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(71) Applicant: **Yoshiritsu Kabushiki Kaisha**

Oyodo-cho

Yoshino-gun

Nara (JP)

(72) Inventors:

• **Kichijo, Hiroshi,**
Yoshiritsu K.K.
Yoshino-gun
Nara (JP)

• **Kichijo, Yoshiie,**
Yoshiritsu K.K.
Yoshino-gun
Nara (JP)

(74) Representative: **Grünecker, Kinkeldey,**

Stockmair & Schwanhäusser

Anwaltssozietät

Maximilianstrasse 58

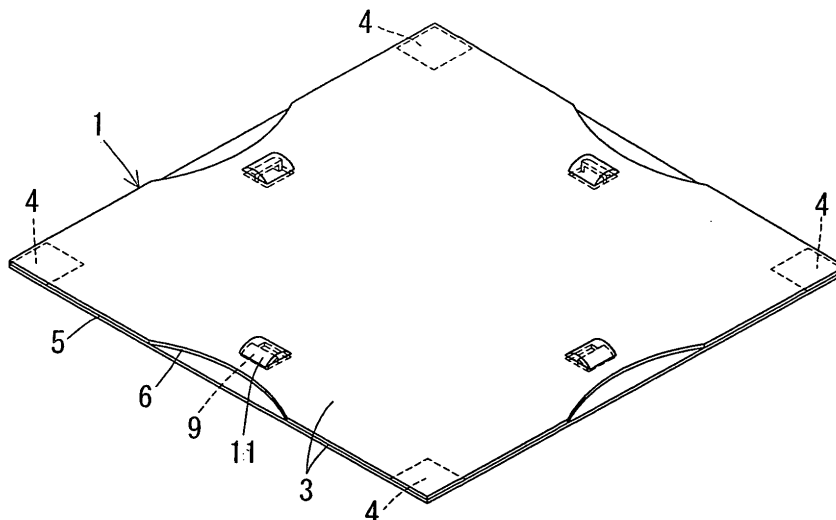
80538 München (DE)

(54) **Assembled block**

(57) A block which can be easily assembled into a large variety of shapes and sizes using a smaller number of kinds of joints at a low cost. The assembled block includes equilateral triangular block plates, square block plates, and joints through which the block plates are coupled together. Each of the joints is formed of a single, flexible and bendable plate having wing portions on both sides thereof. The block plates are made of a flexible material and have edges and receptacles each provided

along one of the edges for accepting one of the wing portions of the joints. The receptacles are each formed with a guide pocket. Any two the block plates can be coupled together through any of the joints by inserting the respective wing portions of the joint into one of the receptacles of one of the two block plates through the corresponding guide pocket and into one of the receptacles of the other of the two block plates through the corresponding guide pocket.

Fig.1



Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a three-dimensional block assembled by coupling a plurality of block plates together through joints.

[0002] In JP patent 3221637, the applicant has proposed an assembled block comprising square block plates and equilateral triangular block plates that are coupled together through joints.

[0003] The block plates and the joints of this block are formed by molding a rigid plastic. Joints are each formed with plugs protruding in at least two directions. Each block plate has receptacles each formed along one of the edges thereof for accepting one of the plugs of the joints.

[0004] Different kinds of joints are prepared, i.e. ones having their plugs protruding in two directions in a common plane, ones having their plugs protruding in two directions perpendicular to each other, ones having their plugs protruding in three directions perpendicular to each other, and ones having plugs arranged so that the distances between the proximal ends of the adjacent plugs are different from each other.

[0005] The angle between block plates coupled together by a joint and the number of block plates usable are determined by the types of joints used. Thus, even if a large number of different types of joints are prepared, the final shape of the block assembled is severely restricted.

[0006] In order to suitably set the strength with which any of the plugs of the joints is fitted in any of the receptacles of the block plates, both the block plates and joints have to be manufactured with narrow dimensional tolerances. Thus, strict dimensional control of the joints and block plates is required, which results in an increase in the manufacturing cost.

[0007] An object of the present invention is to provide a block which can be easily assembled into a large variety of shapes and sizes using a smaller number of kinds of joints at a low cost.

SUMMARY OF THE INVENTION

[0008] According to the present invention, there is provided an assembled block comprising equilateral triangular block plates, square block plates, and joints through which the block plates are coupled together, each of the joints being formed of a single, flexible and bendable plate having wing portions on both sides thereof, the block plates being made of a flexible material and having edges and receptacles each provided along one of the edges for accepting one of the wing portions of the joints, the receptacles being each formed with a guide pocket, whereby any two of the block plates can be coupled together through any of the joints by inserting the respective wing portions of the joint into one of the receptacles of one of the two block plates through the corresponding

guide pocket and into one of the receptacles of the other of the two block plates through the corresponding guide pocket.

[0009] Preferably, a plurality of the joints can be inserted simultaneously into any of the receptacles of any of the block plates with each joint superposed on the others.

[0010] Preferably, the assembled block further comprises an arrangement for preventing any of the wing portions from slipping out of any of the receptacles once the former is inserted in the latter.

[0011] In one arrangement, each of the block plates comprises two base plates superposed one on the other, the receptacles being defined between the two base plates.

[0012] In another arrangement, each of the block plate comprises a base plate and extensions each extending from and folded along one of the edges so as to be superposed on one side of the base plate, the receptacles being defined by cuts each formed along one of the edges.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Other features and objects of the present invention will become apparent from the following description made with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a square block plate made of a plastic;

Fig. 2 is a perspective view of an equilateral triangular block plate made of a plastic;

Fig. 3 is a perspective view of a plastic joint of a basic type;

Fig. 4 is a perspective view of a bent plastic joint;

Fig. 5 is a perspective view of a wide plastic joint;

Fig. 6 is a perspective view of the block plate of Fig. 1 and the joint of Fig. 3, showing how they are coupled together;

Fig. 7 is a perspective view of the block plates of Figs. 1 and 2 and the joint of Fig. 3, showing how the block plates are coupled together through the joint;

Fig. 8 is a partial sectional view of Fig. 7, showing how the joint is coupled to one of the block plates;

Fig. 9 is a perspective view similar to Fig. 7, showing how the block plates form an angle therebetween by bending the joint;

Fig. 10 is a side view of Fig. 9, showing how the angle between the block plates is changed by bending the joint;

Fig. 11 is a perspective view of three of the block plates of Fig. 2, showing how they are coupled together so as to be arranged in skewed relation to each other;

Fig. 12 is a perspective view of three block plates that are coupled together so as to extend in three different directions;

Fig. 13 is a plan view of block plates of which two are coupled together through the wide joint of Fig. 5; Fig. 14 is a perspective view of a block assembled by coupling the block plates of Figs. 1 and 2 together; Fig. 15 is a perspective view of a modified square block plate made of a plastic; Fig. 16 is a perspective view of a modified equilateral triangular block plate made of a plastic; Fig. 17 is a perspective view of a modified plastic joint of a basic type; Fig. 18 is a perspective view of a modified bent plastic joint; Fig. 19 is a perspective view of a modified wide plastic joint; Fig. 20 is a perspective view of the block plate of Fig. 15 and the joint of Fig. 17, showing how they are coupled together; Fig. 21 is a perspective view of the block plates of Figs. 15 and 16 and the joint of Fig. 17, showing how the block plates are coupled together through the joint; Fig. 22 is a partial sectional view of Fig. 21, showing how the joint is coupled to one of the block plates; Fig. 23 is a perspective view of another modified square block plate made of a plastic; Fig. 24 is a perspective view of another modified equilateral triangular block plate made of a plastic; Fig. 25 is a perspective view of a square block plate made of a metal; Fig. 26 is a perspective view of an equilateral triangular block plate made of a metal; Fig. 27 is a perspective view of a metallic joint of a basic type; Fig. 28 is a perspective view of a wide metallic joint; Fig. 29 is a perspective view of a bent metallic joint; Fig. 30 is a perspective view of the block plate of Fig. 25 and the joint of Fig. 27, showing how they are coupled together; Fig. 31 is a perspective view of the block plates of Figs. 25 and 26 and the joint of Fig. 27, showing how the block plates are coupled together through the joint; Fig. 32 is a partial sectional view of Fig. 31, showing how the joint is coupled to one of the block plates; Fig. 33 is a perspective view similar to Fig. 31, showing how the block plates form an angle therebetween by bending the joint; Fig. 34 is a perspective view of three block plates that are coupled together so as to extend in three different directions; Fig. 35 is a perspective view of a block assembled by coupling the block plates of Figs. 25 and 26 together; Fig. 36 is an exploded perspective view of a block plate to be formed into a building block; and Fig. 37 is a perspective view of blocks assembled as a fence and its pillar.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] First, Figs. 1 to 24 show the embodiment comprising plastic plates.

[0015] The assembled block of this embodiment comprises block plates 1 as shown in Figs. 1 and 2, and joints 2 as shown in Figs. 3 to 5. The block plates 1 comprise square ones as shown in Fig. 1 and equilateral triangular ones as shown in Fig. 2. All the block plates 1 have edges of equal length and are equal in thickness too.

[0016] The block plates 1 shown in Figs. 1 and 2 are formed by laminating two flexible plastic base plates 3 (upper and lower plates 3). The two base plates 3 are joined together by e.g. fusing them at joint portions 4 at the corners.

[0017] Except the joint portions 4, the edges of the base plates 3 are not joined together, thus defining receptacles 5 through which a joint 2 can be inserted into between the base plates 3. Each edge of the upper base plate 3 is cut out at its central portion to form an arcuately concave guide pocket 6.

[0018] Slightly inwardly of each edge of the lower base plate 3, a protrusion 9 is formed by removing the inner half of a bulge having a semi-oval section and protruding toward the upper base plate 3. Corresponding to each protrusion 9, the upper base plate 3 is formed with a bulge 11 protruding away from the lower base plate 3 to define a space in which the protrusion 9 is received.

[0019] Any of the joints 2 shown in Figs. 3 to 5 comprises a single plastic plate which is more flexible than the base plates 3 forming the block plates 1 and can be deflected or otherwise bent. Each joint 2 has chevron-shaped wings 8 on both sides thereof. Each wing 8 has a hole 7 near its apex. The hole 7 has an arcuately convex edge near the apex of the wing 8.

[0020] Of the joints 2 shown in Figs. 3 to 5, the one shown in Fig. 3 is the basic type, the one shown in Fig. 4 differs from the one in Fig. 3 only in that its right-hand side portion is bent at an angle of 120 degrees with respect to its left-hand side portion along its longitudinal centerline 10. The one shown in Fig. 5 has a greater width than the one shown in Fig. 3.

[0021] In order to couple each block plate 1 with another block plate 1 through a joint 2, as shown in Figs. 6 and 7, one of the wings 8 of the joint is inserted into one of the block plates 1 through one of its receptacles 5. At this time, by pushing the apex of the wing 8 into the pocket 6, the wing 8 is automatically and easily guided into the receptacle 5.

[0022] When the wing 8 is inserted sufficiently deeply into the block plate 1, the protrusion 9 engages in the hole 7 as shown in Figs. 7 and 8, thus preventing the wing 8 from slipping out of the receptacle 5. Once the protrusion 9 engages in the hole 7, the arcuately convex edge of the hole 7 positively engages the protrusion 9, thus positively preventing the protrusion 9 from coming out of the hole 7.

[0023] The other wing 8 is then inserted in the other block plate 1 in the manner as described above to couple the two block plates 1 together through the joint 2 as shown in Figs. 9 and 10. By bending the joint 2, the block plates 1 can be positioned so as to form any desired angle relative to each other.

[0024] As shown in Fig. 11, three or more equilateral triangular block plates can be coupled together through two or more joints 2. In this case, by bending the joints 2, the block plates 1 can be arranged in skewed relation to each other.

[0025] Further, as shown in Fig. 12, two or more joints 2 may be inserted into a single receptacle 5 of a single block plate 1 with the other wings 8 of these joints 2 inserted in other block plates 1.

[0026] Also, two block plates 1 may be coupled together not through a single joint 2 but through a plurality of joints 2 to more positively prevent the wings 8 from slipping out of the receptacles 5, thereby more stably keeping the block plates 1 coupled together.

[0027] If it is desired to couple two block plates 1 together so that they form an angle of 120 degrees with respect to each other, they should be coupled together through the joint 2 shown in Fig. 4. In Fig. 13, the lower two square block plates 1 are coupled together through the wide joint 2 shown in Fig. 5.

[0028] According to the present invention, any desired number of square and equilateral triangular block plates 1 can be coupled together so as to be arranged at any desired angles with each other as shown in Fig. 14. The block plates 1 and joints 2 may be transparent or colored or may be designed in any desired manner.

[0029] In the embodiment of Figs. 15 to 22, aligned through holes 7 are formed in the two base plates 3 of each block plate 1 near each edge thereof as shown in Figs. 15 and 16. As shown in Figs. 17 to 19, a triangular pyramid-shaped protrusion 9 is formed on each wing 8 of each joint 2 by striking the joint 2 from below so that when one of the wings 8 of the joint 2 is inserted into one of the receptacle 5 of the block plate 1, the protrusion 9 of the joint 2 will engage in the hole 7 of the block plate 1 as shown in Figs. 20 to 22.

[0030] As shown in Figs. 23 and 24, the two base plates 3 forming the block plate 1 may be joined together at a joint portion 4 provided at the central portion of the block plate 1. Such a joint portion 4 is preferably shaped such that when a wing 8 of a joint 2 is inserted into the block plate 1, its apex is guided along its edge and fits snugly in the recess defined by the edge of the joint portion 4 as shown.

[0031] Figs. 25 to 35 show the embodiment of which the block plates and the joints are both made of a metal. In the description of this embodiment, elements corresponding to the elements of the first embodiment are denoted by identical numerals.

[0032] The assembled block of this embodiment comprises block plates 1 as shown in Figs. 25 and 26, and joints 2 as shown in Figs. 27 to 29. The block plates and

the joints are both formed by blanking stainless steel or aluminum plates and pressing the thus blanked plates.

[0033] The block plates 1 comprise square ones as shown in Fig. 25, and equilateral triangular ones as shown in Fig. 26. All the block plates 1 have edges of equal length and are equal in thickness too.

[0034] Each block plate 1 comprises a base plate 4 having an extension 12 extending from each edge of the base plate 4 and folded along a fold line so as to be superposed on one side of the base plate 3. A cut is formed along the fold line as a receptacle 5 through which the joint 2 can be inserted into the block plate 1. At the center of each receptacle 5, a guide pocket 6 is formed by expanding the base plate 3 and the extension 12 away from each other. Semicircular holes 7 are formed in the base plate 3 so that their diameters are in juxtaposition with the respective arcuate edges of the extensions 12.

[0035] Each of the joints 2 shown in Figs. 27 to 29 comprises a single metallic sheet formed with wings 8 on both sides. The wings 8 have their free ends rounded. Near the rounded free end of each wing 8, a protrusion 9 is formed by removing the inner half of a bulge having a semioval section. Inwardly of the protrusion 9, a through hole 13 is formed.

[0036] Of the joints 2 shown in Figs. 3 to 5, the one shown in Fig. 27 is the basic type. The one shown in Fig. 28 has a greater width than the one shown in Fig. 27. The one shown in Fig. 29 differs from the one in Fig. 27 only in that its right-hand side portion is bent at an angle of 90 degrees with respect to its left-hand side portion along its longitudinal centerline 10.

[0037] In order to couple each block plate 1 with another block plate 1 through a joint 2, as shown in Figs. 30 and 31, one of the wings 8 of the joint 2 is inserted into one of the block plates 1 through one of its receptacles 5. At this time, by pushing the apex of the wing 8 into the pocket 6, the wing 8 is automatically and easily guided into the receptacle 5. The wing 8 may be inserted into the receptacle with its protrusion 9 facing either the extension 12 of the block plate 1 or its base plate 3.

[0038] When the wing 8 is inserted sufficiently deeply into the block plate 1, the protrusion 9 engages the edge of the extension 12 if the protrusion 9 faces the extension 12, as shown in Figs. 31 and 32. If the protrusion 9 faces the base plate 3, the protrusion 9 will engage the edge of the hole 7. In either case, the wing 8 is positively prevented from slipping out of the receptacle 5.

[0039] The other wing 8 is then inserted in the other block plate 1 in the manner as described above to couple the two block plates 1 together through the joint 2 as shown in Fig. 33. By bending the joint 2, the block plates 1 can be positioned so as to form any desired angle relative to each other.

[0040] As shown in Fig. 34, two or more joints 2 may be inserted into a single receptacle 5 of a single block plate 1 with the other wings 8 of these joints 2 inserted in other block plates 1. If it is desired to couple two block plates 1 together so that they form an angle of 90 degrees

with respect to each other, they should be coupled together through the joint 2 shown in Fig. 29.

[0041] According to the present invention, any desired number of square and equilateral triangular block plates 1 can be coupled together so as to be arranged at any desired angles with each other as shown in Fig. 35. The block thus formed has an inorganic feel inherent to metallic objects. If it is desired to couple two block plates 1 so as to be widely spaced from each other, they should be coupled together using the wide joint 2 shown in Fig. 28.

[0042] In order to separate any block plate 1 and joint 2 from each other, a plate-shaped tool having protrusions on both sides are inserted into the receptacle 5 to push up the extension 12 or the base plate 3 from its back with one of the protrusions on the plate-shaped tool until the extension 12 or the base plate 3 is sufficiently deflected. Then the joint 1 is pulled slightly to disengage the protrusion 9, and the wing 8 is pulled out of the receptacle 5.

[0043] Figs. 36 and 37 show an example in which the assembled block according to the present invention is used as a component of a building structure.

[0044] As shown in Fig. 36, in this example, each block plate 1 comprises two relatively thick plastic or metallic base plates 3 superposed one on another. One of the base plates 3 is formed with a threaded hole 14a at each corner thereof. The other of the base plates 3 is formed with a through hole 14b at each corner thereof.

[0045] With screws 15 passed through the respective through holes 14b and slightly threaded into the respective threaded holes 14a, one of the wings 8 of the joint 2 is inserted into one of the receptacles 5 of the block plate 1, and the screws 15 are tightened. In this way, a plurality of block plates are coupled together to form an assembled block as a building component.

[0046] By coupling a plurality of block plates as shown in Fig. 36, it is possible to form e.g. a fence and its pillar as shown in Fig. 37, or a house having a dome-shaped roof using equilateral triangular block plates. Such building structures will present unique appearances.

one of said two block plates through the corresponding guide pocket and into one of said receptacles of the other of said two block plates through the corresponding guide pocket.

2. The assembled block of claim 1 wherein a plurality of said joints can be inserted simultaneously into any of said receptacles of any of said block plates with each joint superposed on the others.
3. The assembled block of claim 1 or 2 further comprising an arrangement for preventing any of said wing portions from slipping out of any of said receptacles once the former is inserted in the latter.
4. The assembled block of any of claims 1 to 3 wherein each of said block plates comprises two base plates (3) superposed one on the other, said receptacles being defined between said two base plates.
5. The assembled block of any of claims 1 to 3 wherein each of said block plate comprises a base plate (3) and extensions (12) each extending from and folded along one of said edges so as to be superposed on one side of said base plate, said receptacles being defined by cuts each formed along one of said edges.

Claims

1. An assembled block comprising equilateral triangular block plates (1), square block plates (1), and joints (2) through which said block plates are coupled together, **characterized in that** each of said joints is formed of a single, flexible and bendable plate having wing portions (8) on both sides thereof, that said block plates are made of a flexible material and have edges and receptacles (5) each provided along one of said edges for accepting one of said wing portions of said joints, and that said receptacles are each formed with a guide pocket (6), whereby any two of said block plates can be coupled together through any of said joints by inserting the respective wing portions of said joint into one of said receptacles of

Fig.1

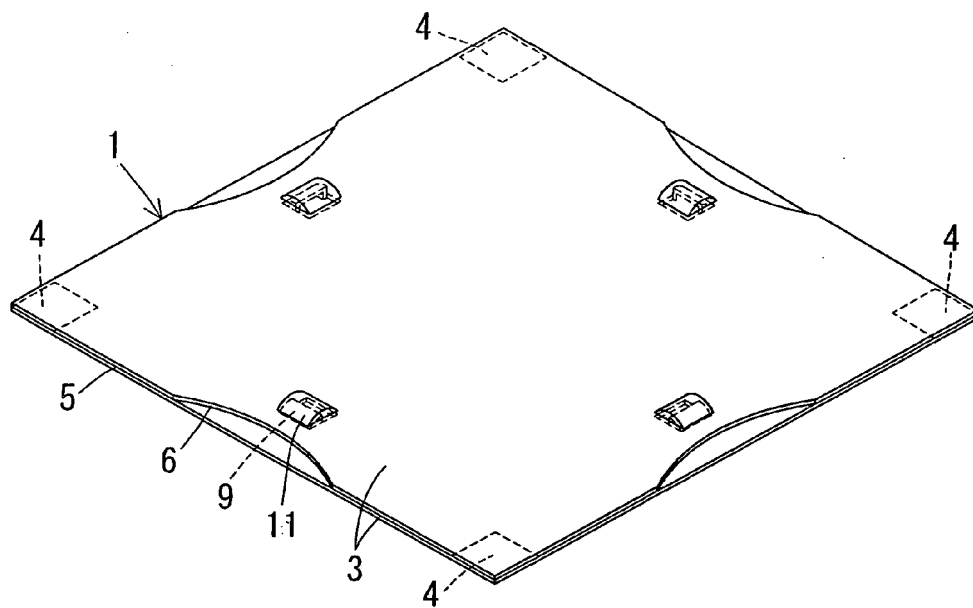


Fig.2

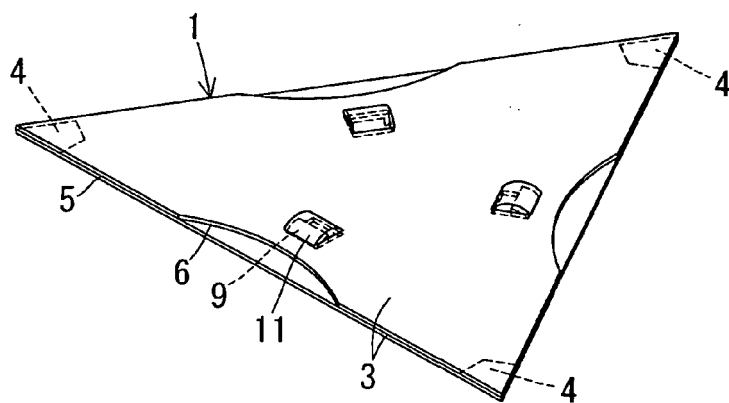


Fig.3

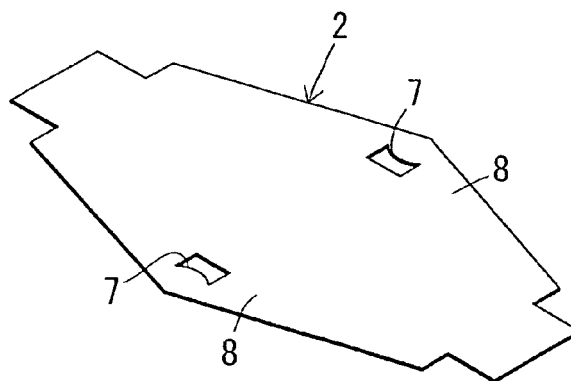


Fig.4

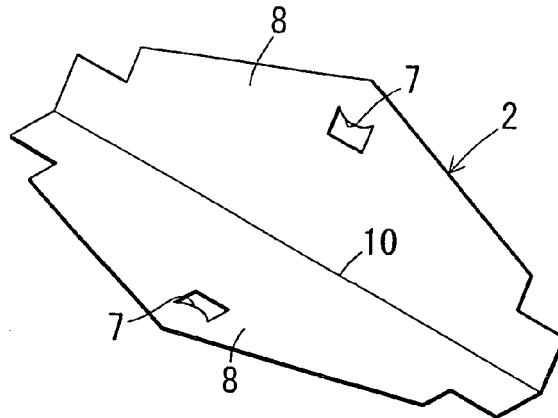


Fig.5

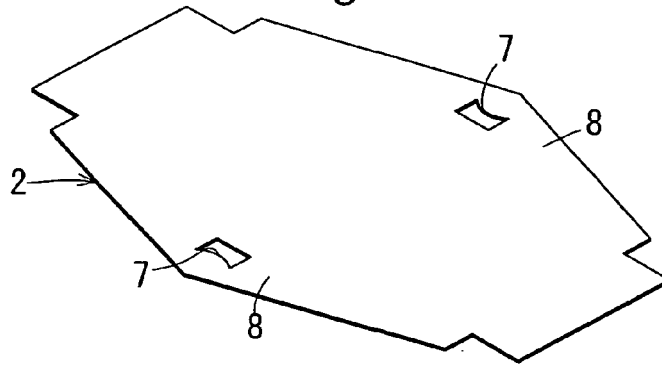


Fig.6

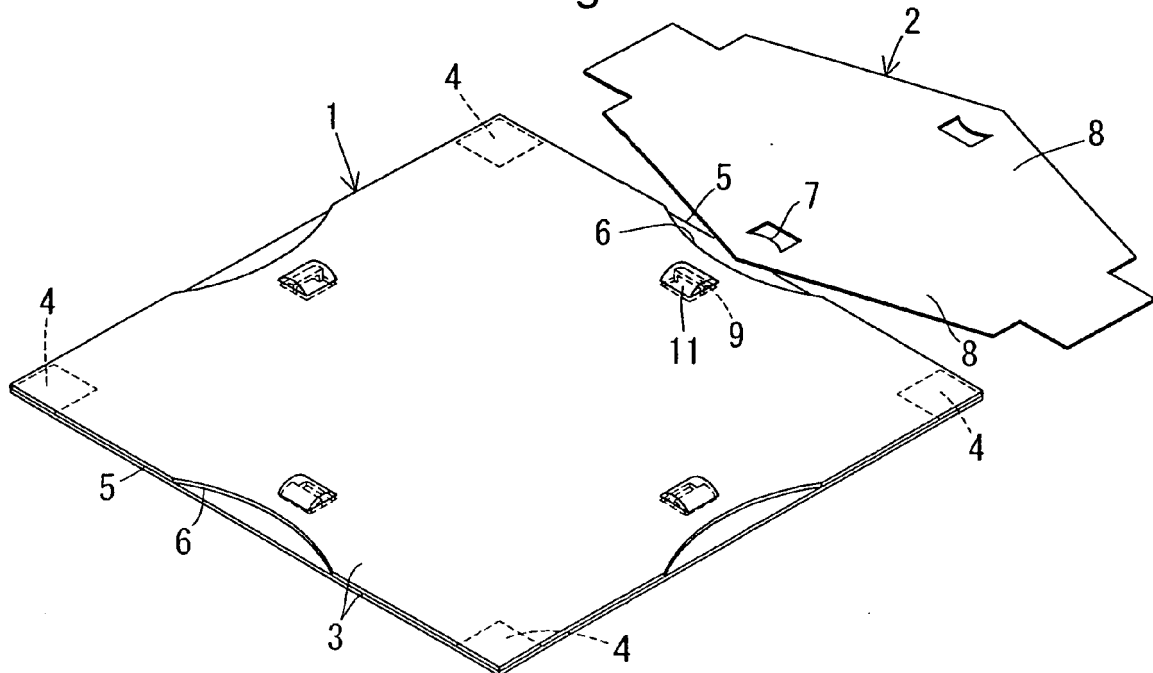


Fig.7

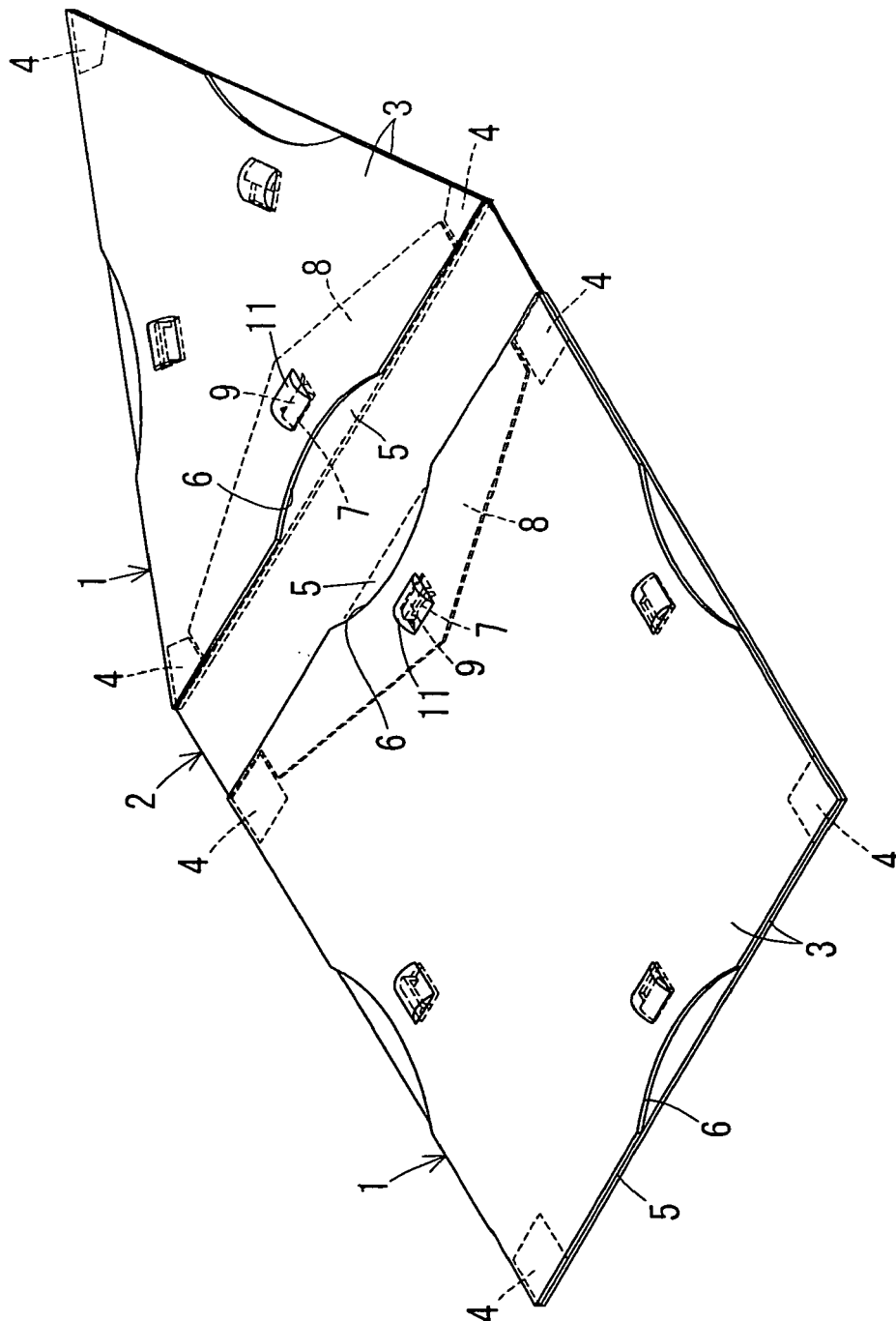


Fig.8

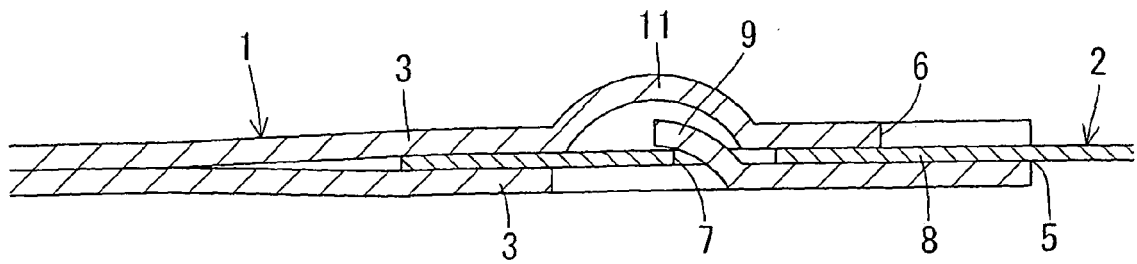


Fig.9

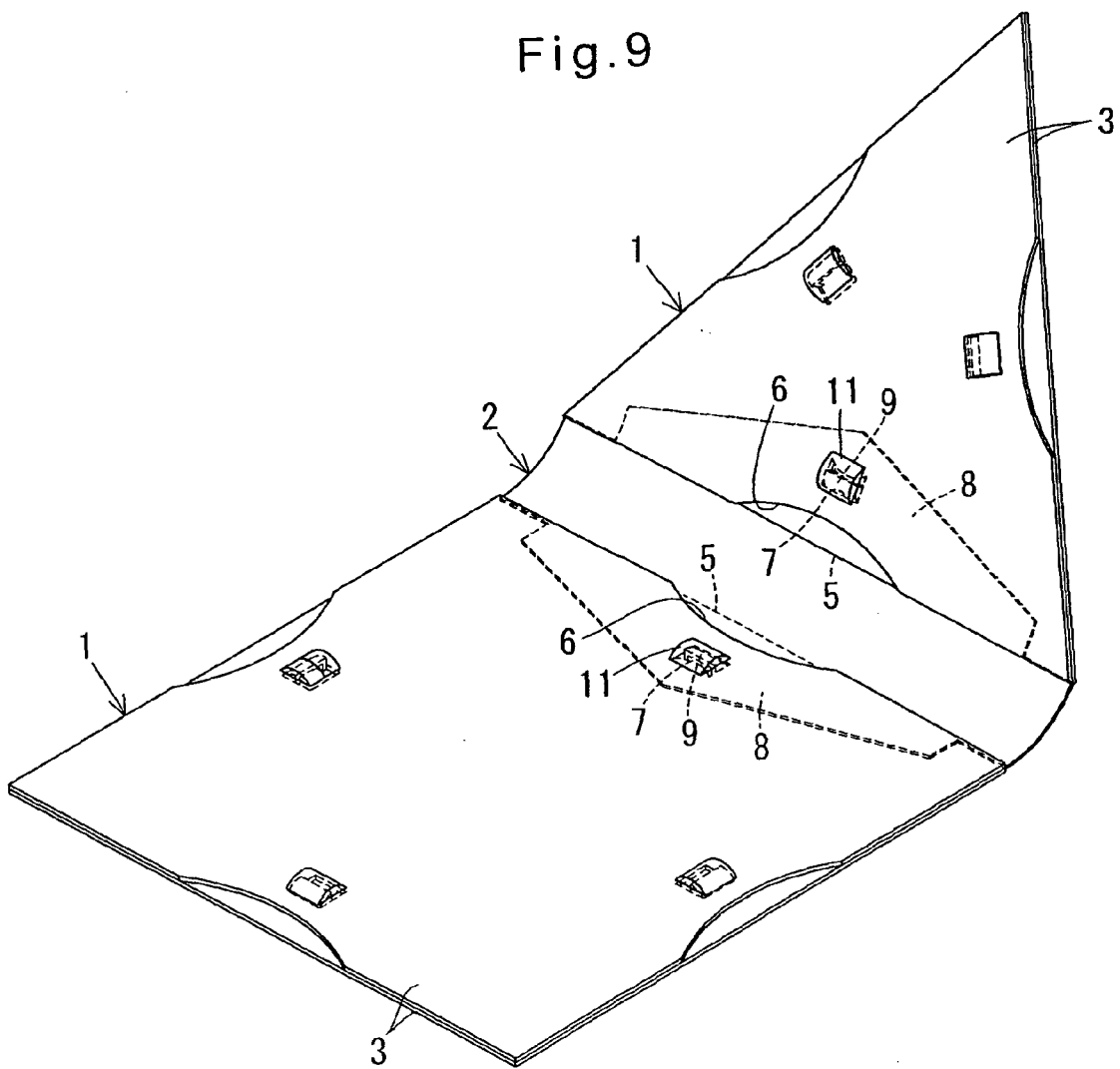


Fig.10

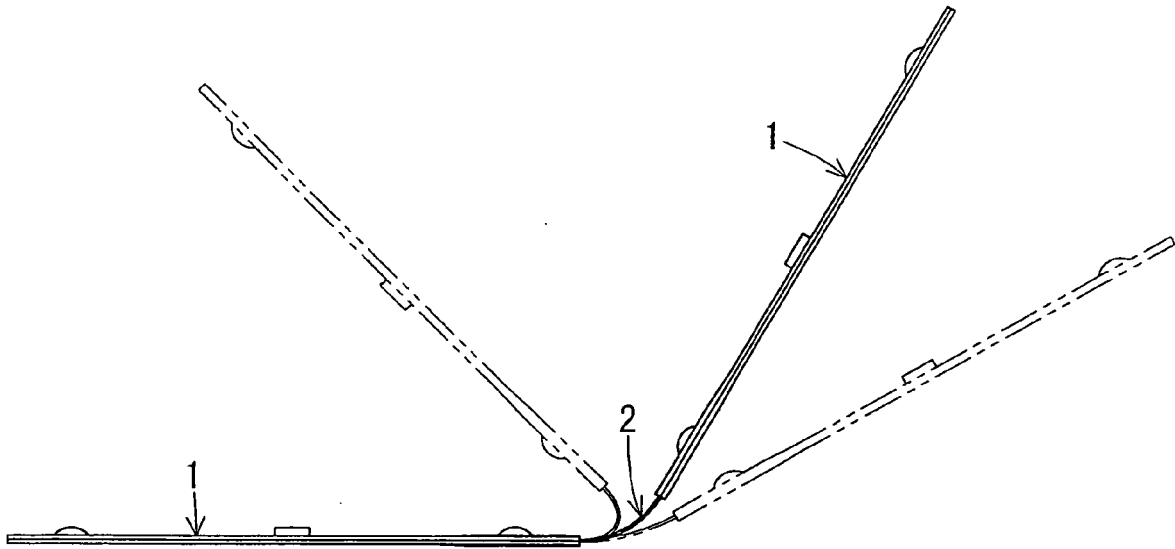


Fig.11

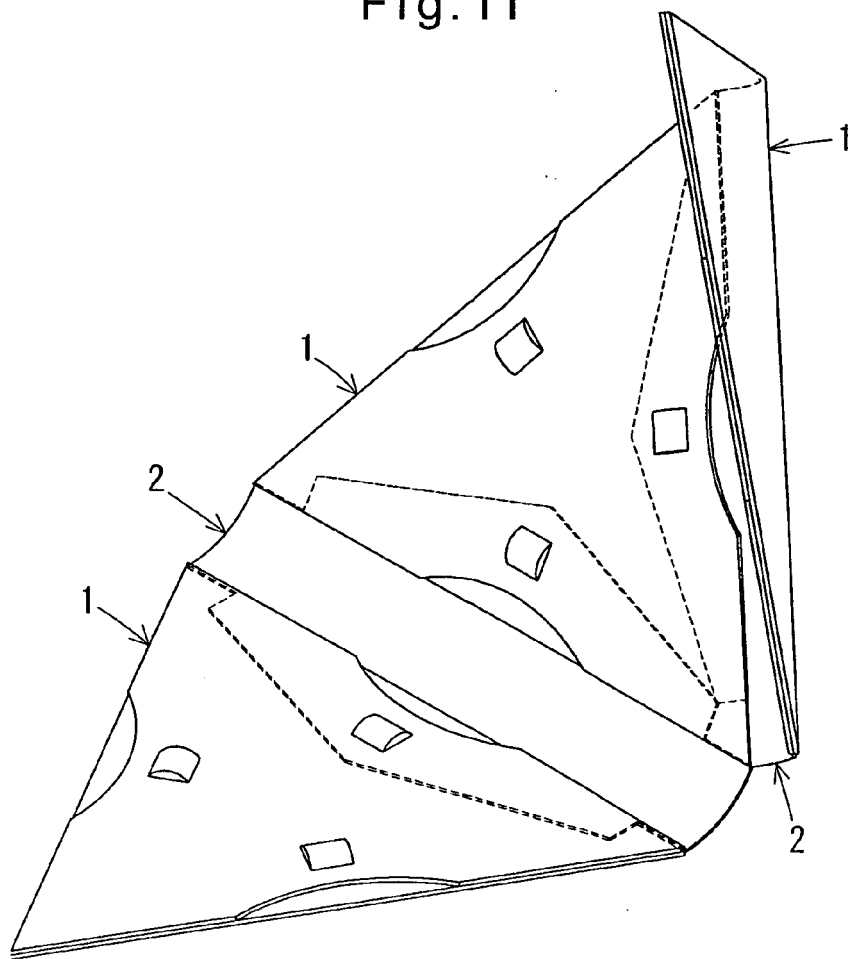


Fig.12

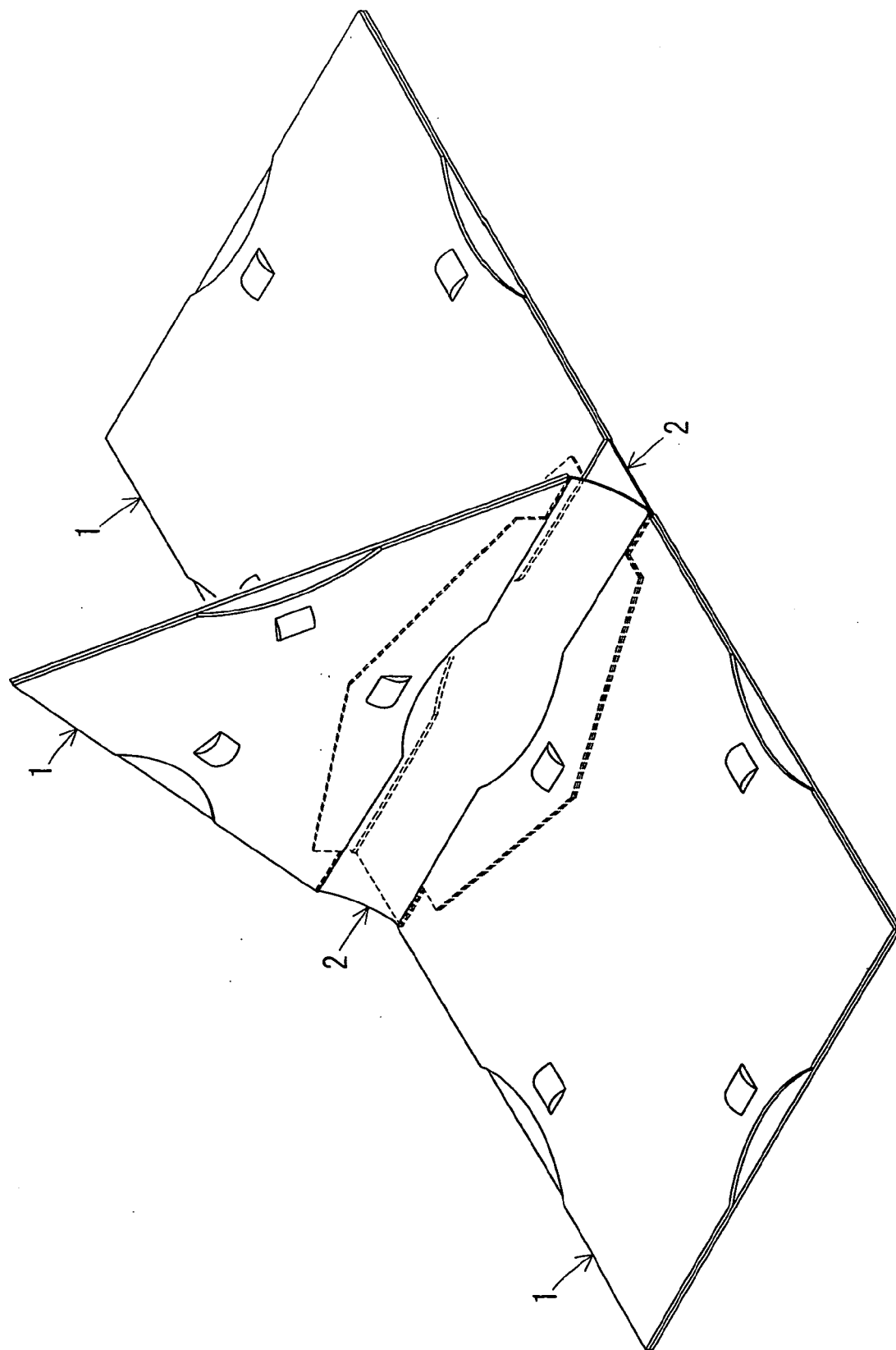


Fig.13

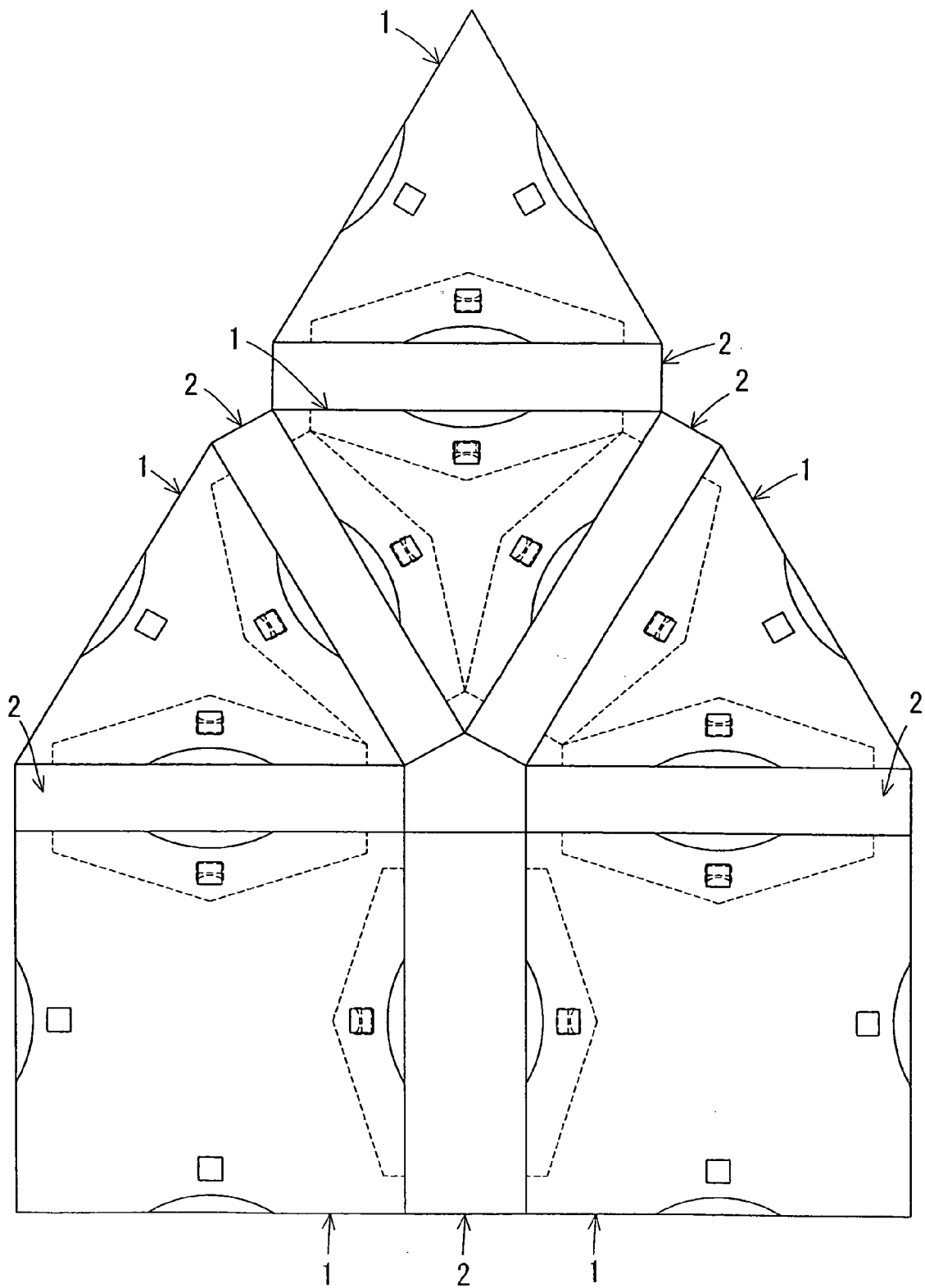


Fig.14

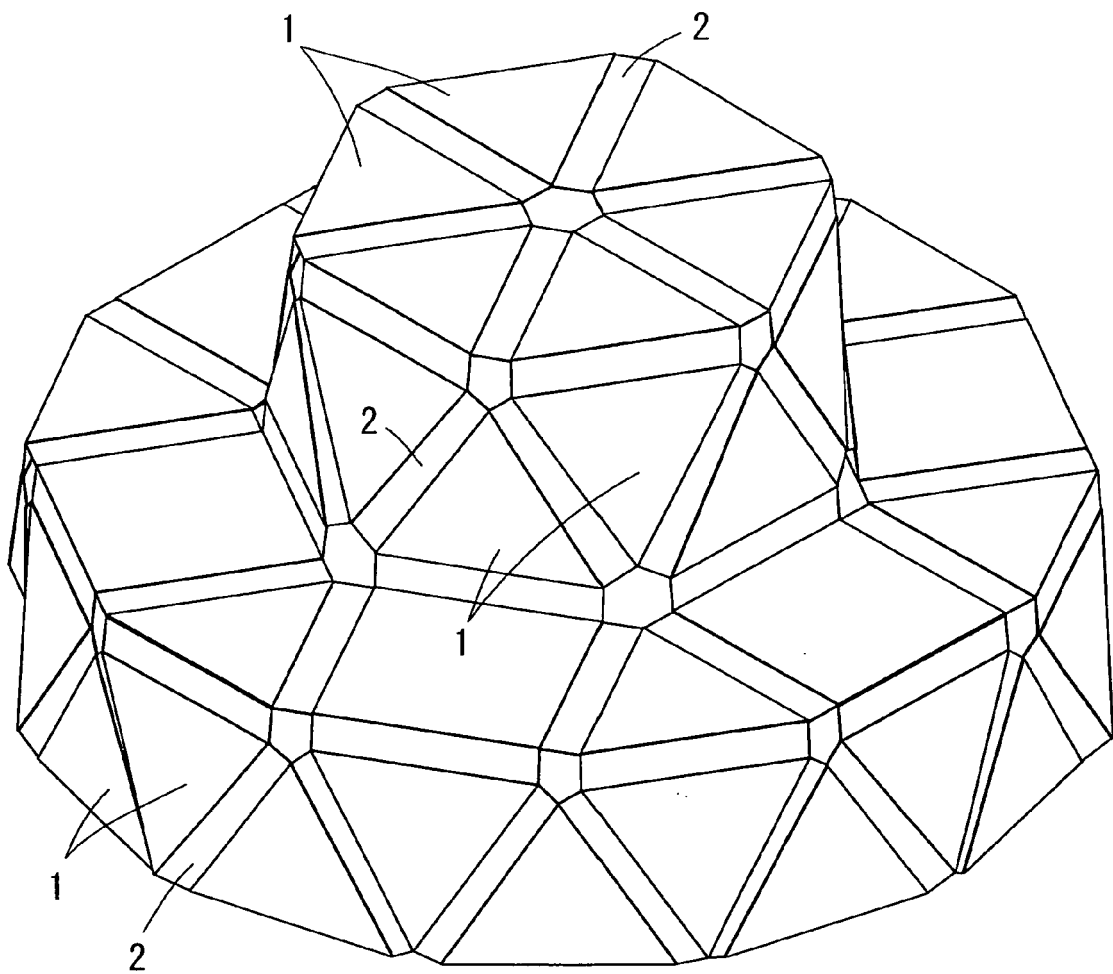


Fig. 15

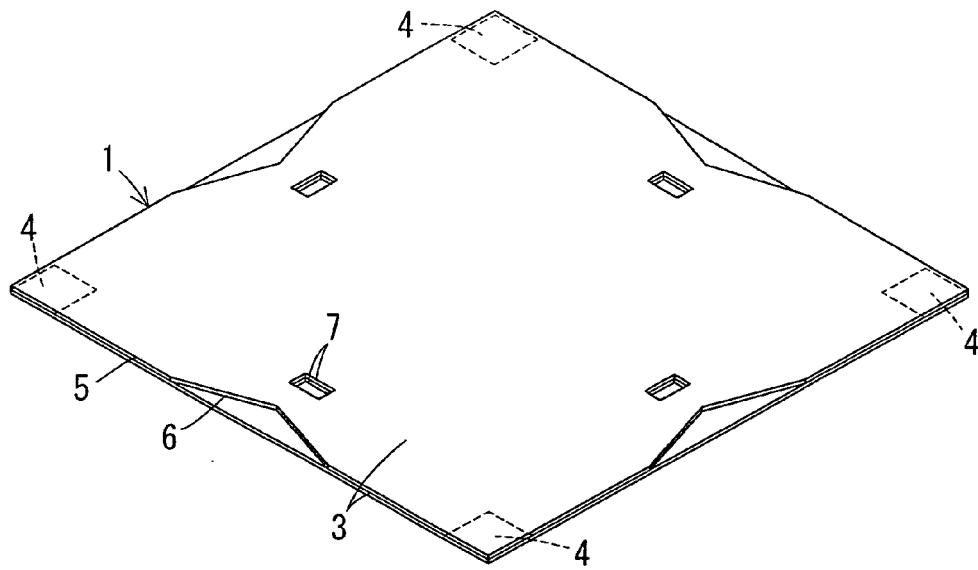


Fig. 16

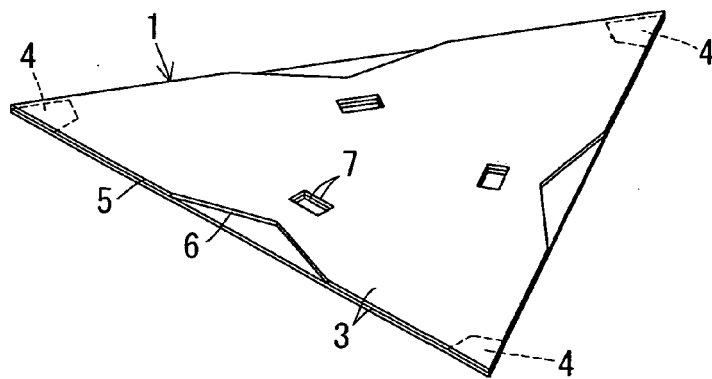


Fig. 17

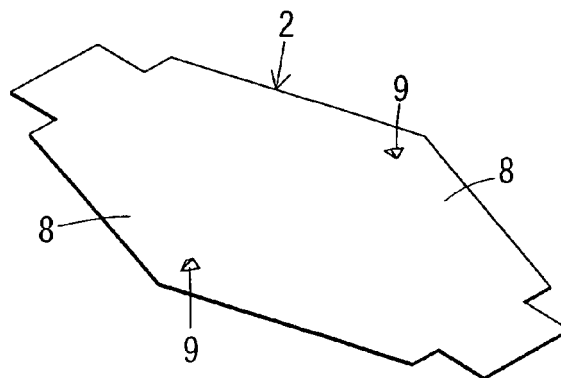


Fig.18

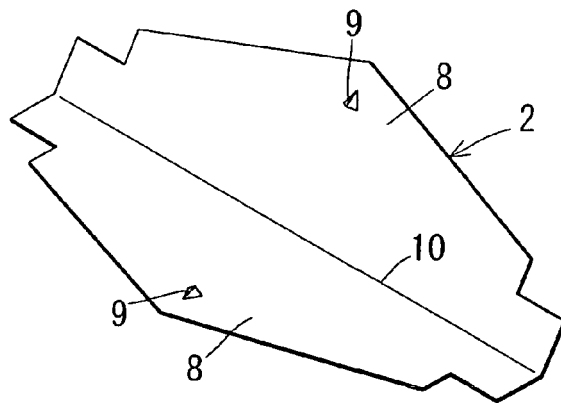


Fig.19

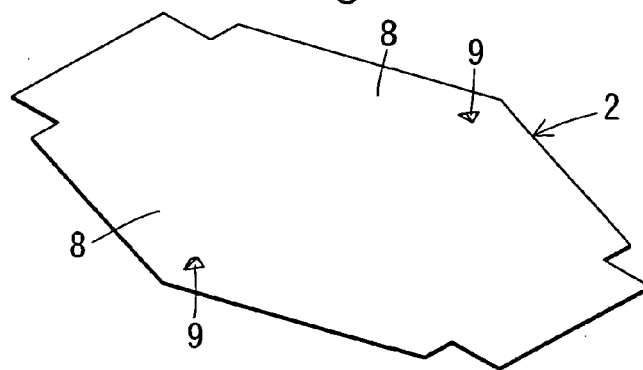


Fig.20

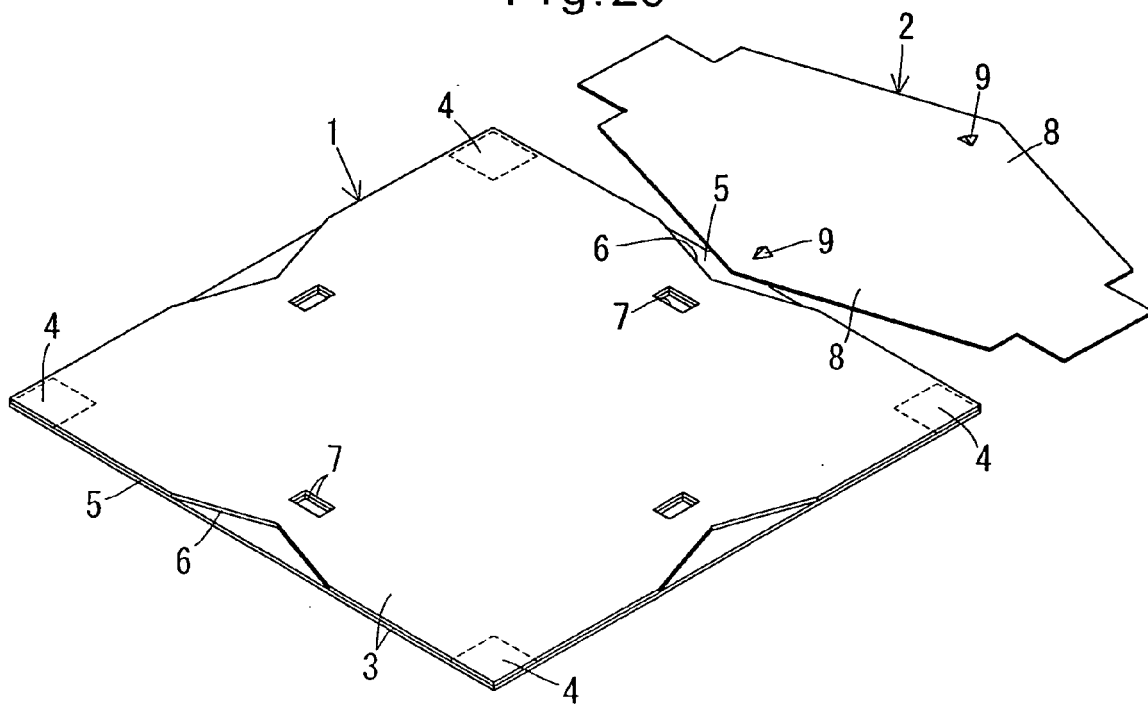


Fig.21

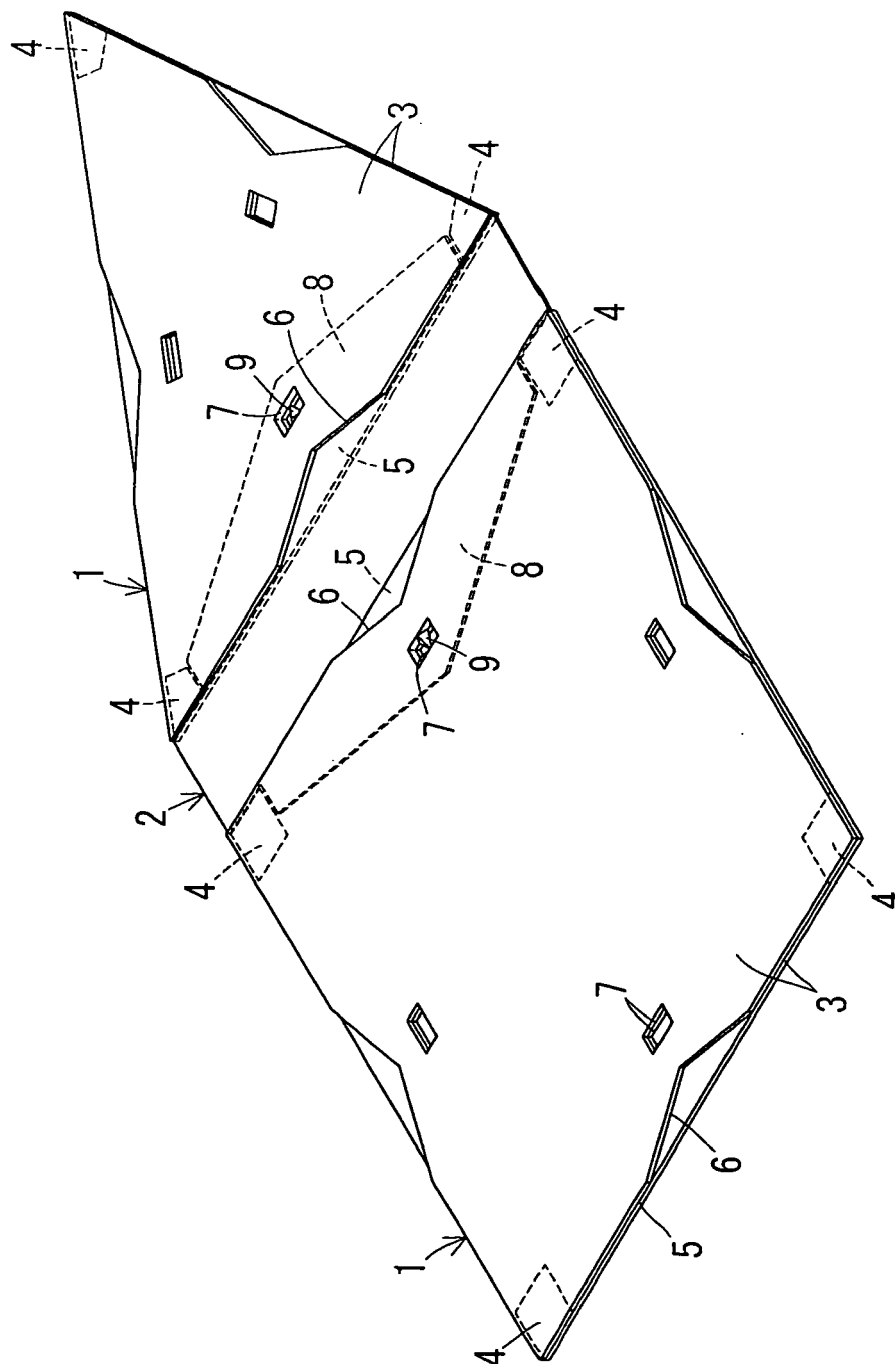


Fig.22

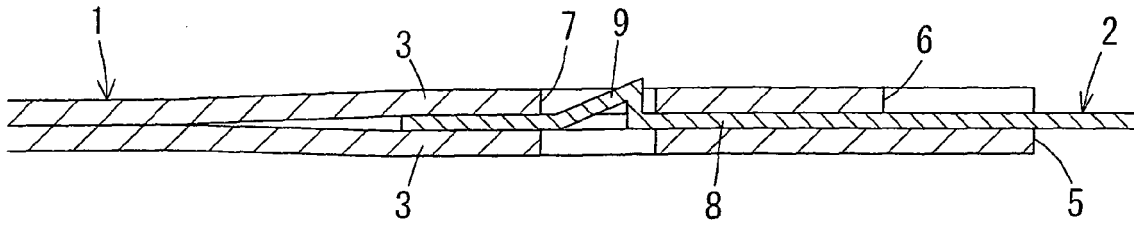


Fig.23

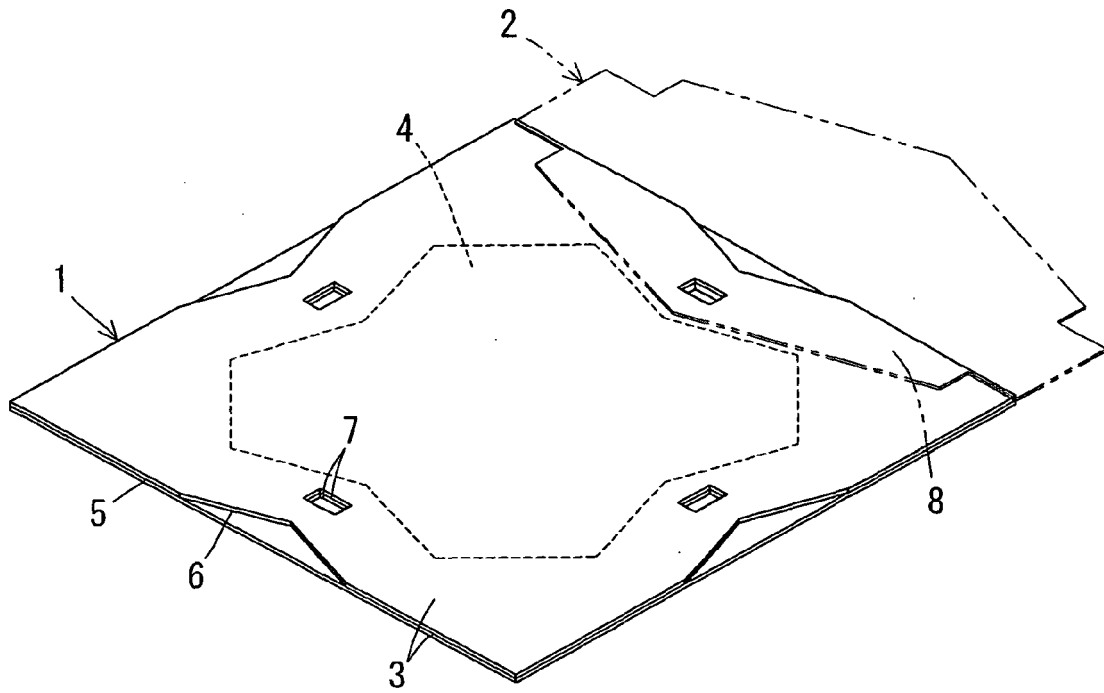


Fig.24

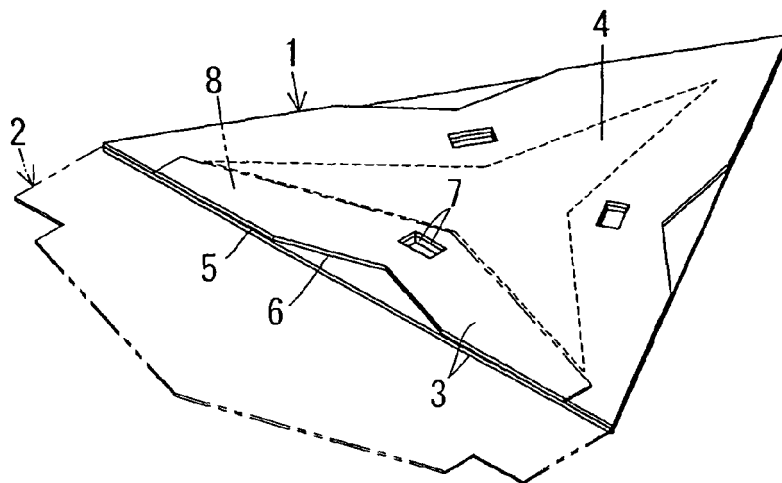


Fig.25

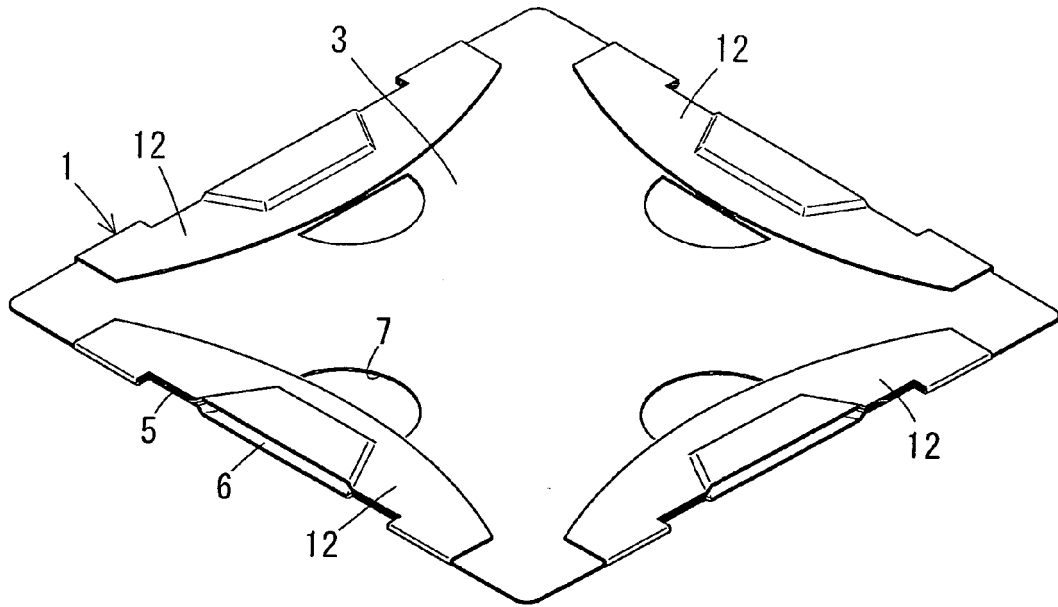


Fig.26

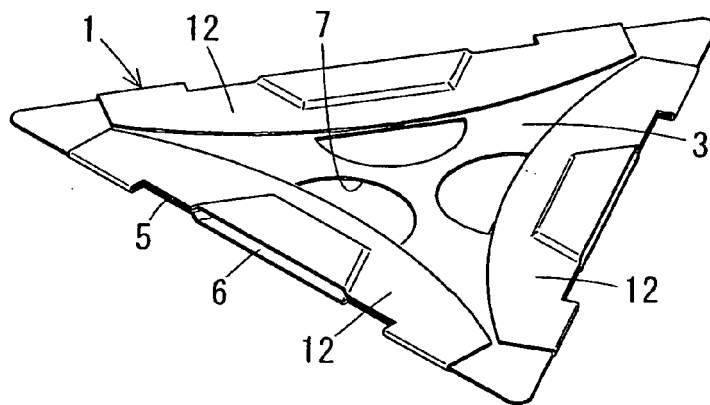


Fig.27

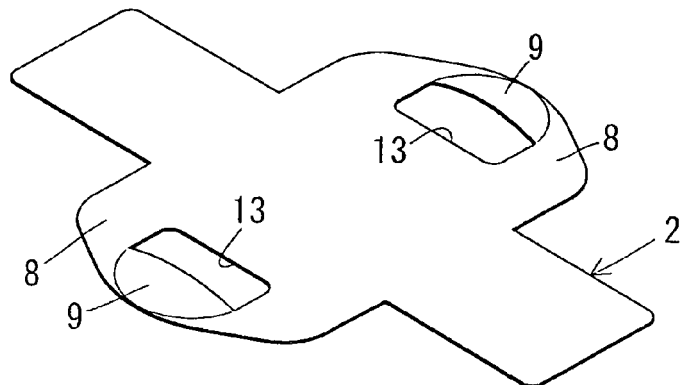


Fig.28

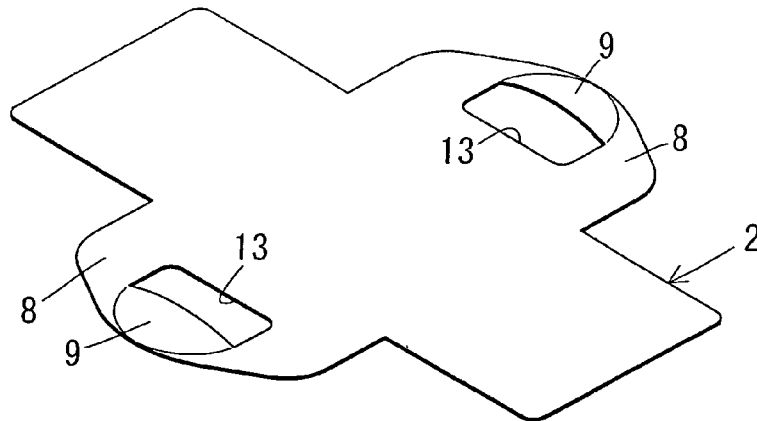


Fig.29

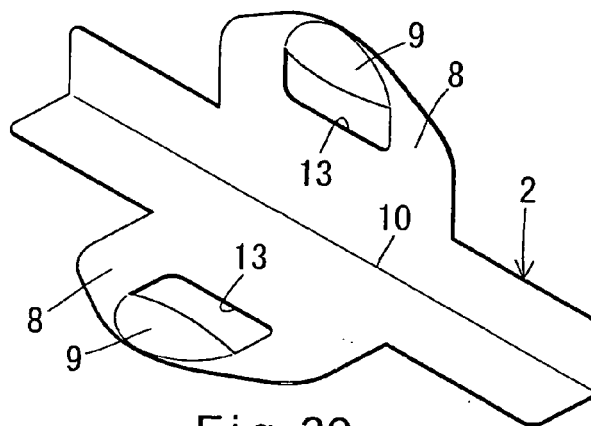


Fig.30

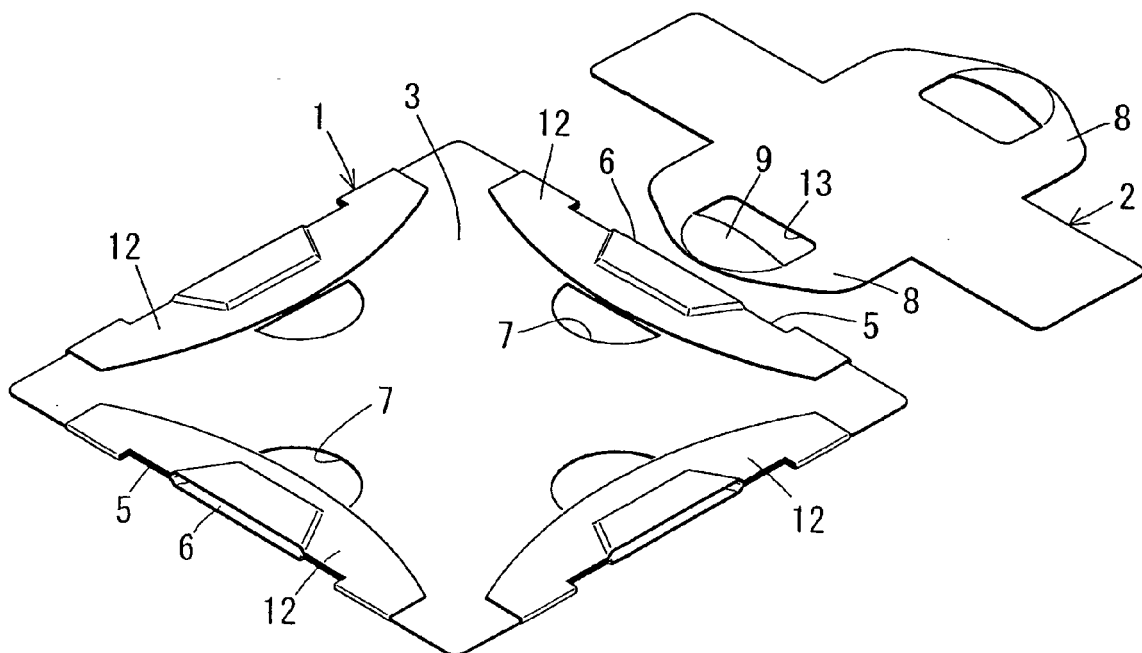


Fig.31

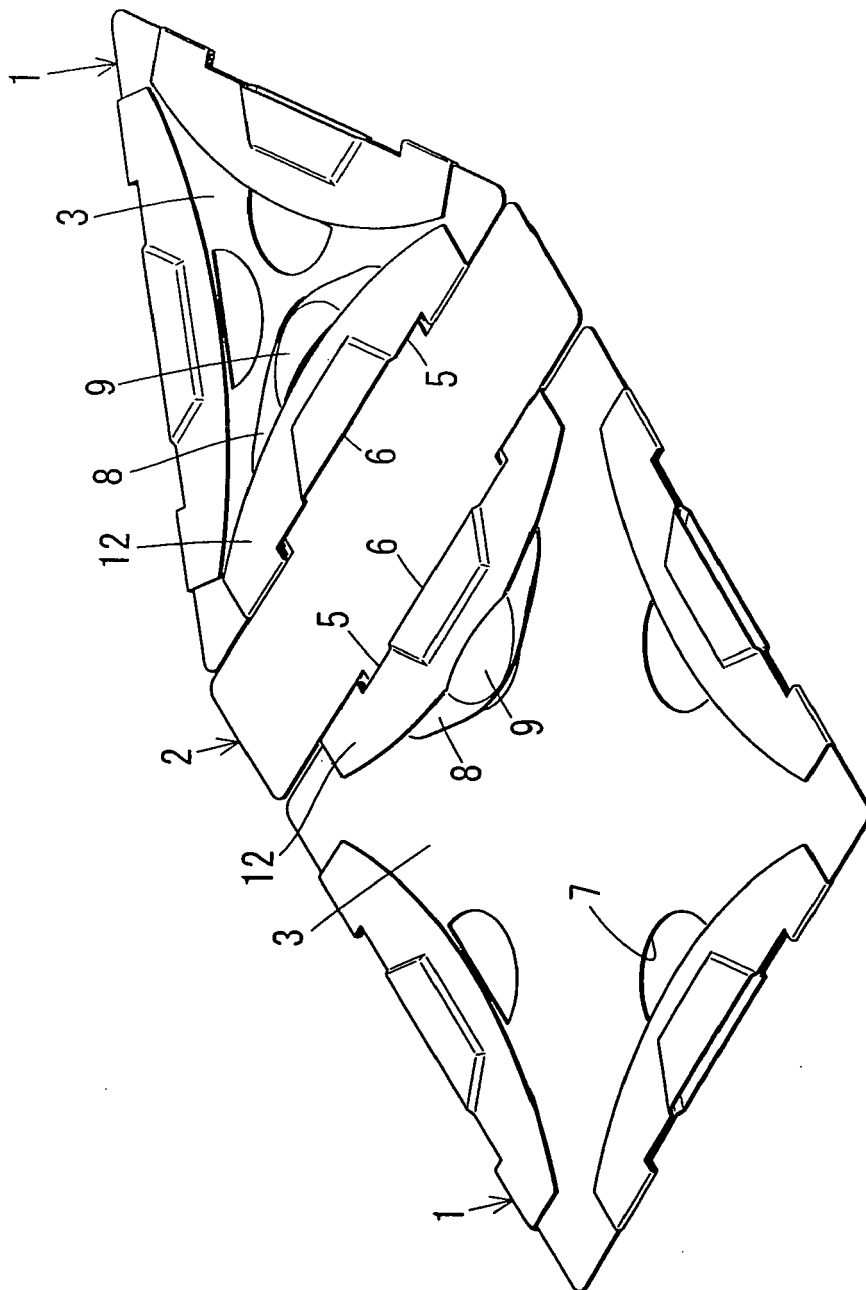


Fig.32

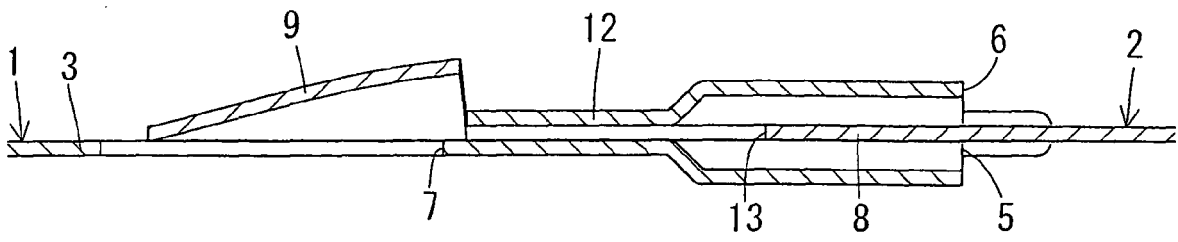


Fig.33

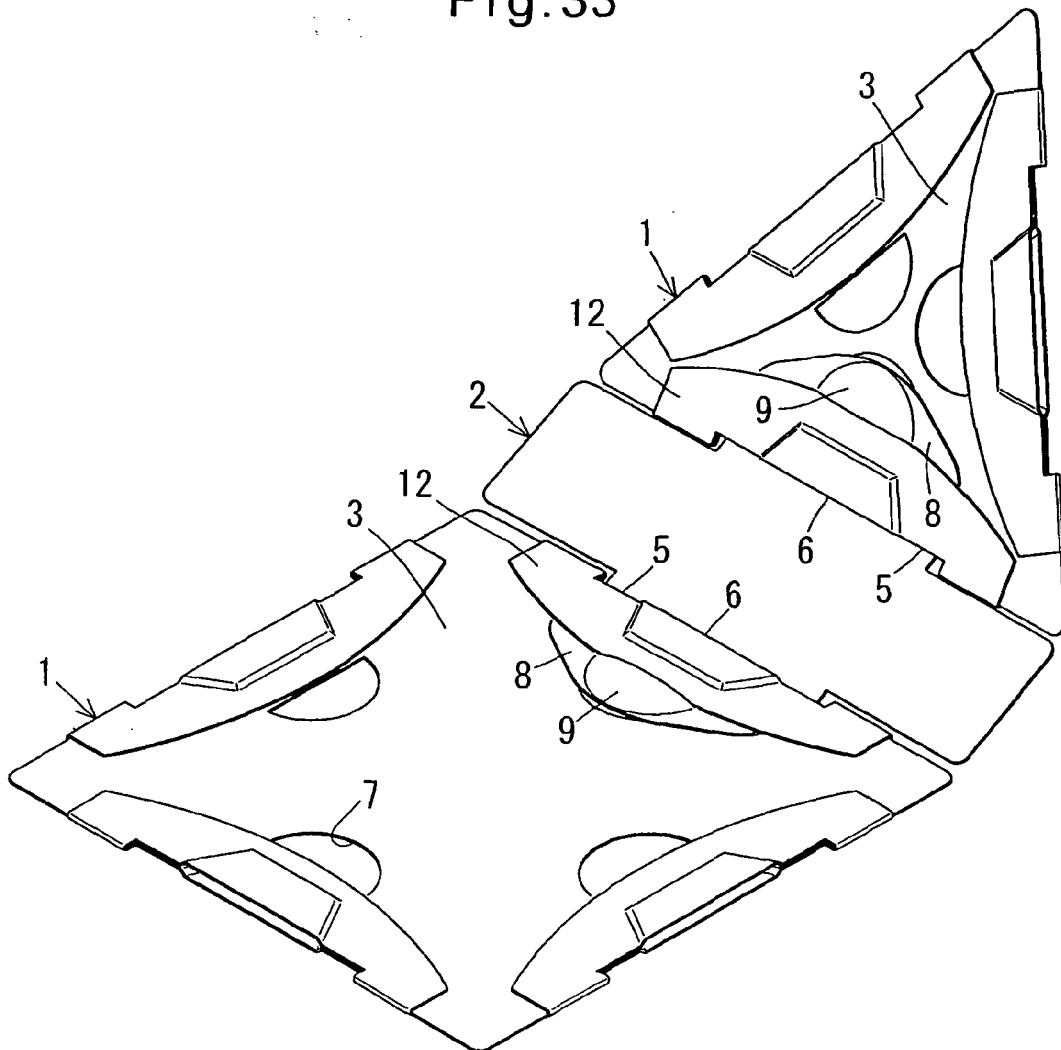


Fig.34

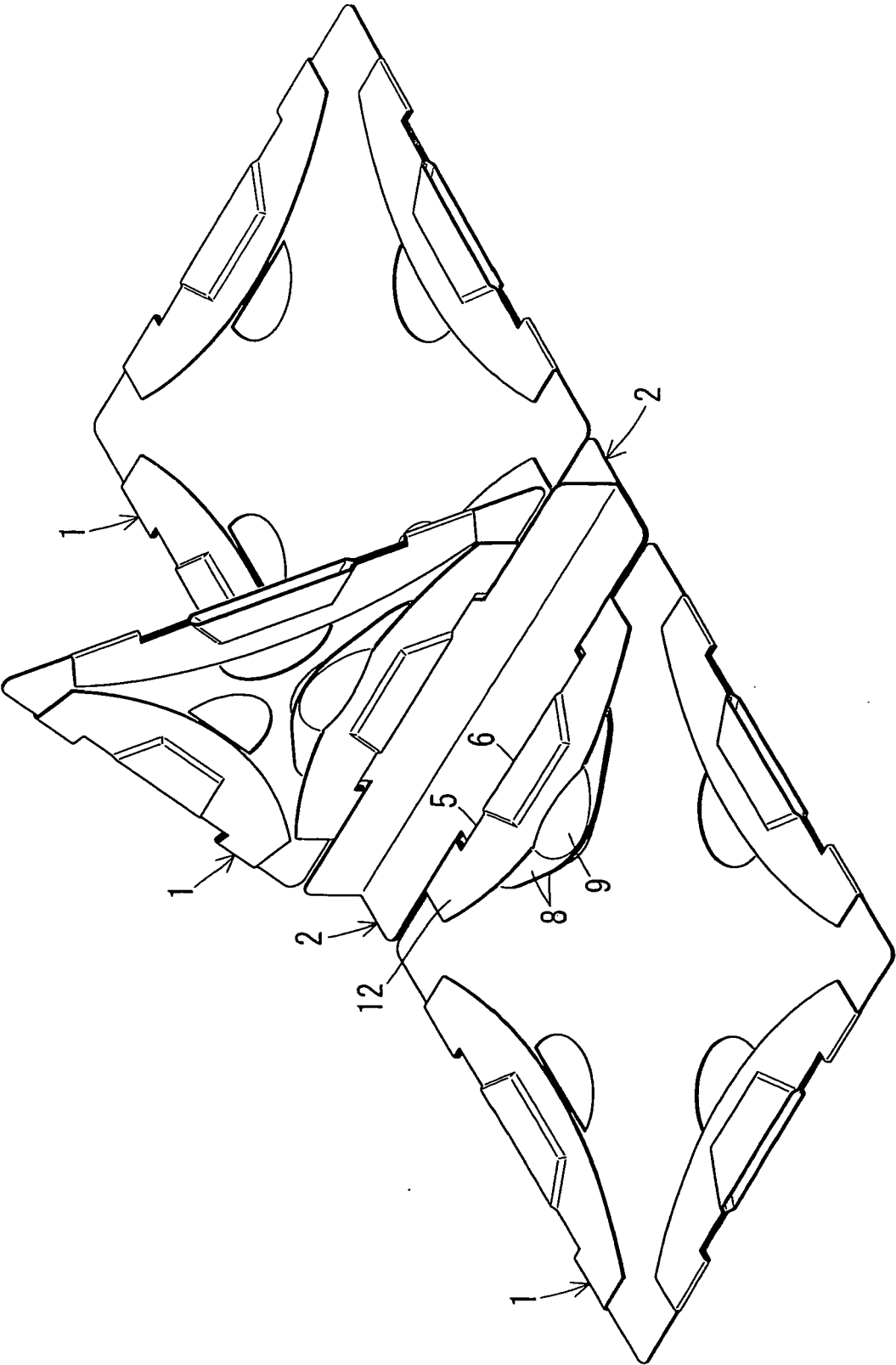


Fig.35

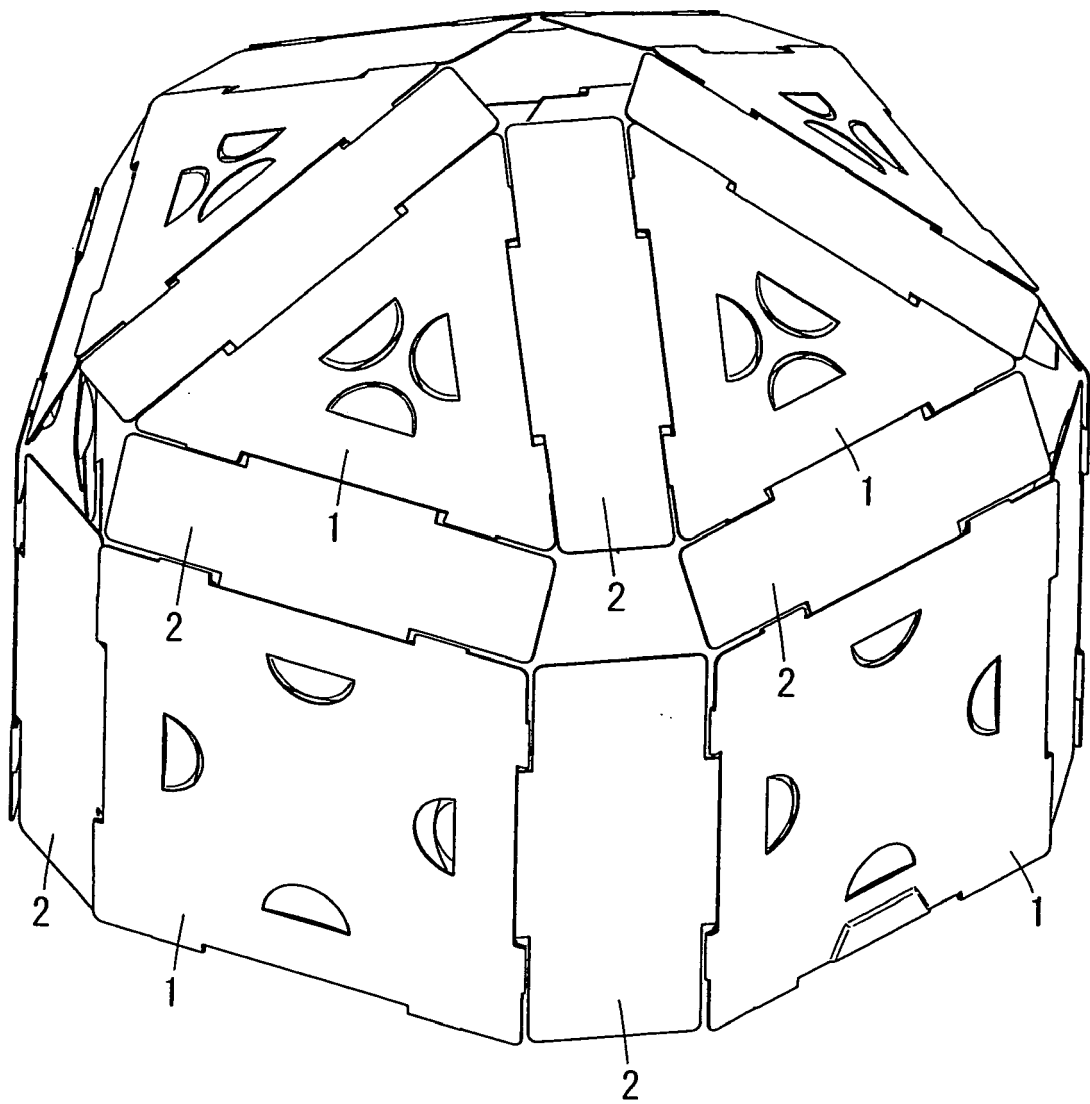


Fig.36

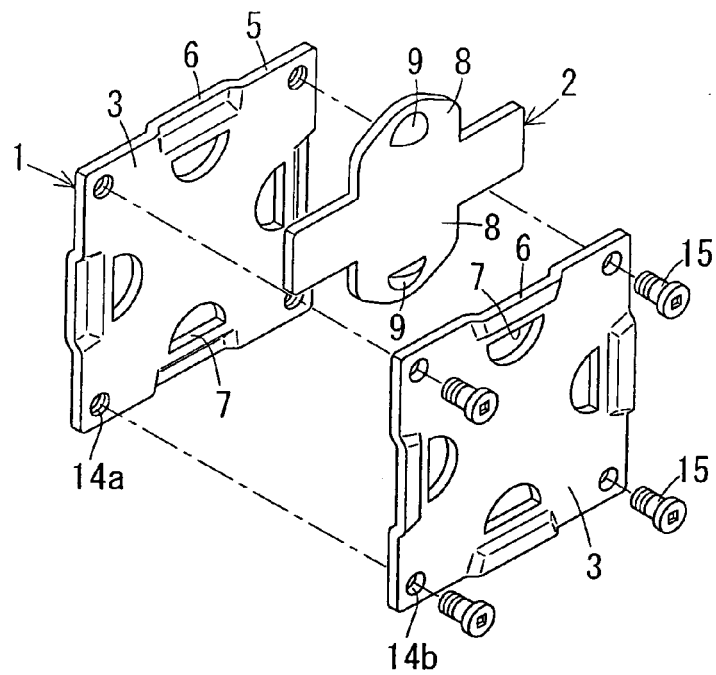
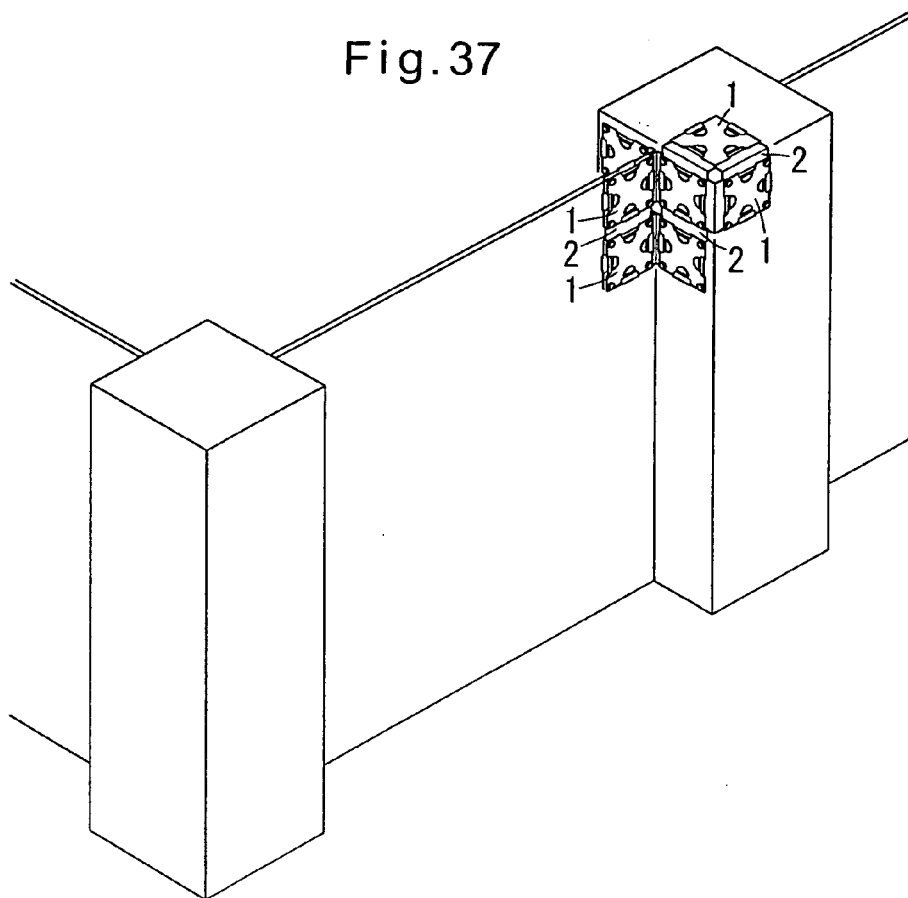


Fig.37





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 01 9581

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 2 355 672 A (TE-LI * HUANG) 2 May 2001 (2001-05-02) * page 3, line 27 - page 4, line 13; figures *	1	A63H33/10
A	GB 2 370 239 A (TE-LI * HUANG) 26 June 2002 (2002-06-26) * figure 8 *	2	
A	FR 2 376 677 A (BECHTLOFF FRANZ VINCENT) 4 August 1978 (1978-08-04) * page 2, line 13 - line 39; figures 2,3a *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A63H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 January 2006	Examiner Lucas, P
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

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ON EUROPEAN PATENT APPLICATION NO.**

EP 05 01 9581

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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18-01-2006

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
GB 2355672	A	02-05-2001	AU	736517 B2	26-07-2001
			AU	5825299 A	10-05-2001
			CA	2288422 A1	03-05-2001
			DE	20019176 U1	18-01-2001
			FR	2800296 A3	04-05-2001

GB 2370239	A	26-06-2002	DE	20100231 U1	22-03-2001
			DK	200100028 A	10-07-2002
			FR	2820157 A1	02-08-2002
			NL	1017105 C2	16-07-2002

FR 2376677	A	04-08-1978	AT	346741 B	27-11-1978
			AT	6277 A	15-03-1978
			DE	7740304 U1	06-07-1978
			SE	7714966 A	11-07-1978
