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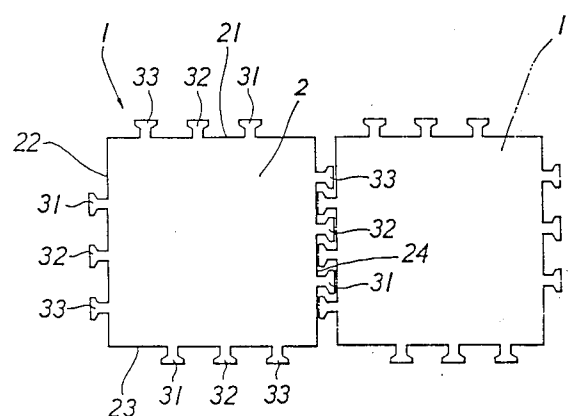
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(54) **TILE PIECE FOR FINISHING SURFACES OF WALL AND FLOOR.**

(57) Tile pieces (1, 7 and 8) used as a material for finishing inner and outer wall surfaces and floor surface of a building. These pieces (1, 7 and 8) are formed of lightweight thin plate members (2, 71 and 81), each of which is provided at the outer peripheral end faces thereof (21 - 24, 82) with a plurality of projections (31 - 33, 83) extending outwardly; i.e. anchors. These projections (31 - 33, 83) are formed at positions which do not cause adjoining tile pieces to interfere with each other when the tile pieces (1, 7 and 8) are laid on the wall or floor surface, and can be inserted under the rear surfaces (2a) of the adjoining tile pieces (1, 7 and 8). These projections (31 - 33, 83) function as allowances for mounting or joining or anchors to the wall surfaces. Consequently, the tile pieces (1, 7 and 8) are firmly secured to a wall surface (5) and the like, thereby hardly posing the possibility of peeling or falling off of the tile pieces.

FIG. 4



(Technical Field)

The present invention relates to tile pieces used as a material for finishing inner and outer wall surfaces and floor of a building. More specifically, the present invention pertains to novel tile pieces which are formed of lightweight thin members made of metal, plastics or the like and which are provided with anchor structure, whereby the tile pieces can be attached securely to the surfaces of a building by means of adhesion or the like.

(Background Art)

Rectangular tile pieces made of clay are typically known as a finishing material for wall surfaces of a building. This kind of tile pieces are attached to concrete wall surfaces of a building with adhesive material such as mortar. However, in a clay tile wall formed by attaching generally used clay tile pieces on the wall surface, there is a problem that since the tile pieces are heavy in weight they are likely to peel or fall off from the wall surface. Also, heavy weight of the tile pieces causes an increase of the load applied on a building. In addition, the heavy weight of the tile pieces causes to make transfer, wrapping and application of the tile pieces to be hard work. In addition to these problems, when the clay tile pieces are exposed to atmosphere of rain and wind for a long period of are exposed to atmosphere of rain and wind for a long period of time the possibility becomes high that the clay tile pieces are cracked to peel and fall off from the wall. In case that the tile pieces are falled off from a wall, severe damage may be given to passengers passing below the wall.

While, in respect of ornamental view point, since clay tile pieces are baked to be given a desired color, it is difficult to manufacture these tile pieces presenting a uniform color. Further, in respect of manufacturing process and strength of clay tile pieces, the size of clay tile pieces is limited, thus tile pieces of large size are hardly obtainable.

(Disclosure of Invention)

An object of the present invention is to provide tile pieces which is able to solve the prior art problems as described above. Other object of the present invention is to provide a novel tile wall which is capable of presenting a uniform color and reproducing beauty of metal material itself on the surface thereof.

In order to achieve these objects, according to the present invention, in the consideration of metal and plastic materials which are lightweight, durable and easy to form, these materials are employed as

a tile material. Further, in order to securely attach tile pieces made of this kind of materials on a wall surface, the shape of the tile pieces having an anchor portion is designed such that the tile pieces are provided with larger area of adhesion or attachment to the wall surface.

A tile piece of the present invention is formed of a shaped thin lightweight member which is integrally provided at least partially at its outer peripheral ends with a plurality of projections extending outwardly and arranged at given intervals along the peripheral ends. According to the tile piece of the present invention, at least one portion of the rear surface and peripheral ends of the thin member and the projections thereof is employed for adhesion or attachment to a wall surface, whereby the tile piece is firmly attached to the wall surface.

Since tile pieces of rectangular shape are usually used, the thin member of the tile piece of the present invention is typically shaped rectangular. The projections are preferably provided on all peripheral ends of the thin member of the tile piece. Where the thin member is shaped rectangular the projections formed on the opposite peripheral ends of the thin member are preferably positioned so as not to interfere with one another when viewed from the direction normal to these peripheral ends. This can avoid contacting of the projections with each other of the tile pieces arranged adjacent to each other on a wall surface. Further, the width of the joint between the tile pieces can be freely adjusted.

Furthermore, it is preferable that each of the projections is formed at its root portion to have a rearwardly stepped portion of the height substantially same as the thickness of the thin plate member and is formed at the end portion extending from the stepped portion to extend substantially parallel to the thin plate member. According to this arrangement, between the tile pieces placed adjacent to each other on a wall surface, the projections of the tile piece at one side can be inserted into a space between the other tile piece and the wall surface. Thus, the tile pieces can be placed on a wall surface with the outer peripheral ends of the respective tile pieces being tightly contacted with each other irrespective of the existence of the projections. Where the tile pieces are arranged in this tightly contacted condition, even if one or more tile pieces placed on a wall surface might peel off from the wall surface, the peeled tile pieces are retained in their positions by the tile pieces placed therearound. Therefore, it is rarely occurred that the tile pieces are falled off from a wall surface because the projections function as anchor portions.

It is preferable that the projections are capable of being bended rear side of the thin plate member of the tile piece. With this, the space between the rear surface of the tile piece and a wall surface can

be varied by changing the amount by which the projections are bent. This means that the amount of adhesive material such as mortar or the like filled into the space between the tile piece and a wall can be varied. In addition, the projections are bent to intrude into the filled adhesive layer, so that the adhesive force of the tile piece to the wall is enhanced.

Instead of forming the projections as mentioned above, the thin plate member may be formed with at least one opening, inner end portion of which is utilized as adhesive area. Both of the projections and openings can be provided.

(Brief Description of Drawings)

Figure 1 is a schematic view of a tile piece of an example according to the present invention.

Figure 2 is a partial plan view of the tile piece of Figure 1.

Figure 3 is a partial sectional view of the tile piece of Figure 1 taken along line III-III.

Figure 4 is a plan view showing arrangement of projections of the tile piece of Figure 1.

Figure 5 is a plan view illustrating an attachment of the tile piece of Figure 1.

Figure 6 is a partial sectional view illustrating the positions of projections of the tile pieces of Figure 1 when arranged in a tightly contacted condition.

Figure 7 is a schematic view of a tile piece of a second example according to the present invention.

Figure 8 is a plan view of a tile piece of a third example according to the present invention.

Figure 9 is a sectional view of a tile piece of a fourth example wherein projections of the tile piece of Figure 1 are bent rear surface side of the tile piece.

Figure 10 is a sectional view of a modification of the fourth example of Figure 9 in which projections of the tile piece of Figure 1 are bent toward the rear surface side of the tile piece by 90 degrees.

Figure 11 is a schematic diagram of a fifth example according to the present invention.

(Best Mode for Carrying Out the Invention)

First example

Figure 1 shows an example of a tile piece according to the present invention. The tile piece 1 of this example is obtained by blanking an aluminum thin plate having a thickness of 0.5 mm. The tile piece 1 has a body portion (thin plate member) 2 of square shape having nearly 5 mm sides which is integrally provided at outer peripheral ends 21 to 24 with a plurality of projections of

the same shape. In this example, three projections 31 to 33 are provided on each of the outer peripheral ends 21 to 24.

Figure 2 shows a portion of the projections 31 to 33 in an enlarged scale. As shown in this figure, each of the projections has a leg portion 3a having a width of about 2 mm rooted in the outer peripheral end 2. At the end of this leg portion 3a, a trapezoidal head portion 3b is continuously formed in a condition that it is widened toward the end at an angle of about 45 degrees. As shown in Figure 3, the projections of this configuration generally extend substantially parallel to the body portion 2. At the root side of the leg portion 3a, there is provided a stepped portion 3c which is formed by bending the leg portion toward the rear surface 2a of the body portion 2. The difference in level d between the rear surface 2a of the body portion 2 and the rear surface 3a of the projection 3 is set to be slightly larger than the thickness D of the body portion and projection.

Next, referring to Figure 4, there will be explained the positions of the respective projections 31 to 33. In this example, three projections 31 to 33 are arranged at equal intervals on the peripheral ends 21 to 24, respectively. The three projections 31 to 33 on the respective peripheral ends are arranged biased toward one side of the corners of the peripheral end. For example, on the peripheral end 21, the distance from the peripheral end 24 of the right side to the projection 31 is larger than that from the peripheral end 22 to the projection 33.

Likewise, three sets of projections 31 to 33 are arranged on the remaining peripheral ends 22, 23 and 24, respectively. According to this arrangement, where a tile piece 1' of the same structure as that of the tile piece 1 of this example is placed adjacent to the tile piece 1, the projections of the respective tile pieces 1 and 1' extending from the facing peripheral ends of these tile pieces do not interfere with one another.

Second Example

Figure 7 illustrates another example of the present invention. In this example, a tile piece 7 has a body portion 71 made of lightweight metal material such as aluminum, plastics or the like. Different from the first example as mentioned above, no projections are provided. Instead, the body portion 71 of the tile piece 7 is formed therein with an opening 72. In this case, inner peripheral ends 73 of the opening 72 is utilized as area of adhesion. The tile piece 7 of this structure can be attached to a wall surface as like as the tile piece 1 of the first example, and attachment process of the tile piece 7 is quite simple compared with tile pieces of prior art. Further, in the case of the tile

piece of this example, another tile pieces which can be arranged in the opening 71 of the tile piece 7 may be prepared and arranged in the opening 7, whereby a wall surface having an excellent ornamentality can easily be produced.

Third Example

Figure 8 shows still another example of the present invention. A tile piece 8 of this example has a structure combined by those of the first and second examples. The tile piece 8 has a body portion 81 which is provided at outer peripheral ends 82 with a plurality of projections 83 and is formed therein with an opening 84. Innerends 85 of the opening 84 are provided with a plurality of projections 86 extending inwardly. The tile pieces 8 of this structure are employed to obtain similar effects as those of the above first and second examples. Above all, according to the tile piece of this example, adhesion or attachment to a wall surface can be enhanced.

Modifications of the tile piece of this example include one with projections only on its outer peripheral ends, one with projections only on its inner peripheral ends and the like. A plurality of openings 84 may be formed instead of a single opening.

Fourth Example

Figures 9 and 10 show tile pieces having projections 31 to 33 bent rear side by about 180 and 90 degrees, respectively. Tile pieces with bent projections as shown by these drawings can be employed.

Alternatively, tile pieces having projections of a given shape or bent by a certain degree may be manufactured from the beginning.

Fifth Example

Figure 11 shows another example of the present invention. In this example, two sheets of tile pieces of Figure 1 are superposed to compose a laminated tile piece 111. One of the tile pieces at the surface side (face side) 1A has three projections 31 to 33 which are bent on the rear surface of the other tile piece 1B at the rear side (base side), to thereby integrate the two tile pieces 1A and 1B. Projections 31 to 33 of the tile piece 1B at the rear side are bent toward rear side to be substantially perpendicular to the tile surface. A tile wall can be formed by the laminated tile pieces 111 of this structure. In a dry process, the rear side tile pieces may be made of thick plate members, for example, 2 mm thick plates, so that the tile pieces can be firmly hooked on attachment beams on a wall surface by means of projections. The thick tile pieces

may be attached to a wall by adhesion of the projections to beams as well as mechanical engagement thereof with the beams. The thin tile pieces of the face side, the thickness of which is, for example, in the range of 0.2 to 0.3 mm, may be attached to the thick tile pieces of the base side.

(Industrial Applicability)

Referring to Figure 5, there will be explained tiling operation of the tile pieces 1 described above with reference to Figures 1 to 4. As shown in Figure 5, adhesive 6 is coated on a concrete wall 5. Then, the tile pieces 1 of the first example are laid on the wall 5. In a laying operation of the tile pieces, the projections of the adjacent tile pieces do not interfere with one another as described above. Therefore, the joint width between the adjacent tile pieces can be freely adjusted. In addition, according to the first example, the projections are provided at root side with the stepped portions 3c, so that the projections of the tile pieces can be inserted into rear side of the adjacent tile pieces. Therefore, as shown in Figure 6, the tile pieces to be arranged adjacent to each other can be placed such that the respective outer peripheral ends are tightly contacted.

Where the tile pieces 1 are laid on a wall by means of adhesive, it is a matter of course that the rear surface 2a of the body portion thereof functions as adhesive area. In addition to this area, the outer peripheral ends 21 to 24 and projections 31 to 33 of the tile piece 1 can also be used as adhesive area. Thus, large adhesive area can be obtained, and therefore enhanced anchor effect can be obtained. Accordingly, the tile pieces 1 can be fixed to a wall securely and firmly.

As explained above, the tile pieces of the first example are made of aluminum and are provided at outer peripheral ends with the projections, and so they are light and easy to handle compared with tile pieces of the prior art. Further, the tile pieces of the first example have large adhesive area, so that they are able to be securely attached to a wall and the like by means of adhesive, thereby hardly posing the possibility of peeling off therefrom. According to measurements of the inventor of this invention, the tile piece of the first example has weight and volume which are only about 10 % of those of the prior art clay tile piece. Adhesive area per unit weight of the present tile pieces is about 850 % of that of the prior art clay tile pieces. Further, since the projections of the present tile pieces are positioned not to interfere with one another between adjacently arranged tile pieces, the joint width between tile pieces can be adjusted freely. Furthermore, since the tile pieces are provided with stepped portions so as to insert the

projections of another tile pieces into the rear side of the body portions, it is possible to lay the tile pieces on a surface in a tightly contacted condition. In addition, since the tile pieces of the first example are made of aluminum, the projections thereof can be bent toward rear surface side of the body portion thereof. By bending the projections, the space between the tile pieces and a wall surface can be modified. Further, when the tile pieces are laid on a wall, the bent projections intrude into mortar and exert anchor effect, whereby stronger adhesion can be obtained compared with that of surface-to-surface adhesion.

The tile pieces of the above examples are only specific examples of the present invention, and it is not intended to limit the present invention to these examples.

Although the tile pieces are made of aluminum in the above example, they may be made of other metal material such as stainless steel, copper, steel or the like. Non-metal material such as plastics can be used. According to measurements of the inventor of this invention, where the tile piece of the first example is made of steel, it is found that the weight thereof is about 24 % when a 0.35 mm thick steel plate is used and about 34 % when a 0.5 mm thick steel plate is used, compared with a clay tile piece of the prior art. The volume of the tile piece is found to be reduced to about 7 % of the clay tile piece, and adhesive area per unit weight of the tile piece is increased to about 280 % of the clay tile piece.

The profile of the body portion of the tile piece may be any shape other than the square. Examples of the profile of the body portion are rectangle, lozenge, circle, ellipse and the like.

The profile of the projections may be a rectangle, a semi-circle and the like instead of the above-mentioned profile. The number of the projections is not limited to three as in the above examples, but is to be changed according to the size of the tile pieces and the like.

A tiling method of the tile pieces of the present invention may be that in which the projections are bent rearward and are hooked on attachment members arranged on a wall surface.

As explained above, the tile pieces of the present invention are made of thin plate members such as metal members, plastic members or the like and are provided at outer and/or inner peripheral ends with a plurality of projections. Accordingly, compared with clay tile pieces of the prior art, the projections of the tile pieces serves as adhesive area, or anchor, whereby tile pieces which are hardly peeled off from a wall and have durability can be realized. The tile pieces of the present invention are less limited in size to manufacture than clay tile pieces, so that it is advantageous that

tile pieces of various size can be made cheaply. Further, since the tile pieces of the present invention are light, the tiling thereof can easily be carried out.

Claims

1. A tile piece characterized in that it is formed of lightweight thin plate member and has a plurality of projections which are integrally formed on at least one portion of outer peripheral ends of said thin plate member and arranged along said outer peripheral ends in a given interval, said tile piece being adhered or attached to a surface of a building in a manner that at least one portion of the rear surface and peripheral ends of said thin plate member and said projections are utilized as adhesive area, attachment area or anchor.
2. A tile piece as set forth in claim 1, wherein said thin plate member is of rectangular shape and said projections are provided at equal intervals along the respective outer peripheral ends of said thin plate member, and wherein said projections on the opposite outer peripheral ends are positioned so as not to interfere with one another when viewed from the direction perpendicular to said opposite outer peripheral ends.
3. A tile piece as set forth in claim 2, wherein said projections are bent at where they are rooted in said outer peripheral ends toward rear side of said thin plate member by an amount of at least a thickness of said thin plate member so that they are formed with a stepped portion, and wherein an end portion extending from said stepped portion of each of the projections extends substantially parallel to said thin plate member.
4. A tile piece as set forth in claim 1, wherein said thin plate member is flexible and said projections are capable of being bent toward rear side of said thin plate member at where they are rooted in said outer peripheral ends.
5. A tile piece as set forth in claim 1, wherein said thin plate member is of rectangular shape and said projections are provided at equal intervals along the respective outer peripheral ends of said thin plate member, and wherein said projections on the opposite outer peripheral ends are positioned so as not to interfere with one another when viewed from the direction perpendicular to said opposite outer peripheral ends.

6. A tile piece as set forth in claim 2, wherein said projections are bent at where they are rooted in said outer peripheral ends toward rear side of said thin plate member by an amount of at least a thickness of said thin plate member so that they are formed with a stepped portion, and wherein an end portion extending from said stepped portion of each of the projections extends substantially parallel to said thin plate member.

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7. A tile piece as set forth in claim 1, wherein at least one of said projections is bent toward rear side of said thin plate member to form a given shape.

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8. A tile piece characterized in that it is formed of a given shaped lightweight thin plate member which is formed with at least one opening therein, said tile piece being adhered to a surface of a building in a manner that at least one portion of the rear surface and peripheral ends of said thin plate member and said opening are utilized as adhesive area.

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9. A tile piece as set forth in claim 8, wherein projections are provided on at least one portion of at least one of outer peripheral ends of said thin plate member and inner peripheral ends of said opening.

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10. A tile piece as set forth in claim 9, wherein said thin plate member is flexible and said projections are capable of being bent toward rear side of said thin plate member at where they are rooted in said outer peripheral ends.

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11. A tile wall structure characterized by laying said tile pieces on a surface.

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Amended claims

1. (Amended) A tile piece characterized in that it is formed of a shaped lightweight thin plate member and is provided at at least one portion of outer peripheral ends thereof with a plurality of projections arranged in a given interval along said outer peripheral ends; and,

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said projections are bent at where they are rooted in said outer peripheral ends toward rear side of said thin plate member by an amount of at least a thickness of said thin plate member, to have stepped portions so that said projections can be inserted into a space between an adjacent tile piece and a surface to be furnished;

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said tile piece being adhered or attached to a surface of a building in a manner that at

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least one portion of the rear surface and peripheral ends of said thin plate member and said projections are utilized as adhesive area, attachment area or anchor.

2. (Cancelled)

3. (Cancelled)

10 4. (Cancelled)

5. (Cancelled)

6. (Cancelled)

7. (Cancelled)

8. (Cancelled)

20 9. (Cancelled)

10. (Cancelled)

11. (Cancelled)

12. (Added) A tile piece as set forth in claim 1, wherein said projections are flexible at least at where they are rooted in said outer peripheral ends and are able to bend toward rear side of said thin plate member.

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13. (Added) A tile piece as set forth in claim 1, wherein said thin plate member is provided with at least one opening, and wherein a plurality of projections are formed on at least one portion of inner peripheral ends of said opening.

14. (Added) A tile piece as set forth in claim 12, wherein said thin plate member is provided with at least one opening, and wherein a plurality of projections are formed on at least one portion of inner peripheral ends of said opening.

15. (Added) A tile piece as set forth in claim 13 or 14, wherein said projections are flexible at least at where they are rooted in said outer peripheral ends and are able to bend toward rear side of said thin plate member.

16. (Added) A tile piece characterized in that it is formed of a generally rectangular shaped lightweight thin plate member which is provided integrally at at least one portion of outer peripheral ends with a plurality of projections arranged in a given interval along said outer peripheral ends,

said projections on the opposite outer peripheral ends being positioned so as not to interfere with one another when viewed from the direction perpendicular to said opposite outer peripheral ends, and,

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said projections being bent at where they are rooted in said outer peripheral ends toward rear side of said thin plate member by an amount of at least a thickness of said thin plate member, to have stepped portions so that said projections can be inserted into a space between an adjacent tile piece and a surface to be furnished;

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whereby said tile piece being adhered or attached to a surface of a building in a manner that at least one portion of the rear surface and peripheral ends of said thin plate member and said projections are utilized as adhesive area, attachment area or anchor.

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17. (Added) A tile piece as set forth in claim 16, wherein each of said projections is bent at least partially to form a given shape.

18. (Added) A tile piece as set forth in claim 16, wherein said projections are flexible at least at where they are rooted in said outer peripheral ends and are able to bend toward rear side of said thin plate member.

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19. (Added) A tile piece as set forth in any one of claims 16 to 18, wherein said thin plate member is provided with at least one opening, and wherein a plurality of projections are formed on at least one portion of inner peripheral ends of said opening.

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20. (Added) A tile piece as set forth in claim 19, wherein at least one of said projections formed on said inner peripheral ends of said opening is bent toward rear side of said thin plate member to form a given shape.

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21. (Added) A tile piece as set forth in claim 19, wherein said projections formed on said inner peripheral ends of said opening are flexible at least at where they are rooted in said outer peripheral ends and are able to bend toward rear side of said thin plate member.

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FIG. 1

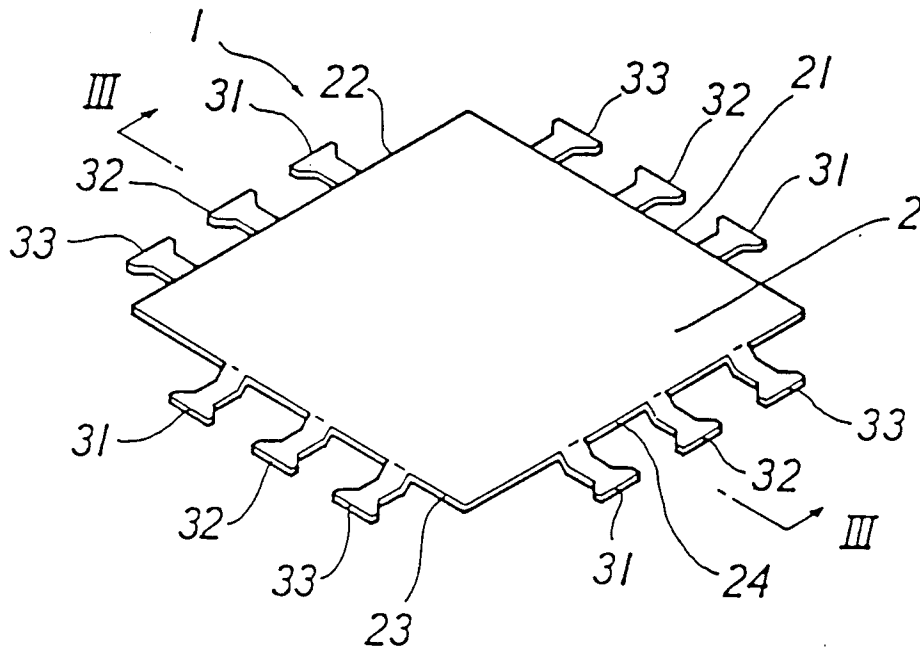


FIG. 2

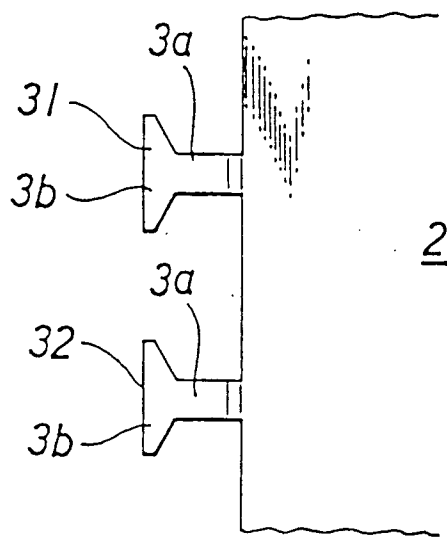


FIG. 3

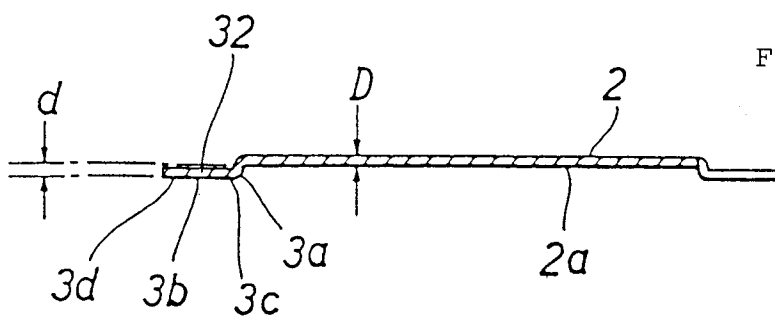


FIG. 4

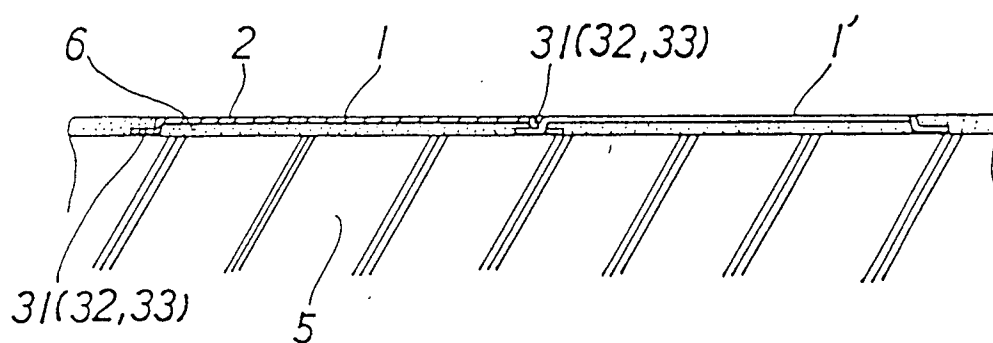
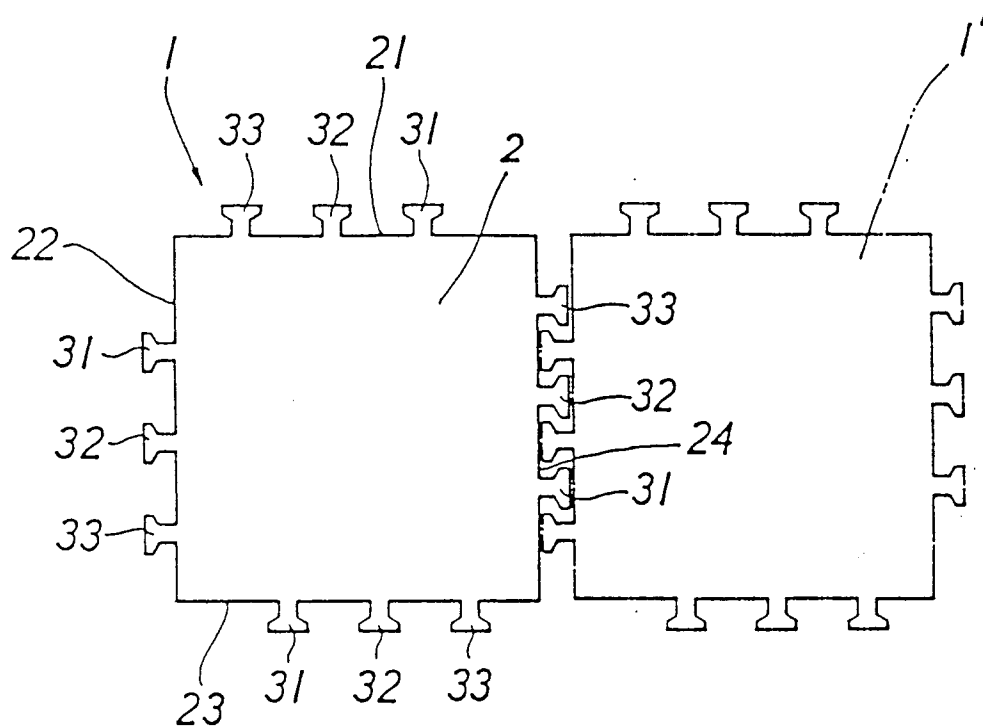


FIG. 5

FIG. 6

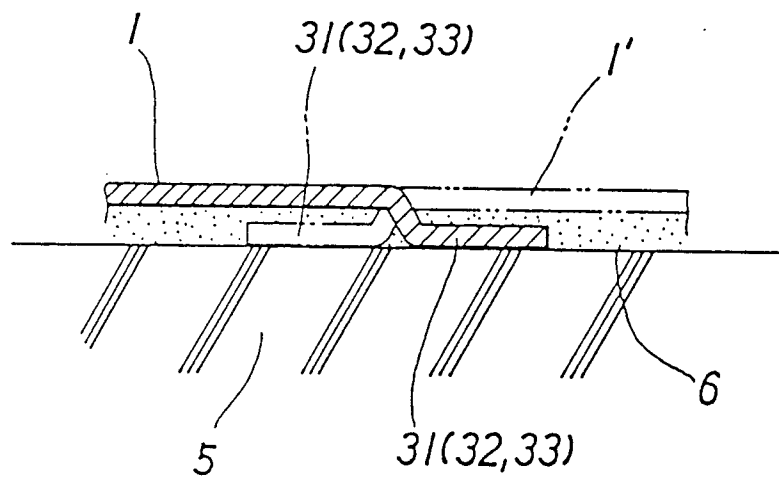


FIG. 7

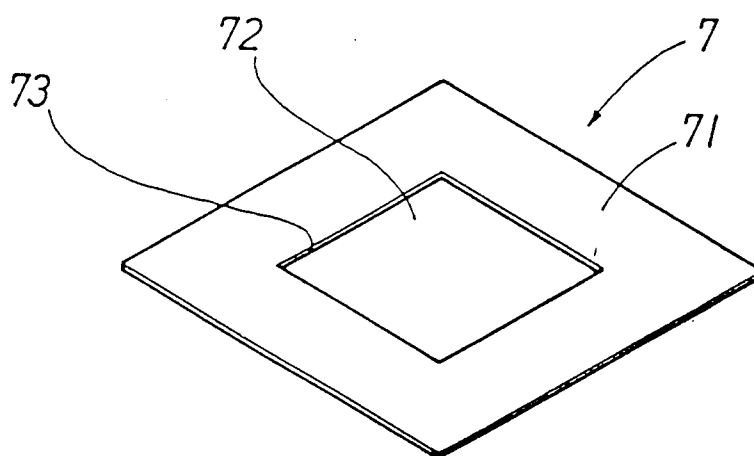


FIG. 8

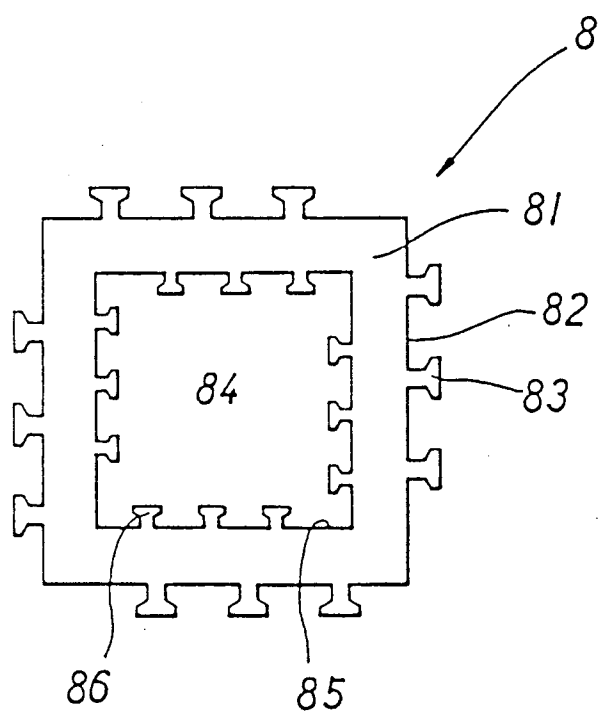


FIG. 9

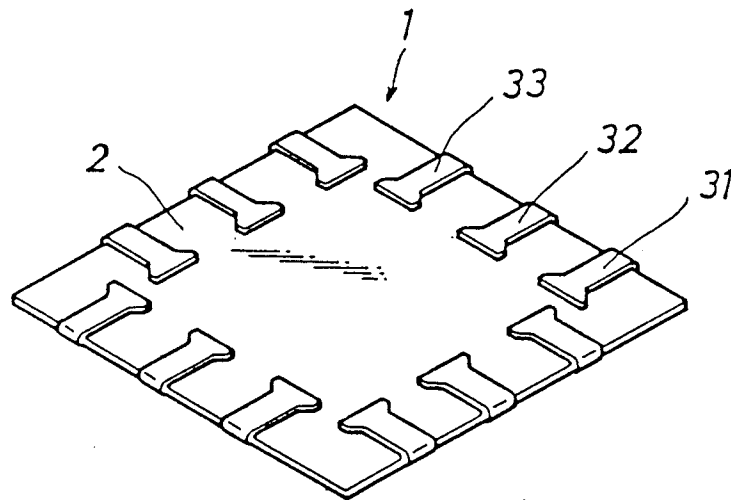


FIG. 10

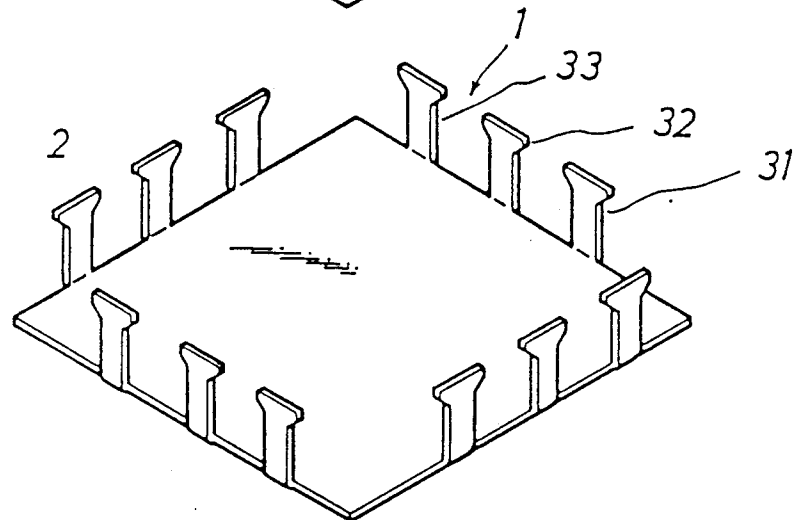
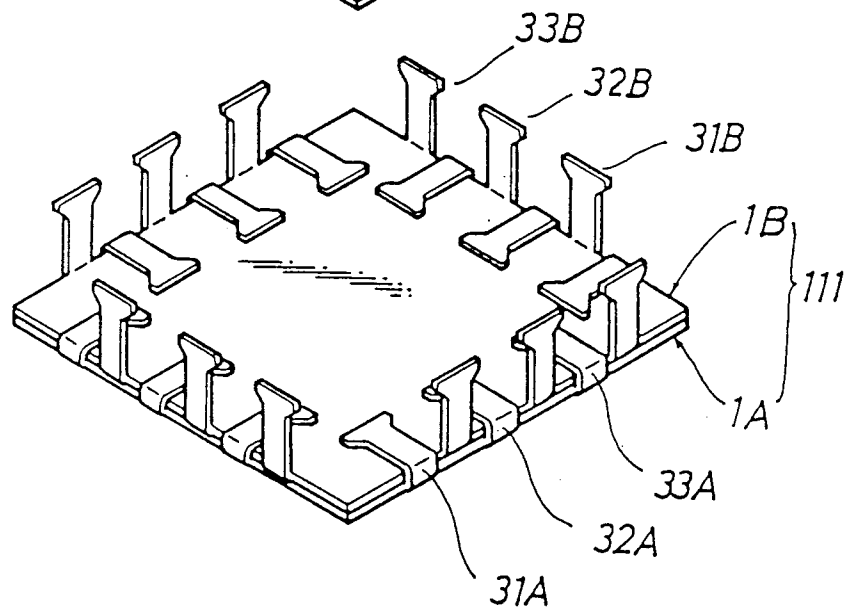


FIG. 11



INTERNATIONAL SEARCH REPORT

International Application No PCT/JP90/01411

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int. Cl ⁵ E04F13/08, 13/12, 13/14, 13/18		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC	E04F13/08-13/18	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
Jitsuyo Shinan Koho	1926 - 1990	
Kokai Jitsuyo Shinan Koho	1971 - 1990	
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category [*]	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	JP, A, 55-68969 (Yoshikazu Yokoi), May 24, 1980 (24. 05. 80), (Family: none)	1, 2, 5, 7, 11
A	JP, U, 58-108021 (Matsushita Electric Works, Ltd.), July 22, 1983 (22. 07. 83), (Family: none)	3, 6
A	JP, U, 59-38328 (Matsushita Electric Works, Ltd.), March 10, 1984 (10. 03. 84), (Family: none)	4, 10
A	JP, U, 60-166731 (Kobayashi Block K.K.), November 6, 1985 (06. 11. 85), (Family: none)	8, 9
[*] Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "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 "Z" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
January 11, 1991 (11. 01. 91)	January 28, 1991 (28. 01. 91)	
International Searching Authority	Signature of Authorized Officer	
Japanese Patent Office		