An elongated timber or lumber member (10) for an elongated, thermally insulating building construction element assembly (20) formed by first and second ones of said elongated timber or lumber member assembled along respective elongated adjoining surfaces (11) facing each other, said elongated timber or lumber member having a first fitting side (13) on a side located opposite to its elongated adjoining surface, said fitting side being spaced from said adjoining surface by timber or lumber of a respective thicknesses, and said fitting side being provided with a tongue or a groove (14A, 14B) to allow a plurality of the elongated, thermally insulating construction element assemblies to be juxtaposed to each other in alignment in a tongue and groove arrangement to form a thermally insulating building surface. The elongated timber or lumber member exhibits an elongated first groove or slot (12) of a first width in its elongated adjoining surface, said first groove extending in a longitudinal direction of said first elongated timber or lumber member over a length exceeding said first width and extending in a direction towards said fitting side of said first elongated timber or lumber member over a depth exceeding one half of said respective thickness, said first groove (12) thereby forming a thermally insulating gap within said building construction element assembly.
The invention provides an elongated timber or lumber member for an elongated, thermally insulating building construction element assembly formed by first and second ones of said elongated timber or lumber member assembled along respective elongated adjoining surfaces facing each other, said elongated timber or lumber member having a first fitting side on a side located opposite to its elongated adjoining surface, said fitting side being spaced from said adjoining surface by timber or lumber of a respective thickness, and said fitting side being provided with a tongue or a groove to allow a plurality of the elongated, thermally insulating construction element assemblies to be juxtaposed to each other in alignment in a tongue and groove arrangement to form a thermally insulating building surface. Said elongated timber or lumber member exhibits an elongated first groove of a first width in its elongated adjoining surface, said first groove extending in a longitudinal direction of said first elongated timber or lumber member over a length exceeding said first width and extending in a direction towards said fitting side of said first elongated timber or lumber member over a depth exceeding one half of said respective first thickness, said first groove thereby forming a thermally insulating gap within said building construction element assembly.

In an embodiment of the building construction element assembly provided by the present invention, said second elongated timber or lumber member exhibits an elongated second groove of a second width in said respective second elongated adjoining surface, said second groove extending in a longitudinal direction of said first elongated timber or lumber member over a length exceeding said first width and extending in a direction towards said respective first fitting side of said first elongated timber or lumber member over a depth exceeding one half of said respective second thickness.

In an embodiment of the building construction element assembly provided by the present invention, said first and second grooves are positioned in respective ones of said first and second timber or lumber member so to be aligned with each other or in an at least substantially overlapping relationship with each other.

In an embodiment of the building construction element assembly provided by the present invention, the timber or lumber members include a means adapted to allow for securing said first one of said timber or lumber member to a second one of said timber or lumber member so as to form said elongated, thermally insulating building construction element assembly.

In an embodiment of the building construction element assembly provided by the present invention, said means adapted to allow for securing said first one of said timber or lumber member to a second one of said timber or lumber member includes a hole adapted to accommodate a bolt arrangement for bolting together said first one of said timber or lumber member and said second one of said timber or lumber member.

In an embodiment of the building construction element assembly provided by the present invention, the timber or lumber members include a means adapted to allow for securing said first one of said timber or lumber member to a second one of said timber or lumber member so as to form said elongated, thermally insulating building construction element assembly.
and said hole being positioned in said timber or lumber member so as to allow air to flow between grooves of timber or lumber members of at least two construction element assemblies juxtaposed to each other.

[0014] In an embodiment of the building construction element assembly provided by the present invention, the timber or lumber member exhibits a hole through said timber or lumber and in communication with said groove so as to provide a means for ventilation of air in grooves of timber or lumber members of a plurality of construction element assemblies juxtaposed to each other.

[0015] In an embodiment of the building construction element assembly provided by the present invention, the timber or lumber member further may have a plurality of said grooves, advantageously extending over the full length, or at least over a substantial length of the elongated the timber or lumber member, whereby the thermal insulation capacity of the building construction element is further improved. Advantageously, the hole through the timber for coupling cavities provided by the grooves may be dimensioned or adapted such that it connects only a single groove of a first member of construction element assembly to a single groove of a first member of an adjacent located construction element assembly, or the hole may be such adapted and dimensioned that it provides communication between a plurality of grooves within the same member or between grooves of members of adjacent located construction element assemblies.

[0016] In a further development of the invention, a thermally insulating building wall formed by a juxtaposition of a plurality of the novel thermally insulating construction element assemblies in alignment in a tongue and groove arrangement includes a novel ground beam or a novel top plate, or both of the aforementioned, wherein the novel ground beam or novel top plate exhibits a channel or duct feature for providing communication of ventilation air carried by said channel or duct to said grooves in said timber or lumber members in at least a part of said thermally insulating construction element assemblies of said building wall. Thereby, air for ventilating, or even heating or cooling of the thermally insulating construction element assemblies of said building wall becomes achievable by arranging the channels or ducts to be in communication with the respective grooves of the members of the thermally insulating construction element assemblies of said building wall.

[0017] The invention will now be explained in further detail with reference to the accompanying drawings, wherein

[0018] FIG. 1A illustrates an end view of an elongated member for a thermally insulating building construction element assembly according to the invention,

[0019] FIG. 1B is a sectional view of the member illustrated in FIG. 1A,

[0020] FIG. 2 is a sectional view of first and second members according to the invention, adapted and positioned for assembly to an elongated, thermally insulating building construction element assembly according to the invention,

[0021] FIG. 3 is a sectional view of an assembly of two elongated members for an elongated, thermally insulating building construction element assembly according to the invention having partly overlapping grooves or slots,

[0022] FIG. 4 is a sectional view of an assembly of two elongated members forming an elongated, thermally insulating building construction element assembly according to the invention having non-overlapping grooves or slots,

[0023] FIG. 5 is a sectional view of first and second elongated members positioned for being assembled to an elongated, thermally insulating building construction element according to the assembly having overlapping grooves or slots,

[0024] FIG. 6 is a perspective view of an elongated member for an elongated, thermally insulating building construction element assembly according to the invention,

[0025] FIG. 7 is a perspective view of an elongated, thermally insulating building construction element assembly according to the invention,

[0026] FIG. 8 is an embodiment of the elongated, thermally insulating building construction element assembly according to the invention illustrated in FIG. 7, adapted for assembly means and ventilation means.

[0027] FIG. 9 is a sectional view of an elongated, thermally insulating building construction element assembly in an embodiment including a bolt as a joining element,

[0028] FIG. 10 is a sectional view of an embodiment of an elongated, thermally insulating building construction element assembly according to the invention, adapted with openings for providing ventilation of grooves or slots in respective elongated members,

[0029] FIG. 11A is a partly sectional view of an elongated, thermally insulating building construction element assembly according to the invention in an embodiment adapted for, and mounted on a ground beam, and

[0030] FIG. 11B is a partly sectional view of an elongated, thermally insulating building construction element assembly in an embodiment adapted to, and mounted on, a ground beam for ventilation of a slot or groove in the elongated member by way of a channel or duct in the ground beam.

[0031] Reference is first made to FIG. 1A, which, in a top view, illustrates the geometry of an elongated timber or lumber member according to the invention, for an elongated, thermally insulating building construction element assembly. In the exemplary end view of FIG. 1A, the longitudinal axes of the member is generally perpendicular to the drawing plane. Accordingly, a plurality of slots 12 running over all part of the length of the member 10, are visible. In the embodiment of FIG. 1A all slots have the same depth Y, made in the member of general width W and thickness H. The elongated timber or lumber member 10 illustrated in FIG. 1A is also provided with a joining surface 11, generally over the width W of the member to provide a surface adapted and suitable for assembling the elongated member to a corresponding elongated member 10. The grooves or slots 11 formed in the timber or lumber material 10 are made to a depth Y which typically is more than one half of the thickness H. For the purpose of aligning first and second elongated members 10 with respective adjoining surfaces 11 facing each other, the elongated timber or lumber member of the invention is preferably provided with a tongue and groove 15A, 15B arrangement. In the embodiment of FIG. 1A the elongated timber or lumber member 10 is provided with a tongue 15A on one side and a groove 15B on the other side, to allow first and second identical elongated timber or lumber members according to the invention to be assembled to form an elongated, firmly insulating building construction element assembly. Other variations of the tongue and groove 15A, 15B arrangement illustrated in FIG. 1A are contemplated, such as providing the elongated timber or lumber member 10 with only grooves 15B on each side, such that the groove 15B will take the place of the tongue 15A, thereby also allowing assembly of a pair of
identical elongated timber or lumber members 10 according to the invention to be assembled to form an elongated thermally isolating building construction element assembly by use of separate tongue members that would fit into grooves 15B made in the adjoining surface 11.

[0032] Also illustrated in FIG. 1A is the fitting surface 13 adapted for providing a suitable interface between a further elongated, thermally insulating building construction element assembly by elongated timber or lumber members according to the invention, and also shown is an exemplary means for aligning juxtaposed elongated, thermally insulating building construction element assemblies by way of a tongue and groove 14A, 14B arrangement, whereby a number of elongated, thermally insulating building construction element assemblies may be fitted side by side to form a thermally insulating building surface, such as a wall, a floor or a ceiling.

[0033] Reference now made to FIG. 1B, which shows in a sectional view of the longitudinal member 10 taken in a direction along the longitudinal axes of the elongated member and away from the end view surface illustrated in FIG. 1A, illustrating the maintenance of the shape shown by the end view contour of FIG. 1A throughout the length of the elongated member 10. The sectional view of FIG. 1B also illustrates the maintenance of the slots and their shape running in the direction of the longitudinal axes of the longitudinal member 10.

[0034] Reference is now made to FIG. 2, which in a sectional view prepared at a level on which the sectional view of FIG. 1B was made, a pair of identically shaped longitudinal members 10 are positioned for assembly into an elongated, thermally insulating building construction element assembly. The illustration of FIG. 2 indicates how the tongue and groove arrangement on a first elongated member is adapted to fit with a tongue and groove arrangement on a second, identical elongated member 10 of the pair of elongated members, and how the adjoining surfaces 11 are facing each other for the assembly of the pair of elongated members 10 to the elongated, thermally insulating building construction element assembly.

[0035] FIG. 3 illustrates yet another embodiment of the elongated member 10, having three grooves or slots 12 formed therein, in a sectional view, wherein a pair of the elongated members 10 have been assembled to form the elongated, thermally insulating building construction element 20. In the embodiment example illustrated in FIG. 3 the grooves or slots 12 are shaped and positioned in the longitudinal member 10, such that when a pair of the longitudinal members 10 are assembled as shown in FIG. 3 to form the longitudinal, thermally insulating building construction element assembly 20, the openings formed by the slots or grooves 12 in the adjoining surface 11 are only partly overlapping as indicated by P.

[0036] Reference is now made to FIG. 4, which shows in a sectional view corresponding to the sectional views of FIGS. 1B, 2 and 3, a further embodiment of a longitudinal member 10 according to the invention, wherein the longitudinal member 10 is provided with elongated slots 12 formed and positioned such in the longitudinal member 10 that, when a pair of the illustrated embodiments of the longitudinal member 10 are assembled to form the longitudinal, thermally insulating building construction element assembly 20, the grooves or slots 12 of the respective longitudinal members 10 of the pair, are positioned and formed such that they are in a non-overlapping relationship within the longitudinal, thermally insulating building construction element assembly 20.

[0037] Reference is now made to FIG. 5, which, in a sectional view taken at about the same position as the sectional views of FIGS. 1B, 2, 3 and 4, illustrates a further embodiment of the elongated member 10 of the invention, wherein the slots or grooves 12 are dimensioned and positioned such that when a pair of the longitudinal member 10 are assembled to form the longitudinal, thermally insulating building construction element assembly 20, the openings of the slots 12 formed in the adjoining surfaces 11 are in a substantially fully overlapping position with respect to each other.

[0038] Reference is now made to FIG. 6, which, in a prospective view, shows a part of the elongated member 10 according to the invention, and also illustrates in a prospective view the section of the lower member of the members 10 illustrated in FIG. 5. Typically, the member 10 will be made in a length 11 measured in the direction of the longitudinal axes of the member 10, that is suitable for building a wall, floor or ceiling of a building construction. In FIG. 6 is also illustrated in the prospective view, the fitting surface 13 adapted for fitting the member 10 to a further member 10 of a juxtaposed thermally insulating building construction element assembly 20, which may suitably be aligned to each other by the tongue and groove arrangements 14A, 14B provided on the fitting surface 13 side of the member 10. The embodiment of the member 10 illustrated in FIG. 6 is also provided with a plurality of openings 17 and a plurality of openings 18, for allowing a pair of longitudinal members 10 to be assembled to form the thermally insulating building construction element assembly 20 by way of mechanical means, and for providing ventilation of the slots or grooves 12 to the environment or for providing a ventilation communication between juxtaposed elongated, thermally insulating building construction element assemblies 20 having such holes 18 aligned with each other, respectively.

[0039] Reference is now made to FIG. 7, which illustrates, in a prospective view, the elongated, thermally insulating building construction element assembly 20, formed by a pair of lumber or timber members 10 joined along respective adjoining surfaces 11. The building construction member of FIG. 7 is illustrated as not being provided with openings 17, or such through holes 17 for keeping the elongated timber or lumber members 10 together in the construction element assembly 20 by separate mechanical means. Preferably, the pair of elongated timber or lumber members 10 are maintained together to form the elongated, thermally insulating building construction element assembly 20 by applying a glue or cement to all or parts of the adjoining surfaces 11, or by shaping the tongues 15A and grooves 15B in such a way that they lock to each other by forcing the elongated timber or lumber members together from a position indicated in FIG. 5 to a position of complete assembly as indicated in FIG. 7, and also as indicated in the sectional views of the complete assembly of the elongated, thermally insulating building construction element of FIGS. 9 and 10.

[0040] A further embodiment of the elongated, thermally insulating building construction element illustrated in FIG. 7, is illustrated in a prospective view in FIG. 8. In FIG. 8 the openings 17 are provided with respective extensions 17A to provide through holes to the building construction element 20, adapted for receiving a bolt or other means for keeping the longitudinal timber or lumber members 10 assembled. In FIG. 8 is also shown in phantom ventilation openings 18
extending from the fitting surfaces 13 and into the interior of the elongated, thermally insulating building construction element assembly 20, so as to provide a duct for ventilating one or more of the grooves or slots 12 to the surroundings or to a further building construction element 20 juxtaposed with fitting surfaces 13 facing and proximal to each other.

[0041] In FIG. 9 a sectional view of the elongated, thermally insulating building construction element is shown, wherein a section is made through the openings 17 and extensions 17A, also illustrated in FIG. 8, and also illustrating assembly of the elongated timber or lumber members 10 into the elongated, thermally insulating building construction element assembly 20 by way of a bolt 30. Although the illustrations of FIGS. 8 and 9 for sake of simplicity only illustrate a single set of openings 17 and opening extensions 17A aligned with each other to accommodate the bolt 30 shown in FIG. 9, the elongated timber or lumber member 10 may be provided with a plurality of openings 17 having associated extension 17A over its length so as to allow the elongated, thermally insulating building construction element assembly 20 to be maintained assembled by providing a plurality of bolts 30 in respective opening 17 and opening extension 17A over the entire length of the elongated, thermally insulating building construction element assembly 20.

[0042] FIG. 10 is a sectional view of the building construction element 20 made perpendicular to the longitudinal axes of the building construction element 20 and through the centres of the openings 18 illustrated in FIG. 8, to illustrate that the openings 18 extend to the timber 16 from the fitting surface 13, and to adapt where the opening 18 is brought into communication with the grooves or slots 12. In the embodiment illustrated in FIG. 10 openings 18 are dimensioned so as to provide ventilation of three out of a total of five slots or grooves 12. It will be understood that the openings 18 may be provided with other dimensions than the dimensions shown in the accompanying drawings, and also be proved in other areas of the fitting surfaces 13, and may also be angled through the timber material 16 such that the opening at the fitting surface 13 may be shifted with respect to the groove or slot in which the opening is in communication with.

[0043] Reference is now made to FIG. 11A which is a combined view illustration of parts of a building construction comprising the elongated, thermally insulating building construction element assembly 20 adapted for, and mounted on a ground beam 40. In the illustration of FIG. 11A is also shown a floor board 50 in a sectional view, which, however, is not part of the elongated, thermally insulating building construction element assembly 20. FIG. 11A illustrate how the construction element assembly 20 is provided with a cut out or recess 19 adapted to receive the upper part of the ground beam 40, which, as illustrated in FIG. 11A, also serves to seal off the slots or grooves 12 at one end of the building construction element assembly 20. Correspondingly, the building construction element 20 may be adapted with corresponding cut out or recess on its other end, i.e., on its upper end in the wall construction of which a lower part is illustrated in FIG. 11A, so as to provide a ceiling of the slots or grooves 12 at the upper end of the building construction element 20. It should be noted that in the view of FIG. 11A, slots or grooves 12 would actually not be visible, in that they are located in the interior of the building construction element 20 and mostly sealed off for providing means for thermal insulation of the elongated, lumber or timber thermally insulating building construction element 20. In the view of FIG. 11A, however, fitting surface 13 would be visible, as well as the tongue 14A and groove 14B.

[0044] In FIG. 11B is shown the same elements, and in the same view, as in FIG. 11A, however, in FIG. 11B is shown an embodiment of the ground beam 40, having cut outs or recesses 41 running in the ground beam 40 in a direction perpendicular to the drawing plane, for providing a duct for ventilating one or more of the grooves or slots in the interior of the building construction element 20. Although the embodiment of the ground beam illustrated in FIG. 11B is provided with two cut outs or recesses 41 to serve as ducts for ventilation, the ground beam 40 may be provided only with a single cut out or recess 41, or any other number of cut outs or recesses 41, positioned with respect to the grooves or slots 12 in the interior of the building construction element 20, so as to provide ventilation of one or more of the slots or grooves 12 as required according to the intended purpose. As an example, referring again to FIG. 11B, the duct provided by the recess 41 on the right hand side of the drawing could be feeding hot air that is driven through the entire length of the building construction element 20 to its upper end for communicating the air driven through the slot or groove 12 to a channel or duct provided in a corresponding top plate.

1. An elongated timber or lumber member (10) for an elongated, thermally insulating building construction element assembly (20) formed by first and second ones of said elongated timber or lumber member (10) assembled along respective elongated adjoining surfaces (11) facing each other, said elongated timber or lumber member having a first fitting side (13) on a side located opposite to its elongated adjoining surface (11), said fitting side being spaced from said adjoining surface by timber or lumber (16) of a respective thickness (H), and said fitting side being provided with a tongue (14A) or a groove (14B) to allow a plurality of the elongated, thermally insulating construction element assemblies (20) to be juxtaposed to each other in alignment in a tongue and groove arrangement to form a thermally insulating building structure comprising said plurality of the elongated, thermally insulating building construction element assemblies (20), characterised in that said elongated timber or lumber member exhibits an elongated first groove (12) of a first width (X) in its elongated adjoining surface (11), said first groove extending in a longitudinal direction of said first elongated timber or lumber member over a length exceeding said first width (X) and extending in a direction towards said fitting side (13) of said first elongated timber or lumber member over a depth (Y) exceeding one half of said respective thickness (H), said first groove thereby forming a thermally insulating gap within said elongated, thermally insulating building construction element assembly.

2. The timber or lumber member of claim 1, further comprising a means adapted to allow for securing said first one of said timber or lumber member to a second one of said timber or lumber member so as to form said elongated, thermally insulating building construction element assembly.

3. The timber or lumber member of claim 2, wherein said means adapted to allow for securing said first one of said timber or lumber member to a second one of said timber or lumber is a hold (17, 17A) adapted to accommodate a bolt arrangement (30) for bolting together said first one of
said timber or lumber member (10) and said second one of said timber or lumber member (10).

4. The timber or lumber member of claim 1, further having an opening or hole (18) in part or in full through said elongated timber or lumber member (10), said opening or hole (18) having an opening at the fitting side (13) and a second opening being in communication with said groove (12), and said hole being positioned in said timber or lumber member so as to allow air to flow between grooves of timber or lumber members of at least two of said construction element assemblies (20) juxtaposed to each other.

5. The timber or lumber member of claim 4, further having a hole through said timber or lumber and in communication with said groove so as to provide a means for ventilation of air in grooves of timber or lumber members of a plurality of construction element assemblies juxtaposed to each other.

6. A elongated, thermally insulating building construction element assembly (20) formed by first and second elongated timber or lumber members (10) assembled along respective facing first and second elongated adjoining surfaces (11), said elongated first and second timber or lumber members having first and second fitting sides (13), respectively, located on an opposite side of their respective adjoining surfaces (11), said fitting sides being spaced from respective ones of said adjoining surfaces by timber or lumber (16) of respective first and second thicknesses (11), and said fitting sides being provided with a respective one of a tongue (14A) and a groove (14B) to allow a plurality of the elongated, thermally insulating construction element assemblies (20) to be juxtaposed to each other in alignment in a tongue and groove arrangement to form a thermally insulating building surface, characterised in that said first elongated timber or lumber member exhibits at least one elongated first groove (12) of a first width (X) in said respective first elongated adjoining surface (11), said first groove extending in a longitudinal direction of said first elongated timber or lumber member over a length exceeding said first width and extending in a direction towards said respective first fitting side (13) of said first elongated timber or lumber member over a depth (Y) exceeding one half of said respective first thickness, said groove thereby forming a thermally insulating gap within said elongated, thermally insulating building construction element assembly (20).

7. The building construction element assembly of claim 6, wherein said second elongated timber or lumber member exhibits an elongated second groove of a second width in said respective second elongated adjoining surface, said second groove extending in a longitudinal direction of said first elongated timber or lumber member over a length exceeding said first width and extending in a direction towards said respective second fitting side of said second elongated timber or lumber member over a depth exceeding one half of said respective second thickness.

8. The building construction element assembly of claim 7, wherein said first and second grooves are positioned in respective ones of said first and second timber or lumber member so to be aligned with each other or in an at least substantially overlapping relationship with each other.

9. The building construction element assembly of claim 7, wherein said first and second grooves are positioned in respective ones of said first and second timber or lumber member so as not to be in an aligned or an overlapping relationship with each other.

10. The building construction element assembly of claim 6, wherein the timber or lumber members include a means adapted to allow for securing said first one of said timber or lumber member to a second one of said timber or lumber member so as to form said elongated, thermally insulating building construction element assembly.

11. The building construction element assembly of claim 10, wherein said means adapted to allow for securing said first one of said timber or lumber member to a second one of said timber or lumber member is a hole adapted to accommodate a bolt arrangement for bolting together said first one of said timber or lumber member and said second one of said timber or lumber member.

12. The building construction element assembly of claim 6, wherein the timber or lumber member exhibits a hole through said timber or lumber and in communication with said groove so as to provide a means for ventilation of air in grooves of timber or lumber members of a plurality of construction element assemblies juxtaposed to each other.

13. The building construction element assembly of claim 12, wherein the timber or lumber member exhibits a hole through said timber or lumber and in communication with said groove so as to provide a means for ventilation of air in grooves of timber or lumber members of a plurality of construction element assemblies juxtaposed to each other.