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(71) Applicant: **Taulell, S.A.**
12006 Castellón de la Planta (ES)

(72) Inventors:
- **PORTOLES IBÁÑEZ, Javier**
  E-12560 Benicassim
  Castellón (ES)
- **SANCHIS BALLESTER, Carlos**
  E-12550 Benicassim
  Castellón (ES)
- **SOLER AGUILAR, Carlos**
  E12005 Castellón (ES)
- **MIRA PEIDRO, Javier**
  E-12100 Castellón (ES)
- **SILVA MORENO, Gonzalo**
  E-12003 Castellón (ES)
- **ALCÁNTARA ALCOVER, Enrique**
  E-46119 Náguerra (ES)
- **ZAMORA ALVAREZ, Tomás**
  E-46021 (ES)

(74) Representative: **Ungria Lopez, Javier**
Avda. Ramon y Cajal, 78
28043 Madrid (ES)

(54) ERGONOMIC FLOORING

(57) The invention relates to ergonomic flooring which is intended for use as a floor covering and which comprises a stiff, wear-resistant layer (1) and at least one absorbing layer (2). The resistant layer is made from materials having high resistance to wear and stiffness values in order to confer mechanical and durability properties on the flooring and the absorbing layer (2) is made from deformable materials in order for the impacts associated with the movement of users to be absorbed, such that the layers can be joined to one another in the most suitable manner to meet the requirements of each flooring application, including by means of stacking.

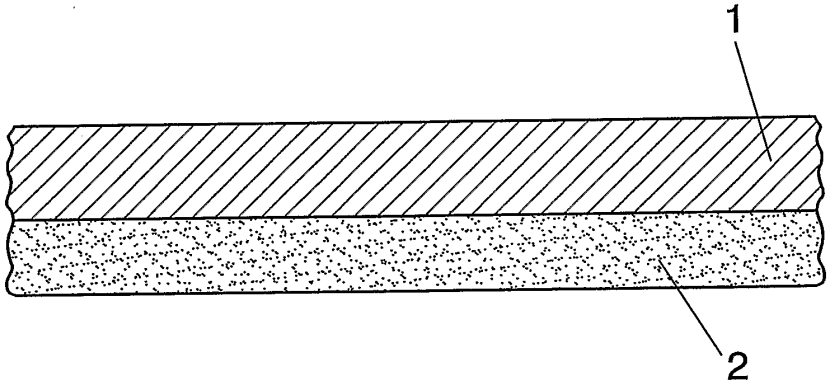

FIG. 1

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Description

OBJECT OF THE TNVENTION

[0001] As stated in the title of this descriptive specification, the present invention relates to ergonomic flooring, intended for being applied as a covering for floors and having a series of features permitting new and better benefits of use to be obtained for people walking on it.

[0002] The object of the invention is to provide flooring which, on the one hand guarantees the mechanical and durability properties of the stiff material required in floor coverings, and on the other hand improves the comfort and reduces the fatigue of users passing over that flooring.

PRIOR ART OF THE INVENTION

[0003] A wide range of materials can be used for floor coverings, in terms of both the shape and nature thereof, whether they be based on stiff modular sheets or on the basis of continuous coverings in such a way that, depending on their type, the properties of the flooring and its interaction with the users, they can be varied to a large degree with the aim of satisfying the established needs.

[0004] Nevertheless, some of these properties can be incompatible with each other, on account of the actual nature of the material, for example, stiffness and absorbing capacity, which has led to the development of construction systems simultaneously consisting of various materials which, as a whole, permit the desired characteristics to be attained.

[0005] In this regard, multi-layer systems are known which incorporate lower layers of greater stiffness for improving the mechanical resistance of the flooring as a whole, for example, glass adhered on ceramic. On the other hand, Spanish Utility Model ES 1058248 U describes a covering system comprising a stiff surface sheet and a lower layer of less density with the aim of providing acoustic and thermal insulation for the flooring, this latter layer being able to consist of natural cork.

[0006] The covering or flooring described in that Spanish utility model is stiff and does not have adequate capacity for deformation that would permit its interaction with the user to be moderated.

[0007] Moreover, the fact can be emphasised that stiff materials in general, such as for example ceramic, natural stone, terrazzo, concrete, etc., usually display high mechanical performance and resistance to wear. Nevertheless, due precisely to their low capacity for deformation, they produce a high concentration of pressure during the support cycle associated with a human step (from the moment the foot touches to the ground to when it takes off again), and especially at the instant following the impact of the heel, which can lead to an impact that is harmful for users and to an increase in general fatigue during prolonged periods of standing or walking.

[0008] On the contrary to this, materials with low stiffness, such as rubber, plastic, carpeting, etc., produce less impact on these biomechanical variables, though their performance is very limited when it comes to wear, chemical attack, etc.

[0009] In short, there are no construction systems currently available that are capable of guaranteeing a high level of durability and simultaneously permit a reduction in fatigue and an increase in the sensation of comfort in the user.

DESCRIPTION OF THE INVENTION

[0010] The flooring forming the object of the invention as a floor covering displays the particular feature of complying with the quality of stiffness and wear-resistance or durability, and at the same time having the capacity for deformation and absorption of impacts in order to improve the comfort of users, improving the distribution of pressures during the phase of supporting the foot and favouring the blood circulation in the lower extremities, in short reducing the intensity of the impacts produced when walking.

[0011] Structurally, the flooring of the invention consists of at least two layers of different materials, with one of said layers presenting a greater stiffness and different nature than the others, with the object of providing resistance properties to tensions and resistance to wear, and therefore providing durability for the whole flooring.

[0012] The other layer, or other layers in the event of there being several, are made of a material which displays less stiffness and greater deformation capacity in order to permit cushioning or absorption of impacts associated with the transit of users.

[0013] The stiff layer can be formed on a basis of ceramic pieces, natural stone, terrazzo, wooden laminas, hardened plastics or similar materials with high resistance and stiffness, being able to have any shape or contour and size.

[0014] In one embodiment of the invention, the stiff layer is produced by means of the attachment of different pieces without the existence of any additional element between the adjacent pieces.

[0015] In an alternative embodiment of the invention, the stiff layer is produced by the attachment of different pieces with the existence of joints between adjacent pieces, in such a way that in this case the attachment between adjacent pieces is carried out by means of those joints. In this embodiment of the invention the joints are elastic with the aim of admitting deformations produced when the relative positions of adjacent pieces or tiles forming the stiff layer are varied.

[0016] This implies a great advantage compared to other configurations since, when there exist different weights on adjacent pieces, the horizontal plane in which those pieces are located can undergo variations in height and these variations can be absorbed by the deformation of the elastic joint, permitting the proper mechanical response of the whole flooring without the joint reaching

the point of breaking, which is entirely the opposite of what would happen if a stiff joint were used.

[0017] For its part, the layer or layers with deformation or absorbing capacity will be able to consist of a suitable material complying with the condition of being able, in a controlled manner, to absorb impacts produced when people walk on the flooring. This material is selected from among various different materials displaying a certain flexibility and deformation capacity, such as rubber, plastic, various polymers, etc.

[0018] The layers will be able to be attached together or otherwise by means of adhesive materials, with the particular feature that the flooring can either include a layer of wear-resistant or stiff material and a single layer of deformable or absorbing material beneath that layer, or it can include a layer of wear-resistant or stiff material and more than one layer of deformable or absorbing material beneath the layer of wear-resistant or stiff material.

[0019] The thickness of the layers and the nature of the materials forming the layers are those that are suitable for ensuring that the intensity of the impact generated while they support the heel can be regulated in line with expected conditions of standing and/or walking.

[0020] In short, the flooring created in the manner described is susceptible to application in order to reduce tiredness or fatigue and increase comfort, both in premises or places where the standing position of the user predominates and in extensive floor areas where the user maintains a continual transit or walking.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] In order to complement the description that is going to be made forthwith and with the aim of aiding a better understanding of the characteristics of the invention, this specification is accompanied by a sheet of plans containing some drawings on the basis of which the innovations and advantages of the ergonomic flooring forming the object of the invention will be more easily understood.

FIGURE 1.- Shows a cross-section view of a segment of flooring formed from two layers, a stiff upper layer and lower deformable or absorbing layer.

FIGURE 2.- Shows a cross-section view of a segment of flooring formed from three layers, a stiff upper one and another two deformable or absorbing layers.

FIGURE 3.- Shows a cross-section view of flooring produced according to a preferred embodiment of the invention, where the pieces seen be seen forming the layers of the flooring and the attachment joints between adjacent pieces of the stiff layer.

[0022] These figures contain numerical references denoting the following elements:

1 stiff, wear-resistant layer
2 absorbing layer
2' additional absorbing layer
3 elastic joint
4 stiff, wear-resistant piece
5 absorbing piece

DESCRIPTION OF THE PREFERRED FORM OF EMBODIMENT

[0023] With the said figures in view, it can be seen how the inventive flooring comprises a stiff, wear-resistant layer 1 and at least one absorbing layer 2, the stiff, wear-resistant layer 1 presenting certain wear-resistant and stiffness qualities greater than those of the absorbing layer 2, and said stiff, wear-resistant layer 1 being able to be materialised in granite, cement or any other material complying with the requirement of displaying a resistance to wear and a stiffness greater than those presented by the absorbing layer 2, while said absorbing layer 2 is deformable, constituting a means of adsorption for the whole of the flooring, being able to be materialised in rubber or other appropriate material.

[0024] The stiff, wear-resistant layer 1 is arranged on the upper part of the absorbing layer 2, in such a way that in all cases the layers 1 and 2 are simply superimposed on each other or they are conveniently attached by means of an adhesive.

[0025] Consequently, the inventive flooring is characterised in that it comprises a stiff, wear-resistant layer 1 and at least one absorbing layer 2, the stiff, wear-resistant layer 1 being able to be formed from stiff, wear-resistant pieces 4 which can be materialised in ceramic materials, natural stone, terrazzo, wooden laminas, hardened plastics or any other material presenting greater resistance and greater stiffness than the rest of the layers in order to guarantee the mechanical and durability properties of the whole flooring, said stiff, wear-resistant layer 1 being arranged on one or several absorbing layers 2 consisting of materials with a greater deformation capacity, which permit absorption of impacts associated with the transit of walkers.

[0026] Figure 2 shows an embodiment of the invention in which three different layers are seen: in the upper zone is a stiff, wear-resistant layer 1 and below it is an absorbing layer 2 and an additional absorbing layer 2', these two absorbing layers 2,2' being able to have different configurations between them, and they can be embodied in different materials.

[0027] The thickness and nature of the different layers, 1,2,2' are adjusted so that the flooring as a whole presents a suitable level of mechanical properties and simultaneously improves the biomechanical variables related to standing and/or walking, favouring the comfort of users and being applicable to both to premises or places where the static position of the user predominates and for favouring the absence of fatigue during prolonged transit or walking.

[0028] The construction system is designed from the

construction and/or architectural point of view so that integrated ergonomic functionalities can be presented, applying industrial design criteria. In this sense, the stiff, wear-resistant layer 1, habitually made of a stiff material, can have a specific surface design consisting of textures of varying roughness, non-slip reliefs or tactile elements with the aim of optimising the ergonomic properties, safety and accessibility of the flooring.

[0029] The stiff, wear-resistant layer 1 can be formed from the attachment of a set of stiff, wear-resistant pieces 4, such as tiles for example, with these stiff, wear-resistant pieces 4 being able to have any contour and size, and a thickness suited to different needs.

[0030] Likewise, the absorbing layer 2 can be formed from the attachment of a set of absorbing pieces 5, these absorbing pieces 5 being able to have any contour and size, and a thickness suited to different needs.

[0031] In one embodiment of the invention, the stiff, wear-resistant layer 1 is produced by means of the attachment of different stiff, wear-resistant pieces 4, without the existence of any additional element between adjacent stiff, wear-resistant pieces 4.

[0032] In an alternative embodiment of the invention, the stiff, wear-resistant layer 1 is produced by means of the attachment of different stiff, wear-resistant pieces 4, with the existence of joints 3 between adjacent stiff, wear-resistant pieces 4, in such a way that in this case the attachment between the adjacent stiff, wear-resistant pieces 4 is done by means of those joints 3. In this embodiment of the invention, the joints 3 are elastic with the aim of admitting deformations produced when the relative positions of the adjacent stiff pieces 4 or tiles forming the resistant layer 1 is varied.

[0033] This implies a great advantage compared to other configurations since, when there exist different weights on adjacent stiff, wear-resistant pieces 4, the horizontal plane in which those stiff, wear-resistant pieces 4 are located can undergo variations in height and these variations can be absorbed by the deformation of the elastic joint 3, permitting the proper mechanical response of the whole flooring without this elastic joint 3 reaching the point of breaking, which is entirely the opposite of what would happen if a stiff joint were used.

Claims

1. ERGONOMIC FLOORING, which, being formed by means of pieces of any size and configuration whose arrangement on a floor determines layers of continual covering, is **characterised in that** it comprises a stiff, wear-resistant layer (1) which presents greater resistance and stiffness than the rest of the layers, and one or more absorbing layers (2,2'), which present deformation capacity for providing an improved comfort for the transmit of people.

2. ERGONOMIC FLOORING, according to claim 1, **characterised in that** the stiff, wear-resistant layer (1) is superimposed on an absorbing layer (2).

3. ERGONOMIC FLOORING, according to claim 1, **characterised in that** it comprises a stiff, wear-resistant layer (1) and several absorbing layers (2,2').

4. ERGONOMIC FLOORING, according to claim 3, **characterised in that** the absorbing layers (2,2') are superimposed on each other, and the stiff, wear-resistant layer (1) is superimposed on the uppermost absorbing layer (2).

5. ERGONOMIC FLOORING, according to any of the above claims, **characterised in that** the stiff, wear-resistant layer (1) is produced in a ceramic material, natural stone, cement, terrazzo, wooden laminas, hardened plastics or other materials of similar resistance, stiffness and other mechanical characteristics.

6. ERGONOMIC FLOORING, according to any of the above claims, **characterised in that** the absorbing layer or layers (2,2') are produced in rubber, plastic or other materials presenting lesser stiffness than the stiff, wear-resistant layer (1), in such a way that they permit an improved sensation of comfort and reduced fatigue for the walking user.

7. ERGONOMIC FLOORING, according to any of the above claims, **characterised in that** the stiff, wear-resistant layer (1) and the absorbing layer (2) are superimposed without the existence of any attachment between them.

8. ERGONOMIC FLOORING, according to any of claims 1 to 6, **characterised in that** the stiff, wear-resistant layer (1) and the absorbing layer (2) are superimposed and attached together by means of adhesive or similar.

9. ERGONOMIC FLOORING, according to any of the above claims, **characterised in that** the stiff, wear-resistant layer (1) is created from stiff, wear-resistant pieces (4) and the absorbing layers (2,2') are created from absorbing pieces (5), the stiff, wear-resistant pieces (4) and the absorbing pieces (5) being able to have any contour and size, and have suitable thickness for providing the flooring with resistance, durability, safety and comfort necessary in each of the different applications of that flooring.

10. ERGONOMIC FLOORING, according to any of the above claims, **characterised in that** the stiff, wear-resistant layer (1) is suitable for being created from stiff, wear-resistant pieces (4) with surface finishes of varying roughness, non-slip reliefs or tactile elements with the aim of optimising the ergonomic properties, safety and accessibility of the flooring.

11. ERGONOMIC FLOORING, according to either of the above claims 9 or 10, **characterised in that** between the stiff, wear-resistant pieces (4) creating the stiff, wear-resistant layer (1) there exist elastic joints (3) in such a way that adjacent stiff, wear-resistant pieces (4) remain attached to each other by those elastic joints (3).

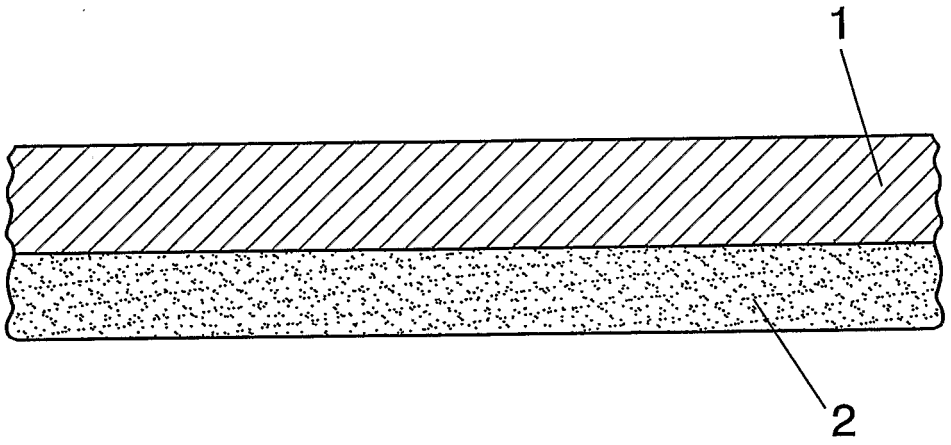

FIG. 1

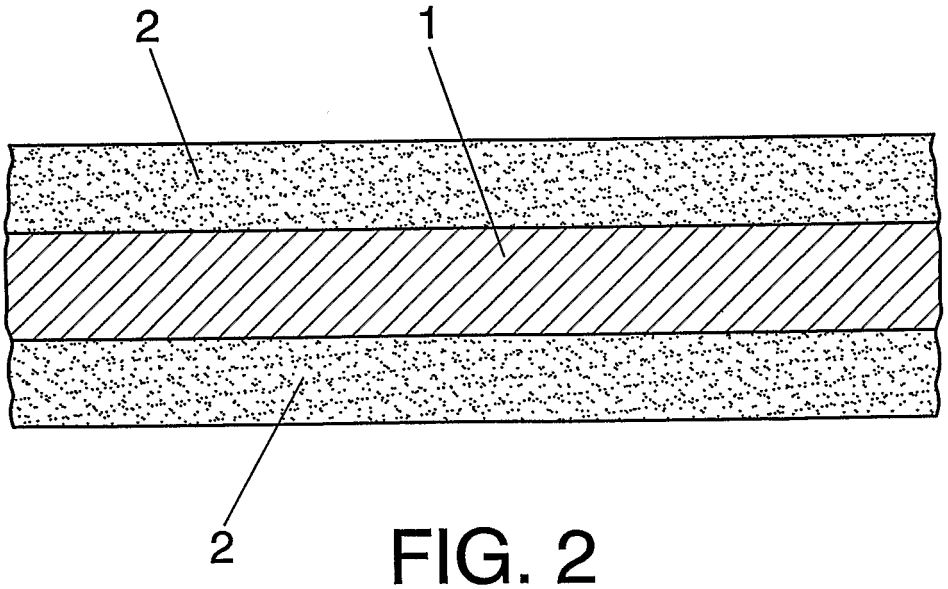

FIG. 2

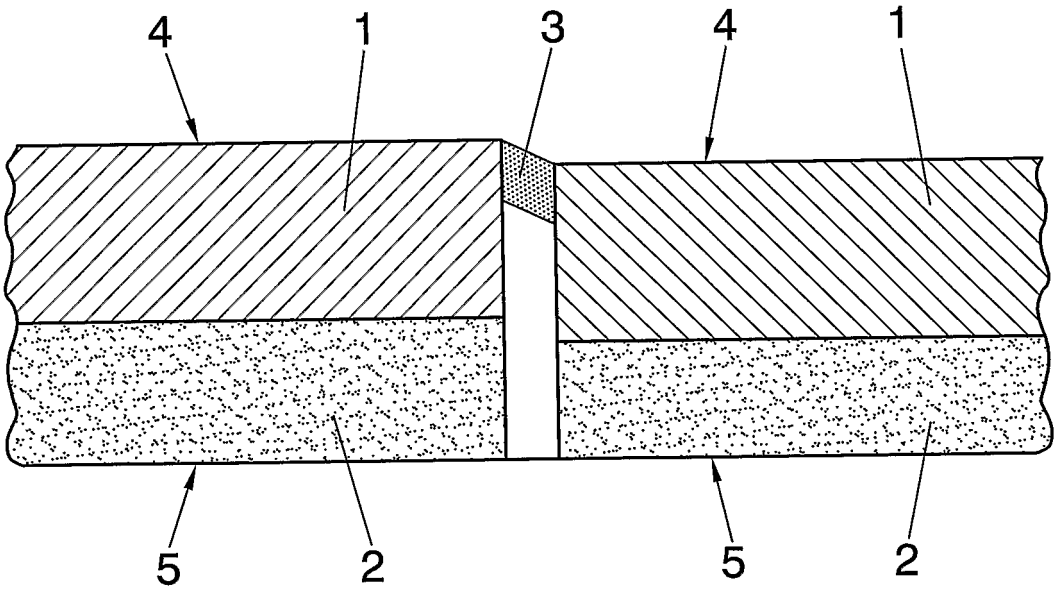

FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 2006/000012

A. CLASSIFICATION OF SUBJECT MATTER

E01C 5/22 (2006.01) *E01C 15/00* (2006.01)

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E01C 5/, E01C 13/, E01C 15/00, E04B 5/, E04F 15/.

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

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

CIBEPAT,EPODOC,PAJ, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ES 2157814 A1 (PEMARSA S.A.) 16.08.2001, **page 3, lines 3-26; page 4, lines 20-22**	1-9
Y		10,11
Y	US 1629185 A (CARBORUNDUM CO) 17.05.1927, **description; drawings**	10
Y	EP 0412254 A2 (P C PLANNING INC) 13.02.1991, **description; drawings**	11
A		1,2,5,6,7, 8,9
X	US 4681786 A (BROWN JOHN G) 21.07.1987, **column 5, lines 53-68; coumn 6; claims 3-6; drawings**	1-9,11
X	JP 11193503 A (KAWASAKI REFRACTORIES CO LTD) 21.07.1999, **abstract; figures**	1-6,8

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 April 2006 (21.04.06)	**27 April 2006 (27.04.06)**
Name and mailing address of the ISA/ **S.P.T.O.** Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
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Form PCT/ISA/210 (extra sheet) (April 2005)

REFERENCES CITED IN THE DESCRIPTION

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