(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 942 997 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
29.04.2009 Bulletin 2009/18

(21) Application number: **06809724.5**

(22) Date of filing: **27.10.2006**

(51) Int Cl.:
A63F 3/02 *(2006.01)*

(86) International application number:
PCT/IB2006/053957

(87) International publication number:
WO 2007/049240 (03.05.2007 Gazette 2007/18)

(54) SHAPE CHANGING PLAYING PIECES

FORMVERÄNDERNDE, SPIELENDE TEILE

Pièces de jeu de forme modifiable

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR

(30) Priority: **27.10.2005 EP 05110065**

(43) Date of publication of application:
16.07.2008 Bulletin 2008/29

(73) Proprietor: **Koninklijke Philips Electronics N.V.**
5621 BA Eindhoven (NL)

(72) Inventors:
- **DECRE, Michel, M., J.**
  5656 AA Eindhoven (NL)
- **WILDERBEEK, Johannes, T., A.**
  5656 AA Eindhoven (NL)
- **KURT, Ralph**
  5656 AA Eindhoven (NL)
- **DEN TOONDER, Jacob, M., J.**
  5656 AA Eindhoven (NL)

(74) Representative: **Van Velzen, Maaike Mathilde et al**
Philips
Intellectual Property & Standards
P.O. Box 220
5600 AE Eindhoven (NL)

(56) References cited:
FR-A- 2 848 871
JP-A- 2 291 891
US-B1- 6 568 869

EP 1 942 997 B1

Printed by Jouve, 75001 PARIS (FR)

Description

FIELD OF THE INVENTION

[0001] The invention relates to a playing piece for use in a board game, and comprising an input for receiving an input signal from an outside control.unit and means for changing an appearance of the playing piece based on the input signal.

[0002] The invention further relates to a system for playing board games.

BACKGROUND OF THE INVENTION

[0003] Such a playing piece is known from a not yet published patent application, with application number EP05103952.7 (attorney docket PH 000431 EP1). In said patent application a computer-controlled pawn is described. A game board comprises a horizontal display surface to support the pawn. The bottom surface of the pawn comprises an image detector for detecting a control image on the display surface, underneath the bottom surface. The pawn further comprises control means, coupled to the image detector for controlling an appearance or position of the pawn in dependence of the control image. Light emitting diodes (LEDs) or a small LCD display screen are used for changing the pawn's appearance. One or more wheels are used for moving the pawn relative to the game board.

[0004] In traditional board games, one is used to have playing pieces of different shapes and sizes for different games. Often within a game, playing pieces of different shapes and sizes have different functions. With the pawn according to above-mentioned patent application these different functions may be represented by showing different images on the LCD display screen.

[0005] FR-A-2 848 871 discloses a playing piece comprising an input, one shapeable segment and shaping means as in the preamble of claim 1.

SUMMARY OF THE INVENTION

[0006] The playing piece according to the invention differs from the known playing piece in that the shaping means is constructed for sequentially transforming neighboring groups of shapeable segments of the playing piece for moving the playing piece. Such a playing piece may move in a worm-like manner.

[0007] When the outside control unit sends an input signal to the playing piece, the shaping means instruct the shapeable segment to deform in dependence of the input signal. The shaping means may simply pass on the input signal to the shapeable segment, may redirect the input signal to different shapeable segments or may analyze the input signal and create instructions for changing the shape and/or size of the shapeable segment, based on said input signal. By coordinately altering the shape of individual segments or small groups of segments, a large variety of forms can be obtained. Relatively small local shape changes of the segments may result in a complete metamorphose of the playing piece. The shapeable playing piece as provided by the invention can fulfill different functions during a game, or can adapt its shape depending on the game that is being played or on its function in a game. This does not only allow for having a limited set of 'electronically augmented' playing pieces for use with a plurality of games, but also enhances the gaming experience by providing playing pieces with a look and feel that matches its function or the actual playing state. It is an advantage of the playing piece according to the invention that the players no longer have to sort the playing pieces and put them on their starting location on the game board. The playing pieces can be placed on any starting location on the game board, where after each piece is shaped to the shape corresponding with the starting location.

[0008] In a preferred embodiment the playing piece further comprises an output for sending playing piece information to the outside control unit, the playing piece information comprising at least one out of the group: identification for indicating the playing piece, location for indicating a position of the playing piece and, sensor output for indicating information sensed by the playing piece. The outside control unit may reshape the playing piece in dependence of the playing piece information and/or game rules. The sensor output may, for example, originate from a touch sensor, sound sensor, temperature sensor, or light sensor. The shape of the playing piece may, for example, be influenced by touching the playing piece or talking to the playing piece. The providing of playing piece information to the outside control unit makes it possible to adapt a playing piece's shape to external or player induced triggers during a game.

[0009] In an exemplary embodiment the shapeable segment comprises a skeleton of nodes and edges, each node joining at least two edges, at least part of the edges being a controlled actuator edge, and wherein the shaping means is constructed for adjusting a length of the controllable actuator edge. For example, the skeleton may be a collection of stacked polyhedrons, such as prisms or tetrahedrons. By coordinately stretching and contracting actuator edges, a large variety of forms can be obtained.

[0010] Preferably, the playing piece further comprises a stretchable material for covering the outer faces of the skeleton. The stretchable material, e.g. rubber, smoothens the surface of the playing piece. The uneven skeleton comprises a lot of edges and nodes and does therefore not look or feel like a traditional playing piece. The stretchable material shrinks and expands together with the skeleton and gives the playing piece a more smooth and natural look and feel.

[0011] In an embodiment, the skeleton encloses a cavity. Polyhedrons can be assembled to form a shell. Since the polyhedrons are structurally stable, they can be assembled in a single thickness, leaving a cavity inside the

object. The cavity may comprise the shaping means, power elements, a light, a speaker, sensor elements or any other element needed for performing and supporting the tasks of the playing piece.

[0012] In another exemplary embodiment the shapeable segment comprises at least one channel, walls of at least part of the channel comprising a pair of electrodes, the shaping means comprising a voltage source for applying a voltage difference between the electrodes of at least one pair of electrodes for contraction or stretching of the corresponding channel.

[0013] When the voltage difference is applied to all pairs of electrodes, all channels will contract due to an electrostatic force and the playing piece will become smaller. When the voltage difference is applied to only part of the channels, only part of the channels will contract, while other parts remain expanded. As a result, the shape of the playing piece will change. By coordinately contracting specific channels, a desired shape can be obtained.

[0014] In an embodiment, the walls comprise elastic material for recovering the corresponding channel to its original shape after removal of the applied voltage difference.

[0015] Alternatively, the walls comprise electrically isolating material for preventing electrical contact between the electrodes of the at least one pair. In a contracted state, equal voltages may be applied to both electrodes of the pair. In that event, an electrostatic force will result in expansion of the channel. Without the isolating material, the electrodes would make an electrical contact when the channel is contracted and applying different voltages to both electrodes would not be possible.

[0016] In a preferred embodiment, the shapeable segment comprises a plurality of the channels, walls of each channel of the plurality of channels comprising a corresponding pair of electrodes and wherein the shaping means is constructed for applying the voltage difference between the electrodes of each pair of electrodes independently.

[0017] When the contraction of each channel is controlled independently, a large variety of forms can be obtained.

[0018] These and other aspects of the invention are apparent from and will be elucidated with reference to the embodiments described hereinafter.

LIST OF FIGURES

[0019] In the drawings:

Figure 1 shows a block diagram of a system according to the invention,
Figure 2 shows a playing piece built of prisms according to an exemplary embodiment of the invention,
Figure 3 shows a prism which may be used in a playing piece according to the invention,
Figure 4 shows a controllable actuator edge which may be used in a playing piece according to the invention,
Figure 5a-d show a front view of a playing piece 20 in two different shapes,
Figure 6 shows an exemplary embodiment of a playing piece according to the invention, built of prisms,
Figure 7 shows an exemplary embodiment of a playing piece according to the invention, built of tetrahedrons,
Figure 8 shows a tetrahedron which may be used in a playing piece according to the invention,
Figure 9 shows a playing piece with a cavity comprising control elements,
Figure 10 shows a spherical playing piece, built of tetrahedrons,
Figure 11 shows a honeycomb like structure for use in a playing piece,
Figure 12a-b shows contraction of a honeycomb like structure,
Figure 13a-c shows an exemplary playing piece according to the invention in three different shapes, and
Figure 14a-d shows a playing piece which is able to move in a worm like manner.

DETAILED DESCRIPTION OF THE INVENTION

[0020] Figure 1 shows a block diagram of a system according to the invention. The system comprises a game board 16 and one or more playing pieces 10. Preferably, the game board 16 comprises a horizontally placed display on which a plurality of different game board layouts can be displayed. Each different game board layout enables the playing of a different game. Furthermore, the game board layout may change during a game, in dependence of the game rules and user interaction. The game board 16 in figure 1 also comprises a control unit 17 for processing the information from and to the playing pieces 10 and for controlling the course of the game in accordance with the game rules. The control unit 17 comprises an input 19 for receiving information from the playing pieces 10 and an output 18 for providing information to the playing pieces 10. The control unit 17 may communicate with the playing pieces 10 via the game board surface, for example, using electrodes or visual codes. Alternatively the communication may be realized wireless, for example, using BlueTooth or infrared communication means. The game board 16 may also be a traditional cardboard board. In that event, the control unit 17 may be comprised in a separate unit. The separate unit may, for example, be a PC. An example of an interactive board game which comprises a cardboard board with a control unit 17 is the "King Arthur" game of Ravensburger (http://www.kingarthur.de/).

[0021] The playing piece 10 comprises an input 12 and an output 14 for communication with the control unit 17. Shaping means 13 instruct a shapeable segment 11 to deform in dependence of the input signal. The shaping

means 13 may simply pass on the input signal to the shapeable segment.11 or may redirect the input signal to different shapeable segments 11. Preferably the shaping means 13 comprises a processor 13 for processing the input signal from the control unit 17 and for providing instructions for the shapeable segment 11 of the playing piece 10 to deform.

[0022] In an embodiment, the processor is programmed to sequentially transform neighboring groups of shapeable segments of the playing piece for moving the playing piece. Such a playing piece may move in a worm-like manner.

[0023] In an embodiment the shapeable segment comprises a skeleton of nodes and edges, each node joining at least two edges, at least part of the edges being a controlled actuator edge. Herein, the processor is programmed to adjust a length of the controllable actuator edge. For example, the skeleton may be a collection of stacked polyhedrons, such as prisms or tetrahedrons. By coordinately stretching and contracting actuator edges, a large variety of forms can be obtained.

[0024] In a most simple embodiment of the invention, the playing piece 10 only comprises one shapeable segment 11, which can shrink or grow. Preferably, the playing piece 10 comprises a plurality of shapeable segments 11, of which not only the size, but also the shape is adjustable. If, furthermore, each shapeable segment 11 can be reshaped individually, then a large variety of shapes may be taken by the playing piece 10.

[0025] Optionally, the playing piece 10 comprises sensing elements 15 for sensing touch, sound, acceleration, position, temperature, light or any other measurable quantity relevant to the game system. Signals from the sensing elements 15 are also processed by the processor 13 and may influence the shape of the playing piece 10. Signals from the sensing elements 15, may also be communicated to the control unit 17 via the output 14 of the playing piece 10 and the input 19 of the control unit 17. In this event, signals from the sensing elements 15 may influence the course of the game.

[0026] The shapeable segments 11 may be made of inflatable or deflatable units, the filling or emptying of which from gas or liquid in a micro fluidic or otherwise controlled manner determines the relative size and shape. Other techniques for controlling the shape of the shapeable segments 11 are described below.

[0027] Figure 2 shows a playing 20 piece built of prisms 21 according to an exemplary embodiment of the invention. This playing piece 20 comprises 96 shapeable prisms. In figure 2 the playing piece 20 is shaped as a box. By changing the shape of the individual prisms 21 in the playing piece 20, other shapes can be obtained. Preferably, the outer surface of the playing piece 20 is covered with a stretchable material like, for example, fabric, rubber or an elastic polymer. The stretchable material smoothens the edgy outer face of the skeleton of prisms 21. The stretchable material may be attached to the corner points of the outer prisms 21 for obtaining a good fit of the stretchable material to the shape of the skeleton.

[0028] Figure 3 shows a prism 21 as is used in the playing piece 20 shown in figure 2. The prism 21 is made of twelve edges 31 jointed at eight nodes 32. Two reinforcements 33 are connected to the prism 21 for providing mechanical stability. At least one, but preferably all edges 31 can be contracted and expanded. Preferably the nodes 32 are flexible for allowing the angles between the edges 31 to vary. By changing the length of some of the edges 31, the shape of the prism is changed.

[0029] Figure 4 shows a controllable actuator edge 40 which may be used as an edge 31 of the prism 21 of figure 3. The controllable actuator edge 40 comprises three sections 41, 42, 43. The first section 41 and the last section 43 are connected to nodes 32 of the prism 21. The sections 41, 42, 43 are coupled to each other by sliders 44. The diameter of the sections 41, 42, 43 are different for providing a 'telescopic effect'. When all sections 41, 42, 43 are slit into each other, the controllable actuator edge 40 is in its shortest contracted form. When all sections 41, 42, 43 are slit out of each other, the controllable actuator edge 40 is in its longest expanded form. The sliders 44 provide for the expansion and contraction. Various techniques may be used for constructing the sliders. For example, shape memory alloys (SMAs) may be used. SMAs have the ability to return to a previously defined shape when subjected to appropriate thermal procedure. An SMA wire below its transformation temperature can be stretched by, for example, an external spring. When the wire is heated, for example, by an electrical current and its own resistance, the wire returns to its original shape. Other techniques which may be used are, small piezo friction drives or DC servo motors.

[0030] Figures 5a-d show a front view of a playing piece 20 in two different shapes. In figure 5a the playing piece 20 is in its original box shape. The outer surface is covered by a stretching material. In figure 5b the same playing piece 20 is shown with the stretching material removed. It can be observed that the prisms 21 are in their original cubic form..In response to the input signal from the control unit 17, the playing piece 20 is reshaped to represent a house. A front view of this house is shown in figure 5c. Figure 5d shows the house with the stretchable material removed. It is observed that the shapeable prisms 21 have transformed into non-cubic shapes. The altered shape of the playing piece 20 is a result of the altered shapes of all individual prisms 21.

[0031] Figure 6 shows an exemplary embodiment of a playing piece according to the invention, built of prisms. It may take some complicate processing, but a playing piece 20 as shown in figures 2 and 5 may even be transformed into a horse 60 as shown in figure 6. Also the horse 60 is built of a plurality of prisms 61. Alternatively, playing pieces 60 may be provided horse shaped. Changing the shape of prisms 61 in the horse 60 may result in movements of the horse 60. The horse 60 may, for example, nod its head or wag its tail or may even move its legs in order to walk small distances.

[0032] Figure 7 shows an exemplary embodiment of a playing piece 70 according to the invention, built of tetrahedrons 71. An enlarged view of one highlighted tetrahedron 71 is provided in figure 8.

[0033] Figure 8 shows a tetrahedron which may be used in a playing piece according to the invention. Like the prism 21 shown in figure 3, the tetrahedron 71 is made of edges 81 jointed by nodes 82. For a tetrahedron 71, six edges 81 and four nodes 82 are used. The edges are preferably realized as controllable actuator edges 40 as shown in figure 4.

[0034] Figure 9 shows another playing piece 90 according to the invention. The playing piece 90 comprises a shapeable outer shell 91 and a cavity 92. A single layer of polyhedrons may be structurally stable enough to form the shell of a playing piece 90. The fewer polyhedrons are used for making the playing piece 90, the smaller the number of degrees of freedom needed to control. A smaller number of degrees of freedom results in less complicated transformations. The cavity 92 may, for example, comprise the processor 13, a light, a power source, or a speaker.

[0035] Figure 10 shows a spherical playing piece 100, built of tetrahedrons 71.

[0036] Figure 11 shows a honeycomb like structure for use in a playing piece. The structure is made of a plurality of sheets 111, 112, which are stacked on each other. In some parts an adhesion layer 115 sticks the structure together. In other parts, the sheets are separated to form a hexagonal channel 110. In the channel walls, the sheets 111, 112 comprise respective electrodes 113, 114. The basis of the sheet 111 and 112 may be a socalled PolyMEMS (Polymer Micro Electro Mechanical System) structure. A double layer composite structure consisting of a polymer film (e.g. an acrylate) and a conductive film (e.g. Chromium) may be used.

[0037] When a voltage difference is applied between the electrodes 113, 114, an electrostatic force will pull the sheets 111, 112 towards each other and the channel height will shrink. When the voltage difference is removed, the channel 110 can recover its original shape, for example, due to elastic properties of the sheets 111, 112. Alternatively, applying different voltages to the electrodes 113, 114 may result in a repelling electrostatic force for recovering the original shape of the channel 110. In a preferred embodiment the sheets 111, 112 are characterized by an initial tensile stress, also called prestrain stress, in the range between 0 and 50 mPa. Negative values of compressive pre-stress would result in wrinkling of the sheets, which is unwanted. It is to be noted that it will only be possible to apply a voltage difference to the electrodes 113 and 114 in a completely contracted channel if they are separated by an insulating layer. When the electrodes 113 and 114 would make an electrical contact, they can not be brought to different potentials. Preferably, the walls of each channel comprise a pair of electrodes and the voltage source is constructed for applying the voltage difference between the electrodes 113, 114 of each pair of electrodes 113, 114 independently. When the contraction of each channel 110 is controlled independently, a large variety of forms can be obtained. Alternatively, small groups of channels 110 are contracted and stretched simultaneously by a pair of common electrodes.

[0038] Figure 12 shows contraction of a honeycomb like structure. In figure 12a all channels 110 have their original hexagonal shape. In figure 12b voltage differences are applied to the electrode pairs and all channels 110 are contracted.

[0039] Figure 13 shows an exemplary playing piece 130 according to the invention in three different shapes. In figure 13, a voltage difference is only applied to electrode pairs of channels at specific locations. By coordinately contracting channels at specific locations, a large variety of forms may be obtained. In figure 13a, the channels in a left part 131 and a right part 133 of a box shaped playing piece 130 are contracted, while the channels in a central part 132 are expanded. This results in a car shaped playing piece 130. In figure 13b, the channels in the left 131 and right part 133 of the same playing piece 130 are expanded, while the channels in the central part 132 are contracted, As a result the playing piece 130 has a totally different form. In figure 13c the same playing piece 130 is shown again. Now only the channels of a front part of the central part 132 of the playing piece 130 are contracted. By contracting and expanding individual channels or small groups of channels, a large variety of shapes may be applied to the playing piece 130.

[0040] Figure 14 shows a playing piece 140 which is able to move in a worm-like manner. In this playing piece 140 the channels in neighboring portions 141, 142, 143, 144 are sequentially contracted and expanded to move the playing piece 140 in a worm-like manner. In figure 14a the playing piece 140 is on its original position. In figure 14b the channels in third portion 143 of the playing piece 140 are contracted. As a result the width of the third portion 143 increases. As a consequence, the width of the total playing piece 140 is also increased. The playing piece 140 now needs a larger area on the game board 145. Because the total friction of the first two portions 141, 142 with the game board 145 is larger than the friction of the fourth part 144 with the game board 145, the fourth portion 144 is pushed to the right (as indicated by the arrow) while the first two portions 141, 142 remain at their original positions. In figure 14c, the channels in the second portion 142 are contracted while the channels of the third portion 143 are expanded. This reshaping has no effect on the total width of the playing piece 140 and the playing piece 140 will remain at its position. In figure 14d the channels of the second portion 142 are expanded and the width of the playing piece 140 is reduced. Because the friction of the first portions 141 with the game board 145 is smaller than the total friction of the third and fourth part 143, 144 with the game board 145, the first portion 141 is pulled to the right (as indicated by the arrow) while the last two portions 143, 144 remain at their

original positions. As a result the playing piece 140 in figure 14d has the same shape as in figure 14a and has moved to the right. In this worm like manner, the playing piece 140 may move in any direction over the game board.

[0041] It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design many alternative embodiments without departing from the scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. Use of the verb "comprise" and its conjugations does not exclude the presence of elements or steps other than those stated in a claim. The article "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. The invention may be implemented by means of hardware comprising several distinct elements, and by means of a suitably programmed computer. In the claims enumerating several means, several of these means may be embodied by one and the same item of hardware. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage. For example, elements described as a part of a playing piece made of a skeleton of polyhedrons, may also be used in playing pieces made of a honeycomb like structure and vice versa.

Claims

1. A playing piece (10, 20) for use in a board game, and comprising:

   - an input (12) for receiving an input signal from an outside control unit (17), the input signal representing a particular shape and/ or size of the playing piece (10, 20), and
   - at least one shapeable segment (11,21),
   - shaping means (13) for coupling the input (12) to the at least one shapeable segment (11, 21) to deform the shapeable segment (11, 21) in dependence of the input signal for obtaining the particular shape and/ or size of the playing piece (10, 20), **characterised in that** the shaping means (13) is constructed for sequentially transforming neighboring groups (141-144) of shapeable segments (11, 21) of the playing piece (10, 20) for moving the playing piece (10, 20).

2. A playing piece (10, 20) as claimed in claim 1, further comprising an output (14) for sending playing piece information to the outside control unit (17), the playing piece information comprising at least one out of the group: identification for indicating the playing piece (10, 20), location for indicating a position of the playing piece (10, 20) and, sensor output for indicating information sensed by the playing piece (10, 20).

3. A playing piece (10, 20) as claimed in claim 1, wherein the shapeable segment (21) comprises a skeleton of nodes (32) and edges (31), each node (32) joining at least two edges (31), at least part of the edges (31) being a controlled actuator edge (40), and wherein the shaping means (13) is constructed for adjusting a length of the controllable actuator edge (40).

4. A playing piece (10, 20) as claimed in claim 3, further comprising a stretchable material for covering the outer faces of the skeleton.

5. A playing piece (10, 20) as claimed in claim 4, wherein the stretchable material is attached to the nodes (32) only.

6. A playing piece (10, 91) as claimed in claim 4, wherein the skeleton encloses a cavity (92).

7. A playing piece (10, 91) as claimed in claim 6, wherein the cavity (92) comprises the shaping means (13).

8. A playing piece (10, 20) as claimed in claim 1, wherein the shapeable segment (11) comprises at least one channel (110), walls of at least part of the channel (110) comprising a pair of electrodes (113, 114), the shaping means (13) comprising a voltage source for applying a voltage difference between the electrodes (113, 114) of at least one pair of electrodes (113, 114) for contraction or stretching of the corresponding channel (110).

9. A playing piece (10, 20) as claimed in claim 8, wherein the walls comprise elastic material for recovering the corresponding channel (110) to its original shape after removal of the applied voltage difference.

10. A playing piece (10, 20) as claimed in claim 8, wherein the walls comprise electrically isolating material for preventing electrical contact between the electrodes of the at least one pair.

11. A playing piece (10, 20) as claimed in claim 8, wherein the walls comprise a polymer layer.

12. A playing piece (10, 20) as claimed in claim 8, wherein a cross section of at least one channel of the plurality of channels is hexagonal.

13. A playing piece (10, 20) as claimed in claim 8, wherein the shapeable segment (11) comprise a plurality of the channels (10), walls of each channel (110) of the plurality of channels (110) comprising a corresponding pair of electrodes (113, 114) and wherein

the shaping means (13) is constructed for applying the voltage difference between the electrodes (113, 114) of each pair of electrodes (113, 114) independently.

14. A system for playing board games, comprising

- at least one playing piece (10, 20) as claimed in 1,
- a game board (16) for supporting the at least one playing piece (10, 20),
- the outside control unit (17) for sending the input signal to the input (12) of the at least one playing piece (10, 20).

15. A system for playing board games as claimed in claim 14, wherein

- the playing piece (10, 20) comprises an output (14) for sending playing piece information to the outside control unit (17), the playing piece information comprising at least one out of the group identification for indicating the playing piece, location for indicating a position of the playing piece (10, 20) and, sensor output for indicating information sensed by the playing piece (10, 20), and
- the outside control unit (17) is arranged for receiving the playing piece information and for providing the input signal based on the playing piece information.

Patentansprüche

1. Spielstein (10, 20) für den Einsatz in einem Brettspiel, der Folgendes umfasst:

- einen Eingang (12) zum Empfangen eines Eingangssignals von einer externen Steuereinheit (17), wobei das Eingangssignal eine spezielle Form und/oder Größe des Spielsteins (10, 20) darstellt, und
- mindestens ein formbares Segment (11, 21),
- Formgebungsmittel (13) zum Verbinden des Eingangs (12) mit dem mindestens einen formbaren Segment (11, 21) zum Verformen des formbaren Segments (11, 21) in Abhängigkeit von dem Eingangssignal, um die spezielle Form und/oder Größe des Spielsteins (10, 20) zu erzielen, **dadurch gekennzeichnet, dass** die Formgebungsmittel (13) so konstruiert sind, dass sie benachbarte Gruppen (141-144) von formbaren Segmenten (11, 21) des Spielsteins (10, 20) der Reihe nach umformen, um den Spielstein (10, 20) zu bewegen.

2. Spielstein (10, 20) nach Anspruch 1, der ferner einen Ausgang (14) zum Senden von Spielsteininformationen zur externen Steuereinheit (17) umfasst, wobei die Spielsteininformationen mindestens ein Element aus der folgenden Gruppe umfassen: Identifikation zum Anzeigen des Spielsteins (10, 20), Standort zum Anzeigen einer Position des Spielsteins (10, 20) und Sensorausgangssignal zum Anzeigen von Informationen, die vom Spielstein (10, 20) erfasst werden.

3. Spielstein (10, 20) nach Anspruch 1, wobei das formbare Segment (21) ein Skelett aus Knotenpunkten (32) und Kanten (31) umfasst, wobei jeder Knotenpunkt (32) mindestens zwei Kanten (31) verbindet, wobei zumindest ein Teil der Kanten (31) eine gesteuerte Stellkante (40) ist und wobei die Formgebungsmittel (13) so konstruiert sind, dass sie eine Länge der steuerbaren Stellkante (40) anpassen.

4. Spielstein (10, 20) nach Anspruch 3, der ferner ein dehnbares Material umfasst, das die Außenseiten des Skeletts bedeckt.

5. Spielstein (10, 20) nach Anspruch 4, wobei das dehnbare Material lediglich an den Knotenpunkten (32) befestigt ist.

6. Spielstein (10, 91) nach Anspruch 4, wobei das Skelett einen Hohlraum (92) einschließt.

7. Spielstein (10, 91) nach Anspruch 6, wobei der Hohlraum (92) die Formgebungsmittel (13) enthält.

8. Spielstein (10, 20) nach Anspruch 1, wobei das formbare Segment (11) mindestens einen Kanal (110) umfasst, wobei die Wände zumindest eines Teils des Kanals (110) ein Paar Elektroden (113, 114) umfassen, wobei die Formgebungsmittel (13) eine Spannungsquelle umfassen, um zwischen den Elektroden (113, 114) von dem zumindest einen Paar Elektroden (113, 114) einen Spannungsunterschied zur Zusammenziehung oder Dehnung des entsprechenden Kanals (110) anzulegen.

9. Spielstein (10, 20) nach Anspruch 8, wobei die Wände elastisches Material umfassen, um den entsprechenden Kanal (110) nach der Aufhebung des angelegten Spannungsunterschieds in seine ursprüngliche Form zurück zu bringen.

10. Spielstein (10, 20) nach Anspruch 8, wobei die Wände elektrisch isolierendes Material umfassen, um einen elektrischen Kontakt zwischen den Elektroden des mindestens einen Paares zu verhindern.

11. Spielstein (10, 20) nach Anspruch 8, wobei die Wände eine Polymerschicht umfassen.

12. Spielstein (10, 20) nach Anspruch 8, wobei der Querschnitt von mindestens einem Kanal der Vielzahl von Kanälen hexagonal ist.

13. Spielstein (10, 20) nach Anspruch 8, wobei das formbare Segment (11) eine Vielzahl der Kanäle (10) umfasst, wobei die Wände jeden Kanals (110) der Vielzahl von Kanälen (110) ein entsprechendes Paar Elektroden (113, 114) umfassen und wobei die Formgebungsmittel (13) so ausgelegt sind, dass sie den Spannungsunterschied zwischen den Elektroden (113, 114) jedes Paares von Elektroden (113, 114) unabhängig anlegen.

14. System zum Spielen von Brettspielen, das Folgendes umfasst:

- mindestens einen Spielstein (10, 20) nach Anspruch 1,
- ein Spielbrett (16) zum Platzieren des mindestens einen Spielsteins (10, 20),
- die externe Steuereinheit (17) zum Senden des Eingangssignals an den Eingang (12) des mindestens einen Spielsteins (10, 20).

15. System zum Spielen von Brettspielen nach Anspruch 14, wobei

- der Spielstein (10, 20) einen Ausgang (14) zum Senden von Spielsteininformationen an die externe Steuereinheit (17) umfasst, wobei die Spielsteininformationen mindestens ein Element aus der folgenden Gruppe umfassen: Identifikation zum Anzeigen des Spielsteins, Standort zum Anzeigen einer Position des Spielsteins (10, 20) und Sensorausgangssignal zum Anzeigen der von dem Spielstein (10, 20) erfassten Informationen, und
- die externe Steuereinheit (17) so ausgelegt ist, dass sie die Spielsteininformationen empfängt und auf der Grundlage der Spielsteininformationen das Eingangssignal bereitstellt.

Revendications

1. Pièce de jeu (10, 20) destinée à être utilisée dans un jeu de société à plateau, et comprenant :

- une entrée (12) destinée à recevoir un signal d'entrée à partir d'une unité de commande extérieure (17), le signal d'entrée représentant une forme et/ou taille particulière de la pièce de jeu (10, 20), et
- au moins un segment pouvant être mis en forme (11,21),
- des moyens de mise en forme (13) destinés à coupler l'entrée (12) à l'au moins un segment pouvant être mis en forme (11,21) pour déformer le segment pouvant être mis en forme (11, 21) de façon dépendante du signal d'entrée pour obtenir la forme et/ou taille particulière de la pièce de jeu (10, 20), **caractérisée en ce que** les moyens de mise en forme (13) sont construits pour transformer séquentiellement des groupes voisins (141 à 144) de segments pouvant être mis en forme (11, 21) de la pièce de jeu (10, 20) pour déplacer la pièce de jeu (10, 20).

2. Pièce de jeu (10, 20) selon la revendication 1, comprenant en outre une sortie (14) destinée à envoyer des informations de pièce de jeu à l'unité de commande extérieure (17), les informations de pièce de jeu comprenant au moins un parmi le groupe constitué de : une identification pour indiquer la pièce de jeu (10, 20), un positionnement pour indiquer une position de la pièce de jeu (10, 20) et une sortie de capteur pour indiquer des informations détectées par la pièce de jeu (10, 20).

3. Pièce de jeu (10, 20) selon la revendication 1, dans laquelle le segment pouvant être mis en forme (21) comprend un squelette de noeuds (32) et bords (31), chaque noeud (32) joignant au moins deux bords (31), au moins une partie des bords (31) étant un bord d'actionneur commandé (40), et dans laquelle les moyens de mise en forme (13) sont construits pour régler une longueur du bord d'actionneur pouvant être commandé (40).

4. Pièce de jeu (10, 20) selon la revendication 3, comprenant en outre un matériau étirable pour recouvrir les faces extérieures du squelette.

5. Pièce de jeu (10, 20) selon la revendication 4, dans laquelle le matériau étirable est fixé aux noeuds (32) seulement.

6. Pièce de jeu (10, 91) selon la revendication 4, dans laquelle le squelette enferme une cavité (92).

7. Pièce de jeu (10, 91) selon la revendication 6, dans laquelle la cavité (92) comprend les moyens de mise en forme (13).

8. Pièce de jeu (10, 20) selon la revendication 1, dans laquelle le segment pouvant être mis en forme (11) comprend au moins un canal (110), des parois d'au moins une partie du canal (110) comprenant une paire d'électrodes (113, 114), les moyens de mise en forme (13) comprenant une source de tension pour appliquer une différence de tension entre les électrodes (113, 114) d'au moins une paire d'électrodes (113, 114) pour la contraction ou l'étirement du canal correspondant (110).

9. Pièce de jeu (10, 20) selon la revendication 8, dans laquelle les parois comprennent un matériau élastique pour remettre le canal correspondant (110) dans sa forme d'origine après l'élimination de la différence de tension appliquée.

10. Pièce de jeu (10, 20) selon la revendication 8, dans laquelle les parois comprennent un matériau électriquement isolant pour empêcher le contact électrique entre les électrodes de l'au moins une paire.

11. Pièce de jeu (10, 20) selon la revendication 8, dans laquelle les parois comprennent une couche de polymère.

12. Pièce de jeu (10, 20) selon la revendication 8, dans laquelle une section transversale d'au moins un canal de la pluralité de canaux est hexagonale.

13. Pièce de jeu (10, 20) selon la revendication 8, dans laquelle le segment pouvant être mis en forme (11) comprend une pluralité des canaux (10), des parois de chaque canal (110) de la pluralité de canaux (110) comprenant une paire correspondante d'électrodes (113, 114) et dans laquelle les moyens de mise en forme (13) sont construits pour appliquer la différence de tension entre les électrodes (113, 114) de chaque paire d'électrodes (113, 114) indépendamment.

14. Système pour jouer des jeux de société à plateau, comprenant :

- au moins une pièce de jeu (10, 20) selon la revendication 1,
- un plateau de jeu (16) pour supporter l'au moins une pièce de jeu (10, 20),
- l'unité de commande extérieure (17) destinée à envoyer le signal d'entrée à l'entrée (12) de l'au moins une pièce de jeu (10, 20).

15. Système pour jouer des jeux de société à plateau selon la revendication 14, dans lequel :

- la pièce de jeu (10, 20) comprend une sortie (14) destinée à envoyer des informations de pièce de jeu à l'unité de commande extérieure (17), les informations de pièce de jeu comprenant au moins un parmi le groupe constitué de : une identification pour indiquer la pièce de jeu, un positionnement pour indiquer une position de la pièce de jeu (10, 20) et une sortie de capteur pour indiquer des informations détectées par la pièce de jeu (10, 20), et
- l'unité de commande extérieure (17) est agencée pour recevoir les informations de pièce de jeu et pour fournir le signal d'entrée sur la base des informations de pièce de jeu.

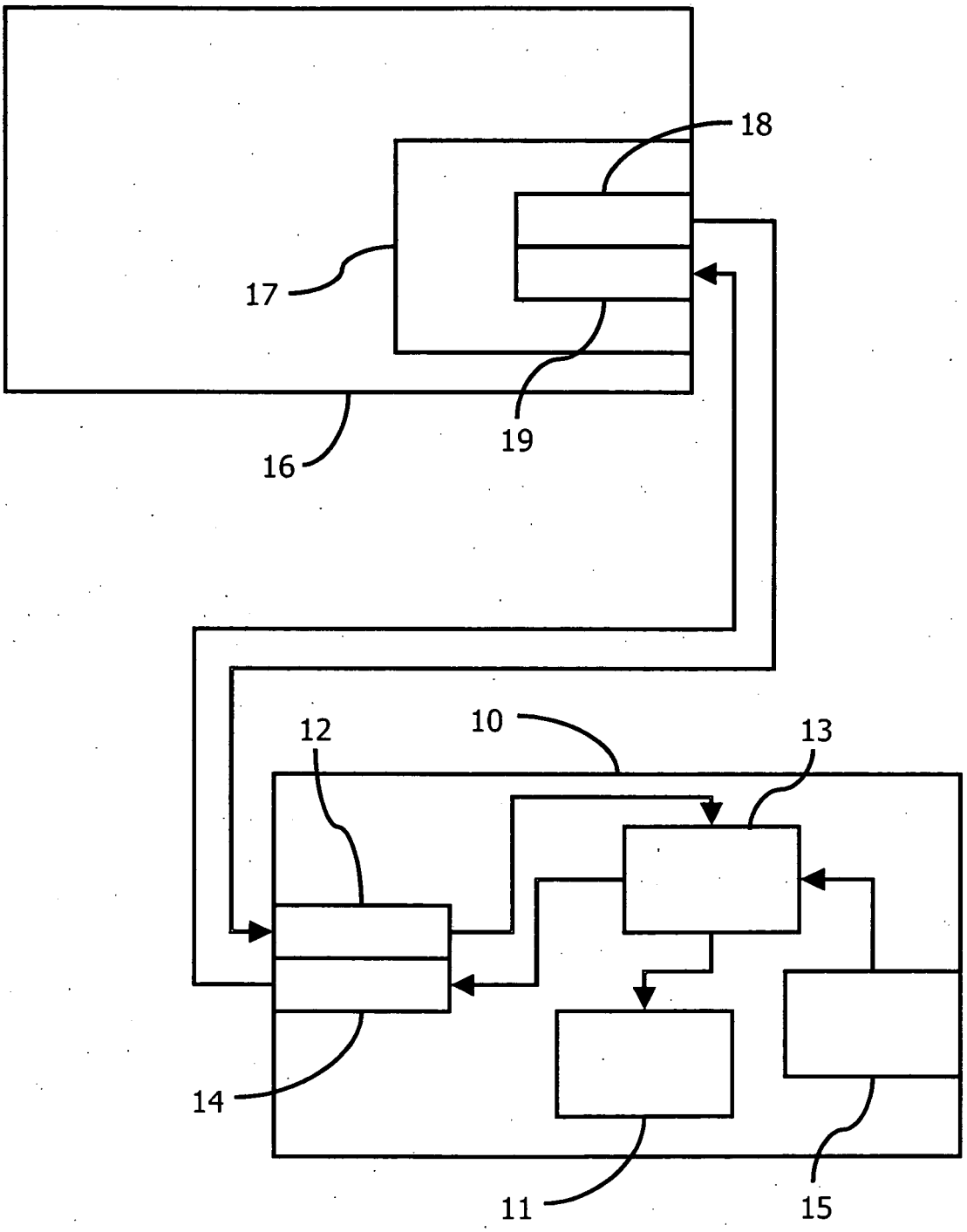

FIG. 1

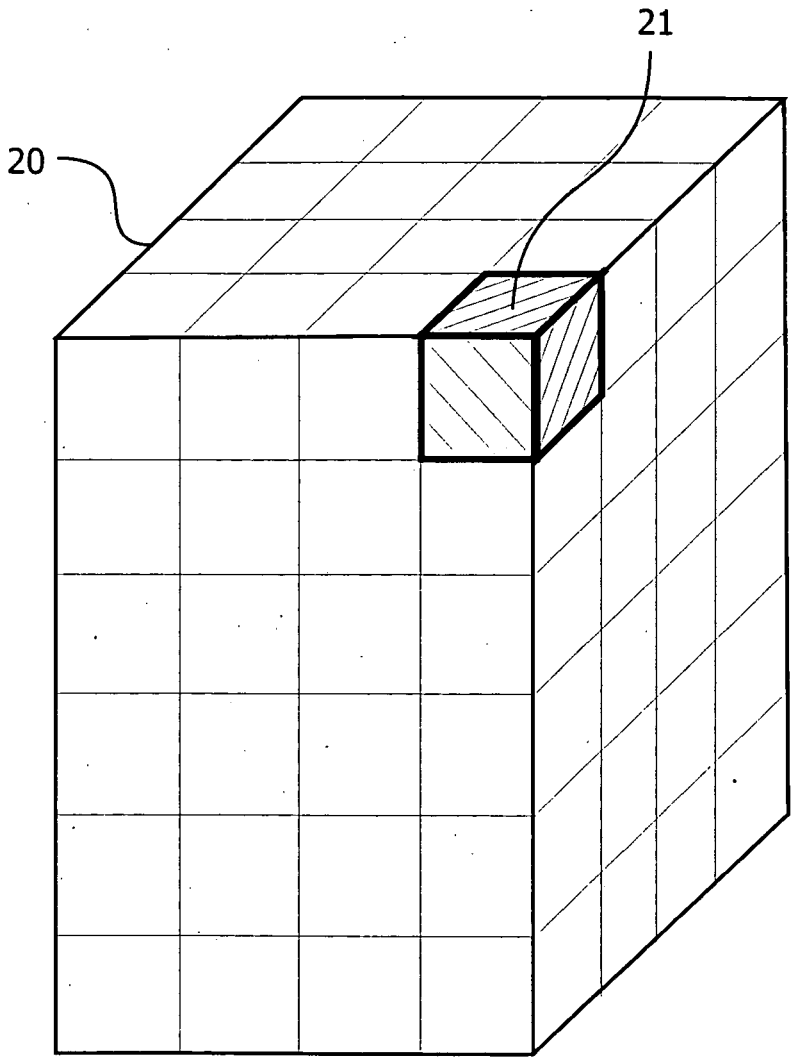

FIG. 2

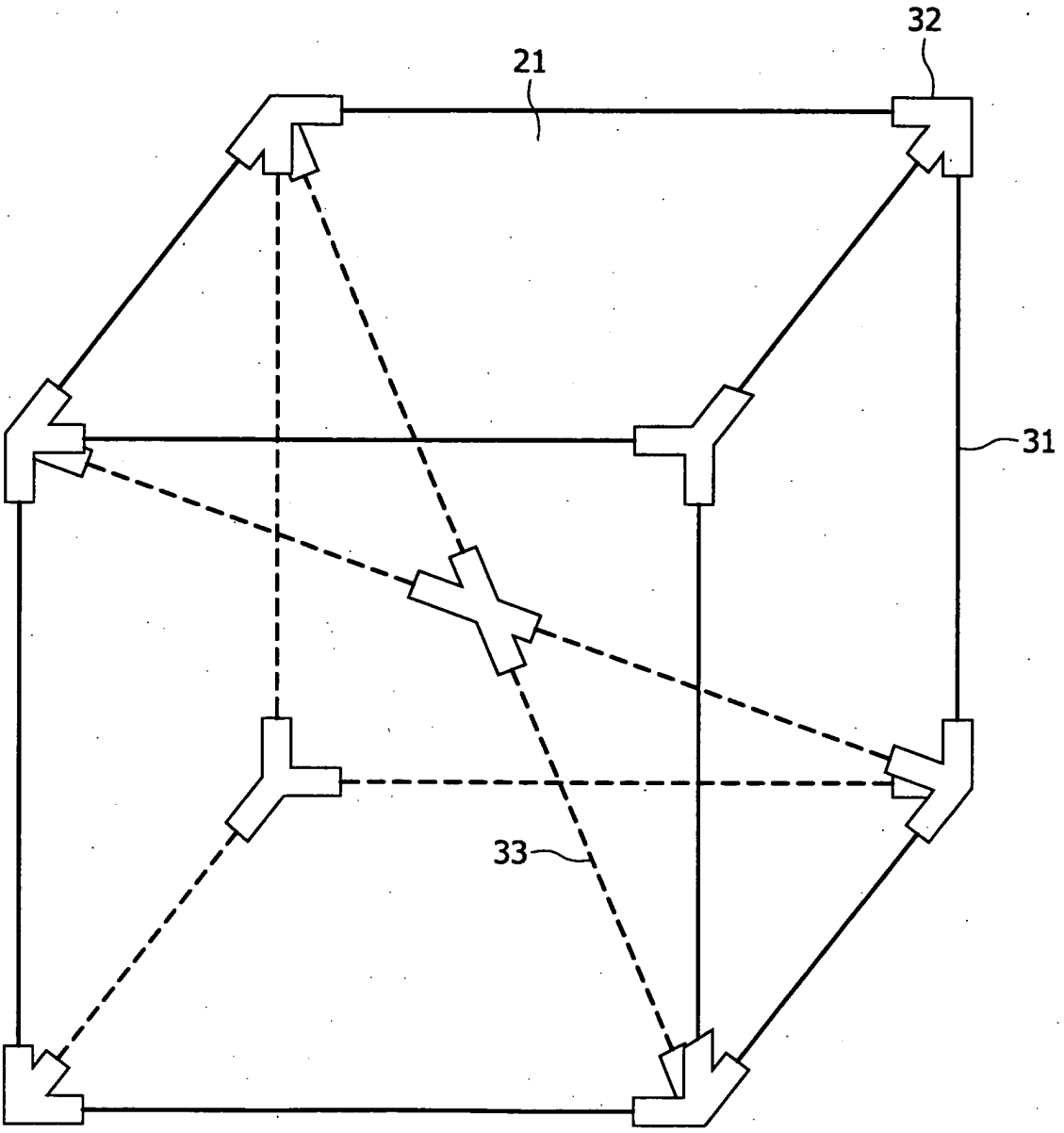

FIG. 3

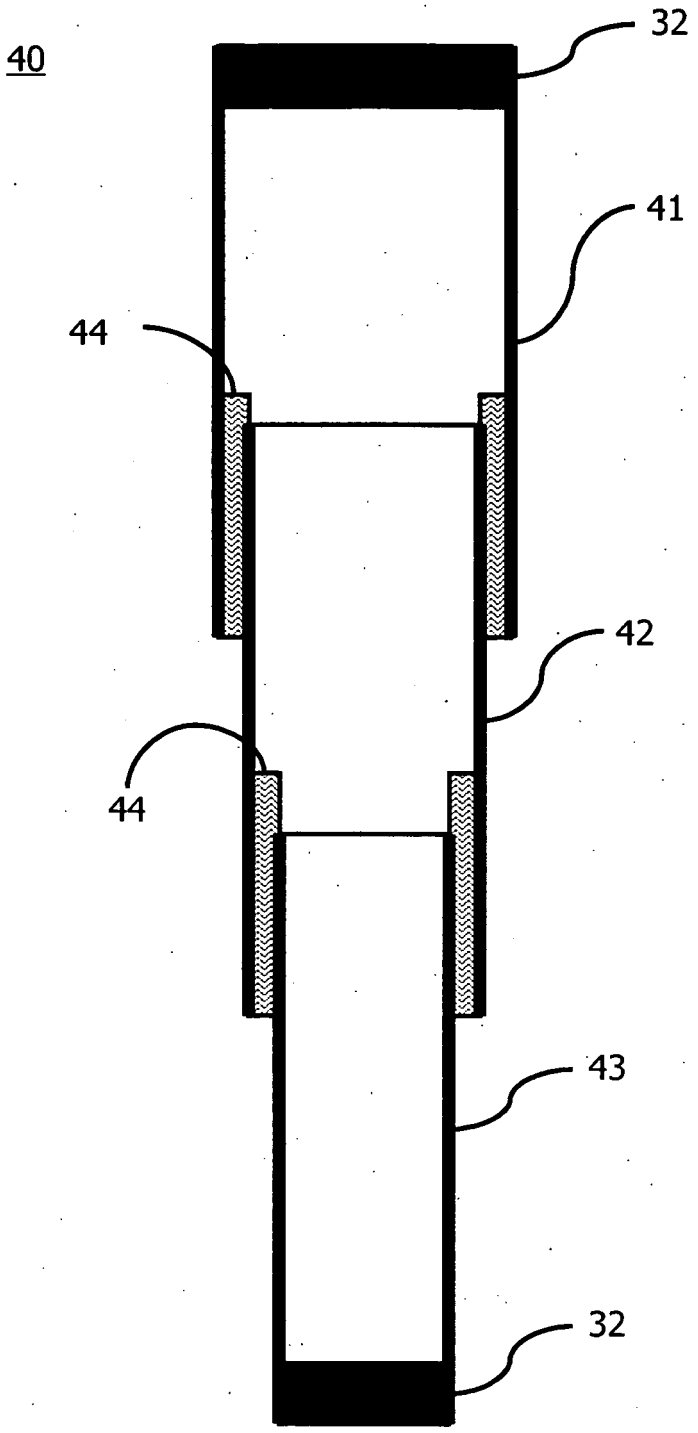

FIG. 4

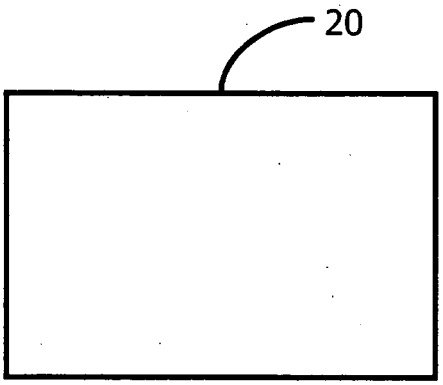

FIG. 5a

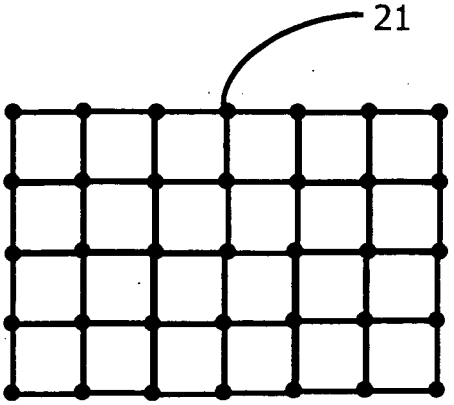

FIG. 5b

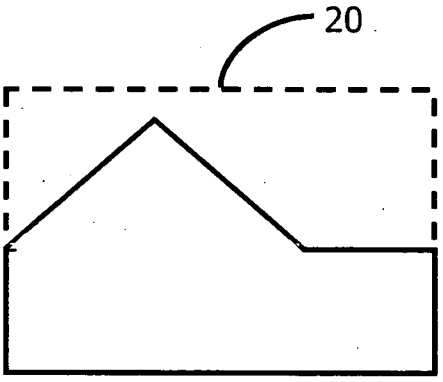

FIG. 5c

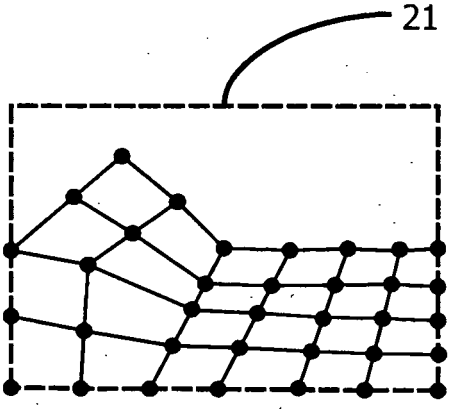

FIG. 5d

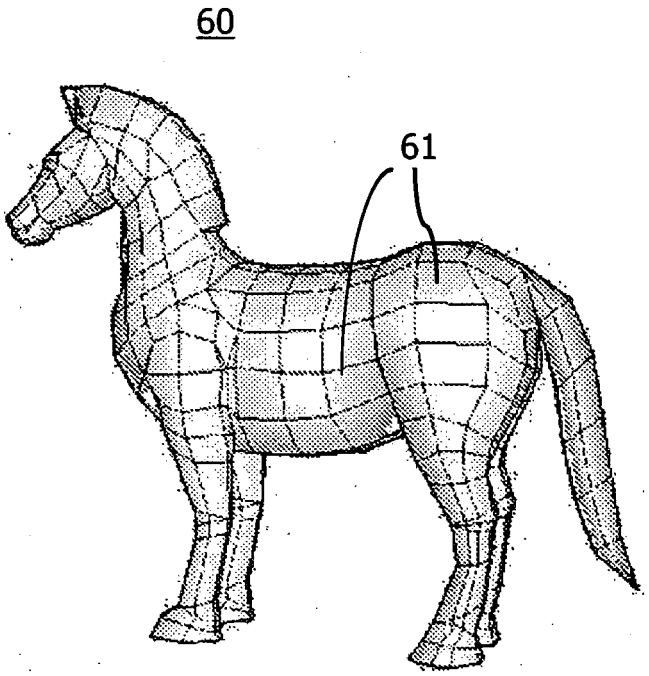

FIG. 6

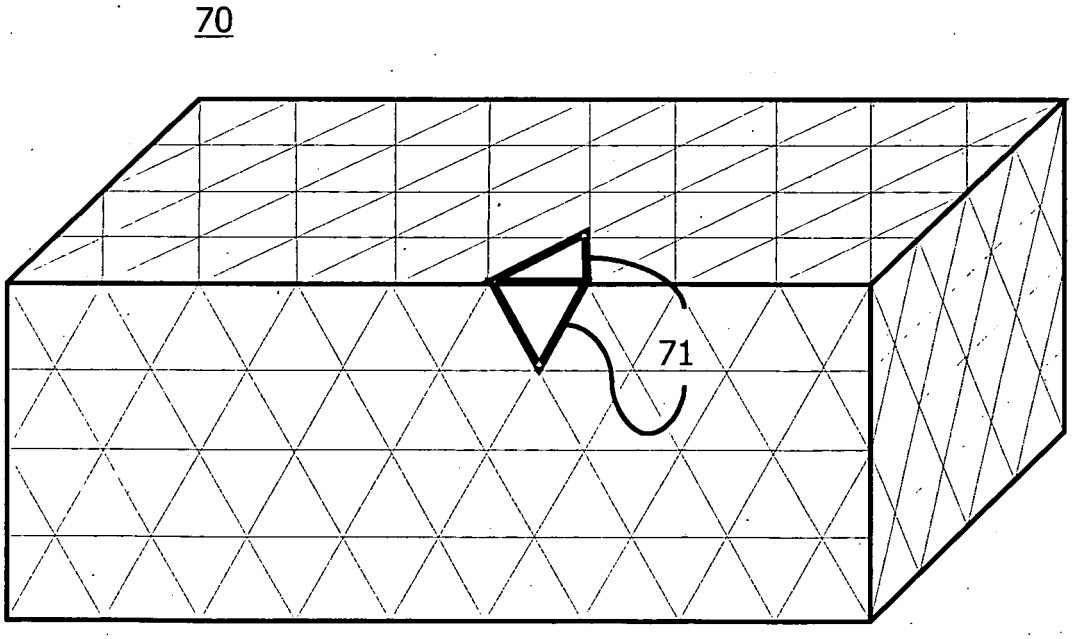

FIG. 7

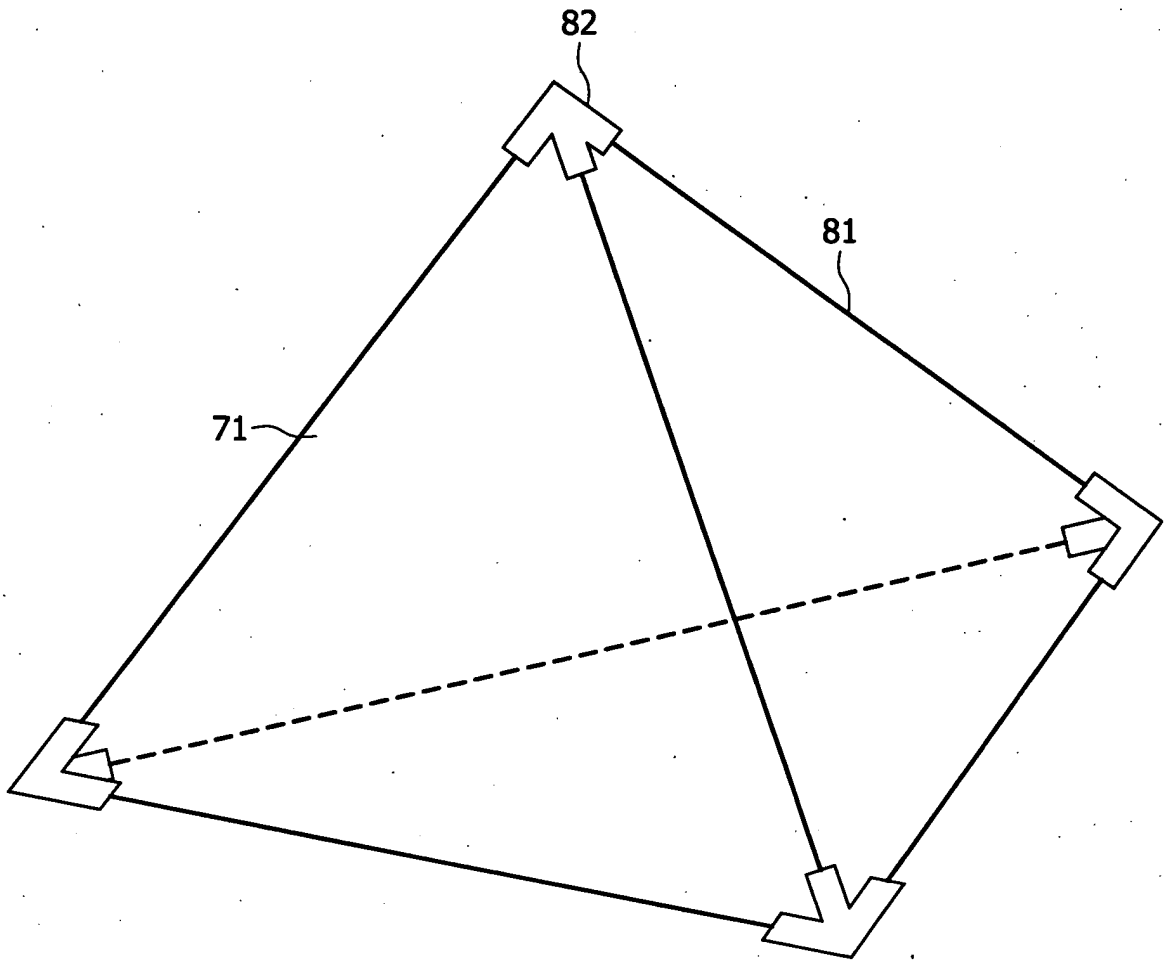

FIG. 8

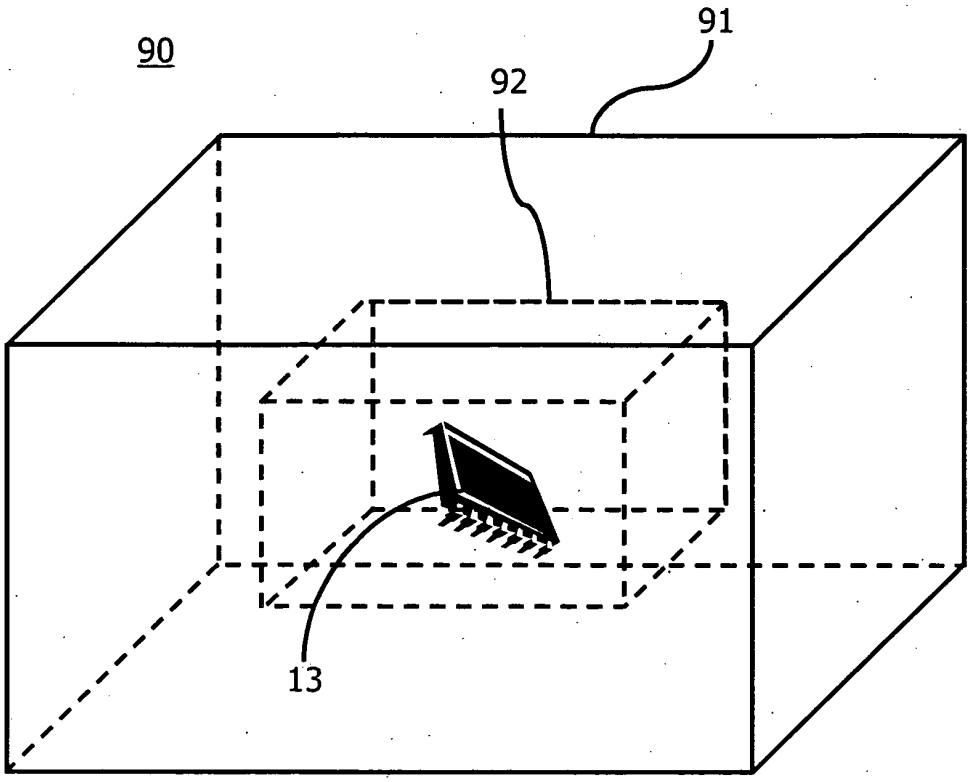

FIG. 9

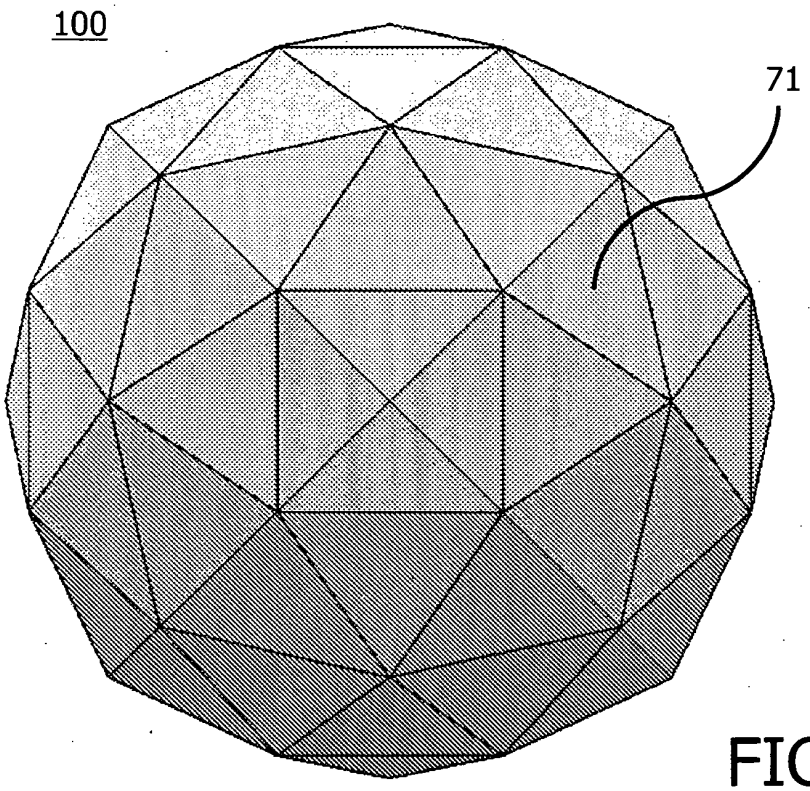

FIG. 10

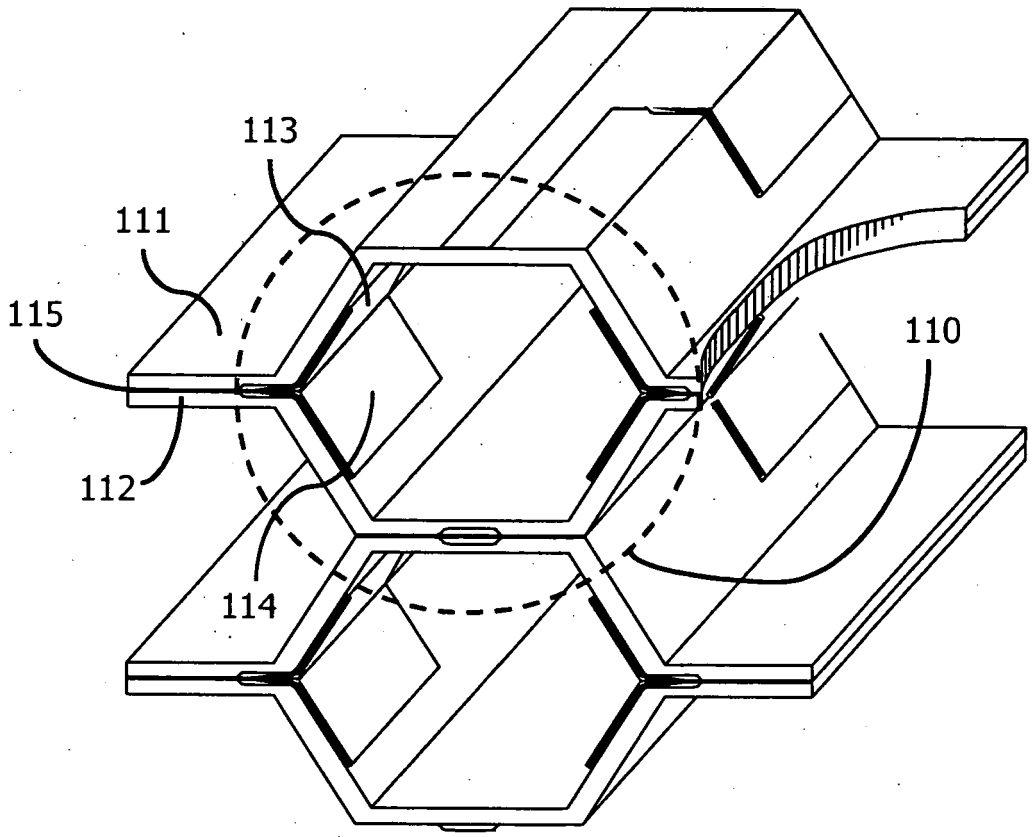

FIG. 11

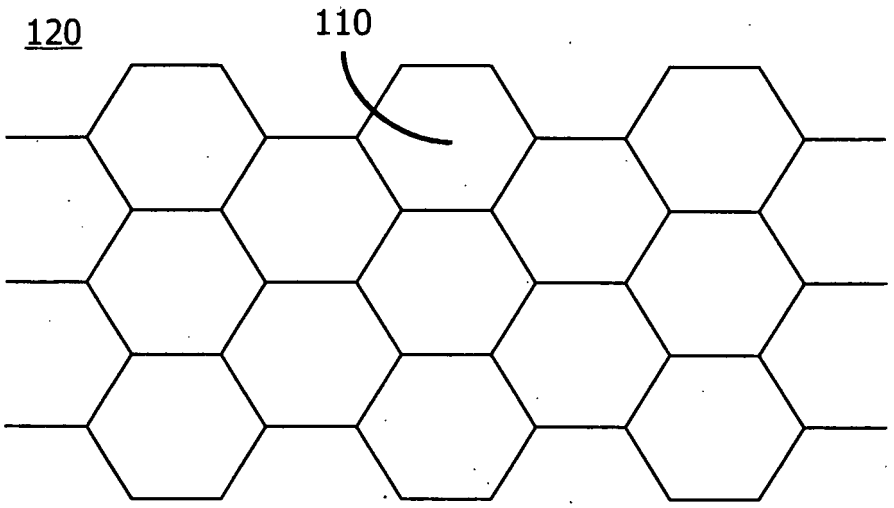

FIG. 12a

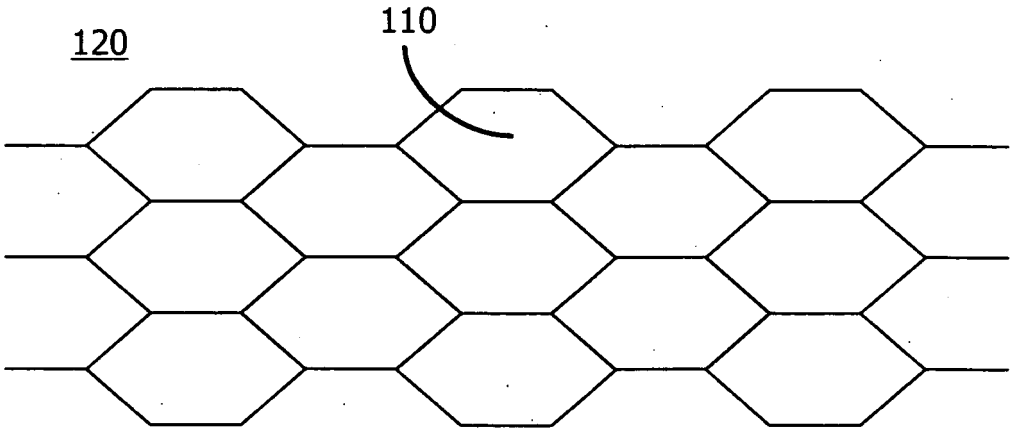

FIG. 12b

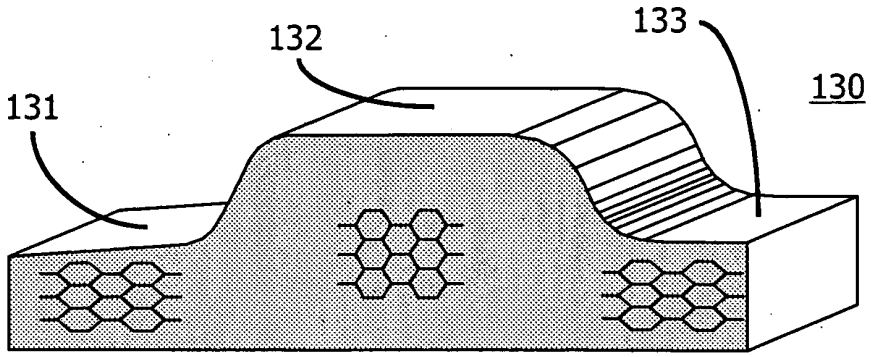

FIG. 13a

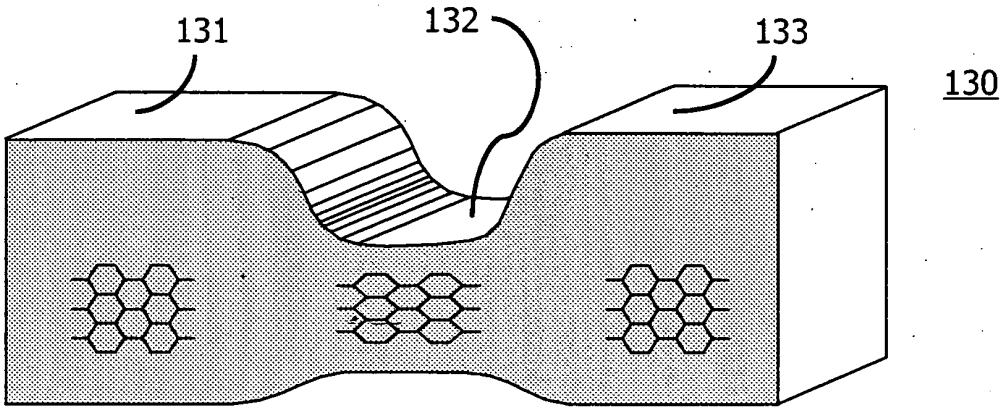

FIG. 13b

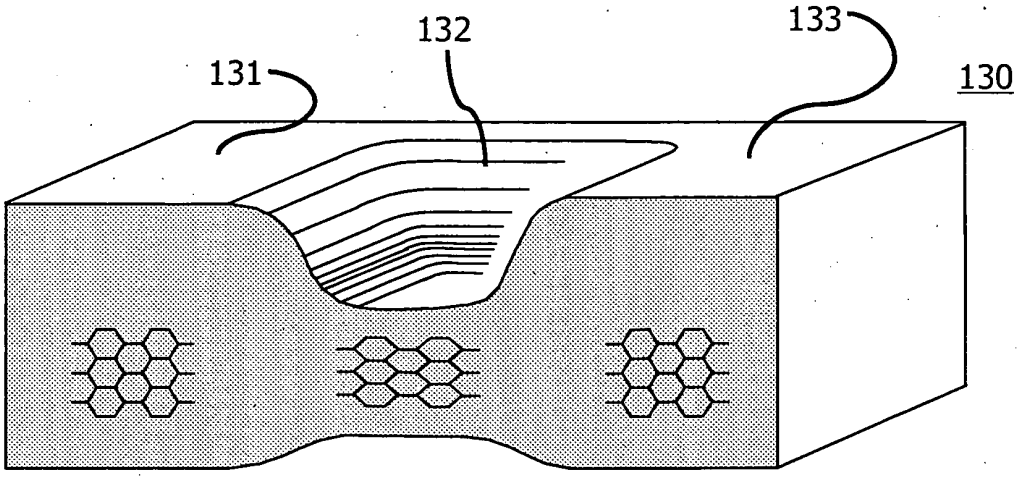

FIG. 13c

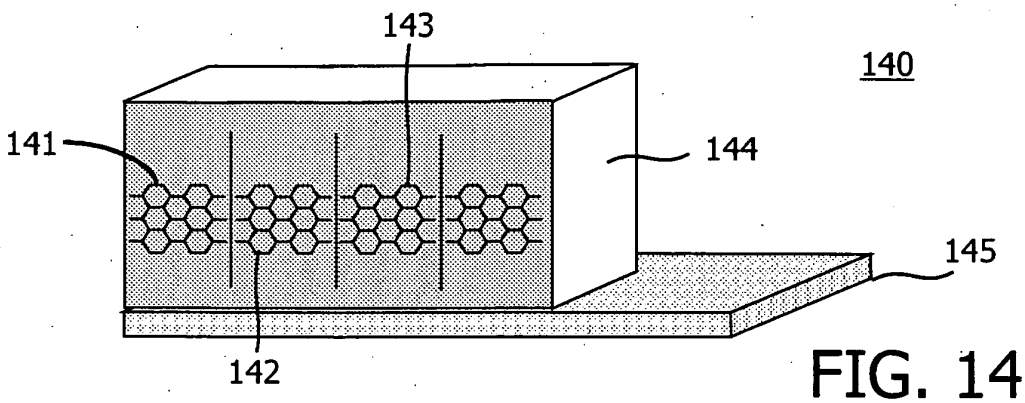

FIG. 14a

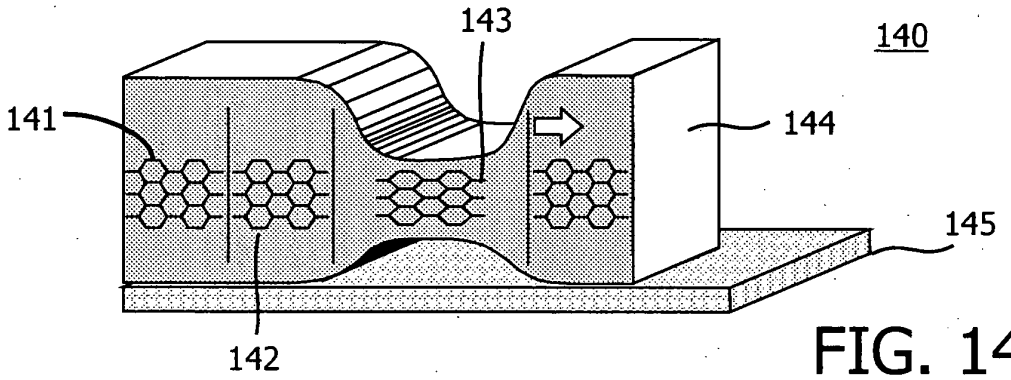

FIG. 14b

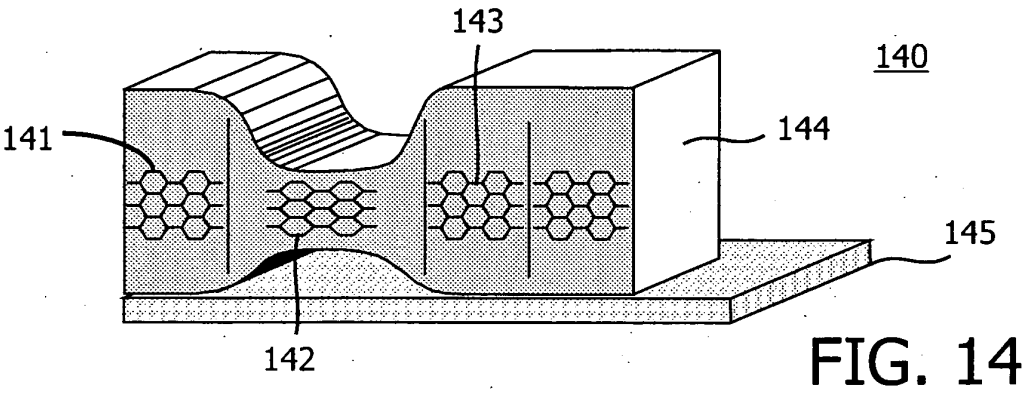

FIG. 14c

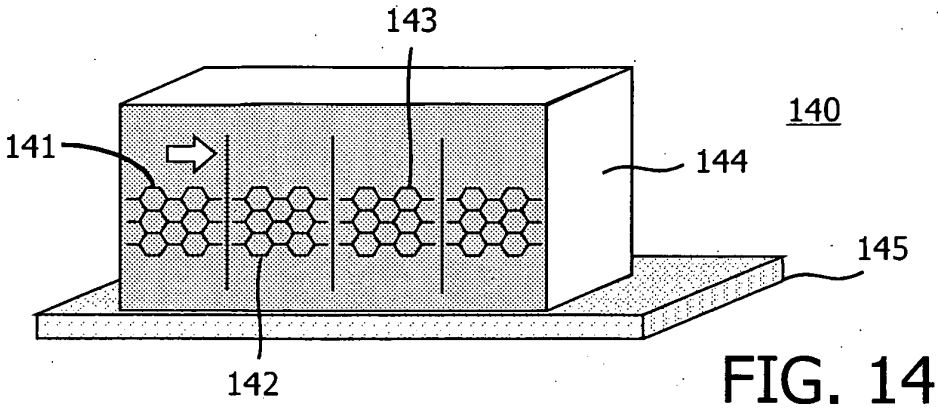

FIG. 14d

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 05103952 A **[0003]**
- FR 2848871 A **[0005]**