(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
28 December 2006 (28.12.2006)

PCT

(10) International Publication Number
WO 2006/136918 A2

(51) International Patent Classification:
E04F 13/12 (2006.01) *E04F 15/06* (2006.01)
E04F 13/08 (2006.01) *E04F 15/20* (2006.01)

(21) International Application Number:
PCT/IB2006/001675

(22) International Filing Date: 21 June 2006 (21.06.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
MI2005A001199 24 June 2005 (24.06.2005) IT

(71) Applicant *(for all designated States except US)*: **INTERSIDER ACCIAI S.P.A.** [IT/IT]; Piazza della Repubblica, 11, I-20124 Milan (IT).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: **BANDERA, Ferdinando** [IT/IT]; c/o Intersider Acciai S.p.A., Piazza della Repubblica, 11, I-20124 Milan (IT).

(74) Agent: **MARIETTI, Giuseppe**; Marietti, Gislon e Trupiano S.R.L., Via Larga, 16, I-20122 Milan (IT).

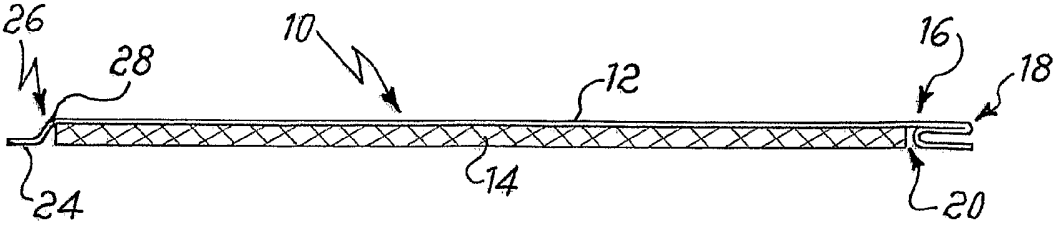
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METAL FINISHING TILE, PRODUCTION METHOD AND RELATED COVERING



(57) Abstract: This invention relates to a tile for covering surfaces in the form of one or more metallic plates and a substratum to be placed on the surface to be covered. At least one metal plate has folds forming male and female shaped elements to be connected with those of adjacent tiles to form a substantially continuous coverage.

WO 2006/136918 A2

"METAL FINISHING TILE, PRODUCTION METHOD AND RELATED COVERING."

****

FIELD OF THE INVENTION

The present invention concerns a tile built applying at least one metallic layer, in stainless steel or other metals, on a substratum like, as example, a sound-deadening or a thermosetting plastic material; a number of such tiles may be used to cover surfaces in the building filed. Characteristic of these tiles is that the tile sides are properly shaped to join the tiles together to realise stable, plane and continuous coverings.

The surfaces to be covered could be horizontal, as a floor, or tilted, up to be vertical as are building facades or inner walls. Tiles format is normally square or rectangular, even if there aren't limits to format type provided that the sides are made to be joined together. The invention concerns also a corresponding method to realise such tiles and the coverings obtained installing the tiles on suitable plane surfaces. Similar tiles are known being made by a metal plate bonded, with various methods, to a substratum of a non metallic material like, but not only, a plastic material. To apply such tiles multiple methods exists, but all of them are time consuming, needs skilled people, and are costly. Moreover the tiles implantation to the rough support requires costly adhesives or similar, that frequently become a critical factor when exposed to humidity or to wide thermal excursions.

An object of the present invention is to propose a new tile of the type and for the applications just described, together with the method to realise it; the tile is carefully designed to make the implantation easy, fast and cheap without using adhesives to fix it to the basement. The essential characteristics of the new tile, of his realisation method, and of the coverings obtained joining a number of such tiles, are defined by the enclosed claims. Further characteristics and advantages of the solution, according to the present invention, will be apparent from the description given below of preferred embodiments, given purely as an indicative example without limitations, with

CONFIRMATION COPY

reference to the enclosed figures, in which:

Figure 1 illustrates, in a schematic way, a tile in section according to the invention.

Figure 2 is a plane view from the bottom of the tile of figure 1.

Figure 3 is a section to show the details of the coupling of two tiles of the type represented by figures 1 and 2.

Figure 4 shows in a section details of the possible implantation of a tile to the basement and reinforced tiles having two metal layers.

Figure 5 shows a different realization of the tile's coupling.

Figure 6 shows the same coupling of the previous figure 3, modified to allow the removal of a single tile from a complete pavement.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference in particular to figures 1 and 2, a tile 10 is illustrated, the tile being composed by a metallic plate 12, preferably but not exclusively, in stainless steel, and by a suitable plane substratum 14, made as example by sound-deadening or thermosetting plastic material. The metallic plate 12, that's the stamping surface or the top external surface of the covering realised assembling these tiles is coupled to the substratum 14 by any suitable way, like, as example by bonding with adhesive. Moreover, when out of ordinary mechanical performances are required, given that a single metallic layer cannot exceed a certain thickness because of the surface's shaping process, the tile could be built coupling more than one metallic plate, as example with two of them.

The tiles, will be installed on a base surface to be covered, normally a plane surface, horizontal in case of floors or tilted as in case of slope coverings, up to vertical when covering facades or internal walls.

To guide and join together adjacent tiles 10, each tile shows, on one side, or preferably on two consecutive sides, a female shaped joint; the opposite sides are properly male shaped, these elements being obtained by the edges of the metallic plate of which the tile is composed. It is important to highlight that the tile joints according to the present invention, are made of

homogeneous material, in the case metal, folded without soldering or other complex workings. Moreover, as per figures 1 and 2, where the tile shown has one metallic plate 12, the four lateral profiles are external to the substratum 14 and properly folded to obtain said male and female joints. The method to get the female profile 16, is to make a first fold 18 of the ending side of the plate versus the tile inner, and a second fold 20, in the opposite direction to obtain an open "Z", with an externally facing seat 22 parallel to the tile side. The global thickness of the "Z" fold is a bit less of the total tile thickness, to assure planarity. The seat 22 of the female 16, is dimensioned to host a free edge 24 of a contiguous tile, said edge being part of a male element 26 result of folding down and then externally as in 28 the metallic side of the tile to obtain a substantially "L" shaped profile, where the free side 24 has a proper quote to perfectly fit inside the "V" seat 22.

With reference to figure 2, a rectangular tile 10 is illustrated, having two female elements 16 on two contiguous sides, and two male elements 26 on the contiguous opposite sides. To avoid metal interferences during folding and to well close the tiles one near to the other during implantation, the angles of the rough metal plate 12 are properly cut as per figure 2, detail 32. To be noticed that cuts at the angles, are made to get a completely continuous and closed tile plane when installed. It's also possible to build tiles having only two joint, typically on the longest dimension, instead of the four shown and described; this two side insertion tile, is preferred for long and tightened tiles and results cheaper.

Moreover the female joints 16 can be formed by single sub-elements 18' obtained with cuts 18'' perpendicular to the tile edge, and folding lines 20 can be previously traced on the tile rear surface to improve the folding precision.

With reference to figure 3, details of a couple of tiles are shown, to highlight the joint of a male element 26' and of a female element 16, belonging to two adjacent tiles 10' and 10 covering a surface 33.

When the surface 33 is horizontal, it's normally not necessary to fix the tiles to the surface; anyhow, in case where the fixing is desired or preferable, the

female edge 34 can be foreseen few millimetres longer to accept fixing screws, 38 on holes 36, as shown in figure 4. Figure 4 illustrates two tiles 10" and 10"', having metal plates 12"a, 12"b and 12"'a, 12"'b respectively, the male and female profiles being obtained by folding the metal plane of the external plates 12"a and 12"'a.

However the male and female joints can be obtained by folding the inner plates 12"b and 12"'b.

An even simpler fixing, is possible on the "L" shaped side as it happens at the ending lane of the coverings.

Due to the characteristics of the present invention, the implantation of tiles results simple, fast, and precise; the covering is aesthetically very clean, without visible screws with the metal tiles quite continuous. The metal joints, as made, allows the recovery of small planarity defects frequently present on the base rough surfaces, and compensate the dimensional changes due to temperature variation. An important advantage of the invention is that the metal tiles are electrically interconnected by a practically infinite number of points, this makes very simple the metal grounding of the complete covering when requested.

With reference to figure 5, a different form of the invention is shown; with reference to two tiles 40 and 40', each having a metal plate 42 and 42', coupled with a substratum 44 and 44', standing on a surface 45. As per this implementation, the female joint element 46 is built folding the metal edge firstly down and secondly up; this realises a "V" seat 48, where to insert a free folded down edge 50" of the male element 52. Also with this implementation the joints could be two or four on the sides of each tile.

It's a general good practice, to simplify the replacement of eventually damaged tiles or to give access to under covering installations, to interpose to normal tiles special easily removable "jolly" tiles without joints or with joints of reduced length as shown in figure 6 where, as example, the joining "Z" profile 16h of the tile 10h has an inner edge shorter than the equivalent one of the tile 10 in figure 3.

As an alternative (not shown), the "jolly" tiles can be formed without joints and maintained in position on the ground surface by means of magnetic attraction between permanent magnetically attracting elements, embedded in the ground surface and in the bottom surface of the tile substratum.

To build the tiles, according to the present invention, a metal plate is properly cut at dimension and the plate corners are cut with a number of additional cuts made because beneficial to the precision of the folding process; as example, the line of folding can be properly engraved to improve precision.

The plate is then folded, in multiple steps, to get the tile metal plate complete with its female and male side profiles. Finally the tile is assembled with an eventual second metal plate, and the substratum. The covering made without screws with tiles produced as per the invention, keeps the lower surface exactly as it was before. This is very desirable and allows temporary installations and tile reusability, important characteristic for a number of applications, as example like the fair stands floors or the technical floors.

In conclusion the present invention realises, with limited investments, simple, flexible and cheap metal covering tiles characterised by an easy, adhesive free installation method, and by a very clean aesthetic, without visible screw or other heterogeneous components. The peculiarity of the metal joint is beneficial to recover the small planarity defects of the installation surface, important to compensate dimensional changes due to the thermal excursion and allows easy electrical grounding.

CLAIMS

1) A tile for covering surfaces like floors, facades, walls or others, composed by one or more metallic plates having the surface opposite to the one eternally exposed, fixed to a plane substratum, placed on the rough basement surface, the tile being characterised in that at least a metal plate thereof has, on at least two opposite sides, a couple of folds forming complementary male and female shaped elements for reciprocal insertion joints, standing between the external tile layer and the basement plane, each joint element being able for the insertion and the retention of a complementary profile on the adjacent tile.

2) A tile, according to claim 1, characterised in that said substratum for placement on the rough basement surface comprises a sound-deadening material.

3) A tile, according to claim 1, characterised in that said substratum for placement on the basement surface is made of plastic material, preferably a thermosetting one.

4) A tile, according to claim 1, 2 or 3, characterised in that the insertion and coupling elements extend along the related tile lane, with the exception of the tile corners.

5) A tile, according to claim 1, 2, 3 or 4, characterised in that the tile plane is limited from the metallic plate(s) on the four corners.

6) A tile, according to one of the previous claims, characterised in that the insertion and coupling elements are made by folding the tile metal plate and are external respect to the substratum plate.

7) A tile, according to one of the previous claims, characterised in that it has a female insertion and coupling element on one side only of the tile and a corresponding male insertion and coupling element on the opposite tile side.

8) A tile, according to one or more of the claims 1 to 6, characterised in that it has two female insertion and coupling elements on two

contiguous sides of the tile and two male insertion and coupling elements on the other contiguous sides.

9) A tile, according to al least one of the previous claims, characterised in that the female insertion and coupling element is formed by a "Z" shaped folding of the edge of the metallic plate, said folding starting from the external surface toward the basement surface.

10) A tile according to claim 9, characterized in that said "Z" shaped folding is formed by a plurality of "Z" shaped parallel parts separated by cuts perpendicular to said "Z" folding.

11) A tile, accordingly to claim 9 or 10, characterised in that the arm of the "Z" 11 shaped folding that is parallel and adjacent to the basement surface has holes for screws or other fixing means to said basement surface.

12) A tile, according to claim 9, 10 or 11, characterised in that the male insertion and coupling element is formed by an "L" shaped folding of the edge of the metallic plate, said folding starting from the external surface toward the surface to be covered to create an edge, parallel to said surfaces.

13) A tile, according to claim 12, characterised in that, the arm of the "L" shaped folding that is parallel and adjacent to the surface to be covered, has one or more openings to allow the tile fixing to the surface to be covered with screws or other elements.

14) A tile, according to claim 13, characterised in that, said arm of said "L" shaped folding is dimensioned to enter inside the opening of said "Z" folding, up to the contact of two adjacent tiles.

15) A tile, according to one or more of claims 1 to 8, characterised in that the female insertion and coupling element is obtained by a folding into an "L" shape a metallic plate edge, from the external tile plane, versus the surface to be covered, and to create a first edge portion parallel to these surfaces, and a second edge portion in continuation of the first one and forming an "U" seat open towards the tile.

16) A tile, according to claim 15, characterised in that said first edge portion has one or more openings to allow the tile fixing with screws or other elements to the surface to be covered.

17) A tile, according to claim 15 or 16, characterised in that the male insertion and coupling element is obtained by a folding into an "L" shape of a metal plate edge, going from the external tile plane, versus the surface to be covered, and in direction of the tile body , to create a free edge between such surfaces.

18) A tile, according to claim 17, characterised in that said free edge is dimensioned to enter inside the "U" shaped seat of said female element, up to the contact of two adjacent tiles.

19) A tile, according to al least one of the previous claims, and formed with at least two metallic overlapped plates and said plane substratum, characterized in that said male and female insertion and coupling elements are part of the more external metal plate.

20) A tile, according to any one of claims 1 to 18, and formed with at least two metallic overlapped plates and said plane substratum characterised in that said male and female insertion and coupling elements are part of the more internal metal plate.

21) A covering for floors, facades or other surfaces, realised with a number of tiles made according to one or more of previous claims, having complementary insertion and coupling elements for keeping the tiles closed one to the others.

22) A covering according to claim 21, characterised in that one or more "jolly" tiles are missing of one or more insertion joints to facilitate a partial or complete removal of the installed covering.

23) A covering according to claim 21, characterised in that one or more "jolly" tiles have one or more shorter insertion joints to facilitate a partial or complete removal of the installed covering.

24) A covering according to one of the claims 21 to 23, characterised in that one or more tiles are standing on the covered surface, without

being fixed or interfering with such surface.

25) A covering according to one of claims 21 to 24, characterised in that, it is applied on a floating floor.

26) A covering according to one of claims 21 to 25, characterised in that at least one of the metallic tiles is electrically grounded.

27) A method for producing tiles according to one or more of claims 1 to 20, comprising the steps of :

- cut to measure and cut the corners of a metallic plate to get plates ready to produce metallic tiles
- folding two or four sides of each tile metallic plate to form one or two insertion and coupling female elements and one or two male insertion and coupling elements.
- add in case additional metallic plates
- add a plane substratum

28) A method according to claim 27, characterised in that the folds of said female insertion and coupling elements are pressed to get thickness lower than the one of the tile.

29) A method according to claim 26 or 27, characterised by performing cuts or line marking on the metal plate to improve the precision of the subsequent folding operation.

Fig.1

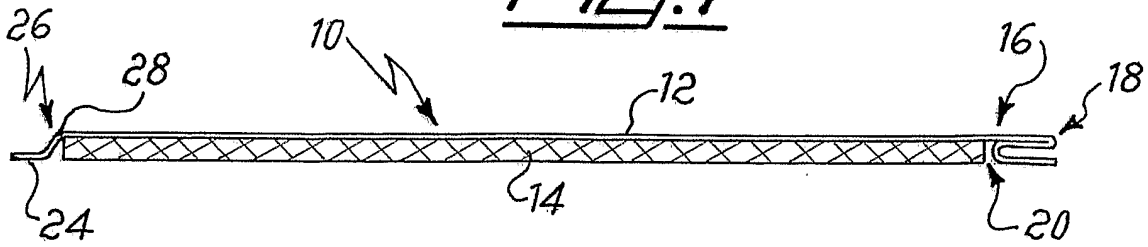


Fig.2

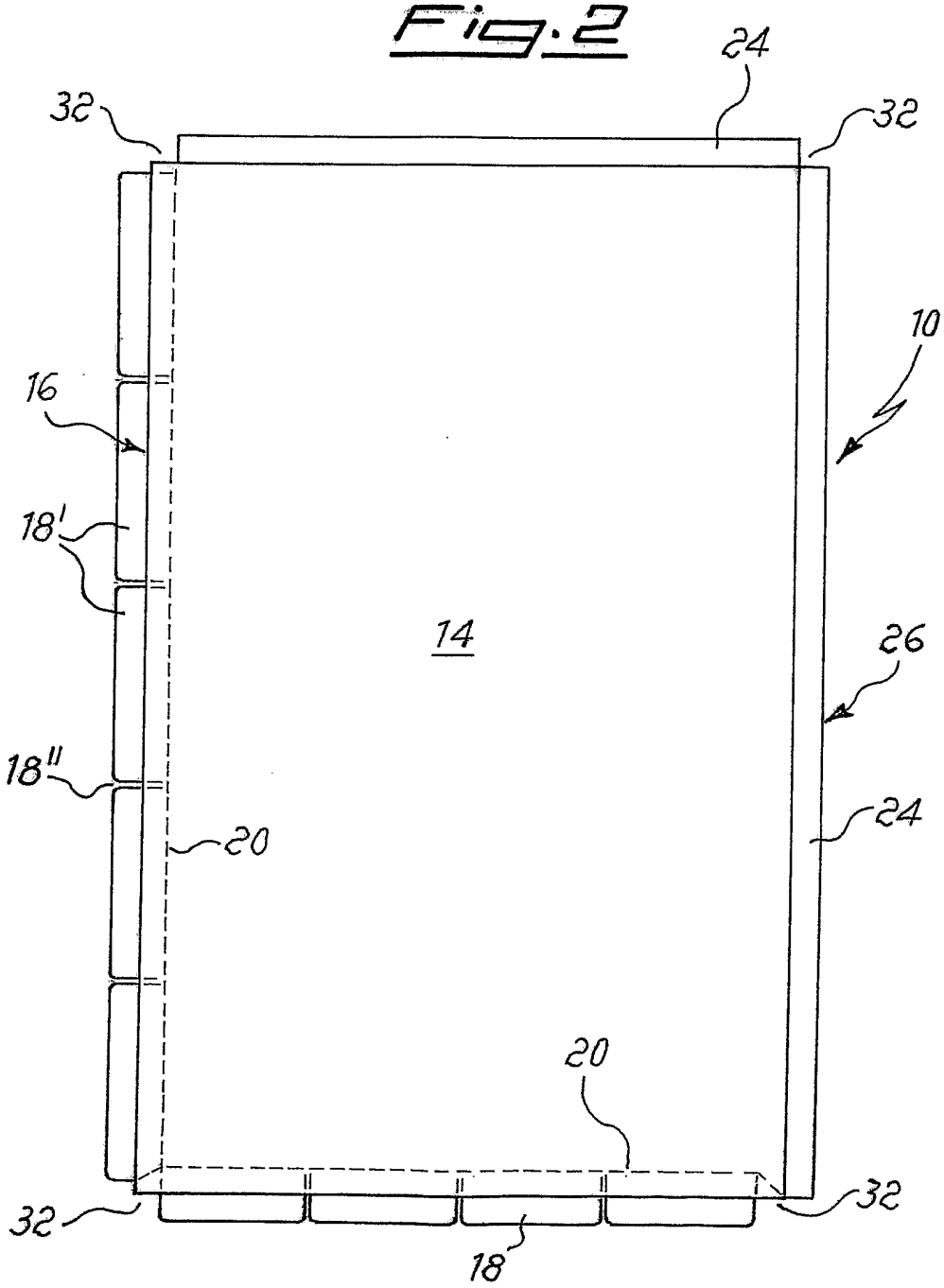


Fig.3

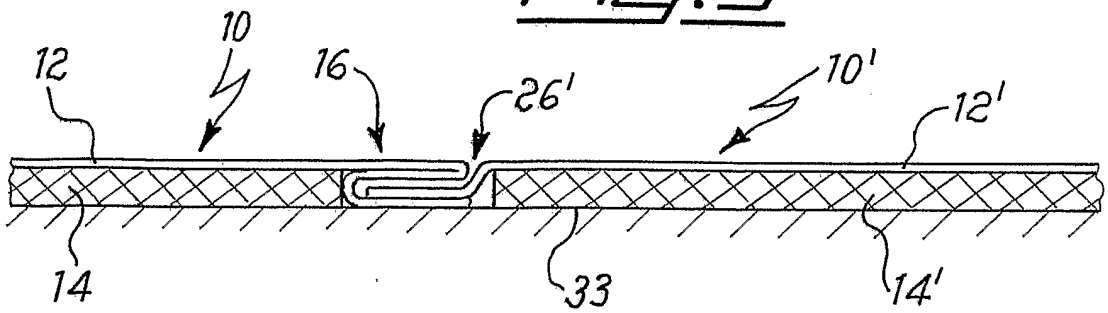


Fig.4

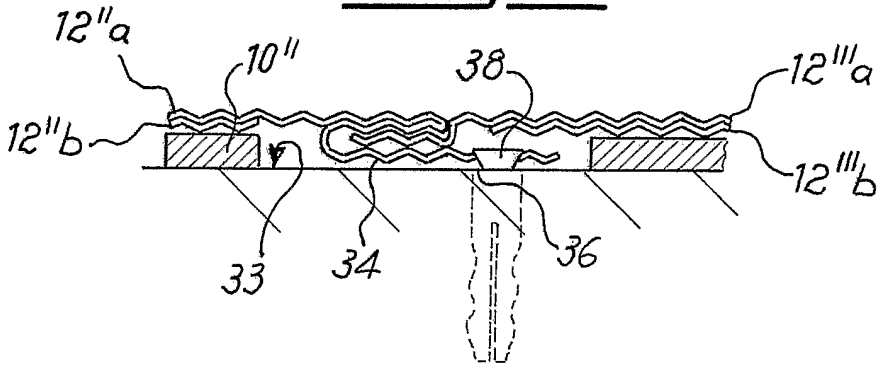


Fig.5

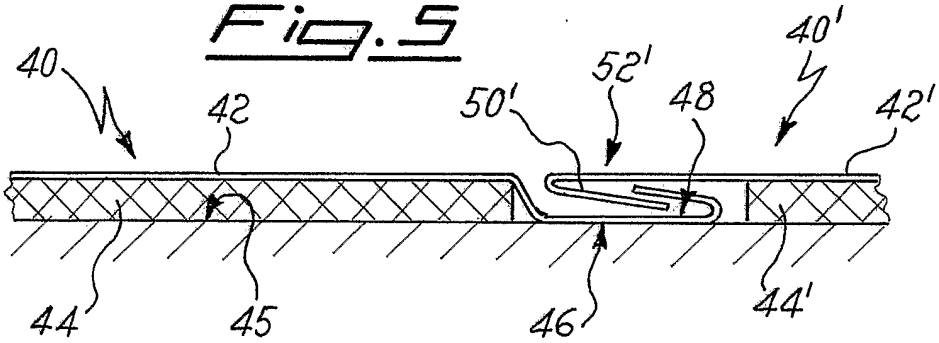
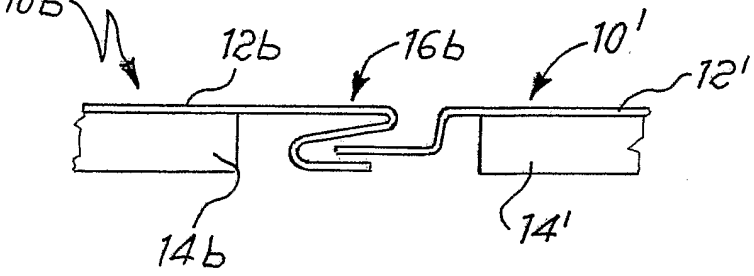



Fig.6