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(54) Floor construction

(57) The present invention relates to a floor construction having improved sound deadening or attenuating characteristics. The invention provides a floor construction (1) comprising a support structure (2) for the floating support of flooring panels (4) to which are fixedly attached battens (6). Each batten (6) has on it at least one horizontal surface thereof a single layer of non-woven fibre material (8). The non-woven fibre material is characterised in that a substantial portion of the fibres of the non-woven fibre material are orientated in the vertical plane. A deck type flooring construction is also described.

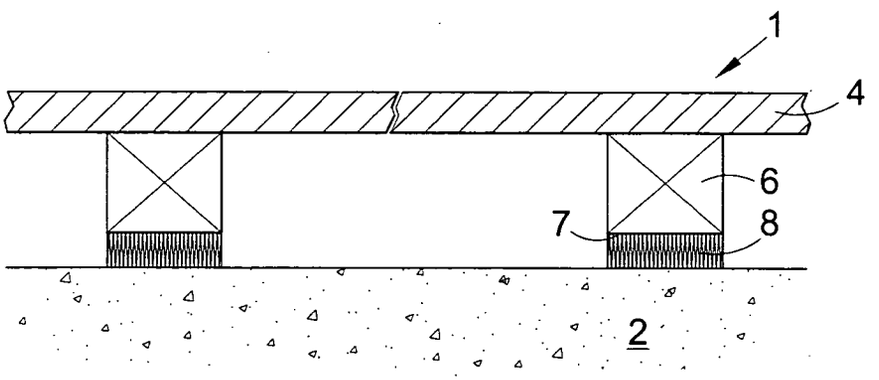

Fig.1

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Description

[0001] The present invention relates to a floor construction and in particular a floor construction having improved sound deadening or attenuating characteristics. The invention is particularly applicable for use on sub floors of masonary, steel or timber such as screeds, concrete sub floors or joisted sub floors in a timber frame construction.

[0002] Building regulations stipulated by local authorities require that floors must be built to comply with certain standards for both air borne and impact sound insulation, sometimes referred to as deadening or attenuation. Prior art flooring systems have proposed many methods of providing adequate attenuation to the transmission of both air borne and impact sound but there is still a demand for improved systems.

[0003] Many types of arrangements have been used in order to attenuate the transmission of impact sound by using mineral wool quilt which is placed underneath the timber battens associated with raft type flooring constructions. Another known arrangement is for strips of closed cell polyethylene or polyurethane foam to be bonded to the underside of battens used in such flooring constructions.

[0004] United Kingdom Patent Publication No. GB 2196356 teaches a floor construction wherein on the underside of each timber batten is an open celled resiliently compliant polyether material. United Kingdom Patent Publication No. GB 2214537 teaches a floor construction wherein the underside of each batten has bonded thereto an open cell foam strip with a vertical deflection in the range of 4mm to 24mm under a static compressive load of 8000 Pa.

[0005] Other flooring constructions such as that described United Kingdom Patent Publication No. GB 2192913 disclose a floating raft structure of chipboard or timber flooring battens each of which has on its underside a laminate of one layer of open cell resiliently pliant polyether material and a second layer of closed cell resiliently pliant polyethylene or polyurethane material.

[0006] United Kingdom Patent Publication No. GB 2316694 teaches of the use of battens or board which have on their underside a bonded laminate comprising one layer of a resiliently flexible polyethylene material of which the cells are closed and another of an extruded randomly orientated polyester fibre.

[0007] Whilst all the aforesaid disclosures teach of flooring constructions that provide adequate levels of noise attenuation, there is still a demand for products which have improved characteristics and which avoid the need for the use of multi-layer or laminate materials in the resilient layer.

[0008] Accordingly it is an object of the present invention to avoid or minimise one or more of the foregoing disadvantages.

[0009] Thus the present invention provides a floor construction comprising a support structure for the floating support of flooring panels to which are fixedly attached battens, each batten having on at least one horizontal surface thereof a single layer of non-woven fibre material wherein a substantial portion of the fibres of said non-woven fibre material are orientated in the vertical plane.

[0010] Alternatively the present invention provides a deck type flooring construction comprising a support structure for the floating support of floor panels, the underside of said floor panels having a single layer of non-woven fibre material wherein a substantial portion of the fibres of said non-woven fibre material are orientated in the vertical plane.

[0011] Thus with a flooring construction according to either aspect of the present invention it is possible to achieve an improved sound attenuation without the need for multi-layer materials.

[0012] The vertical orientation of the fibres within the fibre layer allows for air contained within the interstices of the fibres to be expelled under dynamic load, and for the fibres to bend and deflect under dynamic loading. The position of the fibres in the vertical plane rather than the horizontal plane enhances the performance of the material in flooring constructions which are subjected to a compressive loading cycle.

[0013] Various different types of materials for use as the battens and the flooring panels will be known to those skilled in the art and will include materials such as plywood, softwood and hardwood timber; oriented strand board (OSB), chipboard, hardboard and MDF (medium density fibreboard).

[0014] Preferably it is the underside of the batten (or the flooring panel) that is faced with the non-woven fibre material, although alternatively the upper horizontal surface of the batten may be faced with the material. Advantageously other surfaces in a flooring construction may be faced with an additional layer of the material.

[0015] Further preferred features and advantages of the present invention will now be described with reference to the accompanying drawings in which: -

Fig. 1 shows a cross-section through a floor construction in accordance with a first embodiment of the first aspect of the present invention;
Fig. 2 is a cross-section through a floor construction according to a second aspect of the invention.

[0016] A floor construction, generally indicated by reference numeral 1, is shown in Fig. 1 and comprises a support structure 2, for example a concrete slab or floor or joisted floor, onto which is positioned flooring panels 4 supported on battens 6.

[0017] The flooring panels 4 comprise timber floorboards or lengths of chipboard or MDF or the like fixed to the timber battens 6 by screws or nails (not shown). The battens 6 have on their underside horizontal surface 7 a layer of non-woven fibre material 8 wherein a substantial portion of the fibres therein are orientated predominantly in the vertical plane. The non-woven material 8 is bonded or otherwise secured, e.g. by adhesive, to the batten 6.

[0018] Fig. 2 shows a second arrangement of floor construction 10, comprising a floor panel 12, sometimes referred to as a deck, to which is bonded or otherwise secured e.g. by adhesive 9 single layer of non-woven material 14. The flooring panel 12 and the layer of non-woven material 14 on its underside is positioned above a support structure 16, in this case a concrete slab floor 16.

[0019] Tests have been undertaken to show that the use of the non-woven fibre material on the underside of battens or flooring panels/decks provides enhanced impact and air borne noise insulation over conventional flooring constructions.

Example 1

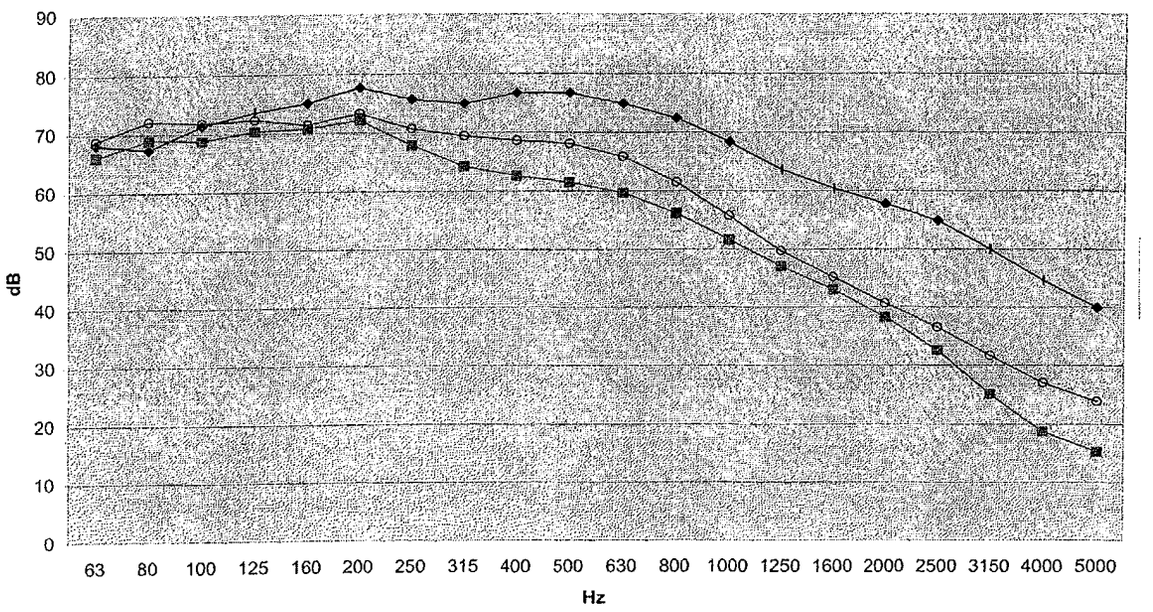
[0020] A comparison was made between the non-woven fibre material used in the present invention against a conventional polyurethane foam to measure the recovery time (in minutes) against the percentage of original thickness. Both materials were compressed to 50% of the original thickness for every cycle and 25000 cycles were completed. The tests show that the non-woven fibre used recovers more quickly, than conventional foams.

Example 2

[0021] A comparison was made between the non-woven fibre material used in the present invention against other conventional materials by measuring the load (in pascals) against thickness (in millimetres). This test showed that the fibre product has improved and more consistent compression properties over conventionally used materials

[0022] Further tests were undertaken in an acoustic laboratory on a full-scale floor construction to make a comparison between a bare floor (that is a floor wherein no resilient material is used); an existing deck product (which utilises the laminate open cell/closed cell foam material described above); and a floor utilising the non-woven material comprising fibres orientated predominately in the vertical plane.

[0023] The graph below with laboratory measured data in 1/3 octave bands (in hertz) including the frequency range the construction industry is concerned with, against normalized impact sound pressure level, *Ln* (in decibels), shows that the vertical non-woven fibre (line -square-) provides improvements at all 1/3 octave bands, upto >8dB and an overall significant improvement in the weighted normalized impact sound pressure level, Ln,w of 4dB over an existing, current system, (line -circle-) that of an open cell/closed cell laminate arrangement and a bare floor (line -diamond-). It is to be appreciated that as the decibel scale is a logarithmic one, the improvements shown equate to a significant improvement over known flooring systems.



[0024] A preferred type of non-woven material is a thermally bonded non-woven polymer material such as that manufactured by Ledatec of Blackburn, England which is sold under the CRIMPTEC Trade Mark. This material is available in thicknesses of from 10mm to 40mm, weights of from 100gm/m^2 to 1900gm/m^2. The non-woven fibre may be laminated to other lightweight materials for improved handling.

[0025] Various modifications may be made to the above-described embodiments without departing from the scope of the present invention.

Claims

1. A floor construction (1) comprising a support structure (2) for the floating support of flooring panels (4) to which are fixedly attached battens (6), each batten (6) having on at least one horizontal surface (7) thereof a single layer of non-woven fibre material (8) wherein a substantial portion of the fibres of said non-woven fibre material are orientated in the vertical plane.

2. A floor construction (1) as claimed in claim 1 wherein said battens and said flooring panels (4) are selected from the group of materials including plywood, softwood, hardwood timber, oriented strand board (OSB), chipboard, hardboard and MDF (medium density fibreboard).

3. A floor construction (1) as claimed in claim 1 or claim 2 wherein the underside of said batten is faced with said non-woven fibre material.

4. A floor construction (1) as claimed in any one of claims 1 to 3 wherein the upper horizontal surface of the batten is faced with said non-woven fibre material.

5. A floor construction (1) as claimed in any one of claims 1 to 4 wherein said non-woven material (8) is bonded by an adhesive to said batten (6).

6. A floor construction (1) as claimed in any one of claims 1 to 5 wherein said non-woven material is a thermally bonded non-woven polymer material.

7. A floor construction (1) as claimed in any one of claims 1 to 6 wherein said non-woven material is laminated to at least one of another lightweight material for handling.

8. A floor construction (1) as claimed in any one of claims 1 to 7 wherein said non-woven fibre material has a thickness in the range of from 10mm to 40mm.

9. A floor construction (1) as claimed in any one of claims 1 to 8 wherein said non-woven fibre material has a weight of from 100gm/m^2 to 1900gm/m^2.

10. A deck type flooring construction (10) comprising a support structure (16) for the floating support of floor panels (12), the underside of said floor panels (12) having a single layer of non-woven fibre material (14) wherein substantial portion of the fibres of said non-woven fibre material are orientated in the vertical plane.

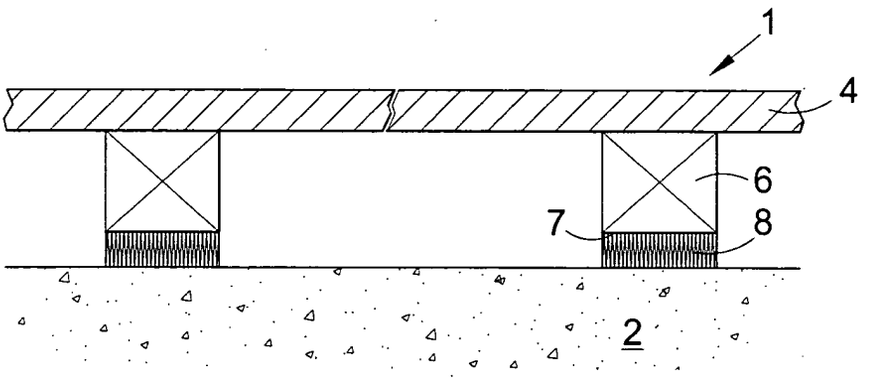


Fig.1

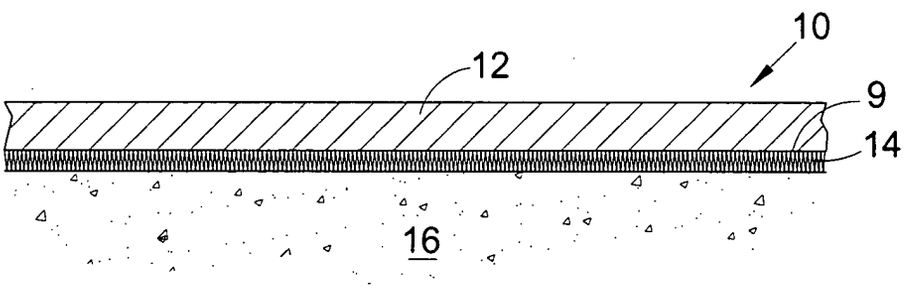


Fig.2