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(54) Set of construction elements for space partitioning

(57) Disclosed is a set for supporting panels comprising guttershaped tracks (11) and studs (12) having opposite structural side members (21, 22). At least a first side member (21) is transversely separated or is transversely separable in the proximity of at least one end of the stud for forming a first longitudinal section (25b) at the proximal end (28) of the stud (12) and a second longitudinal section (25a). The stud (12) has a width at the location of the second section (25a) larger than the width of the track opening. Therefore, upon fitting the stud (12) into the track (11), an offset is created between the front surface (27) of the second section (25a) and an outer surface of the track (11), thereby forming a gap (52) between the outer surface of the track (11) and a plane tangent (51) to the front surface (27) of the second section (25a).

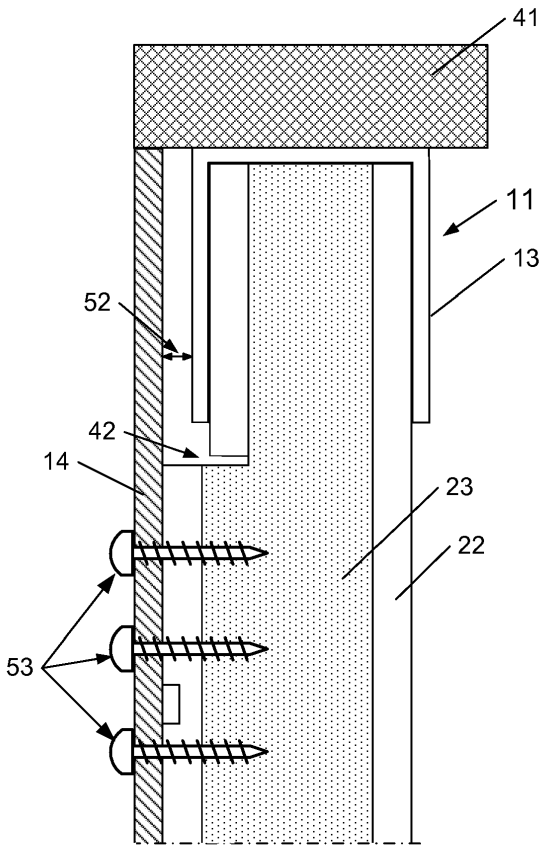

Fig. 6

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Description

TECHNICAL FIELD

[0001] The present invention relates to a set of construction elements comprising studs and tracks for supporting panels, in particular for constructing an interior partitioning system for dividing an interior space into partitions, such as a partitioning wall, floor or ceiling, having improved acoustic insulation properties.

[0002] The present invention further relates to a method for constructing an interior partitioning system wall using the set of studs and tracks.

BACKGROUND ART

[0003] Interior partitioning system construction is a common building technique for the fabrication of interior walls, floors and ceilings of a building and generally involves the step of securing panels, made of a suitable material such as plasterboard or gypsum, or fibreboard, to a frame. Such a frame may be constructed by securing a number of tracks on a respective surface with their opening facing one another and positioning at least one stud between the track openings. For example for the construction of an interior wall, the tracks may be secured on the floor and against the ceiling of the space in which the wall is being constructed. In a further example, for the construction of the ceiling or the floor of the room, the tracks may be secured on opposite walls of the room. Once the frame is in place the panels may be fastened to the studs by means of screws or nails. The partitioning system construction may be completed by further finishing the panels to obtain a smooth surface which may be painted to the desired decorative aspect. As a result, due to the relatively simple construction and low cost compared to the traditional brick and cement approach, partitioning system construction has become highly popular with new building developments and with refurbishing a building in order to adapt the building to a new function. To ensure that the safety, well-being and privacy of occupants of a building are not compromised, partitioning system construction is required to conform to certain building regulation standards, among others regarding fire protection and acoustic insulation. Fire protection may be enhanced by constructing the partitioning system with materials which are fire resistant, for example by positioning panels containing gypsum on a metal frame.

[0004] On the contrary, constructing a partitioning system with acoustic insulation properties requires a more elaborate construction, because sound may be transferred from one part of the building to another via a number of ways, commonly referred to as acoustic transmission processes. Acoustic transmission processes may be divided into three main categories:

a) airborne transmission, whereby the sound waves of the noise source are transmitted from one side of the partitioning system to the other side via adjacent vibrating surfaces or elements of the structure,
b) impact transmission, whereby the noise source is caused by the impact of an object onto a separating surface which then transmits the sound to an adjacent room, and
c) flanking transmission, also referred to as structure borne transmission, wherein sound is transmitted via the elements of structure of the building or the partitioning system, such as via the metal frame of the partitioning system or the steel frame of the building.

[0005] Known solutions in the prior art mainly focus on preventing airborne transmission of sound via the adjacent partitioning system surfaces by increasing the mass of the partitioning system construction. For example, in the case of an interior wall construction, this may be achieved by fastening a second layer of panels on each side of the interior wall and filling the interior wall cavities between adjacent studs with solid material having sound insulating properties, such as foam, fibreglass or rockfibre.

[0006] However, such measures may not prevent the flanking transmission of sound via the elements of the structure of the partitioning system, for example via the partitioning system frame at a location where the tracks and studs are connected.

[0007] Attempts have been made in the prior art to prevent the flanking transmission of sound while maintaining the structural properties of the partitioning system.

[0008] In WO 2013/064191 an interior wall frame with improved acoustic properties is disclosed. In this case, a number of slots are provided on the planar web interconnecting two side walls of a track opening. The slots are positioned such as to reduce the available surface area via which the sound may be transmitted between the two side walls of the track. However, a disadvantage of this prior art is that the sound may still be transmitted via the wall studs positioned into the tracks openings. This is because the studs act as a connecting element between the two side walls of the track, thereby providing a sound transmission path allowing the flanking transmission of sound through the elements of the interior wall frame.

[0009] In US 6,381,916 an upright section for building partitioning walls is disclosed. The upright section is a C-section

that has two section legs extending in parallel positions, spaced from each other and connected by a section bridge. The centre of the section bridge is equipped with an elastic segment designed symmetrically relative to a centre line. The elastic segment consists of longitudinal slots that are punched through and spaced from each other in parallel rows. Therefore, the upright section consists of two components that are not rigidly connected with one another, but via the elastic segment of the section bridge. This configuration of the upright section may improve the sound permeability of a two-board panelling system. However, sound may still be transmitted to the other side of the two-board panelling system, through the connection of the upright section with the track opening.

[0010] Moreover, the solutions disclosed in the patent documents WO 2013/064191 and US 6,381,916 have a further disadvantage in that, once a panel is fastened onto the stud, a physical contact is created between the track and the panel. As a result, sound may still be transmitted between the two sides of the partitioning system via this connection.

[0011] There therefore remains a need for a partitioning system assembly which also reduces the flanking transmission of sound from one side of the partitioning system to the other side.

[0012] The present invention aims to obviate or at least mitigate the above described problem and/or to provide improvements generally.

SUMMARY OF THE INVENTION

[0013] Therefore, it is an object of the present invention to provide a set of construction elements for supporting panels, the set comprising at least one gutter-shaped track and at least one stud, with which, in contrast to the solutions found in the prior art, flanking transmission of sound via the track may be reduced or prevented without increasing the cost or complexity of the partitioning system construction.

[0014] To this end the invention provides a set of construction elements for supporting panels, in particular for the construction of an interior partitioning system such as an interior wall, floor or ceiling, showing the technical characteristics of the first claim and comprising:

- at least one gutter-shaped track comprising a first and a second upstanding side wall enclosing an opening in between for accepting an end of a stud;
- at least one stud comprising two opposite longitudinal structural side members each having a front surface and a back surface, the back surfaces of the side members of the stud facing one another and being connected to one another by at least one vibration dampening connecting element, the stud having at least one end suitable for being fitted into the opening of the track;
  characterised in that at least a first side member of the stud is transversely separated or is transversely separable at a location in the proximity of at least one end of the stud into at least a first longitudinal section at the proximal end of the stud and a second longitudinal section, the stud having a width, at the location of the second longitudinal section, which is larger than the largest width of the cross-section of the gutter opening of the track plus the thickness of at least one of the upstanding side walls of the track, whereby, upon fitting the stud into the track, an offset is created between the front surface of the second longitudinal section and the adjacent outer surface of the track, so that a gap is formed between the outer surface of the track and a plane tangent to the front surface of the second longitudinal section.

[0015] It has been found that by separating the first side member into separate sections and further creating an offset at the location of the separation between the front surface of the second longitudinal section and the outer surface of the track, the flanking transmission of sound may be strongly reduced and possibly even be prevented. This is because, once a panel is secured at the front surface of the second longitudinal section of the first side member, a physical connection between the inner surface of the panel and the outer surface of the track is prevented, thanks to the gap which is formed in between the two surfaces. Therefore, the panels secured on each of the first and second longitudinal side member will be acoustically decoupled.

[0016] In an embodiment of the present invention, upon fitting the stud into the track opening, a further gap may be created between the first longitudinal section and the second longitudinal section of the first side member of the stud.

[0017] This gap may further prevent or reduce the flanking transmission of sound. This is because any sound vibrations generated in the first longitudinal section will not be transmitted to the second longitudinal section, thanks to the gap which is formed in between the two sections.

[0018] According to another embodiment, the first side member of the stud may be provided with at least one transverse weakened portion dividing the first side member into at least the first longitudinal section and the second longitudinal section. The location of separation may be defined by a bridging element interconnecting the first longitudinal section and the second longitudinal section. By providing the transverse weakened portions as lines, the location at which the first side member may be divided into sections may be clearly defined. By making the transverse weakened portions clearly visible, the location at which the first side member may be divided into sections may also be readily identified.

[0019] By providing a plurality of such transverse weakened portions at various locations on the side member of the stud, the operator may readily identify the preferred location or locations for cutting the stud, if the stud needs to be shortened to about a predefined length, such as for adapting the stud to the distance between a floor and a ceiling track, or a floor track and a ceiling track, or between two tracks which are fixed against opposite walls.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

Figure 1 a is a perspective view of a partitioning wall according to the present invention under construction.
Figure 1b is a perspective view of a horizontal embodiment of the present invention under construction.
Figure 2 is a perspective view of one preferred embodiment of a stud according to the present invention.
Figure 3 is a perspective view of another preferred embodiment of a stud according to the present invention.
Figure 4 is a side view of a track and a stud according to the present invention before the stud is fitted into the opening of the track.
Figure 5 is a side view of the track and a stud of Figure 4 after the stud has been fitted into the opening of the track.
Figure 6 is the side view of Figure 5 after a panel has been fixed to the stud.
Figure 7 is a perspective view of one embodiment of a stud according to the present invention.
Figure 8 presents a comparison of the R values obtained from the partitioning system having a 1+1 configuration and using the system of the present invention, denoted by the legend element 'P', and from the same configuration using a standard metal stud, denoted by the legend element'S'.

DETAILED DESCRIPTION

[0021] The invention will now be further elucidated by means of the following description and the appended drawings.

[0022] The present invention will be described in the following with respect to particular embodiments and with reference to certain drawings but the invention is not limited thereto but only by the claims. Any drawings described are only schematic and are non-limiting. In the drawings, the size of some of the elements may be exaggerated and not drawn on scale for illustrative purposes. The dimensions and the relative dimensions do not necessarily correspond to actual reductions to practice of the invention.

[0023] Furthermore, the terms first, second, third and the like in the description and in the claims, are used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. The terms are interchangeable under appropriate circumstances and the embodiments of the invention can operate in other sequences than described or illustrated herein.

[0024] Moreover, the terms top, bottom, over, under and the like in the description and the claims are used for descriptive purposes and not necessarily for describing relative positions. The terms so used are interchangeable under appropriate circumstances and the embodiments of the invention described herein can operate in other orientations than described or illustrated herein.

[0025] The term "comprising", used in the claims, should not be interpreted as being restricted to the means listed thereafter; it does not exclude other elements or steps. It needs to be interpreted as specifying the presence of the stated features, integers, steps or components as referred to, but does not preclude the presence or addition of one or more other features, integers, steps or components, or groups thereof. Thus, the scope of the expression "a device comprising means A and B" should not be limited to devices consisting only of components A and B. It means that with respect to the present invention, the only relevant components of the device are A and B. Accordingly, the terms "comprising" and "including" encompass the more restrictive terms "consisting essentially of" and "consisting of". An interior partitioning system construction may be constructed by positioning panels of a suitable material to a structural frame, which frame may be constructed from a set of tracks and studs.

[0026] To this end a track may be defined as a longitudinal construction element having a suitable shape resulting in an opening, which opening may be arranged for receiving an end of a stud. The opening may be formed between two upstanding side walls, thereby creating a gutter-shaped track, for example U-shaped, i.e. having a U-shaped cross-section, but other shapes may also be suitable such as for example V-shaped, C-shaped or H-shaped.

[0027] A stud may be defined as a longitudinal construction element, having a length which is larger than the outer width of the stud, and may be used in combination with at least one track to support panels for constructing an interior partitioning system, or other construction elements of the partitioning system.

[0028] According to embodiments of the present invention, a set of construction elements for supporting panels, and in particular for the construction of interior partitioning system, such as interior walls, floors, and ceilings may be provided. With reference to the numerals in the accompanying drawings for illustration purposes only, the set of construction elements may comprise at least one gutter-shaped track 11 comprising a first and a second upstanding side wall 13

enclosing an opening in between for accepting an end of a stud 12. Furthermore, at least one stud 12 may be provided, having two opposite longitudinal structural side members 21 and 22. Each of the two opposite side members 21 and 22 may have a front surface 27 and a back surface 26. The opposite side members may be positioned in such a way so that the back surfaces 26 of the side members 21 and 22 of the stud 12 face one another and are connected to one another by at least one vibration dampening connecting element 23. The stud 12 may be arranged so that at least one end 28 is suitable for being fitted into the opening of the track 11. Moreover, at least a first side member 21 of the stud is transversely separated or is transversely separable at a location in the proximity of at least one end of the stud 28 into at least a first longitudinal section 25b at the proximal end 28 of the stud 12 and a second longitudinal section 25a. The stud 12 may have a width, at the location of the second longitudinal section 25a, which is larger than the largest width of the cross-section of the gutter opening of the track 11 including the thickness of at least one of the upstanding side walls 13 of the track. Therefore, upon fitting the stud 12 into the track 11, an offset is created between the front surface 27 of the second longitudinal section 25a and the outer surface of the track 11, so that a gap 52 is formed between the outer surface of the track 11 and a plane tangent 51 to the front surface 27 of the second longitudinal section 25a.

[0029] It has been found that the gap 52 formed between the outer surface of the track 11 and a plane 51 tangent to the front surface 27 of the second longitudinal section 25a may reduce or prevent the flanking transmission of sound of the completed partitioning system. This is because, once a panel 14 is secured on the side member 21, a gap 52 is created between the inner surface of the panel 14 and the outer surface of the side wall 13 of the track 11. Therefore, in contrast to the prior art solutions, the sound waves generated on one side of the partitioning system, may not be transmitted at their full strength to the other side. As a result, the gap 52 may provide an effective measure in acoustically decoupling the panels 14 attached to either side of the partitioning system construction, thereby preventing sound vibrations from being transmitted from one side of the drywall construction 10 to the other side.

[0030] According to another embodiment of the present invention, the width of the stud 12 at the location of the first longitudinal side section 25b may also be larger than the largest width of the cross-section of the gutter opening of the track 11 plus the thickness of at least one of the upstanding side walls 13 of the track. Therefore, upon fitting the stud 12 into the track 11, at least the first longitudinal section 25b may be removed from the proximal end of the stud 28, thereby reducing the outer width of the stud. As a result, after fitting the stud 12 into the track 11, the connecting element may be arranged to contact at least one of the upstanding side walls 13.

[0031] By removing the first longitudinal section 25b, a further reduction of the flanking transmission of sound may be achieved. This is because in this embodiment, upon fitting the stud into the track, the vibration dampening connecting element 23 is brought in contact with one of the track upstanding side walls 13. Therefore, any sound waves generated on the front surface of the second longitudinal section 25a may be dampened by the connecting element. As a result, the flanking transmission of sound via the track opening may be prevented, thereby further improving the acoustic insulation of the partitioning system.

[0032] In another embodiment of the present invention, the width of the stud 12 at the location of the first longitudinal side section 25b may also be larger than the largest width of the cross-section of the gutter opening of the track 11 plus the thickness of at least one of the upstanding side walls 13 of the track. Therefore, upon fitting the stud 12 into the track 11, at least part of the connecting element 23 connecting the first longitudinal section 25b to the opposite side member 22 may be removed from the proximal end of the stud 28, thereby reducing the outer width of the stud 12 at its proximal end. Once the part of the connecting element 23 is removed, the first longitudinal section 25b may be (re)positioned on the proximal end 28 of the stud 12. As a result, after fitting the stud 12 into the track 11, the first longitudinal section 25b contacts at least one of the upstanding side walls 13.

[0033] By removing part of the connecting element 23 and reintroducing the first longitudinal section 25b at the end of the stud 28, the rigidity of the partitioning system at the proximal end 28 of the stud 12 may be enhanced.

[0034] In yet another embodiment of the present invention, the width of the stud at the location of the first longitudinal side section 25b may also be larger than the largest width of the cross-section of the gutter opening of the track 11 plus the thickness of at least one of the upstanding side walls 13 of the track. Therefore, upon fitting the stud into the track, the first longitudinal section 25b may need to be displaced towards the opposite side member 22. This may result in the compression of the part of the connecting element 23 which connects the first longitudinal section 25b with the opposite side member 22. Therefore, at the location of the separation, an offset may be created between the front surfaces 27 of the second longitudinal section 25a and the first longitudinal section 25b, so that the at least one end 28 of the stud may be fitted into the opening of the track 11 with the front surface 27 of the first longitudinal section 25b contacting at least one of the upstanding side walls 13.

[0035] It has been found that by displacing the first section 25b and consequently compressing the connecting element to reduce the width of the stud 12, may have as an effect that the gap 52 may be created in an easy and less complex manner without the use of specialised tools.

[0036] According to embodiments of the present invention, the offset created at the location of the separation may be such that an extra gap 42 may be formed between the first longitudinal section 25b and the second longitudinal section

25a of the first side member 21. Therefore, due to this extra gap, also the direct sound transmission between the first and the second longitudinal section 25a and 25b may be prevented, thereby further improving the acoustic insulation of the partitioning system.

[0037] According to embodiments of the present invention the first side member 21 of the stud 12 may be provided with at least one transverse weakened portion 24 dividing the first side member 21 into at least the first longitudinal section 25b and the second longitudinal section 25a. Each transverse weakened portion 24 may have a bridging element defining a location of separation of the side member.

[0038] By making the transverse weakened portions clearly visible, the locations at which the first side member may be separated are clearly visibly indicated. Furthermore, the weakened portion may enable the separation of the first and second longitudinal section 25a and 25b in an easy and quick manner, without the need of specialised tools.

[0039] In an embodiment of the present invention, the width of the transverse weakened portion 24 may be at least larger than 1.0mm, preferably at least larger than 2.0 mm, and optionally at most smaller than 20.0 mm, preferably at most smaller than 10.0 mm, more preferably at most smaller than 5.0 mm. As a result, at the location of the separation a gap of a predetermined width may be created between the first and second longitudinal sections 25a and 25b.

[0040] According to some embodiments of the present invention, the weakened portions 24 may be provided in the form of a transverse groove having two opposing side walls spaced apart from one another and a bottom surface connecting the two opposing side walls, as for instance shown in Figure 2. The side walls of the groove may thus be spaced from one another by a predetermined distance which may be at least larger than 1.0 mm, preferably at least larger than 2.0 mm, at most smaller than 20 mm, preferably at most smaller than 10 mm, more preferably at most smaller than 5.0 mm. The groove may be arranged such that it does not extend through the full thickness of the side member. Therefore, the bottom surface of the groove may be formed by the remaining material of the at least one side member 21. The depth of the groove as a percentage of the total thickness of the longitudinal side member 21 may be larger than 30% of the total thickness of the side member, smaller than 90%, preferably smaller than 70%, and more preferably smaller than 60%.

[0041] By providing the transverse weakened portion in the form of a groove, the first side member may still maintain the desired structural properties, while readily enabling the separation of the two sections 25a and 25b, in an easy and quick manner.

[0042] In an embodiment of the present invention, the weakened portions 24 may comprise at least one perforation or a line of perforations, as for instance shown in Figure 3. The perforated weakened portions 34 may comprise at least one hole extending through the first longitudinal side member 21. The bridging element between the first and the second sections 25a and 25b may thereby be formed by the material of the first side member 21 left in between the holes of the perforated line. The use of perforated lines may enable side members made of materials such as metal to be readily separated at the specific location.

[0043] In an embodiment of the present invention, a plurality of weakened portions may be provided in the first side member. The weakened portions 24 provided as part of the at least first side member 21 may be spaced from one another by a distance which is at least larger than 2.0 cm, optionally at most smaller than 40.0 cm, preferably at most smaller than 30.0 cm, and more preferably at most smaller than 20.0 cm. By providing a plurality of such transverse weakened portions at various locations on the side member, the operator may readily identify the preferred location or locations for cutting the side member, or even the stud as a whole, such as when the stud needs to be shortened to about a predefined length, such as for adapting the stud length to the distance between a floor and a ceiling track, or a floor track and a ceiling track, or two tracks fixed to opposite walls.

[0044] According to an embodiment of the present invention, the connecting element 23 may be made from a suitable resilient material having a dynamic stiffness from 0.01 MN/m^3 to 12000 MN/m^3, preferably at least 0.05 MN/m^3, more preferably at least 0.1 MN/m^3, even more preferably at least 0.2 MN/m^3, yet more preferably at least 0.5 MN/m^3, preferably at least 1.0 MN/m^3, and optionally at most 1000 MN/m^3, preferably at most 500 MN/m^3, more preferably at most 100 MN/m^3, even more preferably at most 50 MN/m^3, yet more preferably at most 30.0 MN/m^3.

[0045] The resilient material may further have a loss factor, tested according to EN 29052-1:1992 and as explained below, from 0.001 to 2.0, preferably at least 0.01, more preferably at least 0.02, even more preferably at least 0.03, yet more preferably at least 0.04 and optionally at most 1.0, preferably at most 0.5, more preferably at most 0.2, and even more preferably at most 0.15.

[0046] The apparent dynamic stiffness of the resilient material may suitably be tested according to EN 29052-1:1992; using the following test parameters: sample size = 200 mm by 200 mm ; form factor = 1; load mass = 195.7 kg/m^2. The loss factor of the resilient material may be tested according to EN 29052-1:1992; using the following test parameters: sample size = 200 mm by 200 mm ; form factor = 1; load mass = 195.7 kg/m^2.

[0047] An example of a material suitable for a connecting element 23 is a suitable solid material having structural as well as acoustic insulating properties, such as a polymer foam (e.g. polyurethane foam), felt, cork, rubber, metallic wool, mineral fibre, and the like. The polymer foam may be a prime foam but also bonded foam products are suitable, such as polyurethane bonded foam. With bonded foam is in the art typically meant a foam product comprising chopped up

pieces of prime foam, bonded together with an adhesive component. The foam pieces may readily be made from foam which is recycled, such as after already having performed a useful function during a previous life.

[0048] According to embodiments of the present invention, instead of only one connecting element, a plurality of connecting elements may be provided in the form of blocks spaced from one another by predetermined distances along the length of the stud 12. As a result, additional air gaps between the opposite side members 21 and 22 may be formed, which have been found to further reduce the transmission of sound between the first and second side member 21 and 22, thereby enhancing the acoustic insulation properties of the partitioning system. The additional air gaps may further facilitate the installation of electrical cables and other utility components through the studs of the partitioning system.

[0049] In another embodiment the connecting element 23 may be provided continuously along the length of the stud, i.e. as a continuous element along substantially the entire length of the stud. In this way, the rigidity, structural integrity and noise insulation properties of the stud may be enhanced. Furthermore, the connecting element may be provided with openings, not shown, to enable the routing of cables and other utility components through the studs of the partitioning system.

[0050] According to embodiments of the present disclosure, a partitioning system may further be provided. Examples of such a partitioning system may include but are not limited to the partitioning wall shown in Figure1 a, or the partitioning ceiling shown in Figure 1b. The partitioning system 10 may comprise at least one assembled set of studs and tracks according to embodiments of the present invention, and at least one panel 14 fixed to the stud on the front surface 27 of at least one side member 21 of the stud 12. The frame of the partitioning system may be constructed by fixing one or more tracks 11 to a respective surface, such as the floor, ceiling or the walls of a room or interior space. For example, when constructing an interior wall, one of the tracks may be positioned on the ceiling of the room while another track may be positioned on the floor.

[0051] By constructing a partitioning system according to embodiments of the present invention, the acoustic insulation properties of the partitioning system may be enhanced considerably. It has been found that in comparison with a standard partitioning system, the use of the system according to the present invention in the construction of a partitioning system may provide considerable acoustic insulation improvements. The acoustic insulation characteristic of a building element is typically expressed as the Sound Reduction Index R, measured in a test lab as defined in ISO 10140-2:2010 (equation 2). According to ISO 10140-2, the test element is mounted in an opening in the partition between a source room, i.e. the room wherein a sound generator is positioned, and a receiving room, both adjacent to each other. The average sound pressure levels (in dB) in both rooms are then measured at certain frequencies in the frequency range of 100-5000 Hz. From the difference in sound pressure level between both rooms, the R value (dB) may be calculated for each of these frequencies, taking into account the equivalent absorption area of both rooms. The higher the R value, the better the acoustic insulation. It has now been found that at the frequency band of 700Hz to 1250Hz there is a very pronounced increase of R when using the partitioning system according to the present invention. This effect is shown in Figure 8, which presents a comparison of the R values obtained from the partitioning system having a 1+1 configuration and using the system of the present invention, which is denoted by the legend element 'P', and a partitioning system having the same configuration but using a standard metal stud, which is denoted by the legend element 'S'. It can be seen that at the frequency band from 700Hz to 1250Hz the R values obtained from the partitioning system using the system of the present invention is approximately 10-15dB higher in comparison to the R values obtained from the same partitioning system using a standard metal stud. It is worth noting that a sound reduction of 10dB equates to the same sound being perceived by the human ear only half as loud. Besides the Sound Reduction Index, the Weighted Sound Reduction Index (Rw) is also a characteristic rating to express the acoustical performance of a building element. It represents a single figure rating, expressed in dB, as defined in International Standard ISO 717-1:2013. According to this standard, the R values, obtained in accordance with ISO 10140-2 as explained above, are compared with reference values for R at the frequencies of measurement within the range of 100 Hz to 3150 Hz. The corresponding reference R curve is then shifted in increments, for example of 1dB, towards the measured R curve until the sum of the unfavourable deviations between both curves, i.e. those where the measured R curve is below the reference R curve, at the individual measurement points is as large as possible, but not larger than 32 dB. The Rw value (in dB) is then defined as the value of this shifted reference curve at 500 Hz. Similarly, the higher the Rw is, the better the acoustic insulation is. The tests, being performed on the partitioning system according to the invention, have shown that the differences in the Rw obtained from a partitioning system using the system of the present invention in comparison to a standard partitioning system, may vary depending on the partitioning system configuration. In total three different partitioning system configurations were tested: a) configuration 1+1 provided with 12.5 mm thick plasterboard panels on each side of the partitioning system, b) configuration 1+2 provided with a 12.5mm thick plasterboard panel on one side of the partitioning system and a 25mm thick plasterboard panel on the other side, and c) configuration 2+2 provided with 25mm thick plasterboard panels on each side of the partitioning system. All plasterboard panels had a density of 680 kg/m^3. Table 1 presents a summary of the Rw values obtained from the three partitioning system configurations. As it may be observed, for all three partitioning system configurations constructed using the system of the present invention, the Rw value obtained was significantly higher in comparison to the Rw obtained from the equivalent partitioning systems constructed using a standard metal stud. The

difference in the Rw values obtained from the different partitioning systems was in the range of 2-5 dB, depending on the thickness of the plasterboard panels being installed. For example, as shown in table 1, for the partitioning system configuration 1+1 the difference in the Rw value obtained from a partitioning system using the system of the present invention compared to an equivalent system using a standard metal stud is approximately 2 dB. However, for a partitioning system configuration having a larger plasterboard panel thickness, such as the configuration 2+2, the Rw value obtained using the system of the present invention is approximately 5 dB higher than the Rw value obtained from an equivalent standard partitioning system. From the above, it may be concluded that a partitioning system using the system according to the present invention may obtain higher acoustic improvements compared to a standard partitioning system, especially at the frequencies of 400Hz and higher. Similar acoustic improvements were observed for the partitioning systems having other configurations (1+2, 2+2). This represents a major improvement in acoustic performance of a partitioning system, which may be obtained with the system of the present invention in an easy and quick manner.

Table 1 : Comparison of the Rw obtained from different partitioning system configurations using a standard metal stud and the system of the present invention.

Partitioning System configuration	Plasterboard panel Thickness (mm)	Rw (dB)	
		Standard metal stud	Present invention
1+1	12.5 + 12.5	44	46
1+2	12.5 + 25	47	52
2+2	25 + 25	52	57

[0052] According to embodiments of the present invention, a method for constructing a partitioning system may also be provided. The method may comprise the steps of assembling at least one set of construction elements according to the present invention. The step of assembling may comprise the fitting of at least one end 28 of the at least one stud 12 into the opening of the at least one track 11. At least one panel 14 may subsequently be fixed to the front surface 27 of at least one side member 21 of the stud 12.

[0053] According to embodiments of the present invention the step of fitting the stud 12 into the track may further comprise the steps of

(i) if the first side member 21 or 22 is separable, then separating transversely at least one first side member 21 of the at least one stud 12, at a location in the proximity of at least one end 28 of the stud 12, into at least a first longitudinal section 25b at the proximal end 28 of the stud 12 and a second longitudinal section 25a;
(ii) compressing the part of the connecting element 23 that connects the first longitudinal section 25b with the opposite side member 22, or alternatively, removing at least the first longitudinal section 25b from the proximal end of the stud 28, thereby reducing the width of the stud 12 at the proximal end 28 to become at most equal to the width of the track 11, optionally, subsequently removing part of the connecting element 23 connecting the first longitudinal section 25b to the opposite side member 22 from the proximal end of the stud 12, and optionally subsequently replacing the first longitudinal section 25b in connection with the remaining part of the connecting element; and
(iii) fitting the stud 12 into the track, thereby creating an offset between the front surface 27 of the second longitudinal section 25a and the adjacent outer surface of the track 11, so that a gap 52 may be formed between the outer surface of the track 11 and the surface of the panel 14 which is facing the stud.

[0054] According to embodiments of the present invention the method step of separating the at least one first side member may be performed by removing the bridging element at the location of separation from at least one transverse weakened portion 24 provided on the first side member 21 of the stud 12. This may be performed in a manual way, such as by using a tool, for example by using a Stanley knife, a saw or a cutter

[0055] According to embodiments of the present invention, the connecting element may be securely fixed on the back surfaces 26 of the opposite side members 21 and 22 by means of glue or screws, etc, preferably by a suitable adhesive because the use of an adhesive is easier and consumes less time and material upon assembly.

[0056] In a further embodiment of the present invention, at least one of the side members 22 may be gutter-shaped having upstanding side walls 71 spaced apart from one another, thereby providing an opening. The opening may be arranged to have a width which may be larger than the largest width of the opposite side member 21, so that a contact between the side walls 71 of the gutter shaped side member 22 and the opposite side member 21 may be prevented. According to embodiments of the present invention, the connecting element 23 may be arranged on the back surfaces 26 of the two side members. Moreover, at least one of the side members 21 may be provided with weakened portions

24 defining a location of separation between the first and second longitudinal sections 25b and 25a. Furthermore, the upstanding side walls 71 may be provided with at least one opening 73 to enable installation of utility services such as the routing of electrical cables or other utility components through the stud.

[0057] According to further embodiments of the present invention, the side members 21 and 22 may be constructed of any suitable material, such as MDF, metal, plastic, or any other suitable material. Furthermore, the side members 21 and 22 may be constructed from different materials, for example one of the side member 21 may be constructed from MDF while the other side member 22 may be constructed from metal, plastic, etc.

[0058] The workings of the present invention may be further elucidated by the examples shown in Figures 2-7.

[0059] An example of a stud construction according to an embodiment of the present invention is shown in Figure 2. The stud 12 may comprise two opposite longitudinal structural side member 21 and 22, each one having a front surface 27 and a back surface 26. The back surfaces 26 of the two opposite side members 21 and 22 may be connected to one another via at least one connecting element 23 suitable for absorbing sound vibrations. The stud 12 may comprise two opposite ends 28, of which at least one is provided for being fitted into one of the track openings, in such a way that the longitudinal side members 21 and 22 engage the upstanding side walls 13 of the track 11. At least one first side member 21 of the stud may be transversely separated or may be arranged to be transversely separable, at a location in the proximity of one end of the stud, into at least a first longitudinal section 25b at the end of the stud and a second longitudinal section 25a. This may be achieved for example by providing at least one transverse weakened portion 24 dividing the first side member into at least a first longitudinal section 25b and a second longitudinal section 25a. The at least one weakened portion 24 may be provided in the form of a groove or in the form of a perforated line comprising at least one perforation as shown in Figure 2 and Figure 3. Each transverse weakened portion 24 may have a bridging element 72, as shown in Figure 7, which interconnects the first longitudinal section 25b with the second longitudinal section 25a. The bridging element 72 may be part of the first side member 21 and may further define a location of separation on the front surface 27 of the first side member 21. The stud 12 may have a width measured between the front surfaces 27 of the opposite side members 21 and 22, which width may be larger than the width of the track opening, as shown in the stud example of Figure 4. In this case, the width of the stud 12 at the proximal end needs to be reduced so that it fits in the opening of the track 11. For example, this may be achieved by displacing the first longitudinal section of the side member 25b towards the opposite side member 22, thereby compressing the part of the connecting element 23 that connects the first longitudinal section 25b with the opposite side member 22. Alternatively, the width of the stud 12 may be reduced by removing part of the proximal end 28, which may include part of the connecting element 23 and the first longitudinal section 25b. As a result, upon fitting the stud 12 into the track 11, an offset is created between the front surface 27 of the second longitudinal section 25a and an outer surface of the track 11, so that a gap 52 may be formed between the outer surface of the track 11 and a plane tangent 51 to the front surface 27 of the second longitudinal section 25a, as shown in Figure 5. Therefore once a panel 14 is secured on the side member 21, a gap 52 may be created between the inner surface of the panel 14 and the outer surface of the side wall 13 of the track 11, as shown in Figure 6. In the case where the first longitudinal section 25b is displaced, a further gap 42 may be created at the location of separation between the second section 25a and the first section 25b engaging the inner surface of said upstanding side walls 13 of the track opening, as shown in Figure 5. This may have as an additional effect that the sound vibration path between the two side members 21 and 22 of the stud 12 may be interrupted at the location of the gap, thereby preventing flanking transmission of sound via the side walls 13 of the track opening, thus improving the acoustic insulation properties of the partitioning system 10.

[0060] Figure 7 shows a further example of a stud construction according to an embodiment of the present invention. The main difference with the stud 12 shown in Figures 2 and 3 is that at least one longitudinal side member 22 is gutter-shaped having upstanding side walls 71 forming an opening. The opening may be arranged to have a width which may be larger than the largest width of the opposite side member 21, thereby preventing the side walls 71 from being in contact with the opposite side member. Similarly to Figure 2 and 3, a connecting element 23 may be arranged on the back surfaces 26 of the two side members 21, 22. For example, a plurality of connecting elements 23 may be provided in the form of blocks spaced from one another by a predetermined distance in the longitudinal direction of the stud. Furthermore, the front surface 27 of the opposite side member 21 may be provided with weakened portions 24 according to embodiments of the present invention. For example the weakened portion 24 may be provided in the form of a perforated line comprising at least one perforation, as shown in Figure 7. Furthermore, bridging elements 72 may be provided at the location of the weakened portion 24 for connecting the first and second longitudinal sections 25b and 25a. Moreover, the upstanding side walls 71 of the gutter-shaped side member 22 may be provided with at least one opening 73 to enable installation of utility services such as the routing of electrical cables or other utility components through the stud.

LIST OF REFERENCE NUMBERS

[0061]

10 Interior partitioning system construction, such as for a wall, ceiling or floor
11 Track
12 Stud
13 Track opening side walls
14 Panels
21 First longitudinal structural side member
22 Second longitudinal structural side member
23 Connecting element
24 Transverse weakened portion
25a Second longitudinal section
25b First longitudinal section
26 Back surfaces of the longitudinal structural side members
27 Front surfaces of the longitudinal structural side members
28 Stud end
34 Weakened portion with perforation(s)
41 Surface for positioning the track
42 Gap between the first longitudinal section 25b and the second longitudinal section 25a
51 Plane tangent to the front surface 27 of the first longitudinal side member 21
52 Gap between the tangent plane 51 and the track 11
53 Screws
71 Upstanding side walls of the gutter-shaped side member
72 Bridging elements
73 Opening

Claims

1. A set of construction elements for supporting panels, the set comprising:

- at least one gutter-shaped track (11) comprising a first and a second upstanding side wall (13) enclosing an opening in between for accepting an end of a stud (12);
- at least one stud (12) comprising two opposite longitudinal structural side members (21, 22) each having a front surface (27) and a back surface (26), the back surfaces (26) of the side members (21, 22) of the stud (12) facing one another and being connected to one another by at least one vibration dampening connecting element (23), the stud (12) having at least one end (28) suitable for being fitted into the opening of the track (11);

characterised in that

at least a first side member (21) of the stud is transversely separated or is transversely separable at a location in the proximity of at least one end of the stud into at least a first longitudinal section (25b) at the proximal end (28) of the stud (12) and a second longitudinal section (25a), the stud (12) having a width, at the location of the second longitudinal section (25a), which is larger than the largest width of the cross-section of the gutter opening of the track (11) plus the thickness of at least one of the upstanding side walls (13), whereby, upon fitting the stud (12) into the track (11), an offset is created between the front surface (27) of the second longitudinal section (25a) and the adjacent outer surface of the track (11), so that a gap (52) is formed between the outer surface of the track (11) and a plane tangent (51) to the front surface (27) of the second longitudinal section (25a).

2. The set according to claim 1, **characterised in that** the width of the stud (12) at the location of the first longitudinal section (25b) is also larger than the largest width of the cross-section of the gutter opening of the track (11) plus the thickness of at least one of the upstanding side walls (13) of the track, whereby upon fitting the stud (12) into the track (11) at least the first longitudinal section (25b) may be removed from the proximal end of the stud (28) so that after fitting the stud (12) into the track (11) the connecting element contacts at least one of the upstanding side walls (13).

3. The set according to claim 1 or 2, **characterised in that** the width of the stud at the location of the first longitudinal side section (25b) is also larger than the largest width of the cross-section of the gutter opening of the track (11) plus the thickness of at least one of the upstanding side walls (13) of the track, whereby upon fitting the stud (12) into the track (11) at least part of the connecting element (23) connecting the first longitudinal section (25b) to the opposite side member (22) may be removed from the proximal end of the stud (28) so that after fitting the stud (12) into the track (11) the first longitudinal section (25b) contacts at least one of the upstanding side walls (13).

4. The set according to claim 1, **characterised in that** the width of the stud at the location of the first longitudinal side section (25b) is also larger than the largest width of the cross-section of the gutter opening of the track (11) including the thickness of at least one of the upstanding side walls (13) of the track, so that, upon fitting the stud into the track, the first longitudinal section (25b) needs to be displaced towards the opposite side member (22), thereby compressing the part of the connecting element (23) which connects the first longitudinal section (25b) with the opposite side member (22) and creating, at the location of the separation, an offset between the front surfaces (27) of the second longitudinal section (25a) and the first longitudinal section (25b), so that the at least one end (28) of the stud is fitted into the opening of the track (11) with the front surface (27) of the first longitudinal section (25b) contacting at least one of the upstanding side walls (13).

5. The set according to claim 1 or 3 or 4, **characterised in that**, upon fitting the stud into the track, the offset created at the location of the separation is such that an extra gap (42) is formed between the first longitudinal section (25b) and the second longitudinal section (25a) of the first side member (21).

6. The set according to any one of the preceding claims, **characterised in that** the first side member (21) of the stud (12) is provided with at least one transverse weakened portion (24) dividing the first side member (21) into at least the first longitudinal section (25b) and the second longitudinal section (25a), each transverse weakened portion (24) having a bridging element defining a location of separation of the side member.

7. The set according to claim 6, **characterised in that** the width of the transverse weakened portion is larger than 1.0 mm and optionally smaller than 20 mm.

8. The set according to claim 6 or 7, **characterised in that** the weakened portion (24) comprises a transverse groove at the front surface (27) of the first side member (21).

9. The set according to any one of the claims 6 to 8, **characterised in that** the weakened portion comprises at least one perforation (34).

10. The set according to any one of the preceding claims, **characterised in that** the connecting element (23) is a resilient material having an dynamic stiffness from 0.01 MN/m^3 to 12000 MN/m^3.

11. The set according to any one of the preceding claims, **characterised in that** the connecting element (23) is a resilient material having a loss factor from 0.001 to 2.0.

12. A partitioning system (10) comprising:

- At least one assembled set according to any one of claims 1 to 11; and,
- At least one panel (14) fixed to the stud on the front surface (27) of at least one side member (21) of the stud (12).

13. A method for constructing a partitioning system, comprising the steps of :

- assembling at least one set according to any one of claims 1 to 11 comprising the fitting of at least one end (28) of the at least one stud (12) into the opening of the at least one track (11); and,
- fixing at least one panel (14) to the stud at the front surface (27) of at least one side member (21) of the stud (12).

14. The method according to claim 13, **characterised in that** fitting the stud (12) into the track comprises the steps of:

- if the first side member (21 or 22) is separable, separating transversely at least one first side member (21) of the at least one stud (12) at a location in the proximity of at least one end (28) of the stud (12) into at least a first longitudinal section (25b) at the proximal end (28) of the stud (12) and a second longitudinal section (25a);
- compressing the part of the connecting element (23) that connects the first longitudinal section (25b) with the opposite side member (22), or removing at least the first longitudinal section (25b) from the proximal end of the stud (28), thereby reducing the width of the stud (12) at the proximal end (28) to become at most equal to the width of the track (11), thereby optionally subsequently removing part of the connecting element (23) connecting the first longitudinal section (25b) to the opposite side member (22) from the proximal end of the stud (28), and optionally subsequently replacing the first longitudinal section (25b) in connection with the remaining part of the connecting element; and
- fitting the stud (12) into the track, thereby creating an offset between the front surface (27) of the second

longitudinal section (25a) and the adjacent outer surface of the track (11), so that a gap (52) is formed between the outer surface of the track (11) and the surface of the panel (14) which is facing the stud.

15. The method of claim 14, **characterised in that** the step of separating the at least one first side member is performed by removing the bridging element at the location of separation from at least one transverse weakened portion (24) provided on the first side member (21) of the stud (12).

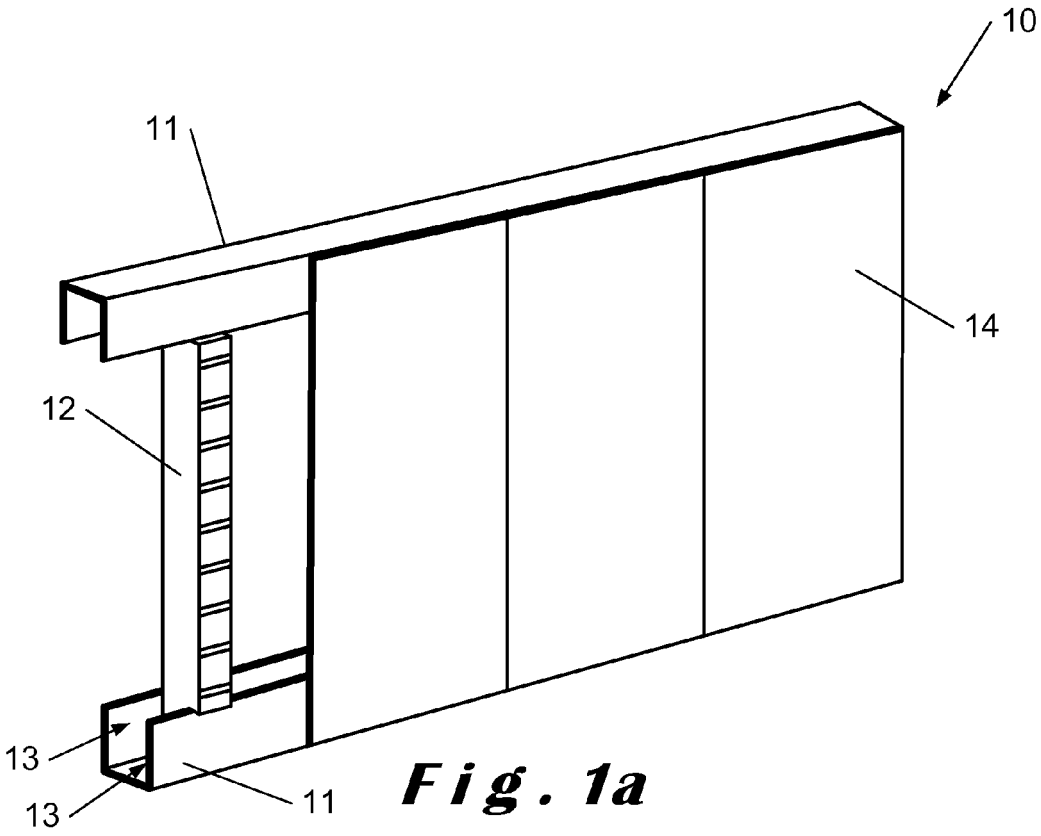


Fig. 1a

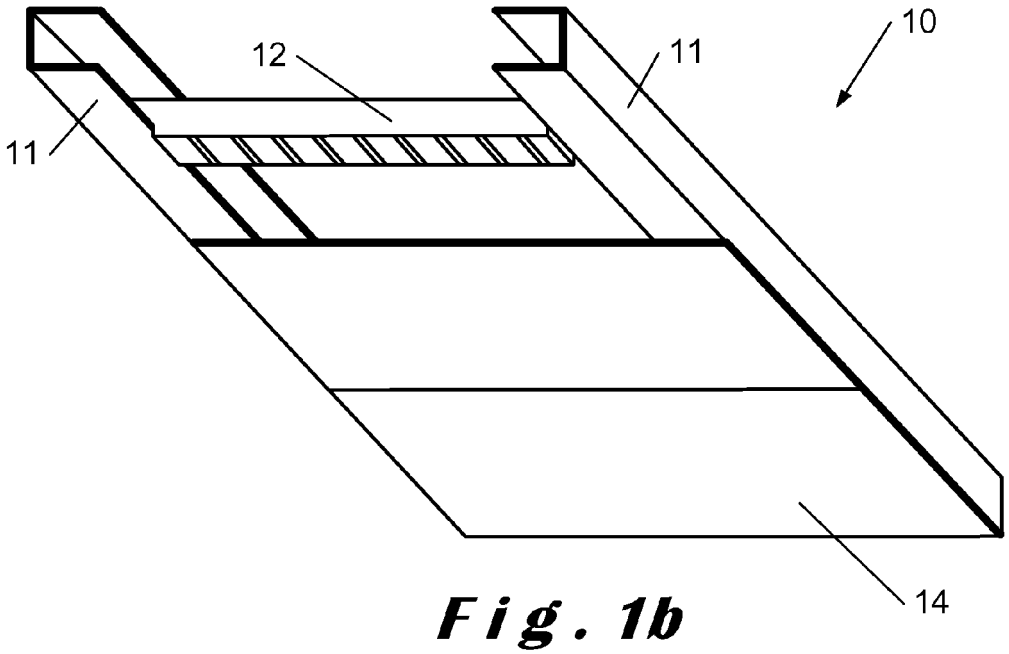
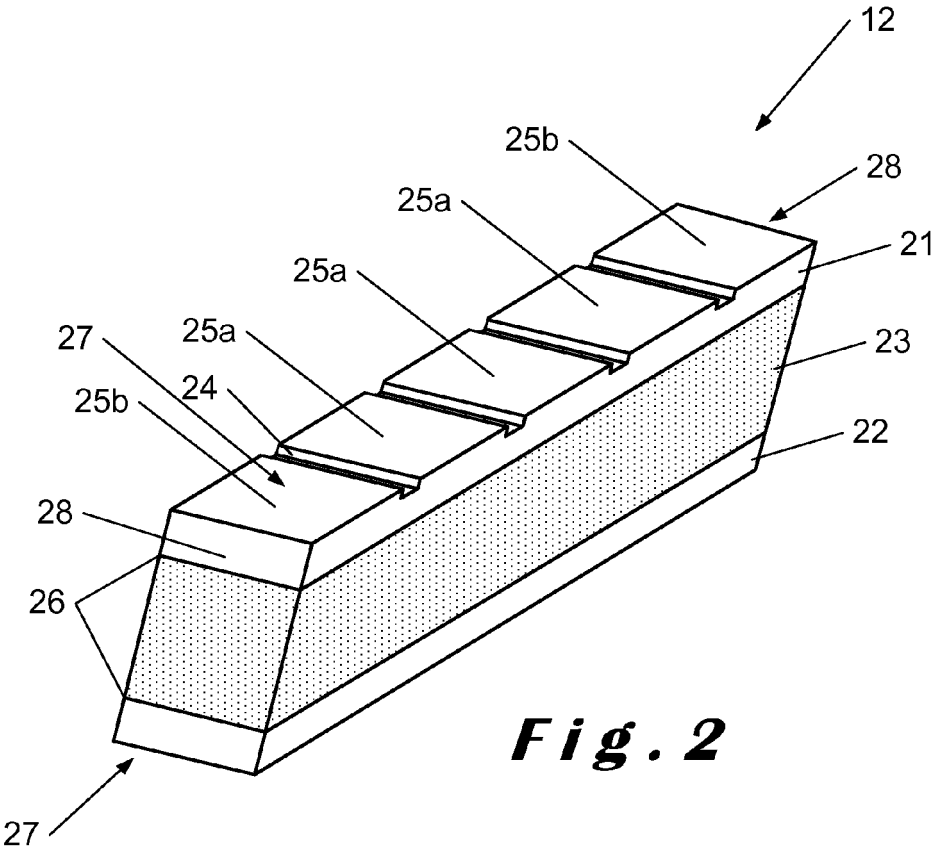


Fig. 1b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25b
28
25a
21
25a
27
25a
23
24
25b
22
28
26
27

Fig. 2

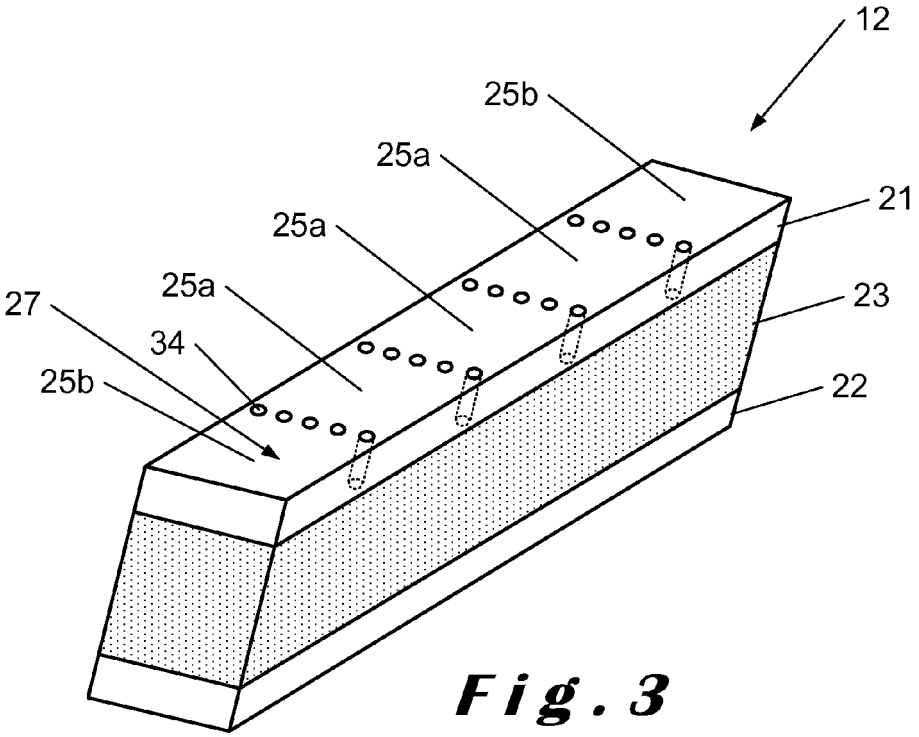
12
25b
25a
21
25a
25a
27
23
34
25b
22

Fig. 3

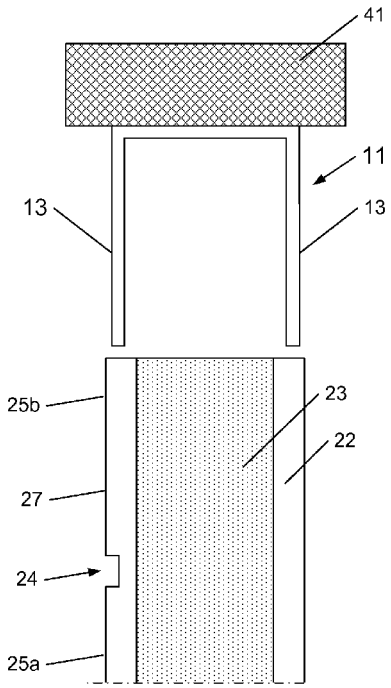

Fig. 4

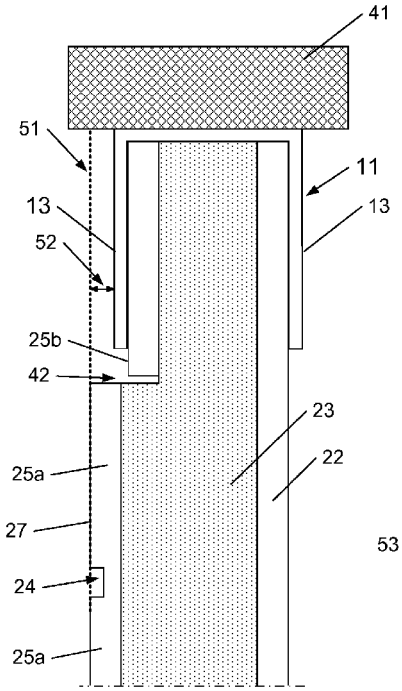

Fig. 5

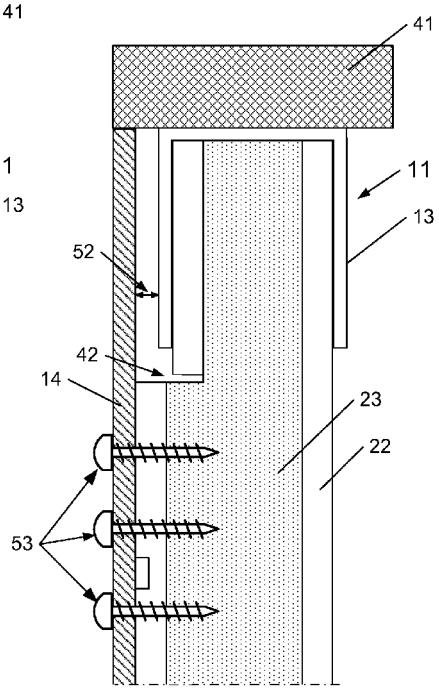

Fig. 6

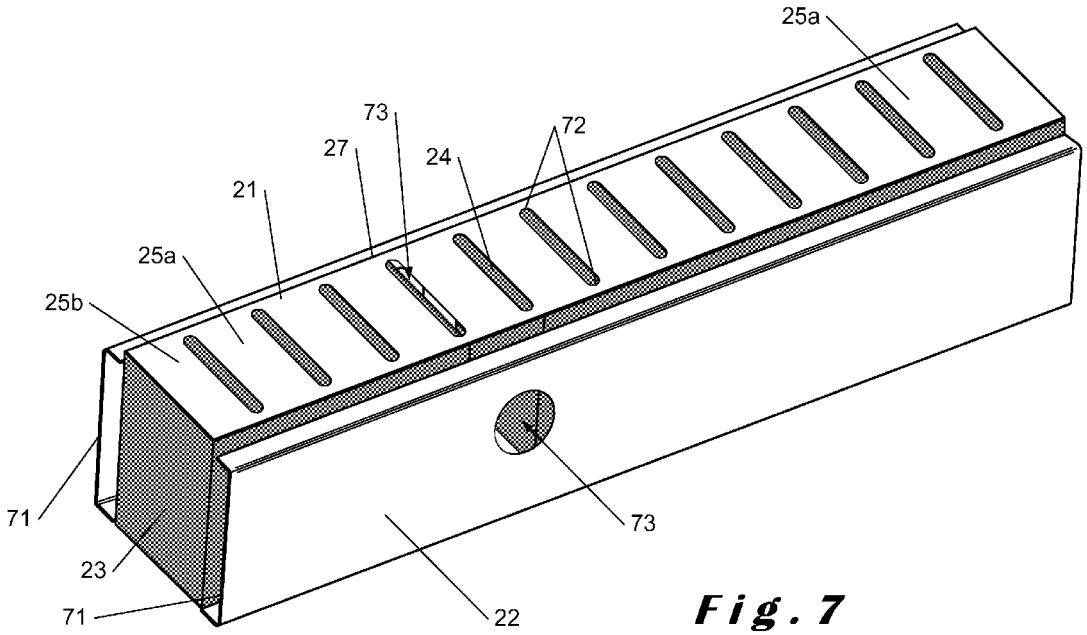

Fig. 7

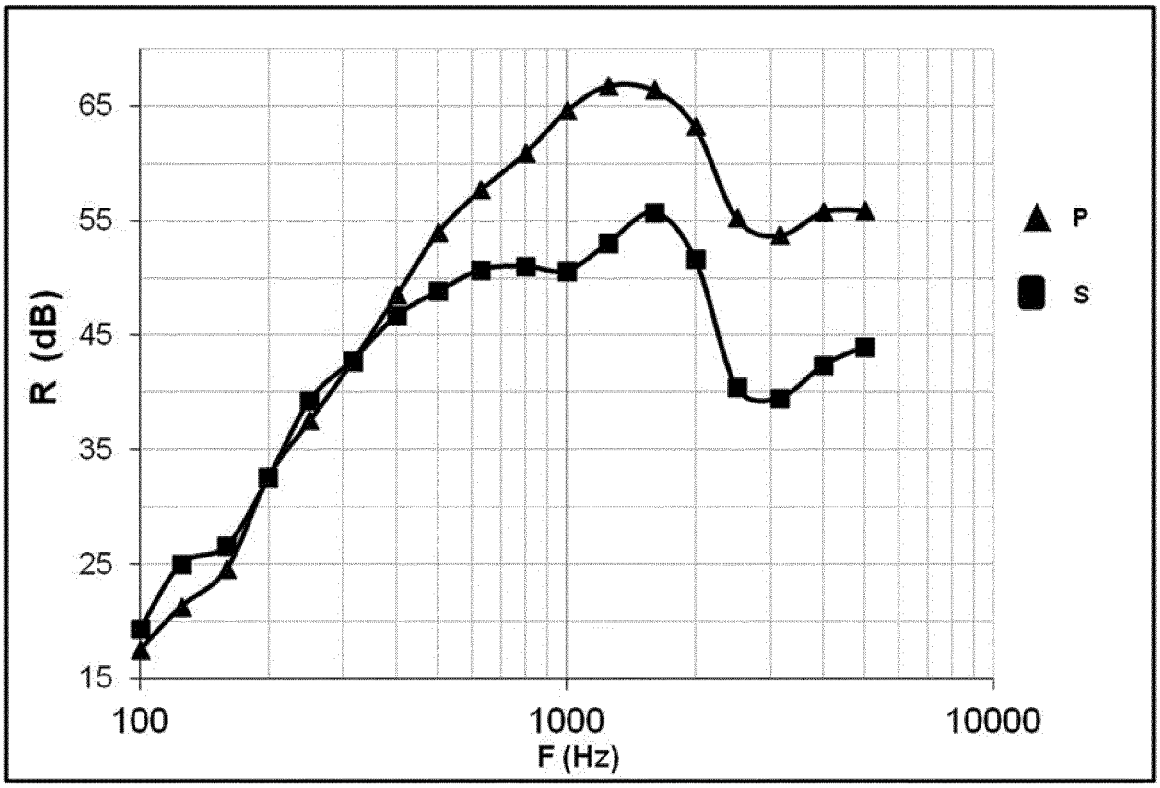

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 13 17 9927

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	US 3 333 390 A (BANNING GEORGE V) 1 August 1967 (1967-08-01) * column 2, line 63 - column 4, line 55; figures 1-3 *	1-5, 10-13 6-9,14, 15	INV. E04B2/74 E04B2/76
Y	FR 2 975 413 A1 (PLACOPLATRE SA [FR]) 23 November 2012 (2012-11-23) * page 5, line 12 - page 8, line 9; figures 1-5,7 *	1,12,13	
Y	EP 2 333 182 A1 (LAFARGE GYPSUM INT [FR]) 15 June 2011 (2011-06-15) * paragraphs [0001] - [0005], [0042]; figures 1,2,14 *	1,12,13	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 January 2014	Porwoll, Hubert

CATEGORY OF CITED DOCUMENTS

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22-01-2014

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