge-like cross-sectional form of the vertical fibre bodies (51) with the vertical cavities (6) traversing them and provided for their formation,
- that, in a second step, the boards (58') or the like provided with the longitudinal grooves (60') adjoin one another along their longitudinal side flanks (55') while forming a layer or first partial layer (TL1) with their non-grooved or grooved main surfaces are deposited on a reinforcing strip layer (700) provided for the forming of the reinforcing strips (7), preferably made of wood, while bonding so as to seal the material to it laterally joined to one another,
- that, at least in an intermediate optional step, at least one second partial layer (TL2) of grooved boards (58') or the like which also adjoin one another along their

longitudinal side flanks (55'), is deposited on the first partial layer (TL1) of grooved boards (58'), mutually offset with respect to their longitudinal side flanks (55'), and joined to the first partial layer TL1,
- that, in a third step, a further strip layer (700') which is preferably similar to the strip layer (700') already mentioned above, is attached to a third partial layer (TL3), respectively bonded as the last one and to the previous partial layer (TL2), also laterally offset again, and bonded to the last partial layer (TL3),
- that, in a fourth step, the plate-like initial body (580') thus formed is divided into a number of vertical fibre body strips (510'), optionally each flanked on both sides by a stiffening strip (7'), by cuts (S) made essentially at a right angle to the longitudinal grooves (60') and the grain of the partial layers (TL1, TL2, TL3) or the grooved boards (58') or the like forming them, each spaced (as) equidistantly from one another, and
- that, in a fifth step, these vertical fibre body strips (510') adjoin one another laterally or in the arrangement or series after an adhesive has been applied: tooth extension (54) - ridge beam (53) placed on a layer (4) of the covering layers (3, 4) and in this way bonded to it, that the vertical cavities (6) are oriented essentially at a right angle to the extension (ed) of these covering plates (4), and
- that, in a sixth step, after an adhesive has been applied, the still missing covering layer (3) is placed on the vertical fibre layer (5) which is still open to the top and bonded to the vertical fibre layer (5).

38. The method according to claim 37, characterized in that the strip layers (700) are used with grains that conform to one another or are parallel, extending essentially at a right angle to the grain of the boards (58') provided with the grooves (60').

39. Use of building boards or building elements or the like according to any on of the claims 1 to 21, either directly as light-weight, dividing and optionally supporting elements, such as in particular walls, partitions (intermedite) ceilings, (intermediate) floors and the like, for new constructions, reconstructions and expansions of, optionally mobile, buildings, in particular finished part buildings, or as facing boards or the like that are optionally used in the manner of a "lost boarding", in particular as heating and sound-absorbing and insulating boards for buildings and building structures.

40. Use of building boards or building elements or the like according to any one of the claims 1 to 21 for furnishing buildings, building parts and rooms, attics, cellars and the like of buildings with heat and sound-insulating facings and linings.

41. Use of building boards or building elements or the like according to any one of the claims 1 to 21 with the proviso that it is formed with a vertical fibre layer (5), whose vertical cavities (6) are coated with a fireproof or fire-retarding substance which expands under the effect of heat in case of a fire or is intumescent, and/or that they are provided on at least one side with a fireproof mineral board bonded to it or similar fire-resistant coating or that at least one of its covering layers is formed directly with a fireproof mineral board of this type or the like, for furnishing buildings, building parts and rooms, attics, cellars and the like of buildings with fireproof and also heat and sound-insulating facings.

42. Use of building boards or building elements or the like according to any one of the claims 1 to 21 for interior furnishing of buildings and rooms, in particular for hinged and sliding doors, safety doors and the like.

43. Use of building boards or building elements or the like according to any one of the claims 1 to 21 for shipbuilding, boat and mobile home construction, trailer and camper building, in particular as "sandwich board" for light-weight furnishing of vehicles, ships, boats, mobile homes and the like, such as floors, facings, built-in elements, built-in furniture and the like.

44. Use of building boards or building elements or the like according to any one of the claims 1 to 21 for erecting halls, bunks, stands, superstructures and extensions of the fair, exhibition, presentation and market sector.

45. Use of building boards or building elements or the like according to any one of the claims 1 to 21 for furniture building as well as for interior architecture and building furnishing purposes.

46. Use of building boards or building elements or the like according to any one of the claims 1 to 21 for instrument making, preferably for resonance and vibration boards of sound-emitting equipment, such as loudspeaker boxes, in particular for ceilings and floors, of (string) instruments and the like.

Application number / numéro de demande: ATO5/00141

Figures: 16, 17

Pages:

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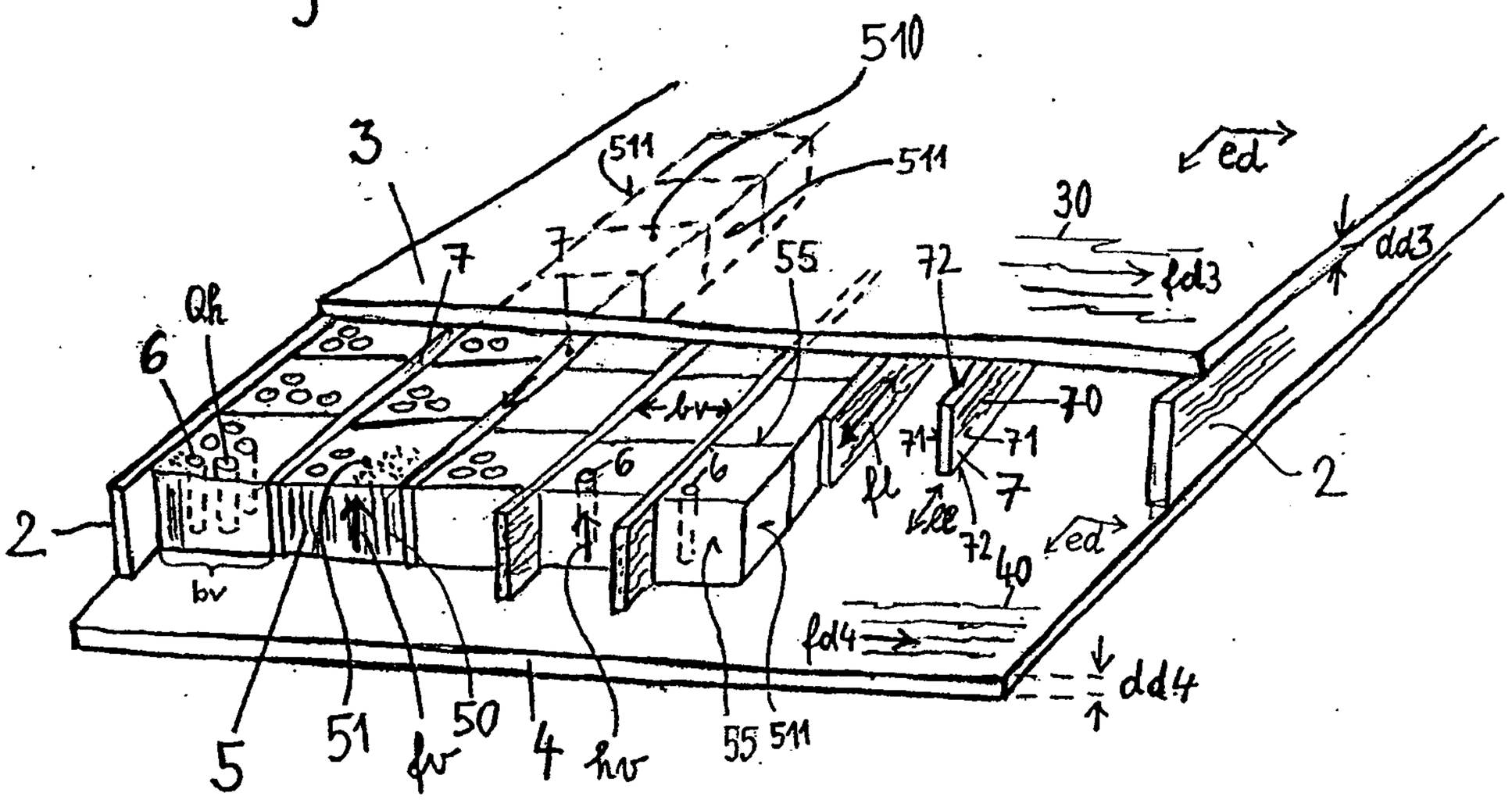
Fig.1



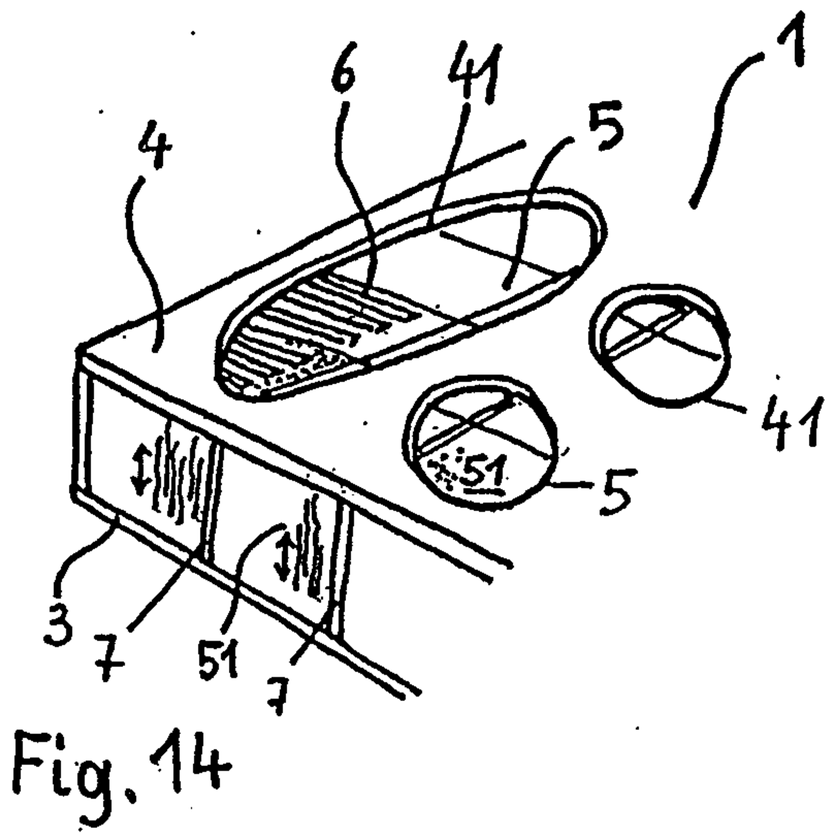


Fig.14

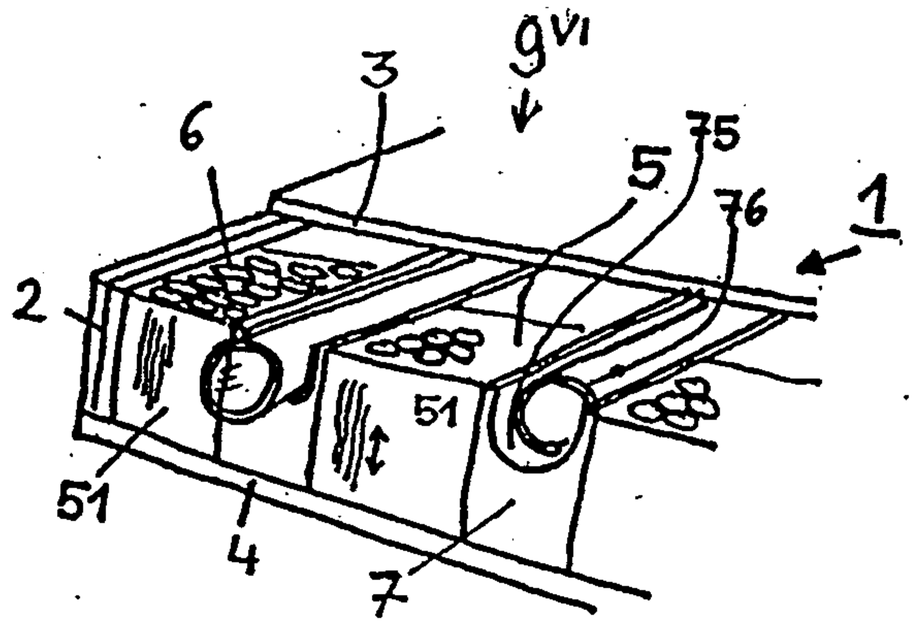


Fig.15

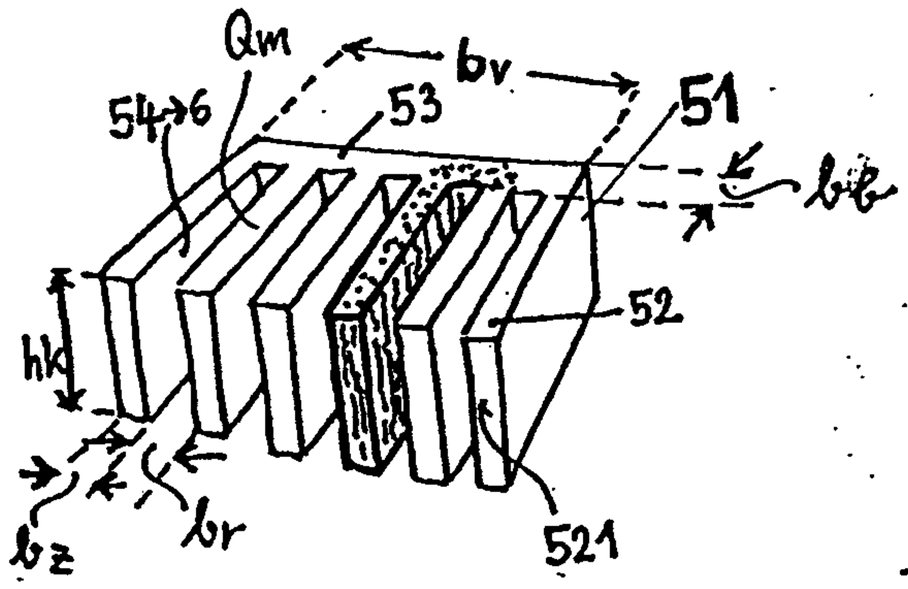
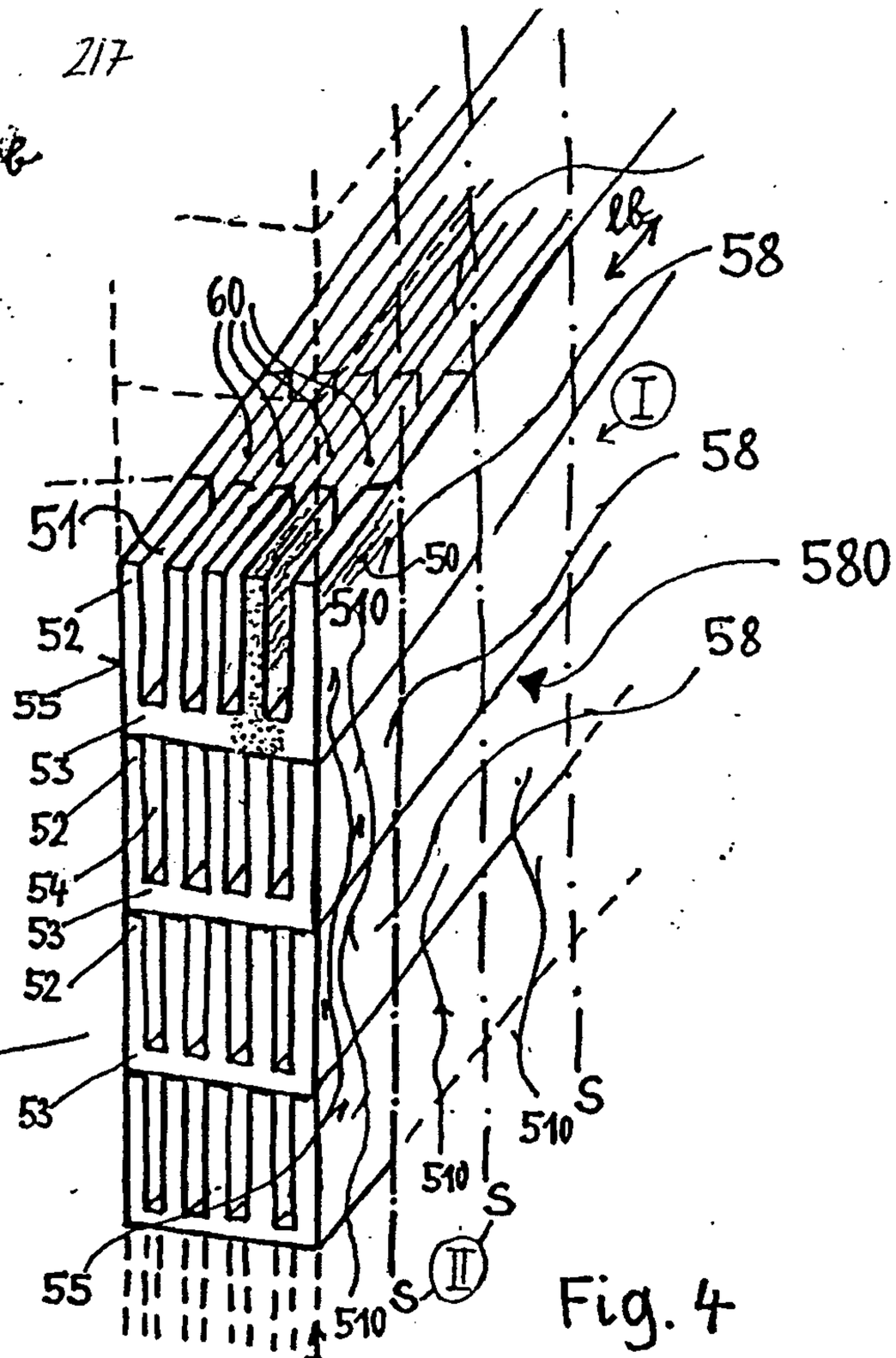


Fig. 2



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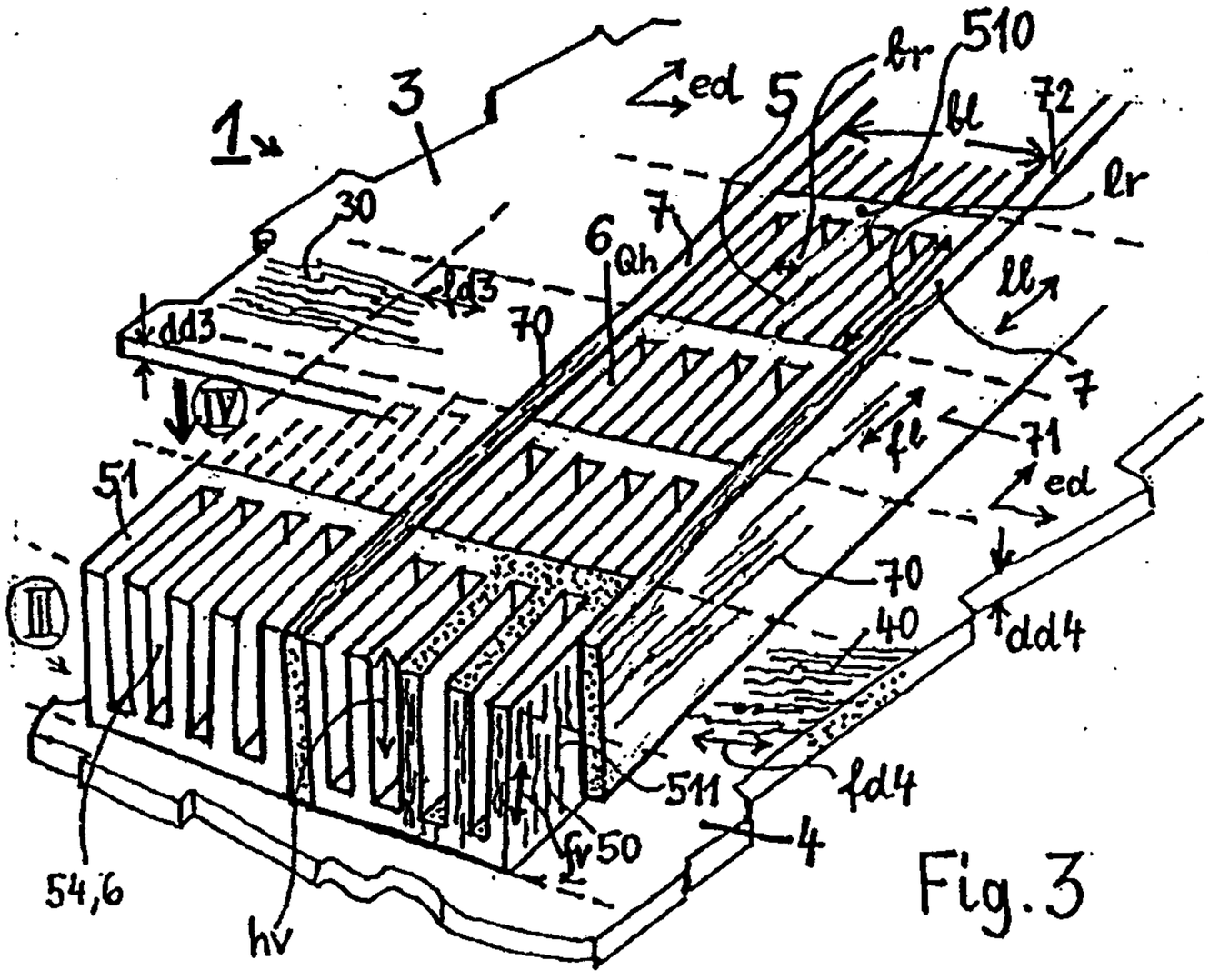


Fig. 3

Fig.5

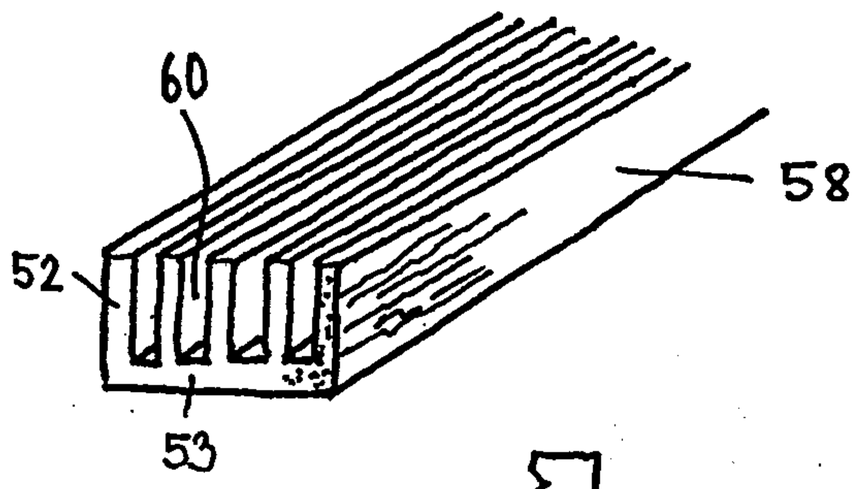


Fig.6

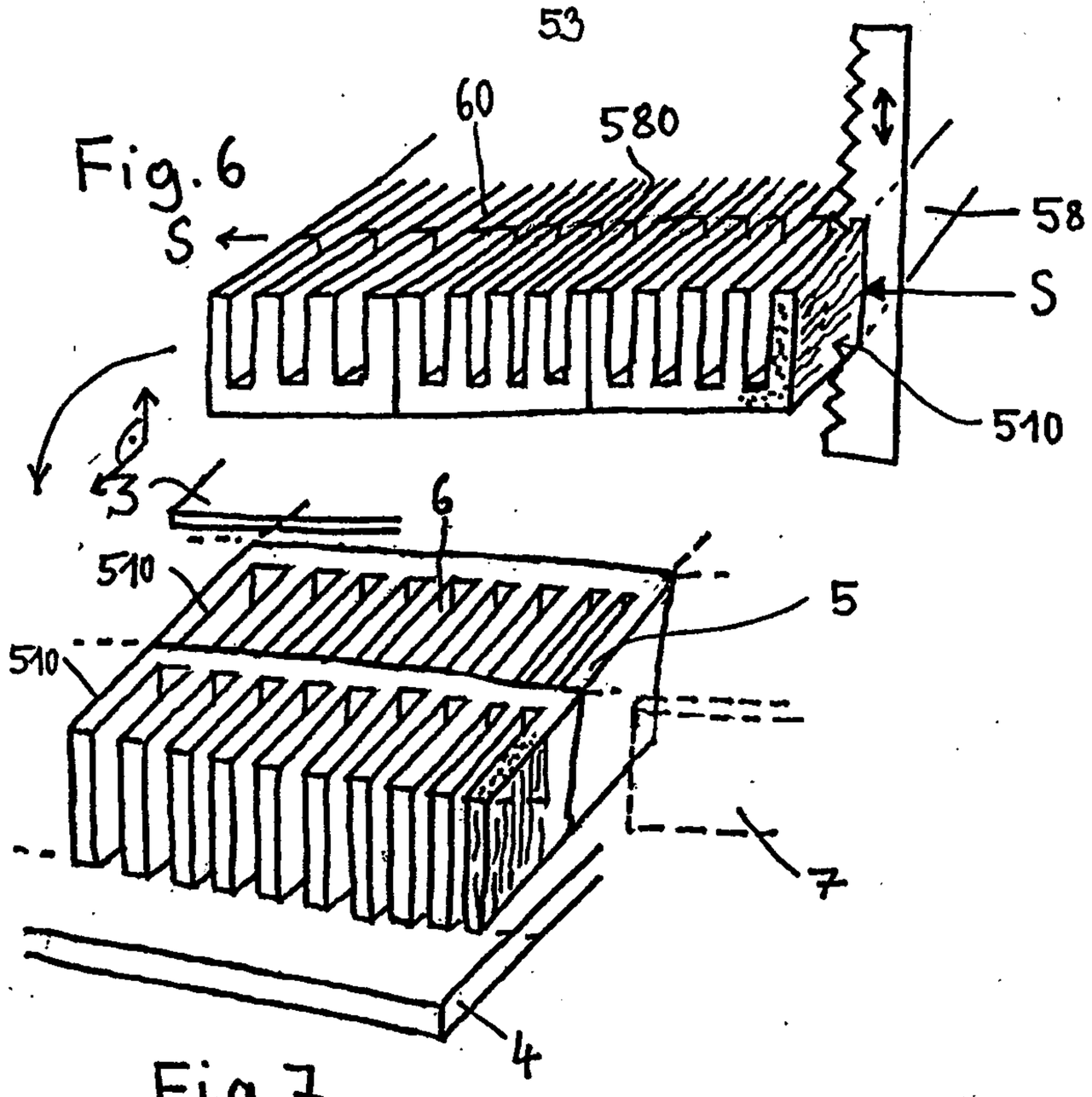


Fig.7

Fig.8

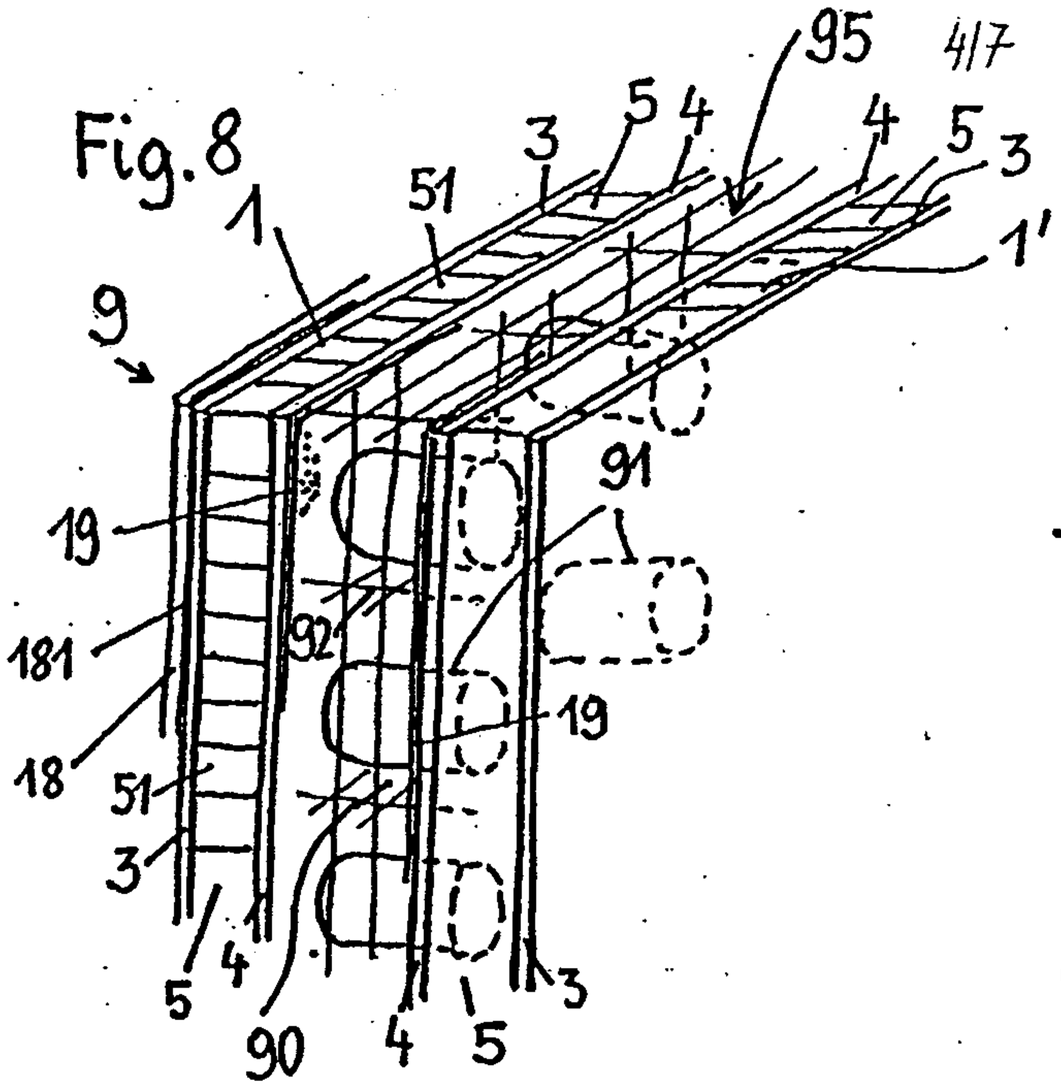


Fig.9

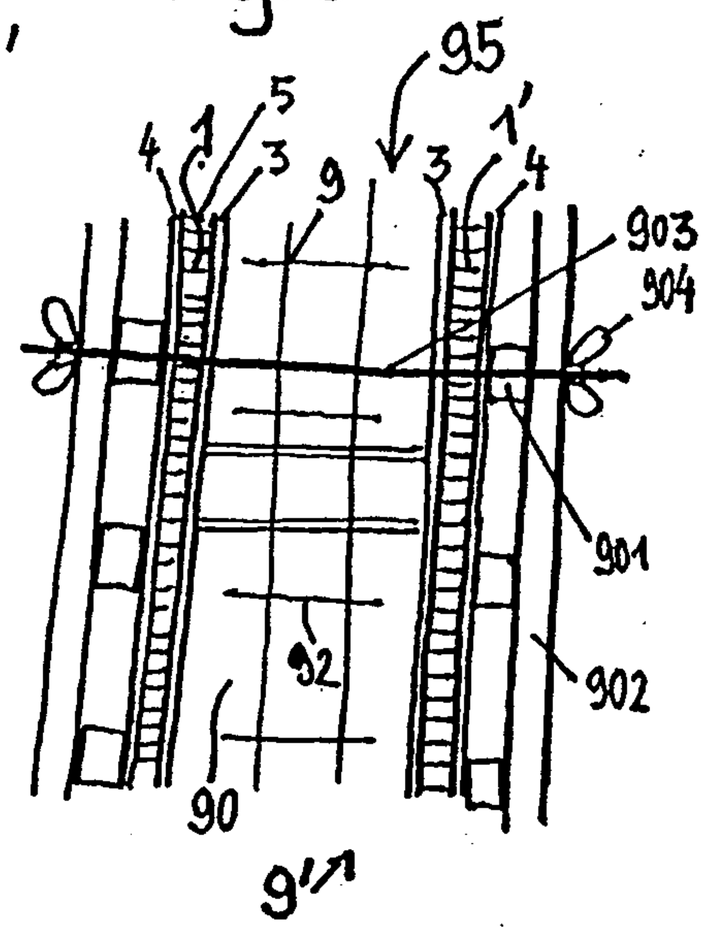


Fig.11

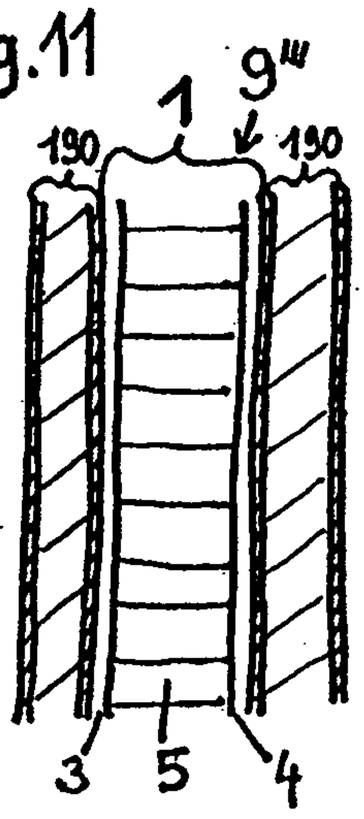


Fig.12

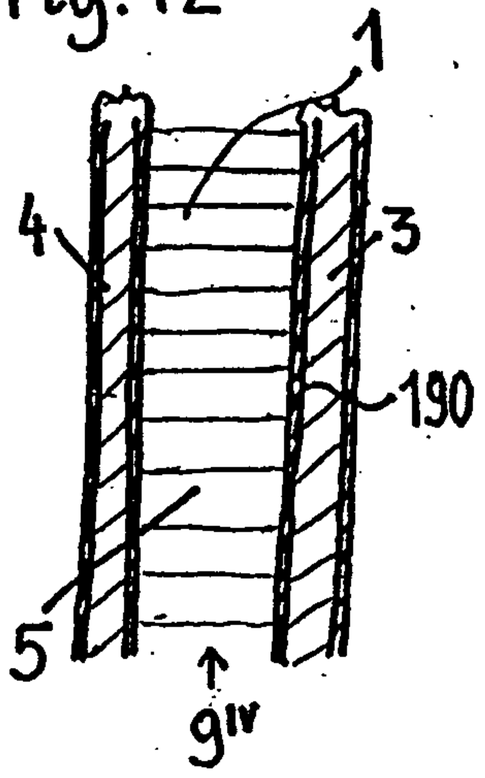


Fig.13

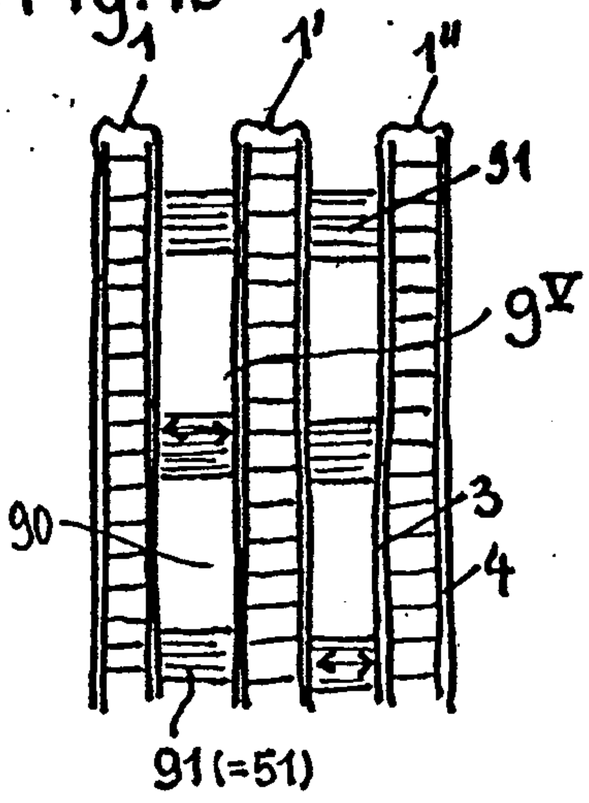
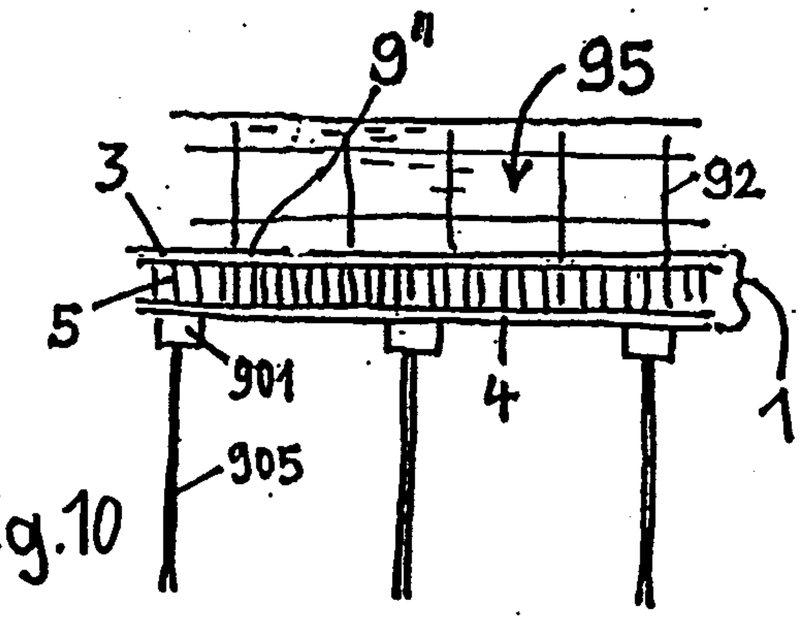


Fig.10



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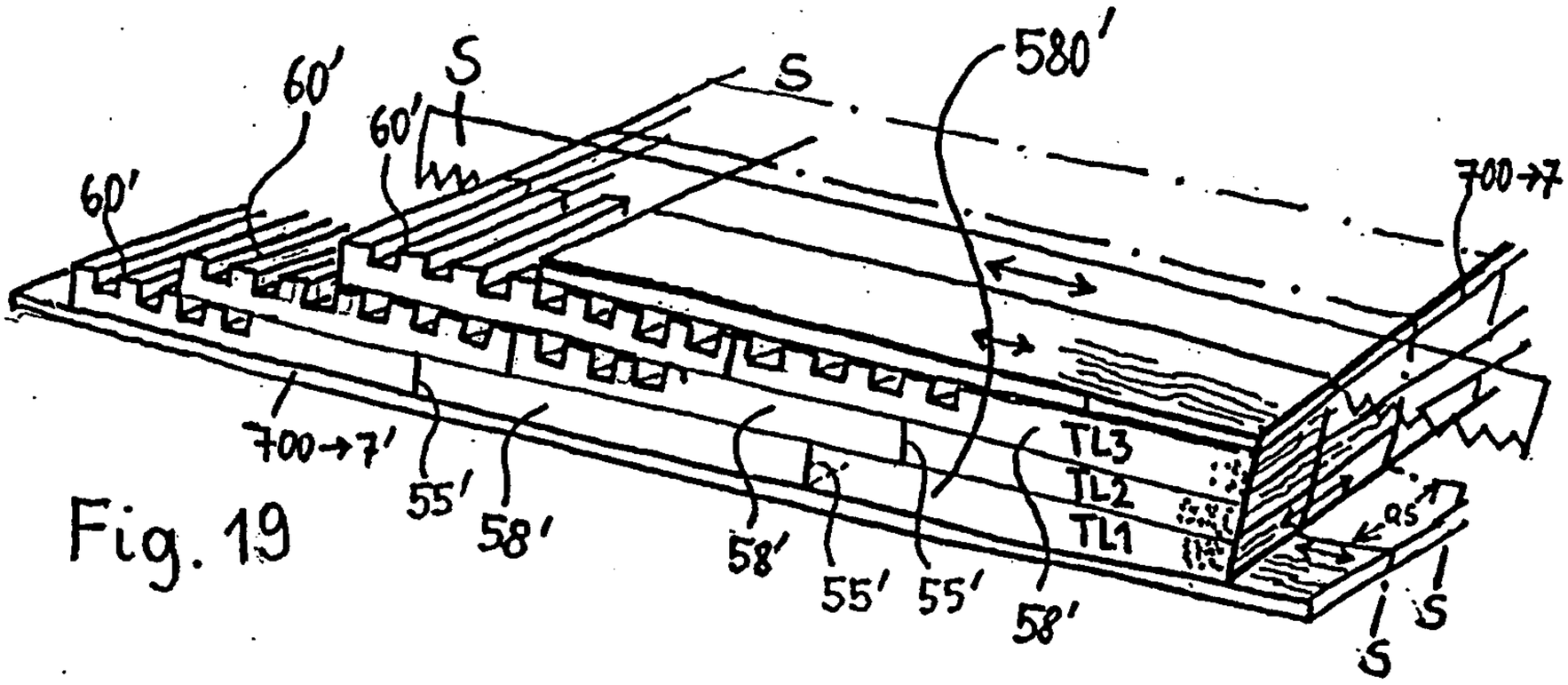


Fig. 19

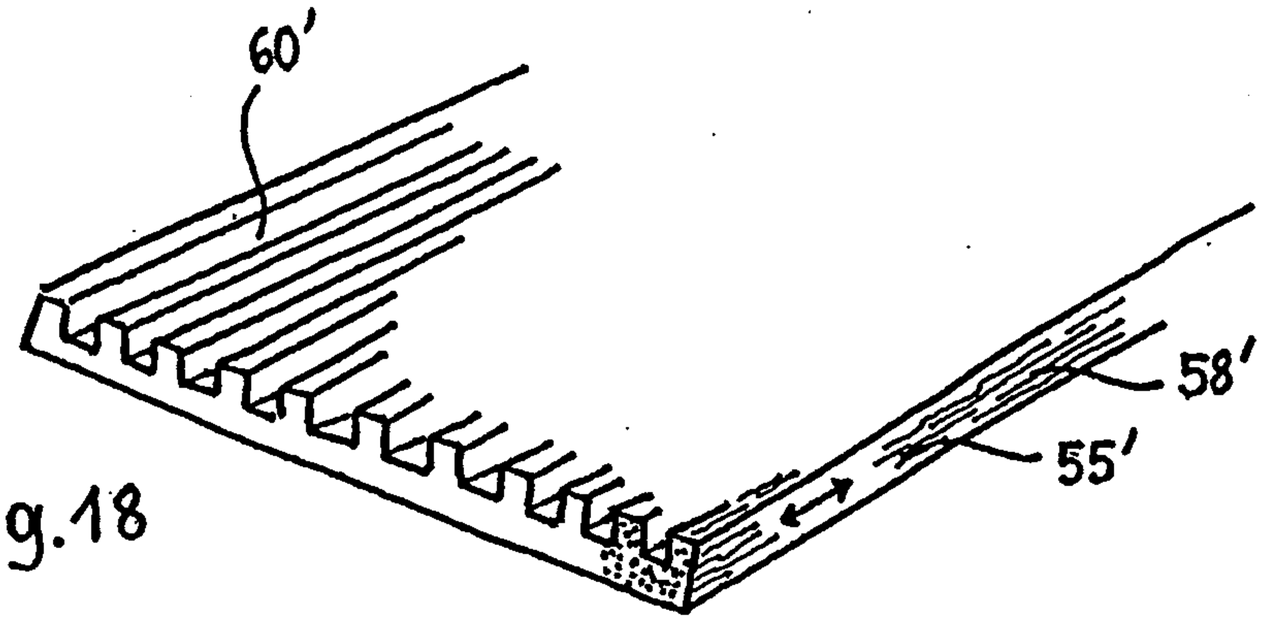


Fig. 18

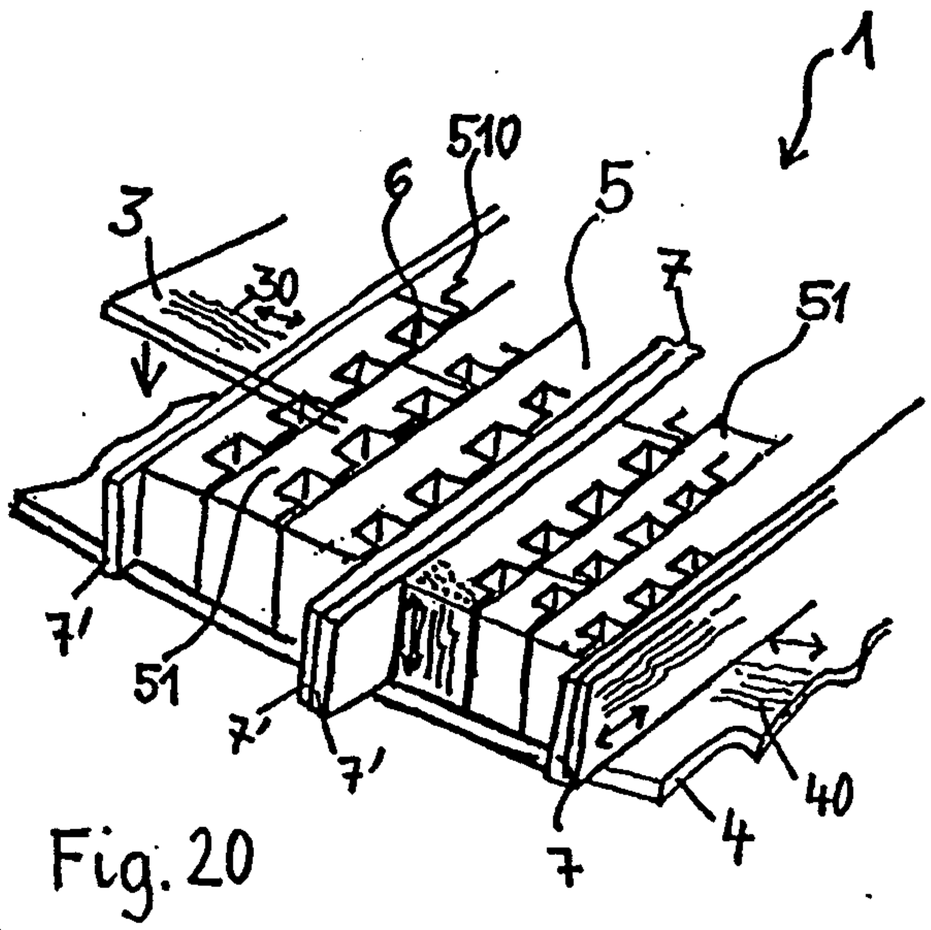


Fig. 20

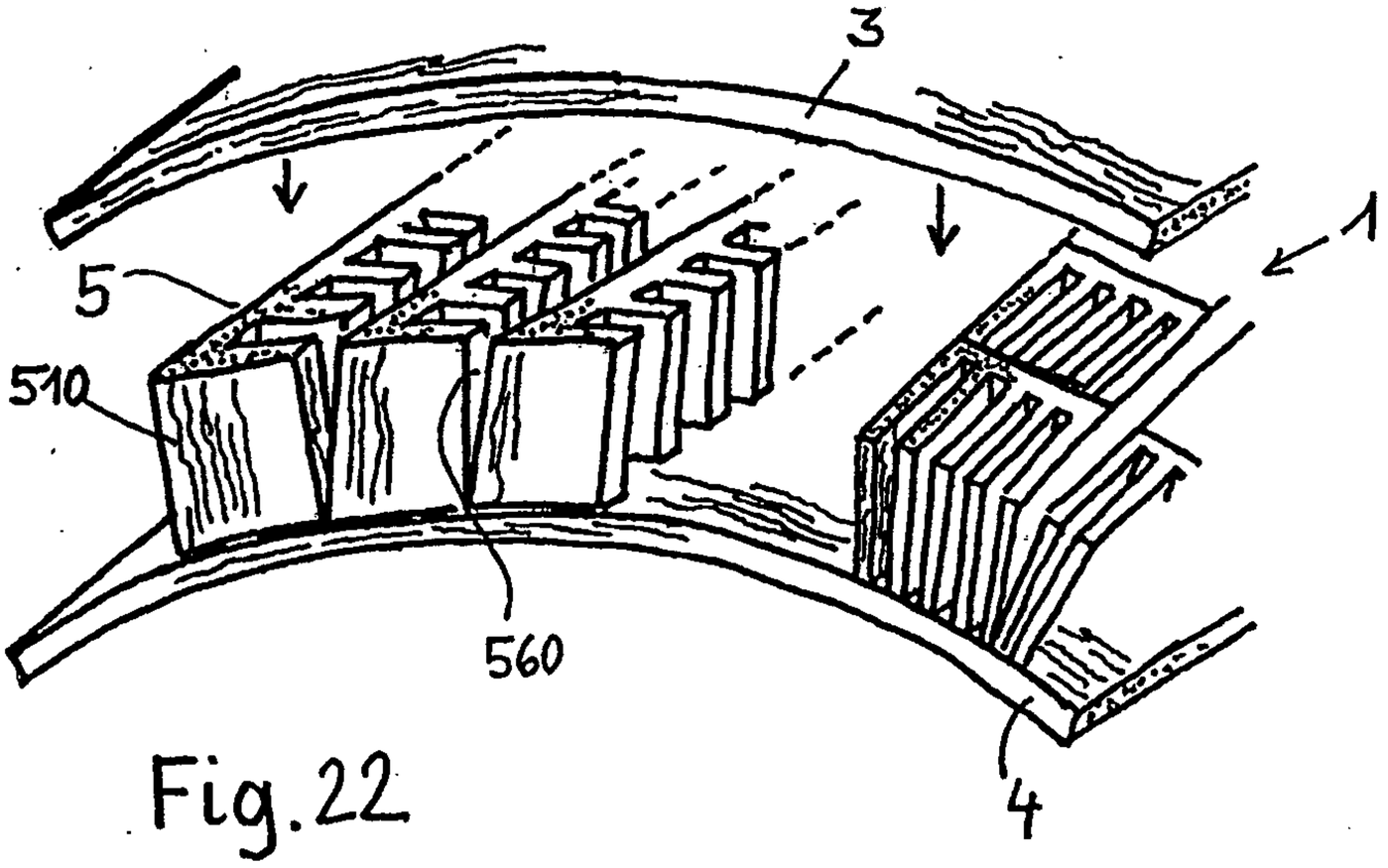


Fig. 22

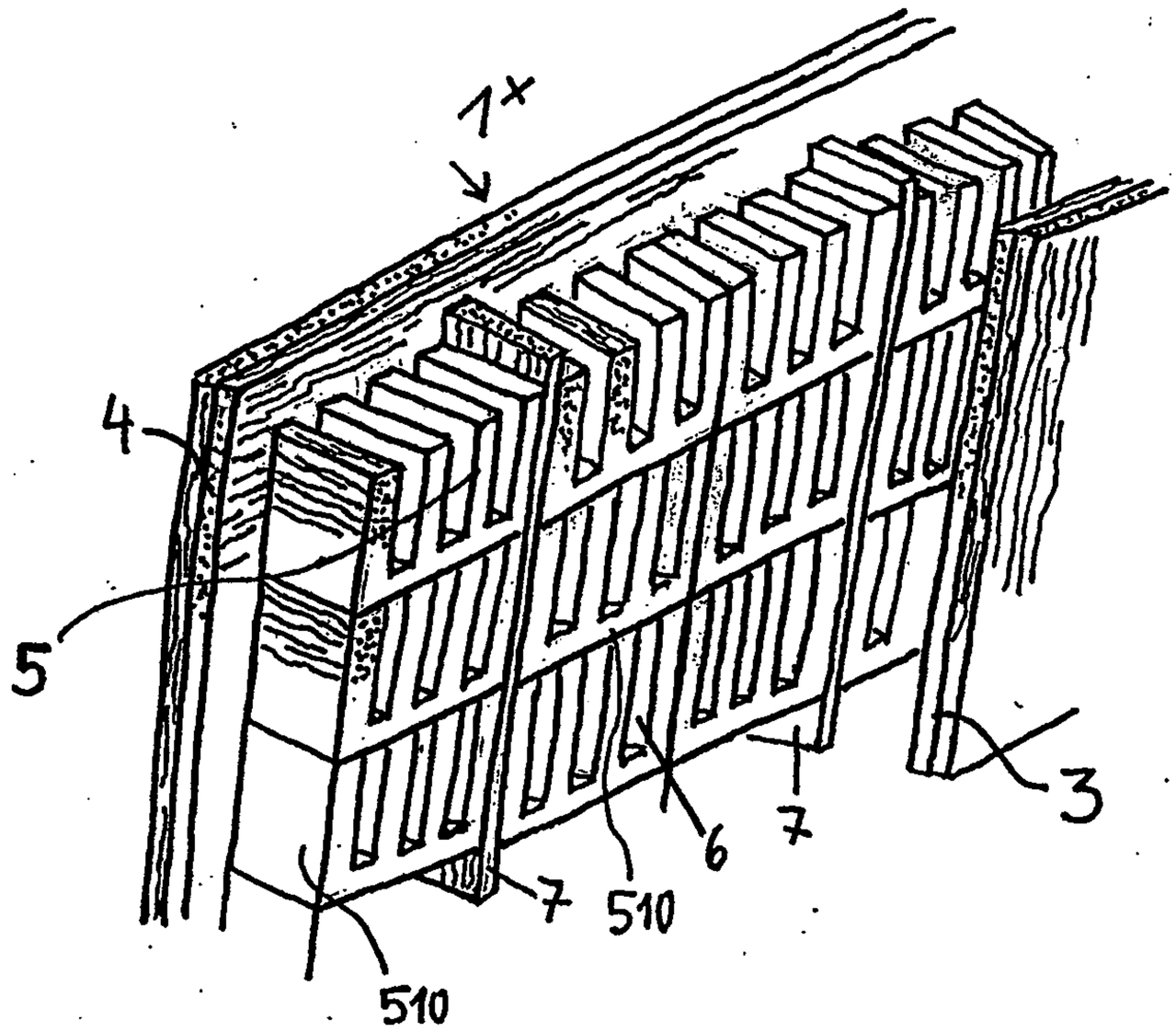
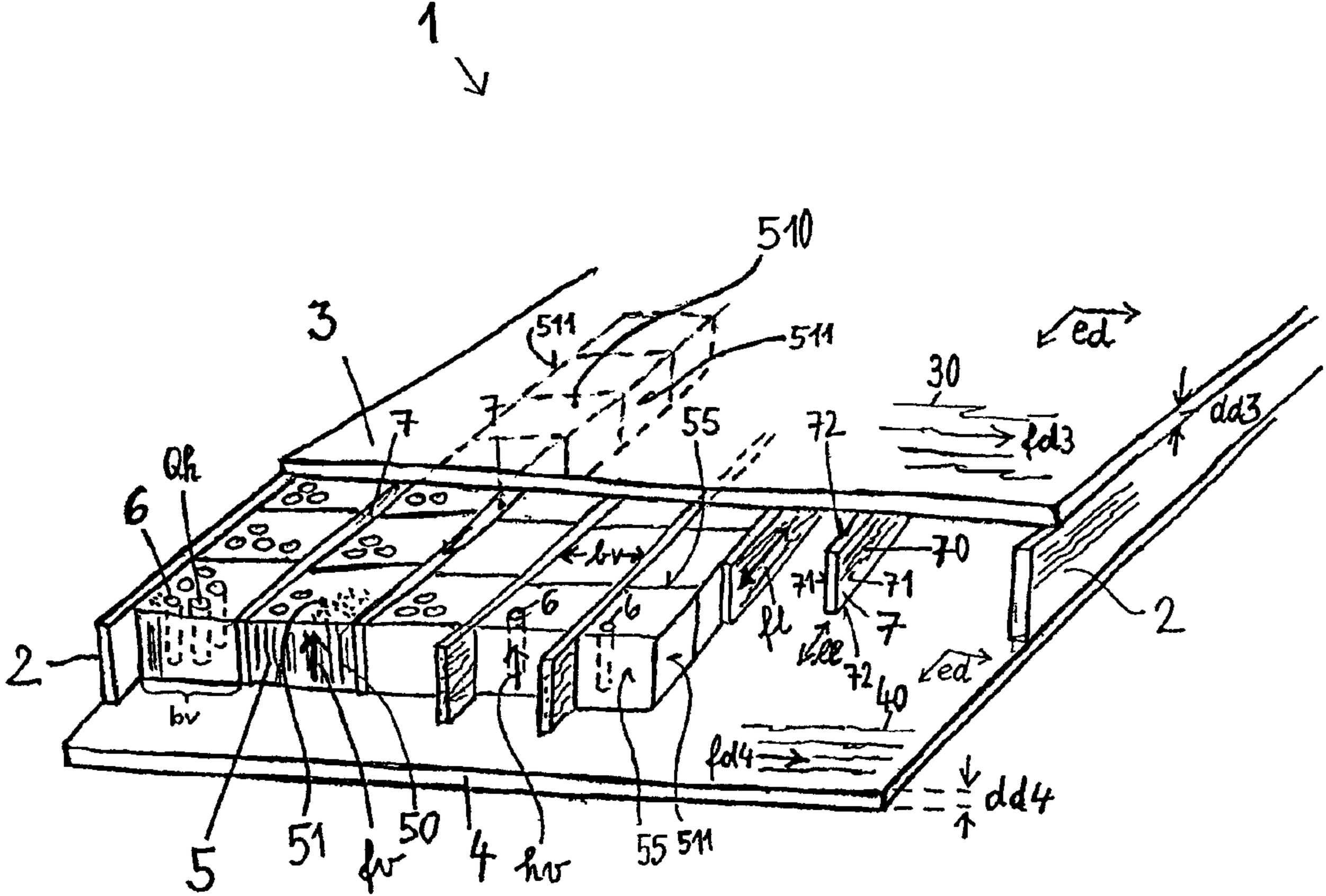


Fig. 21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