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# (54) SYSTEM OF BRICK WITH ROD FOR RETAINING WALL

AUS ZIEGEL UND STANGE BESTEHENDES SYSTEM FÜR STÜTZMAUER

SYSTÈME DE BRIQUE À BARRE POUR MUR DE SOUTÈNEMENT

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(56) References cited:
**EP-A2- 0 872 607**
**DE-A1- 10 340 596**
**DE-U1- 8 104 628**
**JP-A- 4 146 330**
**US-B1- 6 578 338**
**WO-A1-2004/001151**
**DE-U1- 8 104 628**
**GB-A- 2 105 383**
**JP-A- 2001 241 055**



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## Description

### BACKGROUND OF THE INVENTION

### 1. FIELD OF THE INVENTION

**[0001]** The present invention is related to the field of construction of inclined walls with bricks which interlock horizontally and vertically.

**[0002]** In the field of the present invention, walls have been described that are constructed with bricks having protuberances and cavities which interlock horizontally and vertically with the objective of reducing the use of adhesives or mortar. Bricks with protuberances and cavities which interlock horizontally and vertically have also been described with the aim of constructing walls with high lateral resistance to uniform and cyclic forces of nature. However, a system of bricks and rods has not been described for the construction of inclined walls in which there are no need for adhesive or mortar, which results in walls with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic and gravitational forces.

### 2. DESCRIPTION OF PRIOR ART

**[0003]** In the prior art construction of walls have been described using bricks with protuberances and cavities that interlock horizontally and vertically resulting in walls in which the use of adhesive or mortar is reduced, with high resistance to uniform and cyclic forces of nature.

**[0004]** Specifically, Nanayakkara describes in his patents, U.S. No. 6,550,208 B2 (April 22, 2003), U.S. No. 6,105,330 (August 22, 2000), y U.S. No. 6,578,338 B1 (June 17, 2003), bricks or blocks with a system of horizontal and vertical interlocks, with reduction in the use of mortar, resulting in walls with high lateral resistance to natural uniform and cyclic forces. U.S. patent No. 6,550,208 B2 describes a brick having external positive and negative geometries that are complementary, and a continuous vertical cavity, resulting in horizontal and vertical interlocks between adjacent bricks for construction of walls which would have continuous vertical cavities.

**[0005]** The Nanayakkara's patents do not describe a brick or block like the one described in the system of brick with rod of the present invention. The brick or block described in Nanayakkara's patents is not adequate for inclined walls. Nanayakkara does not describe a brick with perforations or holes that are specifically adapted to the diameter of a rod which function is to reinforce the interlocks formed by the protuberances and cavities of the horizontally and vertically adjacent bricks of a wall.

**[0006]** The inventor of the present invention, in the Colombia Patent Application No. 06-049234 (May 23, 2006), describes a brick with perforations or holes that are specifically adapted to the diameter of rods which function is to reinforce the interlocks formed by the protuberances and cavities of the horizontally and vertically adjacent bricks of a wall.

**[0007]** However, in the prior art, there has not been described a system of brick with rod that allows the construction of inclined walls. The system of brick with rod of the present invention permits the construction of inclined walls, as for example, retaining walls with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic and gravitational forces.

**[0008]** JP 4-146330 is regarded as the closest prior art and describes a concrete block having interlocking projecting threads and interlocking recessed grooves formed in the vertical ends and longitudinal sides. The block also has through holes extending between longitudinal sides of the block for receiving steel reinforcements.

DESCRIPTION OF THE INVENTION

**[0009]** The present invention provides a system of brick and rod, wherein the system is characterized by a rectangular tridimensional brick to build walls, wherein the brick is defined by the three Cartesian coordinates X, Y, Z, wherein the horizontal axis X defines length, the vertical axis Y defines height, the horizontal axis Z defines width, and wherein the brick is a solid block comprising:

a. a superior horizontal surface and a inferior horizontal surface defined by the X and Z axis;

b. a vertical anterior surface and a vertical posterior surface defined by the Z and Y axis;

c. two vertical lateral surfaces defined by the X and Y axis;

d. a protuberance of positive geometry that is originated on the brick's vertical anterior surface in direction of the X axis, and with an axis between the superior horizontal surface and the inferior horizontal surface with an inclination angle between 1° and 45° in relation to the Y axis, wherein said protuberance interlocks precisely with an horizontally adjacent block with the cavity described in **e.**;

e. a cavity of negative geometry that is originated on the brick's vertical posterior surface in direction of the X axis, and with an axis between the superior horizontal surface and the inferior horizontal surface with an inclination angle between 1° and 45° in relation to the Y axis, wherein said cavity interlocks precisely with an horizontally adjacent brick with the protuberance described in **d.**;

f. two protuberances of positive geometry located on the brick's superior horizontal surface in direction of an axis with an inclination angle between 1° and 45° in relation to the Y axis, wherein said protuberances interlock precisely with vertically adjacent blocks

with the cavities described in **g**.;

g. two cavities of negative geometry located symmetrically on the inferior horizontal surface in direction of an axis with an inclination angle between 1° and 45° in relation to the Y axis, wherein said cavities interlock precisely with vertically adjacent blocks with the protuberances described in f.;

h. two cylindrical holes which perforate entirely the brick, wherein the span of said holes, in direction of an axis with an inclination angle between 1° and 45° in relation to the Y axis, is defined from the positive geometry superior border of the protuberances described in **f**. to the negative geometry superior border of the cavities described in **g.**; and wherein these holes and the identical holes of vertically adjacent brick's in a wall are aligned in direction of an axis with an equal inclination angle in the wall, to form inclined continuous holes that go throughout the height of the wall; and wherein said holes have a diameter which fits the diameter of a rod such that the rod can be introduced through the continuous hole that goes throughout the height of the wall;

**[0010]** and wherein resistant interlocks are created between vertically and horizontally adjacent bricks to build an inclined wall which allows the introduction of an skeleton constituted by a plurality of rods thus resulting in a structure with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic and gravitational forces.

**[0011]** In one further aspect of the present invention, the brick has two additional holes, wherein the first of these two additional holes is a cylindrical hole which perforates entirely the brick, wherein the span of the first additional hole, in direction of an axis with an inclination angle between 1° and 45° in relation to the Y axis, is defined from the brick's superior horizontal surface to the brick's inferior horizontal surface; and wherein the first additional hole is located in parallel between the two holes described in h.; and wherein the second of these two additional holes is a vertical cylindrical hole which perforates entirely, in direction of an axis with an inclination angle between 1° and 45° in relation to the Y axis, the protuberance described in d., wherein the span of the second additional hole is defined from the center of said protuberance's superior horizontal surface to the center of said protuberance's inferior horizontal surface; and wherein the first additional hole and the second additional hole are of equal diameter, and wherein the first additional hole and the second additional hole of vertically adjacent bricks are aligned in direction of an axis with an equal inclination axis in a wall, to form an inclined continuous hole that goes throughout the height of a the wall; and wherein these two additional holes have a diameter that fits the diameter of a rod such that the rod can be introduced through the continuous hole that goes throughout the height of the wall.

**[0012]** In another aspect of the present invention, the system is characterized by a rod, wherein the span of the rod is equal or exceeds the span of the wall's height; and wherein the rod is vertically introduced through the continuous holes of the wall.

**[0013]** In another aspect of the present invention, the system is characterized by a rod, wherein the rod is a composed rod that comprises rod fragments wherein each rod fragment's span is equal to one and a half times the span of the brick's height, and wherein each rod fragment is formed by three parts defined as first part, second part and a third part; wherein the three parts have exactly the same span such that each part has a span equal to one third the span of the rod fragment; wherein the first part is at one rod fragment's end; and wherein the first part is hollow with internal thread thus constituting the part that functions as female screw of the rod fragment; and wherein the second part is the middle of the rod fragment between the first part and the third part; and wherein the second part is solid; and wherein the third part is solid with external thread; and wherein the third part is located at the end opposite to the end constituted by the first part; and wherein the third part is the part that functions as male screw of the rod fragment; and wherein the first part of a rod fragment interlocks with the third part of another identical rod fragment, and wherein a plurality of identical rod fragments that have successively been interlocked form the composed rod.

**[0014]** In another aspect of the present invention, the system is characterized by a rod, wherein the rod is a composed rod that comprises rod fragments wherein each rod fragment's span is equal to one and a half times the span of the brick's height, and wherein each rod fragment is formed by three parts defined as first part, second part and a third part; wherein the three parts have exactly the same span such that each part has a span equal to one third the span of the rod fragment; wherein the first part is at one rod fragment's end; and wherein the first part is hollow with an internal diameter that fits the external diameter of the third part; and wherein the first part is the female part of the rod fragment; and wherein the second part is in the middle of the rod fragment between the first part and the third part; and wherein the second part is solid; and wherein the third part is solid with an external diameter that fits the internal diameter of the first part; and wherein the third part is located at the end opposite to the end constituting the first part; and wherein the third part is the male part of the rod fragment; and wherein the first part of a rod fragment interlocks with the third part of another identical rod fragment, and wherein a plurality of identical rod fragments that have successively been interlocked form the composed rod.

**[0015]** In a second version of the present invention, the system of brick and rod is according to claim 6 and in a first aspect of said second version, the brick is characterized by a symmetrical protuberance of positive geometry that is originated in the middle of the brick's ver-

tical anterior surface in direction of the X axis, wherein said protuberance interlocks precisely with a horizontally adjacent block with the cavity of the posterior vertical surface.

**[0016]** In another aspect of the second version of the present invention, the brick is characterized by a symmetrical cavity of negative geometry that is originated in the middle of the brick's vertical posterior surface in direction of the X axis, wherein said cavity interlocks precisely with a horizontally adjacent block with the protuberance of the brick's vertical anterior surface.

**[0017]** In an additional aspect of the second version of the present invention, the brick is characterized by two protuberances of positive geometry located on the brick's superior horizontal surface in direction of the Y axis, wherein said protuberances interlock precisely to vertically adjacent blocks with the cavities of the inferior horizontal surface.

**[0018]** In one further aspect of the second version of the present invention, the brick is characterized by two cavities of negative geometry located on the inferior horizontal surface in direction of the Y axis, wherein said cavities interlock precisely with vertically adjacent blocks with the protuberances of the superior horizontal surface.

**[0019]** In another aspect of the second version of the present invention, the brick is characterized by two cylindrical holes that perforate entirely the brick, wherein the span of said holes, in direction of an axis with an inclination angle between 1° and 45° in relation to the Y axis, is defined from the border of the protuberances' positive geometry of the superior horizontal surface to the border of the cavities' negative geometry of the inferior horizontal surface; and wherein these holes and the identical holes of the vertically adjacent bricks in a wall are aligned in direction of an axis with an equal inclination angle in the wall, to form continuous inclined holes that go throughout the height of the wall; and wherein said holes have a diameter that fits the diameter of a rod such that the rod can be introduced trough the continuous hole that goes throughout the height of the wall;

**[0020]** and wherein resistant interlocks are created between the vertically and horizontally adjacent bricks to build a wall that allows the introduction of a skeleton constituted by a plurality of rods thus resulting in a structure with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic, and gravitational forces.

**[0021]** In a third version which is not part of the presently claimed invention, the brick is a tridimensional block to build walls, wherein the block is characterized by two lateral vertical surfaces defined by the X and Y axis; wherein the first lateral vertical surface is a convex surface; and wherein the second vertical lateral surface is a concave surface; and wherein the first lateral surface and the second lateral surface are parallel.

**[0022]** In one aspect of the third version, the brick is characterized by a symmetrical protuberance of positive geometry that is originated in the middle of the brick's vertical anterior surface in direction of the X axis, wherein said protuberance interlocks precisely with a horizontally adjacent block with the cavity of the vertical posterior surface.

**[0023]** In another aspect of the third version, the brick is characterized by a cavity of negative geometry that is originated in the middle of the brick's vertical posterior surface in direction of the X axis, wherein said cavity interlocks precisely with a horizontally adjacent brick with the protuberance of the vertical anterior surface.

**[0024]** In another additional aspect of the third version, the brick is characterized by two protuberances of positive geometry located symmetrically in the middle of the brick's superior horizontal surface in direction of the Y axis, wherein said protuberances interlock precisely with vertically adjacent blocks with the cavities of the inferior horizontal surface.

**[0025]** In another further aspect of the third version, the brick is characterized by two cavities of negative geometry located symmetrically on the middle of the inferior horizontal surface in direction of the Y axis, wherein said cavities interlock precisely with vertically adjacent blocks with the protuberances of the superior horizontal surface.

**[0026]** In another aspect of the third version, the brick is characterized by two vertical cylindrical holes that perforate entirely the brick, wherein the span of said holes, in direction of the Y axis, is defined from the superior border of the protuberances' positive geometry on the superior horizontal surface to the superior border of the cavities' negative geometry on the inferior horizontal surface; and wherein these holes and identical holes of the vertically adjacent bricks in a wall are aligned in direction of the vertical axis in the wall to form continuous vertical holes that go throughout the height of the wall;

**[0027]** and wherein resistant interlocks are created between vertically and horizontally adjacent bricks to build a wall with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic and gravitational forces.

**[0028]** In another further aspect of the third version, the brick is characterized by two vertical cylindrical holes that perforate entirely the brick, wherein the span of said holes, in direction of the Y axis, is defined from the superior border of the protuberances' positive geometry on the superior horizontal surface to the superior border of the cavities' negative geometry on the inferior horizontal surface; and wherein these holes and identical holes of the vertically adjacent bricks in a wall are aligned in direction of the vertical axis in the wall to form vertical continuous holes that go throughout the height of the wall; and wherein said holes have a diameter that fits the diameter of identical rods such that the rods can be introduced trough the continuous holes that go throughout the height of the wall; and wherein resistant interlocks are created between vertically and horizontally adjacent bricks to build a wall that allows the introduction of a skeleton constituted by a plurality of vertical rods ; and wherein said wall is a structure with great rigidity and lateral resistance, and great resistance to extreme uniform, cy-

clic and gravitational forces.

**[0029]** In another further aspect of the third version, the brick is characterized by two additional holes, wherein the first of these two additional holes is a cylindrical hole that perforates entirely the brick, wherein the span of the first additional hole, in direction of the Y axis, is defined from the brick's superior horizontal surface to the brick's inferior horizontal surface; and wherein the first additional hole is located in parallel between the two holes that go from the protuberances of the superior horizontal surface to the cavities of the inferior horizontal surface; and wherein the second of these two additional holes is a vertical cylindrical hole that perforates entirely, in direction of the Y axis, the protuberance of the vertical anterior wall, wherein the span of the second additional hole is defined from the center of the superior horizontal surface of the protuberance of the vertical anterior wall to the center of the inferior horizontal surface of the protuberance of the vertical anterior wall; and wherein the first additional hole and the second additional hole have equal diameter, and wherein the first additional hole and the second additional hole of vertically adjacent bricks are aligned in direction of a vertical axis in a wall, to form a continuous vertical hole that goes throughout the height of the wall; and wherein these two additional holes have a diameter that fits the diameter of identical rods such that the rods can be introduced trough the continuous holes that go throughout the height of the wall; an wherein resistant interlocks are created between vertically and horizontally adjacent bricks to build a wall that allows the introduction of a skeleton constituted by a plurality of vertical rods; and wherein said wall is a structure with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic and gravitational forces.

**[0030]** In another further aspect of the third version the brick is characterized by a 90 degree right angle channel on the two edges, in direction of the Y axis, of the vertical anterior surface; a 90 degree right angle channel on the two edges, in direction of the Y axis, of the vertical posterior surface, a 90 degree right angle channel on the two edges, in direction of the X axis, of the superior horizontal surface; and a 90 degree right angle on the two edges, in direction of the X axis, of the inferior horizontal surface.

**[0031]** Objectives and additional advantages of the present invention will become more evident in the description of the figures, the detailed description of the invention and the claims.

Preferred embodiments of the invention will now be described, by way of example only, and with reference to the accompanying drawings in which:

**[0032]** **FIGURE 1**. is a tridimensional view of one embodiment of a brick suitable for use in the system of the present invention.

**[0033]** **FIGURE 2**. is a tridimensional view of one embodiment of a brick suitable for use in the system suitable for use in the system of the present invention, in which bricks interlocked vertically and horizontally are observed.

**[0034]** **FIGURE 3**. is a view of a bi-dimensional plane of the brick suitable for use in the system of the present invention, In which a sagittal plane at the level of the inclined holes of the brick is observed.

**[0035]** **FIGURE 4.** is a tridimensional view of two embodiments of a brick suitable for use with the present invention.

**[0036]** **FIGURE 5**. is a tridimensional view of two embodiments of a brick suitable for use with the present invention.

**[0037]** **FIGURE 6**. is a tridimensional view of one embodiment of a brick suitable for use in the system of the present invention.

**[0038]** **FIGURE 7**. is a tridimensional view of one embodiment of a brick suitable for use in the system of the present invention, in which bricks interlocked vertically and horizontally are observed.

**[0039]** **FIGURE 7A** is a tridimensional figure of an embodiment of brick suitable for use in the system of the present invention, in which bricks interlocked vertically and horizontally are observed; wherein a rod going through the height of a wall is also seen; and wherein the rod is attached to a cable which function is to anchor the wall.

**[0040]** **FIGURE 8**. is a tridimensional view of two embodiments of a brick suitable for use with the present invention.

**[0041]** **FIGURE 9**. is a tridimensional view of two embodiments of a brick suitable for use with the present invention.

**[0042]** **FIGURE 10**. is a tridimensional view of the second version of a brick suitable for use in the system of the present invention.

**[0043]** **FIGURE 11**. is a tridimensional view of the second version of a brick suitable for use in the system of the present invention, in which bricks interlocked vertically and horizontally are observed.

**[0044]** **FIGURE 12**. is a view of bi-dimensional plane of the second version of a brick suitable for use in the system of the present invention, in which a sagittal plane at the level of the inclined holes of the brick is observed.

**[0045]** **FIGURE 13**. is a tridimensional view of two embodiments of a second version of a brick suitable for use with the present invention.

**[0046]** **FIGURE 14**. is a tridimensional view of two embodiments of a second version of a brick suitable for use with the present invention.

**[0047]** **FIGURE 15**. shows a bi-dimensional view of the first and second version of the system of brick with rod of the present invention, in which a sagittal plane at the level of the inclined holes of the brick can be observed. This figure also shows tridimensional representations of three versions of fragment rods of the present invention.

**[0048]** **FIGURE 16**. shows a view of a bi-dimensional plane of the first and second version of the system of brick with rod of the present invention, in which three bricks interlocked vertically with rods that go through the continuous inclined holes can be observed.

**[0049]** **FIGURE 17**. is a tridimensional view of two embodiments of the third version of the brick which does not from part of the presently claimed invention.

**[0050]** **FIGURE 18**. is a tridimensional view of two embodiments of the third version of the brick.

**[0051]** **FIGURE 19**. shows a bi-dimensional view of a plane that cross at the transversal level a wall built with the third version.

**[0052]** **FIGURE 20**. shows a bi-dimensional view of a sagittal plane that cross at the level of one of the protuberances on the superior horizontal surface and one of the cavities on the inferior horizontal surface of the third version of the brick.

**[0053]** **FIGURE 1**. shows a tridimensional view of an embodiment of the brick of the present invention. The brick is defined, as it is shown in **FIGURE 4.**, by the three Cartesian coordinates X, Y, Z, wherein the horizontal axis X defines length, the vertical axis Y defines height, the horizontal axis Z defines width.

**[0054]** The brick has a superior horizontal surface **(1) (FIGURE 1. y 3.),** a inferior horizontal surface **(2)(FIGURE 3.**), a vertical anterior surface **(3) (FIGURE 1.),** a vertical posterior surface **(4)(FIGURE 1.**), and two lateral vertical surfaces **(5)(FIGURES 1. y 3.).**

**[0055]** In **FIGURE 1.** shows the first version of the present invention in which it is observed a protuberance of positive geometry **(6)** that is originated on the brick's vertical anterior surface **(3)** in direction of the X axis, and with an axis between the superior horizontal surface and the inferior horizontal surface with an inclination angle **(7)** between 1° and 45° in relation to the Y axis, wherein said protuberance interlocks precisely with a horizontally adjacent block with the cavity **(8)** of the vertical posterior surface **(4).**

**[0056]** The positive geometry of the protuberance can be any appropriate geometrical form. The preferred positive geometry, as it is observed in **FIGURE 1.**, is represented by a protuberance of rounded-convex geometry **(6)** that is originated on the brick's vertical anterior surface **(3)** in direction of the X axis, and with an axis between the superior horizontal surface and the inferior horizontal surface with an inclination angle **(7)** between 1° and 45° in relation to the Y axis, wherein said protuberance interlocks precisely with a horizontally adjacent block with the cavity **(8)** of the vertical posterior surface **(4);** and wherein the base **(9)** of the protuberance in the brick's vertical anterior surface **(3),** defined in the same direction of the Z axis, is of shorter span than the maximum diameter **(10)** of the convex geometry of the protuberance **(6).**

**[0057]** **FIGURE 1.** also shows a cavity of negative geometry **(8)** that is originated on the brick's posterior vertical surface **(4)** in direction of the X axis, and with an axis between the superior horizontal surface **(1)** and the inferior horizontal surface **(2)(FIGURE 3.),** with an inclination angle between 1° and 45° in relation to the Y axis, and wherein said cavity **(8)** interlocks precisely with a horizontally adjacent block with the protuberance **(6)** of the vertical anterior surface **(3).**

**[0058]** The negative geometry of the cavity **(8)** can be any *appropriate geometry form. The preferred negative geometry, as it is observed in **FIGURE 1.,** is represented by a cavity of concave geometry **(8)** that is originated on the brick's posterior vertical surface **(4)** in direction of the X axis, and with an axis between the superior horizontal surface **(1)** and the inferior horizontal surface **(2)** with an inclination angle between 1° and 45° in relation to the Y axis, and wherein said cavity **(8)** interlocks precisely with a horizontally adjacent block with the protuberance **(6)** of the vertical anterior surface **(3);** and wherein the span of the aperture **(11)** of the cavity **(8)** on the brick's vertical posterior surface **(4),** defined in the same direction of the Z axis, is less than the maximum diameter **(12)** of the concave geometry of the cavity **(8).**

**[0059]** **FIGURE 1.** shows the two protuberances **(13)** of positive geometry located on the brick's superior horizontal surface **(1)** in direction of an axis with an inclination angle **(14)(FIGURE 3.)** between 1° and 45° in relation to the Y axis, wherein said protuberances **(13)** interlock precisely with vertically adjacent blocks with the cavities **(14) (FIGURE 3.)** of the inferior horizontal surface **(2).**

**[0060]** The positive geometry of the protuberances **(13)** can be any appropriate geometry form. The preferred positive geometry, as it is observed in **FIGURE 1.,** is represented by two protuberances **(13)** of convex-cylindrical geometry located on the brick's superior horizontal surface **(1)** in direction of an axis with an inclination angle **(14)** between 1° and 45° in relation to the Y axis, wherein said protuberances **(13)** interlock precisely with vertically adjacent blocks with the cavities **(17)** of the inferior horizontal surface **(2);** and wherein the diameter **(15)(FIGURE 3.)** of the base of each protuberance **(13)** on the brick's superior horizontal surface **(1)** is equal to the diameter **(16)(FIGURE 3.)** of the cylindrical part of the protuberance **(13).**

**[0061]** **FIGURE 3.** shows two cavities **(17)** with negative geometry located symmetrically on the inferior horizontal surface **(2)** in direction of an axis with an inclination angle **(14)** between 1° and 45° in relation to the Y axis, wherein said cavities (17) interlock precisely with vertically adjacent blocks with the protuberances (13) of the superior horizontal surface (1).

**[0062]** The negative geometry of the cavities (13) can be any appropriate geometry form. The preferred negative geometry, as it is observed in FIGURE 3., is represented by a cavity (17) with concave-cylindrical geometry located symmetrically on the inferior horizontal surface (2) in direction of an axis with an inclination angle (14) between 1° and 45° in relation to the Y axis, wherein said cavities (17) interlock precisely with vertically adjacent blocks with the protuberances (13) of the superior horizontal surface (1); and wherein the aperture's diameter (18) of each cavity (17) on the brick's inferior horizontal surface (2) is equal to the diameter (19) of the cylindrical part of the cavity **(17).**

**[0063]** **FIGURES 1.** and **3.** show two cylindrical holes **(20)** that perforate entirely the brick, wherein the span of

said holes **(20),** in direction of an axis with an inclination angle **(14)(FIGUR3 3.)** between 1° and 45° in relation to the Y axis, is defined from the superior border **(21)(FIGURE 3.)** of the positive geometry of the protuberances **(13)** of the superior horizontal surface **(1)** to the superior border **(22)(FIGURE 3.)** of the negative geometry of the cavities **(17)** of the inferior horizontal surface; and wherein these holes **(20)** and the identical holes **(20)(FIGURE 3.)** of the vertically adjacent bricks in a wall are aligned in direction of an axis with an equal inclination angle in the wall, to form continuous inclined holes that go throughout the height of the wall; and wherein said holes have a diameter that fits the diameter of a rod such that the rod can be introduced through the continuous hole that goes throughout the height of the wall; and wherein resistant interlocks are created between the horizontally and vertically adjacent bricks to build an inclined wall that allows the introduction of an skeleton constituted by a plurality of rods thus resulting in a structure with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic and gravitational forces.

**[0064]** In **FIGURE 6.** two additional holes **(23)** can be observed, wherein the first of these two additional holes **(23)** is a cylindrical hole that perforates entirely the brick, wherein the span of the first additional hole **(23),** in direction of an axis with an inclination angle between 1° and 45° in relation to the Y axis, is defined from the brick's superior horizontal surface **(1)** to the brick's inferior horizontal surface **(2)**; and wherein the first additional hole **(23)** is located in parallel between the two holes **(20)** that go from the protuberance **(13)** of the superior horizontal surface **(1)** to the cavity of inferior horizontal surface **(2);** and wherein the second of these additional holes **(23)** is a vertical cylindrical hole that perforates entirely, in direction of an axis with an inclination angle between 1° and 45° in relation to the Y axis, the protuberance **(6)** of the vertical anterior surface **(3),** wherein the span of the second additional hole **(23)** is defined from the center of the superior horizontal surface **(1)** of said protuberance **(6)** to the center of the inferior horizontal surface **(2)** of said protuberance **(6)**; and wherein the first additional hole **(23)** and the second additional hole **(23)** are of equal diameter, and wherein the first additional hole **(23)** and the second additional hole **(23)** of vertically adjacent bricks are aligned in direction of an axis with an equal inclination angle in a wall, to form a continuous inclined hole that goes throughout the height of the wall; and wherein these two additional hole have a diameter that fits the diameter of a rod such that the rod can be introduced trough the continuous hole that goes throughout the height of the wall.

**[0065]** In **FIGURE 16.** a rod representation **(24)** in a system of the present invention is observed, wherein the span of the rod **(24)** is equal or exceeds the span of the wall's height; and wherein the rod **(24)** is introduced through the continuous holes of the wall.

**[0066]** The rod **(24)** of the present invention can also be used to anchor the wall with a cable as it is observed in **FIGURE 7A.**, wherein the cable **(66)** has an adapter **(67)** between two vertically adjacent bricks. The adapter can have different mechanisms to hold to the wall. The adapter could hold to the exterior of the wall by a T termination. The adapter can also hold to the wall by a orifice that fits to one of the protuberances of the superior horizontal surface. In a preferred embodiment, said adapter **(67)** has a hole that fits to the diameter of the rod **(24).**

**[0067]** The rod **(24)** can be a composed rod formed by more than one rod fragment. One of the preferred versions of the present invention is represented in **FIGURE 15.** which shows rod fragments **(26),** where the span of each rod fragment is equal to one and a half times the span of the brick's height, and wherein each rod fragment is formed by three parts defined as first part **(26A)**, second part **(26B)** and a third part **(26C)**; wherein the three parts have exactly the same span such that each part has a span equal to one third of the span of the rod fragment; and wherein the first part **(26A)** is at one end of the rod fragment; and wherein the first part **(26A)** is hollow with internal thread thus constituting the part that functions as female screw of the rod fragment; and wherein the second part **(26B)** is in the middle of the rod fragment between the first part **(26A)** and the third part **(26C);** and wherein the second part **(26B)** is solid; and wherein the third part **(26C)** is solid with external thread; and wherein the third part **(26C)** is located at the end opposite to the end constituted by the first part **(26A);** and wherein the third part **(26C)** is the part that functions as the male screw of the rod fragment; and wherein the first part **(26A)** is interlocked to the third part **(26C)** of another identical rod fragment, and wherein a plurality of identical rod fragments that have been successively interlocked form the composed rod **(24)(FIGURE 16.)**.

**[0068]** In **FIGURE 15.** rod fragments **(25)** are also observed wherein the span of each rod fragment is equal to one and a half times the span of the brick's height, and wherein each rod fragment is formed by three parts defined as first part **(25A)**, second part **(25B)** and a third part **(25C);** wherein the three parts have exactly the same span such that each part has a span equal to one third of the span of the rod fragment; and wherein the first part **(25A)** is at one end of the rod fragment; and wherein the first part **(25A)** is hollow with an internal diameter that fits the external diameter of the third part **(25C)**; and wherein the first part **(25A)** is the female part of the rod fragment; and wherein the second part **(25B)** is in the middle of the rod fragment between the first part **(25A)** and the third part **(25C)**; and wherein the second part **(25B)** is solid; and wherein the third part **(25C)** is solid with an external diameter that fits the internal diameter of the first part **(25A)**; and wherein the third part **(25C)** is located at the end opposite to the end constituted by the first part **(25A)**; and wherein the third part **(25C)** is the part that functions as the male part of the rod fragment; and wherein the first part **(25A)** is interlocked to the third part **(25C)** of another identical rod fragment, and wherein a plurality of identical rod fragments that have been successively in-

terlocked form the composed rod **(24)(FIGURE 16.)**.

**[0069]** In **FIGURE 10.** the second version of the present invention is observed, in which the brick is characterized by a protuberance **(27)** of positive geometry that is originated on the middle of the brick's vertical anterior surface **(3)** in direction of the X axis, wherein said protuberance **(27)** interlocks precisely with a horizontally adjacent block with the cavity **(28)** of the vertical posterior surface **(4).**

**[0070]** The positive geometry of the protuberance **(27)** can be any appropriate geometry form. The preferred positive geometry, as it is observed in **FIGURE 10**., is represented by a protuberance **(27)** of rounded convex geometry that is originated on the middle of the brick's vertical anterior surface **(3)** in direction of the X axis, wherein said protuberance **(27)** interlocks precisely with a horizontally adjacent block with the cavity **(28)** of the vertical posterior surface **(4);** and wherein the base **(29)** of the protuberance of the brick's vertical anterior surface **(3)**, defined in the same direction of the Z axis, is of minor span than the maximum diameter **(30)** of the convex geometry of the protuberance **(27)**.

**[0071]** **FIGURE 10.** also shows another aspect of the second version of the present invention in which the brick is characterized by a symmetrical cavity **(28)** of negative geometry that is originated on the middle of the brick's vertical posterior surface **(4)** in direction of the X axis, wherein said cavity **(28)** interlocks precisely with an horizontally adjacent block with the protuberance **(27)** of the vertical anterior surface **(3).**

**[0072]** The negative geometry of the cavity **(28)** can be any appropriate geometry form. The preferred negative geometry, as it is observed in **FIGURE 10**., is represented by a symmetrical cavity **(28)** of concave geometry that is originated on the middle of the brick's vertical posterior surface **(4)** in direction of the X axis, wherein said cavity **(28)** interlocks precisely with an horizontally adjacent block with the protuberance **(27)** of the vertical anterior surface **(3);** and wherein the span **(31)** of the aperture of the cavity **(28)** on the brick's vertical posterior surface **(4)**, defined in the same direction of the Z axis, is less than the maximum diameter **(32)** of the concave geometry of the cavity **(28).**

**[0073]** In **FIGURE 10.** and **12.** another additional aspect of the second version of the present invention is also observed, in which the brick is characterized by two protuberances **(33)** of positive geometry located on the brick's superior horizontal surface **(1)** in direction of the Y axis, wherein said protuberances **(33)** interlock precisely with vertically adjacent blocks with the cavities **(34) (FIGURE 12.)** of the inferior horizontal surface **(2).**

**[0074]** The positive geometry of the protuberances **(33)** can be any appropriate geometry form. The preferred positive geometry, as it is observed in FIGURES 10.and **12.**, is represented by a two protuberances **(33)** of convex-cylindrical geometry located on the brick's superior horizontal surface **(1)** in direction of the Y axis, wherein said protuberances **(33)** interlock precisely with vertically adjacent blocks with the cavities **(34)** of the inferior horizontal surface **(2);** and wherein the diameter **(35)(FIGURE 12.)** of the base of each protuberance **(33)** on the brick's superior horizontal surface **(1)** is equal to the diameter **(36)(FIGURE 12.)** of the cylindrical part of the protuberance **(33).**

**[0075]** In **FIGURE 12.** another further aspect of the second version of the present invention is observed, in which the brick is characterized by two cavities **(34)** of negative geometry located on the inferior horizontal surface **(2)** in direction of the Y axis, wherein said cavities interlock precisely with vertically adjacent blocks with the protuberances **(33)** of the superior horizontal surface **(1).**

**[0076]** The negative geometry of the cavities **(34)** can be any appropriate geometry form. The preferred negative geometry, as it is observed in **FIGURE 12**., is represented by two cavities **(34)** of concave-cylindrical geometry located on the inferior horizontal surface **(2)** in direction of the Y axis, wherein said cavities **(34)** interlock precisely with vertically adjacent blocks with the protuberances **(33)** of the superior horizontal surface **(1)**; and wherein the diameter of the aperture **(37)** of each cavity **(34)** on the brick's inferior horizontal surface **(2)** is equal to the diameter **(38)** of the cylindrical part of the cavity **(34)** of the cavity **(34).**

**[0077]** In **FIGURES 10.-12.** another aspect of the second version of the present invention is observed, in which the brick is characterized by two cylindrical holes **(39)** that perforate entirely the brick, wherein the span of said holes **(39)**, in direction of an inclination angle **(40)(FIGURE 12.)** between 1° and 45° in relation to the Y axis, is defined from the superior border **(41)** of the positive geometry of the protuberances **(33)** of the superior horizontal surface **(1)** to the superior border **(42)** of the negative geometry of the cavities **(34)** of the inferior horizontal surface **(2)**; and wherein said holes **(39)** and the identical holes **(39)** of the vertically adjacent blocks in a wall are aligned in direction of an equal inclination angle in the wall, to form continuous inclined holes that go throughout the height of the wall; and wherein said holes have a diameter that fits the diameter of a rod such that the rod can be introduced through the continuous hole that goes throughout the height of the wall; and wherein resistant interlocks are created between the vertically and horizontally adjacent bricks to build a wall that allows the introduction of a skeleton constituted by a plurality of rods, thus resulting in a structure with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic and gravitational forces.

**[0078]** The two versions that have been described of the system of brick with rod of the present invention, are adequate for the construction of inclined walls for retaining walls.

**[0079]** In **FIGURES 17.-19** a third version of a brick which is not part of the presently claimed invention is shown, wherein the brick is a tridimensional block for the construction of walls; and wherein the block is characterized by two lateral vertical surfaces (**43** and **44)(FIG-**

**URE 17.)** defined by the X and Y axis; and wherein the first lateral vertical surface **(43)(FIGURE 17.)** is a convex surface; and wherein the second lateral vertical surface **(44)** is a concave surface; and wherein the first vertical surface **(43)** and the second vertical surface **(44)** are parallel.

**[0080]** In **FIGURES 17.-18.** another aspect of the third version is observed, in which the brick is characterized by a symmetrical protuberance **(45)** of positive geometry that is originated on the middle of the brick's anterior vertical surface **(3)(FIGURE 17.)** in direction of the X axis, wherein said protuberance **(45)** interlocks precisely with a horizontally adjacent block with the cavity **(46)** of the vertical posterior surface **(4).**

**[0081]** The positive geometry of the protuberance **(45)** can be any appropriate geometry form. The preferred positive geometry, as it is observed in **FIGURES 17.-18.,** is represented by a symmetrical protuberance **(45)** of rounded convex geometry that is originated on the middle of the brick's anterior vertical surface **(3)** in direction of the X axis, wherein said protuberance **(45)** interlocks precisely with a horizontally adjacent block with the cavity **(46)** of the vertical posterior surface **(4);** and wherein the base **(47)(FIGURE 17.)** of the protuberance **(45)** on the brick's vertical anterior surface **(3),** defined in the same direction of the Z axis, is of less span than the maximum diameter **(48)(FIGURE 17.)** of the convex geometry of the protuberance **(45).**

**[0082]** In **FIGURES 17.-18**. another aspect of the third version is also observed, in which the brick is characterized by a cavity **(46)** of negative geometry that is originated on the middle of the brick's vertical posterior surface **(4)** in direction of the X axis, wherein said cavity **(46)** interlocks precisely with a horizontally adjacent block with the protuberance **(45)** of the vertical anterior surface **(3)**.

**[0083]** The negative geometry of the cavity **(46)** can be any appropriate geometry form. The preferred negative geometry, as it is observed in **FIGURES 17.- 18.,** is represented by a symmetrical cavity **(46)** of concave geometry that is originated on the middle of the brick's vertical posterior surface **(4)** in direction of the X axis, wherein said cavity **(46)** interlocks precisely with a horizontally adjacent block with the protuberance **(45)** of the vertical anterior surface **(3);** and wherein the span **(49)(FIGURE 17.)** of the aperture of the cavity **(46)** on the brick's vertical posterior surface **(3)**; defined in the same direction of the Z axis, is less than the maximum diameter **(50)(FIGURE 17.)** of the concave geometry of the cavity **(46)**.

**[0084]** In **FIGURES 17., 18.** y **20.** another additional aspect of the third version is observed, in which the brick is characterized by two protuberances **(51)** of positive geometry located symmetrically on the middle of the brick's superior horizontal surface **(1)** in direction of the Y axis, wherein said protuberances **(51)** interlock precisely with vertically adjacent blocks with the cavities **(52) (FIGURE 20.)** of the inferior horizontal surface **(2)**;

**[0085]** The positive geometry of the protuberances **(51)** can be any appropriate geometry form. The preferred positive geometry, as it is observed in **FIGURES 17.-18.**and **20.,** is represented by two protuberances **(51)** of convex-cylindrical geometry located symmetrically on the middle of the brick's superior horizontal surface **(1)** in direction of the **Y** axis, wherein said protuberances **(51)** interlock precisely with vertically adjacent blocks with the cavities **(52)** of the inferior horizontal surface **(2);** and wherein the diameter **(53)(FIGURE 20.)** of the base of each protuberance **(51)** on the brick's superior horizontal surface **(1)** is more than or equal to the diameter of the cylindrical part **(54)(FIGURE 20.)** of the protuberance **(51).**

**[0086]** In **FIGURE 20.** another further aspect of the third version , in which the brick is characterized by two cavities **(52)** of negative geometry located on the middle of the inferior horizontal surface **(2)** in direction of the Y axis, wherein said cavities **(52)** interlock precisely with vertically adjacent blocks with the protuberances **(51)** of the superior horizontal surface **(1).**

**[0087]** The negative geometry of the cavities **(52)** can be any appropriate geometry form. The preferred negative geometry, as it is observed in **FIGURE 20.,** is represented by two cavities **(52)** of concave-cylindrical geometry located on the middle of the inferior horizontal surface **(2)** in direction of the Y axis, wherein said cavities **(52)** interlock precisely with vertically adjacent blocks with the protuberances **(51)** of the superior horizontal surface **(1);** and wherein the aperture's diameter **(55)** of each cavity on the brick's inferior horizontal surface **(2)** is more than or equal to the diameter **(56)** of the cylindrical part of the cavity **(52).**

**[0088]** In **FIGURES 17.-20**. another aspect of the third version , in which the brick is characterized by two vertical cylindrical holes **(57)** that perforate entirely the brick, wherein the span of said holes **(57),** in direction of the Y axis, is defined from the superior border **(58)(FIGURE 20.)** of the positive geometry of the protuberances **(51)** of the superior horizontal surface **(1)** to the superior border **(59)(FIGURE 20.)** of the negative geometry of the cavities **(52)** of the inferior horizontal surface **(2)**; and wherein said holes **(57)** and the identical holes **(57)** of the vertically adjacent bricks in a wall are aligned in direction of the vertical axis in the wall to form continuous vertical holes that go throughout the height of the wall; and wherein resistant interlocks are created between the vertically and horizontally adjacent bricks to build a wall with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic, and gravitational forces.

**[0089]** In **FIGURE 20.** another further aspect of the third version is observed, in which the brick is characterized by two vertical cylindrical holes **(57)** that perforate entirely the brick, wherein the span of said holes **(57),** in direction of the Y axis, is defined from the superior border **(58)** of the positive geometry of the protuberances **(51)** of the superior horizontal surface **(1)** to the superior border **(59)** of the negative geometry of the cavities **(52)** of the inferior horizontal surface **(2)**; and wherein said holes **(57)** and the identical holes **(57)** of the vertically adjacent

bricks are aligned in direction of the vertical axis in a wall to form continuous vertical holes that go throughout the height of the wall; and wherein said holes have a diameter that fit the diameter of identical rods such that the rods can be introduced through the continuous holes that go throughout the height of the wall; and wherein resistant interlocks are created between the vertically and horizontally adjacent bricks for the construction that allows the introduction of a skeleton constituted by a plurality of vertical rods; and wherein said wall is a structure with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic, and gravitational forces.

**[0090]** In **FIGURES 18.** y **19.another** further aspect of the third version is observed, in which the brick is characterized by two additional holes **(60** y **61),** wherein the first **(60)** of these two additional holes is a cylindrical hole that perforates entirely the brick, wherein the span of the first additional hole **(60),** in direction of the Y axis, is defined from the brick's superior horizontal surface **(1)** to the brick's inferior horizontal surface **(2);** and wherein the first additional hole **(60)** is located in parallel between the two holes **(57)** that go from the protuberances **(51)** of the superior horizontal surface **(1)** and the cavities **(52)** of the inferior horizontal surface **(2)**; and wherein the second **(61)** of these two additional holes is a vertical cylindrical hole that perforates entirely, in direction of the Y axis, the protuberance **(45)** of the vertical anterior surface **(3)**, where the span of the second additional hole **(61)** is defined from the center of the superior horizontal surface **(1)** of the protuberance **(45)** of the vertical anterior surface **(3)**, to the center of the inferior horizontal surface **(2)** of the protuberance **(45)** of the vertical anterior surface **(3)**; and wherein the first additional hole **(60)** and the second additional hole **(61)** have equal diameter, and wherein the first additional hole **(60)** and the second additional hole **(61)** of vertically adjacent bricks are aligned in direction of a vertical axis in a wall, to form a continuous vertical hole that goes throughout the height of the wall; and wherein these two additional holes have a diameter that fit the diameter of identical rods such that the rods can be introduced through the continuous holes that go throughout the height of the wall; and wherein resistant interlocks are created between the vertically and horizontally adjacent bricks to build a wall that allows the introduction of a skeleton constituted by a plurality of vertical rods; and wherein said wall is a structure with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic, and gravitational forces.

**[0091]** In **FIGURES 17.** y **18.** another further aspect of the third version is observed, in which the brick is characterized by a 90 degree right angle channel **(62)** on the two edges, in direction of the Y axis, of the vertical anterior surface **(3)**; a 90 degree right angle channel **(63)** on the two edges, in direction of the Y axis, of the vertical posterior surface **(4);** a 90 degree right angle channel **(64)** on the two edges, in direction of the X axis, of the superior horizontal surface **(1)**; and a 90 degree right angle channel **(65)** on the two edges, in direction of the X axis, of the inferior horizontal surface **(2)**.

**[0092]** The brick of the third version is appropriate for the contraction of curved walls.

**[0093]** One of the advantages of the system of brick with rod of the present invention is that in addition to the three preferred versions mentioned so far, the present invention also includes bricks with only one pair of holes of equal diameter. Said diameter must fit the diameter of a rod. In the case of a single pair of holes, said holes can be like the pair of holes that go from the protuberances on the superior horizontal surface to the cavities on the inferior horizontal surface, or like the pair of holes wherein one hole goes from the middle of the superior horizontal surface to the middle of the inferior horizontal surface, and wherein the other hole goes along the protuberance of the vertical anterior surface from the superior horizontal surface to the inferior horizontal surface.

**[0094]** While the description presents the preferred embodiments of the present invention, additional changes can be made in the form and disposition of the parts while still remaining within the scope of the following claims:

## Claims

**1.** A system of brick and rod (24), wherein the system comprises a tridimensional rectangular brick to construct walls, wherein the brick is defined by the three Cartesian coordinates X, Y, Z, wherein the horizontal axis X defines length, the vertical axis Y defines height, the horizontal axis Z defines width, and wherein the brick is a solid block comprising:

a. a superior horizontal surface (1) and a inferior horizontal surface (2) defined by the X and Z axis;

b. a vertical anterior surface (3) and a vertical posterior surface (4) defined by the Z and Y axis;

c. two vertical lateral surfaces (5) defined by the X and Y axis; wherein the system is **characterized by** the brick comprising:

d. a protuberance of positive geometry (6) that is originated on the brick's vertical anterior surface (3) in direction of the X axis, and with an axis between the superior horizontal surface and the inferior horizontal surface with an inclination angle (7) between 1° and 45° in relation to the Y axis, wherein said protuberance interlocks precisely with an horizontally adjacent block with the cavity (8) described in e.;

e. a cavity (8) of negative geometry that is originated on the brick's vertical posterior surface (4) in direction of the X axis, and with an axis between the superior horizontal surface and the inferior horizontal surface with an inclination angle (7) between 1° and 45° in relation to the Y axis, wherein said cavity (8) intertocks precisely

with an horizontally adjacent brick with the protuberance described in d.;

f. two protuberances (13) of positive geometry located on the brick's superior horizontal surface (1) in direction of an axis with an inclination angle between 1° and 45° in relation to the Y axis, wherein said protuberances (13) interlock precisely with vertically adjacent blocks with the cavities described in g.;

g. two cavities (17) of negative geometry located symmetrically on the inferior horizontal surface (2) in direction of an axis with an inclination angle (14) between 1° and 45° in relation to the Y axis, wherein said cavities (17) interlock precisely with vertically adjacent blocks with the protuberances described in f.;

h. two cylindrical holes (20) which perforate entirely the brick, wherein the span of said holes, (20) in direction of an axis with an inclination angle (14) between 1° and 45° in relation to the Y axis, is defined from the superior border (21) of the positive geometry of the protuberances (13) described in f. to the superior border (22) of the negative geometry of the cavities (17) described in g.; and wherein these holes (20) and the identical holes of vertically adjacent brick's in a wall are aligned in direction of an axis with an equal inclination angle in the wall, to form inclined continuous holes that go throughout the height of the wall; and wherein said holes have a diameter which fits the diameter of a rod such that the rod can be introduced through the continuous hole that goes throughout the height of the wall;

and wherein resistant interlocks are created between vertically and horizontally adjacent bricks to build an inclined wall which allows the introduction of an skeleton constituted by a plurality of rods thus resulting in a structure with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic and gravitational forces.

**2.** The system according to claim 1, **characterized by** a brick with two additional holes (23), wherein the first of these two additional holes (23) is a cylindrical hole which perforates entirely the brick, wherein the span of the first additional hole, in direction of an axis with an inclination angle between 1° and 45° in relation to the Y axis, is defined from the brick's superior horizontal surface (1) to the brick's inferior horizontal surface (2), and wherein the first additional hole (23) is located in parallel between the two holes (20) described in **1.h.**; and wherein the second of these additional two holes (23) is a vertical cylindrical hole which perforates entirely, in direction of an axis with an inclination angle between 1° and 45° in relation to the Y axis, the protuberance (6) described in **1.d.**, wherein the span of the second additional hote (23) is defined from the center of said protuberance's superior horizontal surface (1) to the center of said protuberance's inferior horizontal surface (2), and wherein the first additional hole (23) and the second additional hole (23) are of equal diameter, and wherein the first additional hole and the second additional hole of vertically adjacent bricks are aligned in direction of an axis with an equal inclination axis in a wall, to form an inclined continuous hole that goes throughout the height of a the wall; and wherein these two additional holes have a diameter that fits the diameter of a rod (24) such that the rod (24) can be introduced through the continuous hole that goes throughout the height of the wall.

**3.** The system, according to claim 1, **characterized by** a rod, (24) wherein the span of the rod is equal or exceeds the span of the wall's height; and wherein the rod (24) is vertically introduced through the continuous holes (23) of the wall.

**4.** The system, according to claim 1, **characterized by** a rod, (24) wherein the rod is a composed rod that comprises rod fragments (26) wherein each rod fragment's span is equal to one and a half times the span of the brick's height, and wherein each rod fragment is formed by three parts defined as first part, (26A) second part (26B) and a third part (26C) wherein the three parts have exactly the same span such that each part has a span equal to one third the span of rod fragment; wherein the first part (26A) is at one rod fragment's end; and wherein the first part (26A) is hollow with internal thread thus constituting the part that functions as female screw of the rod fragment; and wherein the second part (26B) the middle of the rod fragment between the first part (26A) and the third part, (26C) and wherein the second part (26B) is solid; and wherein the third part (26C) is solid with external thread; and wherein the third part (26C) is located at the end opposite to the end constituted by the first part; (26A) and wherein the third part (26C) is the part that functions as male screw of the rod fragment; and wherein the first part (26A) of a rod fragment interlocks with the third part (26C) of another identical rod fragment, and wherein a plurality of identical rod fragments (26) hat have successively been interlocked form the composed rod (24).

**5.** The system, according to claim 1, **characterized by** a rod, (24) wherein the rod is a composed rod that comprises rod fragments (25) wherein each rod fragment's span is equal to one and a half times the span of the brick's height, and wherein each rod fragment is formed by three parts defined as first part, (25A) second part (25B) and a third part, (25C) wherein the three parts have exactly the same span such that

each part has a span equal to one third the span of the rod fragment; wherein the first part (25A) is at one rod fragment's end; and wherein the first part (25A) is hollow with an internal diameter that fits the external diameter of the third part (25C), and wherein the first part (25A) is the female part of the rod fragment; and wherein the second part (25B) is in the middle of the rod fragment (25) between the first part (25A) and the third part (25C) and wherein the second part (25) is solid; and wherein the third part (25C) is solid with an external diameter that fits the internal diameter of the first part; (25A) and wherein the third third part (25C) is the at the end opposite to the end constituting the first part, (25A) and wherein the third part (25C) is the male part of the rod fragment; and wherein the first part (25A) of a rod fragment interlocks with the third part (25C) of another identical rod fragment, and wherein a plurality of identical rod fragments (25) that have successively been interlocked form the composed rod (24).

**6.** A system of brick and rod, wherein the system comprises a tridimensional rectangular brick to construct walls, wherein the brick is defined by the three Cartesian coordinates X, Y, Z, wherein the horizontal axis X defines length, the vertical axis Y defines height, the horizontal axis Z defines width, and a rod; and wherein the brick is a solid block comprising:

a. a superior horizontal surface (1) and a inferior horizontal surface (2) defined by the X and Z axis;
b. a vertical anterior surface (3) and a vertical posterior surface (4) defined by the Z and Y axis;
c. two vertical lateral surfaces (5) defined by the X and Y axis;
d. a protuberance of positive geometry (27) that is originated on the middle of the brick's vertical anterior surface (3) in direction of the X axis, wherein said protuberance (27) interlocks precisely with an horizontally adjacent block with the cavity described in e.;
e. a cavity (28) of negative geometry which is originated on the middle of the brick's vertical posterior surface (4) in direction of the X axis, wherein said cavity (28) interlocks precisely with a horizontally adjacent block with the protuberance (27) described in d.; wherein the system is **characterized by** the brick comprising :
f. two protuberances (33) of positive geometry located on the brick's superior horizontal surface (1) in direction of the Y axis, wherein said protuberances (33) interlock precisely with vertically adjacent blocks with the cavities (34) described in g.;
g. two cavities (34) of negative geometry located on the inferior horizontal surface (2) in direction of the Y axis, wherein said cavities (34) interlock precisely with vertically adjacent blocks with the protuberances (33) described in f.;
h. two cylindrical holes (39) that perforate entirely the brick, wherein the span of said holes, (39) in direction of an axis with an inclination angle between 1° and 45° in relation to the Y axis, is defined from the superior border (41) of the positive geometry of the protuberances (33) described in f. to the superior border (41) of the concave geometry of the cavities (34) describe in g.; and wherein these holes (39) and the identical holes (39) of the vertically adjacent bricks in a wall are aligned in direction of an axis with an equal inclination angle in the wall, to form continuous inclined holes that go throughout the height of the wall; and wherein said holes have a diameter that fits the diameter of a rod (24) such that the rod can be introduced through the continuous hole that goes throughout the height of the wall;

and wherein resistant interlocks are created between the vertically and horizontally adjacent bricks to build a wall that allows the introduction of a skeleton constituted by a plurality of rods thus resulting in a structure with great rigidity and lateral resistance, and great resistance to extreme uniform, cyclic, and gravitational forces.

**7.** The system, according to claim 6, **characterized by** a rod, (24) wherein the span of the rod is equal or exceeds the span of the wall's height; and wherein the rod is vertically introduced through the continuous holes of the wall.

**8.** The system, according to claim 6, **characterized by** a rod, (24) wherein the rod is a composed rod that comprises rod fragments (26) wherein each rod fragment's span is equal to one and a half times the span of the brick's height, and wherein each rod fragment is formed by three parts defined as first part, (26A) second part (26B) and a third part; (26C) wherein the three parts have exactly the same span such that each part has a span equal to one third the span of the rod fragment; wherein the first part (26A) is at one rod fragment's end; and wherein the first part (26A) is hollow with internal thread thus constituting the part that functions as female screw of the rod fragment; and wherein the second part (26B) is the middle of the rod fragment between the first part (26A) and the third part, (26C) and wherein the second part (26B) is solid; and wherein the third part (26C) is solid with external thread; and wherein the third part (26C) is located at the end opposite to the end constituted by the first part; (26A) and wherein the third part (26C) is the part that functions as male screw of the rod fragment; and wherein the third part (26C) is the part that functions as male screw of the

rod fragment; and wherein the first part (26A) of a rod fragment interlocks with the third part (26C) of another identical rod fragment, and wherein a plurality of identical rod fragments (26) that have successively been interlocked form the composed rod (24).

**9.** The system, according to claim 6, **characterized by** a rod, (24) wherein the rod is a composed rod that comprises rod fragments (25) wherein each rod fragment's span is equal to one and a half times the span of the brick›s height, and wherein each rod fragment is formed by three parts defined as first part, (25A) second part (25B) and a third part; (25C) wherein the three parts have exactly the same span such that each part has a span equal to one third the span of the rod fragment; wherein the first part (25A) is at one rod fragment's end; and wherein the first part (25A) is hollow with an internal diameter that fits the external diameter of the third part, (25C) and wherein the first part (25A) is the female part of the rod fragment; and wherein the second part (25B) is in the middle of the rod fragment between the first part (25A) and the third part (25C), and wherein the second part (25B) solid; and wherein the third part (25C) is solid with an external diameter that fits the internal diameter of the first part, (25A) and wherein the third part (25C) is located at the end opposite to the end constituting the first part; (25A) and wherein the third part (25C) is the male part of the rod fragment; and wherein the first part(25A) of a rod fragment interlocks with the third part (25C) of another identical rod fragment, and wherein a plurality of identical rod fragments (25) that have successively been interlocked form the composed rod (24).

**Patentansprüche**

**1.** System aus Ziegel und Stab (24), wobei das System einen dreidimensionalen rechtwinkligen Ziegel enthält, um Wände zu errichten, wobei der Ziegel durch die drei kartesischen Koordinaten X, Y, Z definiert ist, wobei die horizontale Achse X die Länge definiert, die vertikale Achse Y die Höhe definiert und die horizontale Achse Z die Breite definiert und wobei der Ziegel ein massiver Block ist, der enthält:

a. eine obere horizontale Oberfläche (1) und eine untere horizontale Oberfläche (2), die durch die X- und die Z-Achse definiert sind;
b. eine vertikale vordere Oberfläche (3) und eine vertikale hintere Oberfläche (4), die durch die Z- und die Y-Achse definiert sind;
c. zwei vertikale seitliche Oberflächen (5), die durch die X- und die Y-Achse definiert sind;
wobei das System **dadurch gekennzeichnet ist, dass** der Ziegel enthält:

d. einen Vorsprung mit positiver Geometrie (6), der von der vertikalen vorderen Oberfläche (3) des Ziegels in Richtung der X-Achse ausgeht und eine Achse zwischen der oberen horizontalen Oberfläche und der unteren horizontalen Oberfläche mit einem Neigungswinkel (7) zwischen 1° und 45° in Bezug auf die Y-Achse besitzt, wobei der Vorsprung präzise mit einem horizontal benachbarten Block mit einem in e. beschriebenen Hohlraum (8) verriegelt;
e. einen Hohlraum (8) mit negativer Geometrie, der von der vertikalen hinteren Oberfläche (4) des Ziegels in Richtung der X-Achse ausgeht und eine Achse zwischen der oberen horizontalen Oberfläche und der unteren horizontalen Oberfläche mit einem Neigungswinkel (7) zwischen 1° und 45° in Bezug auf die Y-Achse besitzt, wobei der Hohlraum (8) präzise mit einem horizontal benachbarten Ziegel mit dem in d. beschriebenen Vorsprung verriegelt;
f. zwei Vorsprünge (13) mit positiver Geometrie, die sich an der oberen horizontalen Oberfläche (1) des Ziegels in Richtung einer Achse mit einem Neigungswinkel zwischen 1° und 45° in Bezug auf die Y-Achse befinden, wobei die Vorsprünge (13) präzise mit vertikal benachbarten Blöcken mit in g. beschriebenen Hohlräumen verriegeln;
g. zwei Hohlräume (17) mit negativer Geometrie, die sich symmetrisch an der unteren horizontalen Oberfläche (2) in Richtung einer Achse mit einem Neigungswinkel (14) zwischen 1° und 45° in Bezug auf die Y-Achse befinden, wobei die Hohlräume präzise mit vertikal benachbarten Blöcken mit den in f. beschriebenen Vorsprüngen verriegeln;
h. zwei zylindrische Löcher (20), die vollständig durch den Ziegel verlaufen, wobei die Abmessung der Löcher (20) in Richtung einer Achse mit einem Neigungswinkel (14) zwischen 1° und 45° in Bezug auf die Y-Achse von dem oberen Rand (21) der positiven Geometrie der Vorsprünge (13), die in f. beschrieben sind, zu dem oberen Rand (22) der negativen Geometrie der Hohlräume (17), die in g. beschrieben sind, definiert ist; und wobei diese Löcher (20) und die gleichen Löcher von vertikal benachbarten ziegeln in einer Wand in Richtung einer Achse unter einem gleichen Neigungswinkel in der Wand ausgerichtet sind, um geneigte ununterbrochene Löcher zu bilden, die über die gesamte Höhe der Wand verlaufen; und wobei die Löcher einen Durchmesser haben, der zu dem Durchmesser eines Stabs passt, so dass der Stab durch das ununterbrochene Loch eingeführt werden kann, das über die gesamte Höhe der Wand verläuft; und wobei widerständige Verriegelungen zwischen vertikal und horizontal benachbarten Zie-

geln erzeugt werden, um eine geneigte Wand zu errichten, die die Einführung eines durch mehrere Stäbe gebildeten Skeletts ermöglichen, was eine Struktur mit großer Starrheit und seitlichem Widerstand und großem Widerstand gegenüber extremen gleichmäßigen, zyklischen und gravitativen Kräften ergibt.

**2.** System nach Anspruch 1, **gekennzeichnet durch** einen Ziegel mit zwei zusätzlichen Löchern (23), wobei das erste dieser zwei zusätzlichen Löcher (23) ein zylindrisches Loch ist, das vollständig **durch** den Ziegel verläuft, wobei die Abmessung des ersten zusätzlichen Lochs in Richtung einer Achse mit einem Neigungswinkel im Bereich von 1° bis 45° in Bezug auf die Y-Achse von der oberen horizontalen Oberfläche (1) des Ziegels zu der unteren horizontalen Oberfläche (2) des Ziegels definiert ist und wobei das erste zusätzliche Loch (23) parallel zwischen den zwei in 1.h. beschriebenen Löchern (20) angeordnet ist; und wobei das zweite dieser zusätzlichen zwei Löcher (23) ein vertikales zylindrisches Loch ist, das in Richtung einer Achse mit einem Neigungswinkel von 1° bis 45° in Bezug auf die Y-Achse den in 1.d. beschriebenen Vorsprung (6) vollständig durchläuft, wobei die Abmessung des zweiten zusätzlichen Lochs (23) von dem Zentrum der oberen horizontalen Oberfläche (1) des Vorsprungs zu dem Zentrum der unteren horizontalen Oberfläche (2) des Vorsprungs definiert ist; und wobei das erste zusätzliche Loch (23) und das zweite zusätzliche Loch (23) den gleichen Durchmesser haben und wobei das erste zusätzliche Loch und das zweite zusätzliche Loch vertikal benachbarter Ziegel in Richtung einer Achse unter gleichem Neigungswinkel in einer Wand ausgerichtet sind, um ein geneigtes ununterbrochenes Loch zu bilden, das über die gesamte Höhe der Wand verläuft; und wobei diese zwei zusätzlichen Löcher einen Durchmesser haben, der zu dem Durchmesser eines Stabs (24) passt, so dass der Stab (24) **durch** das ununterbrochene Loch eingeführt werden kann und über die gesamte Höhe der Wand verläuft.

**3.** System nach Anspruch 1, **gekennzeichnet durch** einen Stab (24), wobei die Abmessung des Stabs gleich oder größer ist als die Abmessung der Wandhöhe; und wobei der Stab **durch** die ununterbrochenen Löcher (23) der Wand vertikal eingeführt wird.

**4.** System nach Anspruch 1, **gekennzeichnet durch** einen Stab (24), wobei der Stab ein zusammengesetzter Stab ist, der Stabfragmente (26) enthält, wobei die Abmessung jedes Stabfragments gleich der eineinhalbfachen Abmessung der Ziegelhöhe ist und wobei jedes Stabfragment **durch** drei Teile gebildet ist, die als ein erstes Teil (26A), ein zweites Teil (26B) und ein drittes Teil (26C) definiert sind, wobei die drei Teile genau die gleiche Abmessung haben, derart, dass jedes Teil eine Abmessung besitzt, die gleich einem Drittel der Abmessung des Stabfragments ist; wobei sich das erste Teil (26A) an einem Stabfragmentende befindet; und wobei das erste Teil (26A) hohl ist und ein Innengewinde aufweist, um so das Teil zu bilden, das als eine Mutter des Stabfragments dient; und wobei das zweite Teil (26B) die Mitte des Stabfragments zwischen dem ersten Teil (26A) und dem dritten Teil (26C) ist; und wobei das zweite Teil (26B) massiv ist; und wobei das dritte Teil (26C) massiv ist und ein Außengewinde aufweist; und wobei sich das dritte Teil (26C) an dem Ende gegenüber dem **durch** das erste Teil (26A) gebildeten Ende befindet; und wobei das dritte Teil (26C) das Teil ist, das als ein Gewindebolzen des Stabfragments dient; und wobei das erste Teil (26A) eines Stabfragments mit dem dritten Teil (26C) eines weiteren, gleichen Stabfragments verriegelt und wobei mehrere gleiche Stabfragmente (26), die nacheinander verriegelt worden sind, einen zusammengesetzten Stab (24) bilden.

**5.** System nach Anspruch 1, **gekennzeichnet durch** einen Stab (24), wobei der Stab ein zusammengesetzter Stab ist, der Stabfragmente (25) umfasst, wobei die Abmessung jedes Stabfragments gleich der eineinhalbfachen Abmessung der Ziegelhöhe ist und wobei jedes Stabfragment **durch** drei Teile gebildet ist, die als ein erstes Teil (25A), ein zweites Teil (25B) und ein drittes Teil (25C) definiert sind, wobei die drei Teile genau die gleiche Abmessung haben, derart, dass jedes Teil eine Abmessung besitzt, die gleich einem Drittel der Abmessung des Stabfragments ist; wobei sich das erste Teil (25A) an einem Stabfragmentende befindet; und wobei das erste Teil (25A) hohl ist und einen Innendurchmesser besitzt, der zu dem Außendurchmesser des dritten Teils (25C) passt; und wobei das erste Teil (25A) das Buchsenteil des Stabfragments ist; und wobei das zweite Teil (25B) die Mitte des Stabfragments (25) zwischen dem ersten Teil (25A) und dem dritten Teil (25C) ist; und wobei das zweite Teil (25B) massiv ist; und wobei das dritte Teil (25C) massiv ist und einen Außendurchmesser besitzt, der zu dem Innendurchmesser des ersten Teils (25A) passt; und wobei sich das dritte Teil (25C) an dem Ende gegenüber dem das erste Teil (25A) bildenden Ende befindet; und wobei das dritte Teil (25C) das Steckteil des Stabfragments ist; und wobei das erste Teil (25A) eines Stabfragments mit dem dritten Teil (25C) eines weiteren gleichen Stabfragments verriegelt und wobei mehrere gleiche Stabfragmente (25), die nacheinander verriegelt worden sind, den zusammengesetzten Stab (24) bilden.

**6.** System aus Ziegel und Stab, wobei das System einen dreidimensionalen rechtwinkligen Ziegel, um

Wände zu errichten, wobei der Ziegel durch die drei kartesischen Koordinaten X, Y, Z definiert ist, wobei die horizontale Achse X die Länge definiert, die vertikale Achse Y die Höhe definiert und die horizontale Achse Z die Breite definiert, und einen Stab enthält; und wobei der Ziegel ein massiver Block ist, der enthält:

a. eine obere horizontale Oberfläche (1) und eine untere horizontale Oberfläche (2), die durch die X- und die Z-Achse definiert sind;
b. eine vertikale vordere Oberfläche (3) und eine vertikale hintere Oberfläche (4), die durch die Z- und Y-Achse definiert sind;
c. zwei vertikale seitliche Oberflächen (5), die durch die X- und Y-Achse definiert sind;
d. einen Vorsprung mit positiver Geometrie (27), der von der Mitte der vertikalen vorderen Oberfläche (3) des Ziegels in Richtung der X-Achse ausgeht, wobei der Vorsprung (27) präzise mit einem horizontal benachbarten Block mit dem in e. beschriebenen Hohlraum verriegelt;
e. einen Hohlraum (28) mit negativer Geometrie, der von der Mitte der vertikalen hinteren Oberfläche des Ziegels in Richtung der X-Achse ausgeht, wobei der Hohlraum (28) präzise mit einem horizontal benachbarten Block mit dem in d. beschriebenen Vorsprung (27) verriegelt;
wobei das System **dadurch gekennzeichnet ist, dass** der Ziegel enthält:
f. zwei Vorsprünge (33) mit positiver Geometrie, die sich auf der oberen horizontalen Oberfläche (1) des Ziegels in Richtung der Y-Achse befinden, wobei die Vorsprünge (33) präzise mit vertikal benachbarten Blöcken mit den in g. beschriebenen Hohlräumen (34) verriegeln;
g. zwei Hohlräume (34) mit negativer Geometrie, die sich auf der unteren horizontalen Oberfläche (2) in Richtung der Y-Achse befinden, wobei die Hohlräume (34) präzise mit vertikal benachbarten Blöcken mit den in f. beschriebenen Vorsprüngen (33) verriegeln;
h. zwei zylindrische Löcher (39), die vollständig durch den Ziegel verlaufen, wobei die Abmessung der Löcher (39) in Richtung einer Achse mit einem Neigungswinkel zwischen 1° und 45° in Bezug auf die Y-Achse von dem oberen Rand (41) der positiven Geometrie der Vorsprünge (33), die in f. beschrieben sind, zu dem oberen Rand (42) der konkaven Geometrie der Hohlräume (34), die in g. beschrieben sind, definiert ist; und wobei diese Löcher (39) und die gleichen Löcher (39) der vertikal benachbarten Ziegel in einer Wand in Richtung einer Achse unter dem gleichen Neigungswinkel in der Wand ausgerichtet sind, um ununterbrochene geneigte Löcher zu bilden, die über die gesamte Höhe der Wand verlaufen; und wobei die Löcher einen Durchmesser haben, der zum Durchmesser eines Stabs (24) passt, derart, dass der Stab durch das ununterbrochene Loch, das über die gesamte Höhe der Wand verläuft, eingeführt werden kann;
und wobei widerständige Verriegelungen zwischen den vertikal und horizontal benachbarten Ziegeln erzeugt werden, um eine Wand zu errichten, die die Einführung eines durch mehrere Stäbe gebildeten Skeletts ermöglicht, was eine Struktur mit großer Starrheit und seitlichem Widerstand und großem Widerstand gegenüber extremen gleichmäßigen, zyklischen und gravitativen Kräften ergibt.

**7.** System nach Anspruch 6, **gekennzeichnet durch** einen Stab (24), wobei die Abmessung des Stabs gleich oder größer ist als die Abmessung der Wandhöhe; und wobei der Stab **durch** die ununterbrochenen Löcher der Wand vertikal eingeführt wird.

**8.** System nach Anspruch 6, **gekennzeichnet durch** einen Stab (24), wobei der Stab ein zusammengesetzter Stab ist, der Stabfragmente (26) enthält, wobei jede Stabfragmentabmessung gleich der eineinhalbfachen Abmessung der Ziegelhöhe ist und wobei jedes Stabfragment **durch** drei Teile gebildet ist, die als ein erstes Teil (26A), ein zweites Teil (26B) und ein drittes Teil (26C) definiert sind, wobei die drei Teile exakt die gleiche Abmessung haben, derart, dass jedes Teil eine Abmessung besitzt, die gleich einem Drittel der Abmessung des Stabfragments ist; wobei sich das erste Teil (26A) an einem Stabfragmentende befindet; und wobei das erste Teil (26A) hohl ist und ein Innengewinde aufweist, um somit das Teil zu bilden, das als Mutter des Stabfragments dient; und wobei das zweite Teil (26B) die Mitte des Stabfragments zwischen dem ersten Teil (26A) und dem dritten Teil (26C) ist; und wobei das zweite Teil (26B) massiv ist; und wobei das dritte Teil (26C) massiv ist und ein Außengewinde aufweist; und wobei sich das dritte Teil (26C) an dem Ende gegenüber dem **durch** das erste Teil (26A) gebildeten Ende befindet; und wobei das dritte Teil (26C) das Teil ist, das als Gewindebolzen des Stabfragments dient; und wobei das erste Teil (26A) des Stabfragments mit dem dritten Teil (26C) eines weiteren gleichen Stabfragments verriegelt und wobei mehrere gleiche Stabfragmente (26), die nacheinander verriegelt worden sind, den zusammengesetzten Stab (24) bilden.

**9.** System nach Anspruch 6, **gekennzeichnet durch** einen Stab (24), wobei der Stab ein zusammengesetzter Stab ist, der Stabfragmente (25) umfasst, wobei die Abmessung jedes Stabfragments gleich der eineinhalbfachen Abmessung der Ziegelhöhe ist und wobei jedes Stabfragment **durch** drei Teile ge-

bildet ist, die als ein erstes Teil (25A), ein zweites Teil (25B) und ein drittes Teil (25C) definiert sind, wobei die drei Teile genau die gleiche Abmessung haben, derart, dass jedes Teil eine Abmessung besitzt, die gleich einem Drittel der Abmessung des Stabfragments ist; wobei sich das erste Teil (25A) an einem Stabfragmentende befindet; und wobei das erste Teil (25A) hohl ist und einen Innendurchmesser besitzt, der zu dem Außendurchmesser des dritten Teils (25C) passt; und wobei das erste Teil (25A) das Buchsenteil des Stabfragments ist; und wobei das zweite Teil (25B) die Mitte des Stabfragments (25) zwischen dem ersten Teil (25A) und dem dritten Teil (25C) ist; und wobei das zweite Teil (25B) massiv ist; und wobei das dritte Teil (25C) massiv ist und einen Außendurchmesser besitzt, der zu dem Innendurchmesser des ersten Teils (25A) passt; und wobei sich das dritte Teil (25C) an dem Ende gegenüber dem das erste Teil (25A) bildenden Ende befindet; und wobei das dritte Teil (25C) das Steckteil des Stabfragments ist; und wobei das erste Teil (25A) eines Stabfragments mit dem dritten Teil (25C) eines weiteren gleichen Stabfragments verriegelt und wobei mehrere gleiche Stabfragmente (25), die nacheinander verriegelt worden sind, den zusammengesetzten Stab (24) bilden.

**Revendications**

**1.** Système de brique et de barre (24), le système comportant une brique rectangulaire tridimensionnelle pour construire des murs, dans lequel la brique est définie par les trois coordonnées cartésiennes X, Y, Z , dans lequel l'axe horizontal X définit la longueur, l'axe vertical Y définit la hauteur, l'axe horizontal Z définit la largeur, et dans lequel la brique est un bloc plein comportant :

a. une surface horizontale supérieure (1) et une surface horizontale inférieure (2) définies par les axes X et Z ;
b. une surface antérieure verticale (3) et une surface postérieure verticale (4) définies par les axes Z et Y ;
c. deux surfaces latérales verticales (5) définies par les axes X et Y ;
dans lequel le système est **caractérisé en ce que** la brique comporte :
d. une protubérance (6) à géométrie positive qui prend naissance sur la surface antérieure verticale (3) de la brique dans la direction de l'axe X, et avec un axe entre la surface horizontale supérieure et la surface horizontale inférieure avec un angle d'inclinaison (7) entre 1° et 45° par rapport à l'axe Y, ladite protubérance s'emboîtant précisément avec un bloc horizontalement adjacent avec la cavité (8) décrite en e. ;
e. une cavité (8) à géométrie négative qui prend naissance sur la surface postérieure verticale (4) de la brique dans la direction de l'axe X, et avec un axe entre la surface horizontale supérieure et la surface horizontale inférieure avec un angle d'inclinaison (7) entre 1° et 45° par rapport à l'axe Y, ladite cavité (8) s'emboîtant précisément avec une brique horizontalement adjacente avec la protubérance décrite en d. ;
f. deux protubérances (13) à géométrie positive situées sur la surface horizontale supérieure (1) de la brique dans la direction d'un axe avec un angle d'inclinaison entre 1° et 45° par rapport à l'axe Y, lesdites protubérances (13) s'emboîtant précisément avec des blocs verticalement adjacents avec les cavités décrites en g. ;
g. deux cavités (17) à géométrie négative situées symétriquement sur la surface horizontale inférieure (2) dans la direction d'un axe avec un angle d'inclinaison (14) entre 1° et 45° par rapport à l'axe Y, lesdites cavités (17) s'emboîtant précisément avec des blocs verticalement adjacents avec les protubérances décrites en f. ;
h. deux trous cylindriques (20) qui perforent entièrement la brique, dans lequel l'étendue desdits trous (20), dans la direction d'un axe avec un angle d'inclinaison (14) entre 1° et 45° par rapport à l'axe Y, est définie à partir de la bordure supérieure (21) de la géométrie positive des protubérances (13) décrites en f. jusqu'à la bordure supérieure (22) de la géométrie négative des cavités (17) décrites en g. ; et dans lequel ces trous (20) et les trous identiques de briques verticalement adjacentes dans un mur sont alignés dans la direction d'un axe avec un angle d'inclinaison égal dans le mur, pour former des trous continus inclinés qui s'étendent sur toute la hauteur du mur ; et dans lequel lesdits trous ont un diamètre qui correspond au diamètre d'une barre de telle sorte que la barre peut être introduite à travers le trou continu qui s'étend sur toute la hauteur du mur ;
et dans lequel des emboîtements résistants sont créés entre des briques verticalement et horizontalement adjacentes pour construire un mur incliné qui permet l'introduction d'une ossature constituée d'une pluralité de barres en ayant ainsi pour résultat une structure avec une rigidité et une résistance latérale importantes, et une résistance importante à des forces de gravité, cycliques et uniformes extrêmes.

**2.** Système selon la revendication 1, **caractérisé par** une brique avec deux trous supplémentaires (23), dans lequel le premier de ces deux trous supplémentaires (23) est un trou cylindrique qui perfore entièrement la brique, dans lequel l'étendue du premier trou supplémentaire, dans la direction d'un axe avec

un angle d'inclinaison entre 1° et 45° par rapport à l'axe Y, est défini à partir de la surface horizontale supérieure (1) de la brique jusqu'à la surface horizontale inférieure (2) de la brique ; et dans lequel le premier trou supplémentaire (23) est situé parallèlement entre les deux trous (20) décrits en 1.h. ; et dans lequel le second de ces deux trous supplémentaires (23) est un trou cylindrique vertical qui perfore entièrement, dans la direction d'un axe avec un angle d'inclinaison entre 1° et 45° par rapport à l'axe Y, la protubérance (6) décrite en 1.d., dans lequel l'étendue du second trou supplémentaire (23) est définie à partir du centre de ladite surface horizontale supérieure (1) de la protubérance jusqu'au centre de ladite surface horizontale inférieure (2) de la protubérance ; et dans lequel le premier trou supplémentaire (23) et le second trou supplémentaire (23) sont de diamètre égal, et dans lequel le premier trou supplémentaire et le second trou supplémentaire de briques verticalement adjacentes sont alignés dans la direction d'un axe avec un angle d'inclinaison égal dans un mur, pour former un trou continu incliné qui s'étend sur toute la hauteur du mur ; et dans lequel ces deux trous supplémentaires ont un diamètre qui correspond au diamètre d'une barre (24) de telle sorte que la barre (24) peut être introduite à travers le trou continu qui s'étend sur toute la hauteur du mur.

**3.** Système selon la revendication 1, **caractérisé par** une barre (24), dans lequel l'étendue de la barre est égale ou dépasse l'étendue de la hauteur du mur ; et dans lequel la barre (24) est introduite verticalement à travers les trous continus (23) du mur.

**4.** Système selon la revendication 1, **caractérisé par** une barre (24), dans lequel la barre est une barre composée qui comporte des fragments de barre (26), dans lequel l'étendue de chaque fragment de barre est égale à une fois et demie l'étendue de la hauteur de la brique, et dans lequel chaque fragment de barre est formé par trois parties définies comme une première partie (26A), une deuxième partie (26B) et une troisième partie (26C), dans lequel les trois parties ont exactement la même étendue de telle sorte que chaque partie a une étendue égale à un tiers de l'étendue d'un fragment de barre ; dans lequel la première partie (26A) est à une extrémité du fragment de barre ; et dans lequel la première partie (26A) est creuse avec un filetage intérieur en constituant ainsi la partie qui fonctionne comme une vis femelle du fragment de barre ; et dans lequel la deuxième partie (26B) est le milieu du fragment de barre entre la première partie (26A) et la troisième partie (26C) ; et dans lequel la deuxième partie (26B) est pleine ; et dans lequel la troisième partie (26C) est pleine avec un filetage extérieur ; et dans lequel la troisième partie (26C) est située à l'extrémité opposée à l'extrémité constituée de la première partie (26A) ; et dans lequel la troisième partie (26C) est la partie qui fonctionne comme une vis mâle du fragment de barre ; et dans lequel la première partie (26A) d'un fragment de barre s'emboîte avec la troisième partie (26C) d'un autre fragment de barre identique, et dans lequel une pluralité de fragments de barre identiques (26) qui ont successivement été emboîtés, forment la barre composée (24).

**5.** Système selon la revendication 1, **caractérisé par** une barre (24), dans lequel la barre est une barre composée qui comporte des fragments de barre (25), dans lequel l'étendue de chaque fragment de barre est égale à une fois et demie l'étendue de la hauteur de la brique, et dans lequel chaque fragment de barre est formé par trois parties définies comme une première partie (25A), une deuxième partie (25B) et une troisième partie (25C) ; dans lequel les trois parties ont exactement la même étendue de telle sorte que chaque partie a une étendue égale à un tiers de l'étendue du fragment de barre ; dans lequel la première partie (25A) est à une extrémité du fragment de barre ; et dans lequel la première partie (25A) est creuse avec un diamètre intérieur qui correspond au diamètre extérieur de la troisième partie (25C) ; et dans lequel la première partie (25A) est la partie femelle du fragment de barre ; et dans lequel la deuxième partie (25B) est au milieu du fragment de barre (25) entre la première partie (25A) et la troisième partie (25C) ; et dans lequel la deuxième partie (25B) est pleine ; et dans lequel la troisième partie (25C) est pleine avec un diamètre extérieur qui correspond au diamètre intérieur de la première partie (25A) ; et dans lequel la troisième partie (25C) est située à l'extrémité opposée à l'extrémité constituant la première partie (25A) ; et dans lequel la troisième partie (25C) est la partie mâle du fragment de barre ; et dans lequel la première partie (25A) d'un fragment de barre s'emboîte avec la troisième partie (25C) d'un autre fragment de barre identique, et dans lequel une pluralité de fragments de barre identiques (25) qui ont successivement été emboîtés, forment la barre composée (24).

**6.** Système de brique et de barre, le système comportant une brique rectangulaire tridimensionnelle pour construire des murs, dans lequel la brique est définie par les trois coordonnées cartésiennes X, Y, Z , dans lequel l'axe horizontal X définit la longueur, l'axe vertical Y définit la hauteur, l'axe horizontal Z définit la largeur, et une barre ; et dans lequel la brique est un bloc plein comportant :

a. une surface horizontale supérieure (1) et une surface horizontale inférieure (2) définies par les axes X et Z ;
b. une surface antérieure verticale (3) et une sur-

face postérieure verticale (4) définies par les axes Z et Y ;
c. deux surfaces latérales verticales (5) définies par les axes X et Y ;
d. une protubérance (27) à géométrie positive qui prend naissance sur le milieu de la surface antérieure verticale (3) de la brique dans la direction de l'axe X, ladite protubérance (27) s'emboîtant précisément avec un bloc horizontalement adjacent avec la cavité décrite en e. ;
e. une cavité (28) à géométrie négative qui prend naissance sur le milieu de la surface postérieure verticale (4) de la brique dans la direction de l'axe X, ladite cavité (28) s'emboîtant précisément avec un bloc horizontalement adjacent avec la protubérance (27) décrite en d. ;
dans lequel le système est **caractérisé en ce que** la brique comporte :
f. deux protubérances (33) à géométrie positive situées sur la surface horizontale supérieure (1) de la brique dans la direction de l'axe Y, lesdites protubérances (33) s'emboîtant précisément avec des blocs verticalement adjacents avec les cavités (34) décrites en g. ;
g. deux cavités (34) à géométrie négative situées sur la surface horizontale inférieure (2) dans la direction de l'axe Y, lesdites cavités (34) s'emboîtant précisément avec des blocs verticalement adjacents avec les protubérances (33) décrites en f. ;
h. deux trous cylindriques (39) qui perforent entièrement la brique, dans lequel l'étendue desdits trous (39), dans la direction d'un axe avec un angle d'inclinaison entre 1° et 45° par rapport à l'axe Y, est définie à partir de la bordure supérieure (41) de la géométrie positive des protubérances (33) décrites en f. jusqu'à la bordure supérieure (42) de la géométrie concave des cavités (34) décrites en g. ; et dans lequel ces trous (39) et les trous identiques (39) des briques verticalement adjacentes dans un mur sont alignés dans la direction d'un axe avec un angle d'inclinaison égal dans le mur, pour former des trous continus inclinés qui s'étendent sur toute la hauteur du mur ; et dans lequel lesdits trous ont un diamètre qui correspond au diamètre d'une barre (24) de telle sorte que la barre peut être introduite à travers le trou continu qui s'étend sur toute la hauteur du mur ;
et dans lequel des emboîtements résistants sont créés entre les briques verticalement et horizontalement adjacentes pour construire un mur qui permet l'introduction d'une ossature constituée d'une pluralité de barres en ayant ainsi pour résultat une structure avec une rigidité et une résistance latérale importantes, et une résistance importante à des forces de gravité, cycliques et uniformes extrêmes.

**7.** Système selon la revendication 6, **caractérisé par** une barre (24), dans lequel l'étendue de la barre est égale ou dépasse l'étendue de la hauteur du mur ; et dans lequel la barre est introduite verticalement à travers les trous continus du mur.

**8.** Système selon la revendication 6, **caractérisé par** une barre (24), dans lequel la barre est une barre composée qui comporte des fragments de barre (26) dans lequel l'étendue de chaque fragment de barre est égale à une fois et demie l'étendue de la hauteur de la brique, et dans lequel chaque fragment de barre est formé par trois parties définies comme une première partie (26A), une deuxième partie (26B) et une troisième partie (26C) ; dans lequel les trois parties ont exactement la même étendue de telle sorte que chaque partie a une étendue égale à un tiers de l'étendue du fragment de barre ; dans lequel la première partie (26A) est à une extrémité du fragment de barre ; et dans lequel la première partie (26A) est creuse avec un filetage intérieur en constituant ainsi la partie qui fonctionne comme une vis femelle du fragment de barre ; et dans lequel la deuxième partie (26B) est le milieu du fragment de barre entre la première partie (26A) et la troisième partie (26C) ; et dans lequel la deuxième partie (26B) est pleine ; et dans lequel la troisième partie (26C) est pleine avec un filetage extérieur ; et dans lequel la troisième partie (26C) est située à l'extrémité opposée à l'extrémité constituée de la première partie (26A) ; et dans lequel la troisième partie (26C) est la partie qui fonctionne comme une vis mâle du fragment de barre ; et dans lequel la première partie (26A) d'un fragment de barre s'emboîte avec la troisième partie (26C) d'un autre fragment de barre identique, et dans lequel une pluralité de fragments de barre identiques (26) qui ont successivement été emboîtés, forment la barre composée (24).

**9.** Système selon la revendication 6, **caractérisé par** une barre (24), dans lequel la barre est une barre composée qui comporte des fragments de barre (25), dans lequel l'étendue
de chaque fragment de barre est égale à une fois et demie l'étendue de la hauteur de la brique, et dans lequel chaque frein de barre est formé par trois parties définies comme une première partie (25A), une deuxième partie (25B) et une troisième partie (25C), dans lequel les trois parties ont exactement la même étendue de telle sorte que chaque partie a une étendue égale à un tiers de l'étendue du fragment de barre ; dans lequel la première partie (25A) est à une extrémité du fragment de barre ; et dans lequel la première partie (25A) est creuse avec un diamètre intérieur qui correspond au diamètre extérieur de la troisième partie (25C) ; et dans lequel la première partie (25A) est une partie femelle du fragment de barre ; et dans lequel la deuxième partie (25B) est

au milieu du fragment de barre entre la première partie (25A) et la troisième partie (25C) ; et dans lequel la deuxième partie (25B) est pleine ; et dans lequel la troisième partie (25C) est pleine avec un diamètre extérieur qui correspond au diamètre intérieur de la première partie (25A) ; et dans lequel la troisième partie (25C) est située à l'extrémité opposée à l'extrémité constituant la première partie (25A) ; et dans lequel la troisième partie (25C) est la partie mâle du fragment de barre ; et dans lequel la première partie (25A) d'un fragment de barre s'emboîte avec la troisième partie (25C) d'un autre fragment de barre identique, et dans lequel une pluralité de fragments de barre identiques (25) qui ont successivement été emboîtés, forment la barre composée (24).

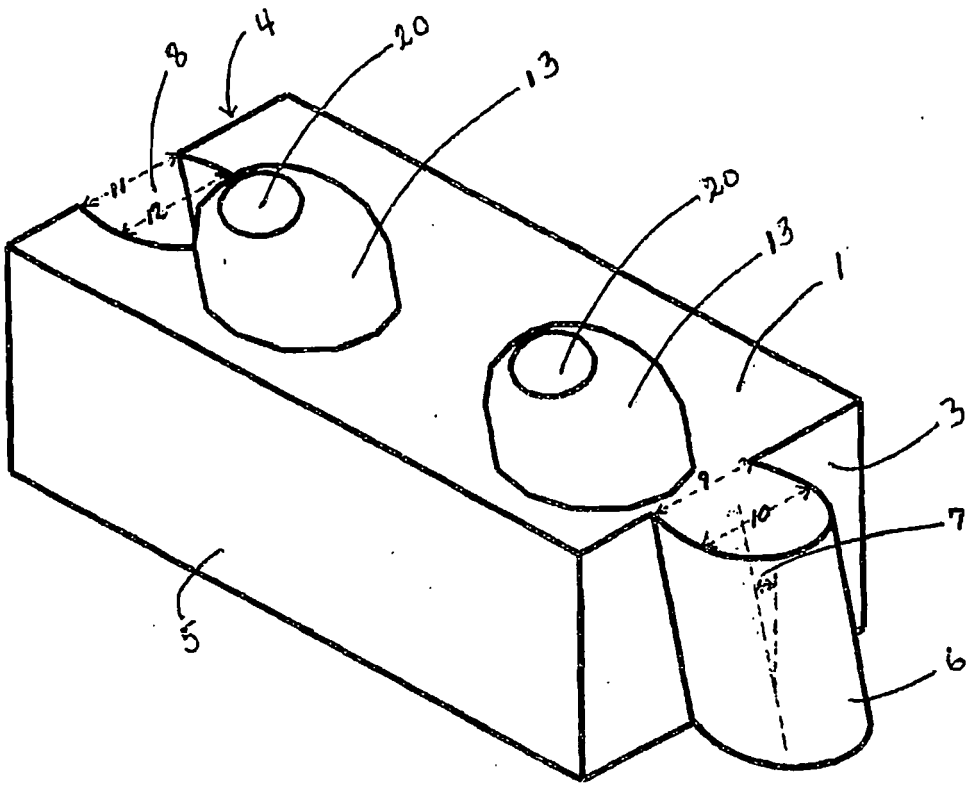


FIG. 1

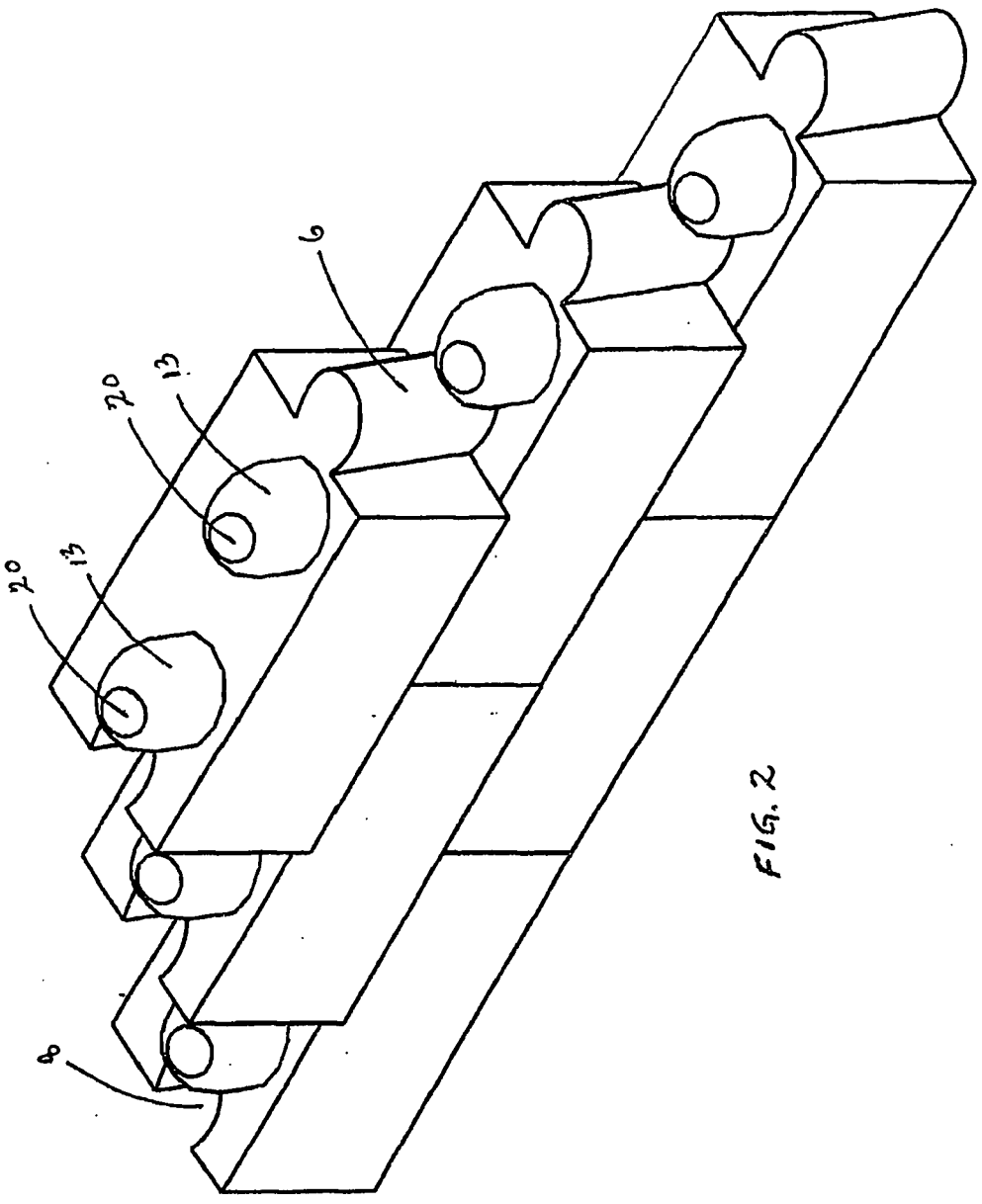


FIG. 2

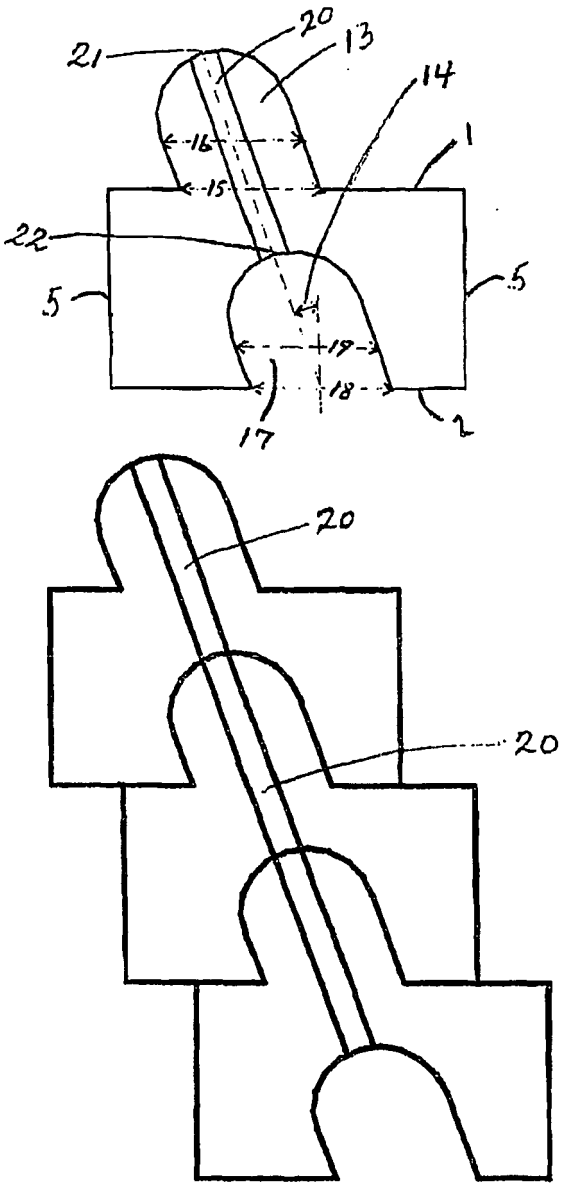


FIG. 3

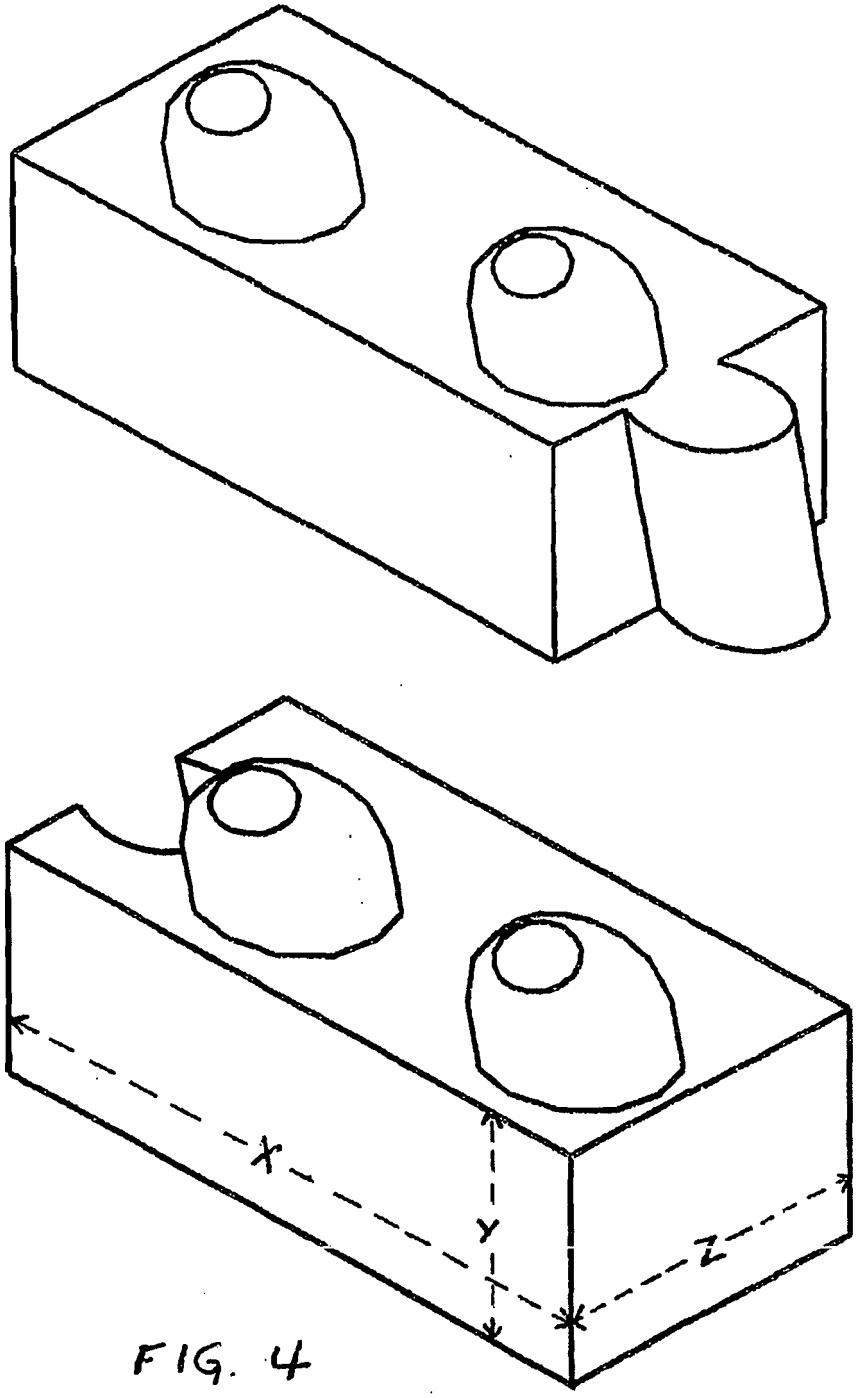


FIG. 4

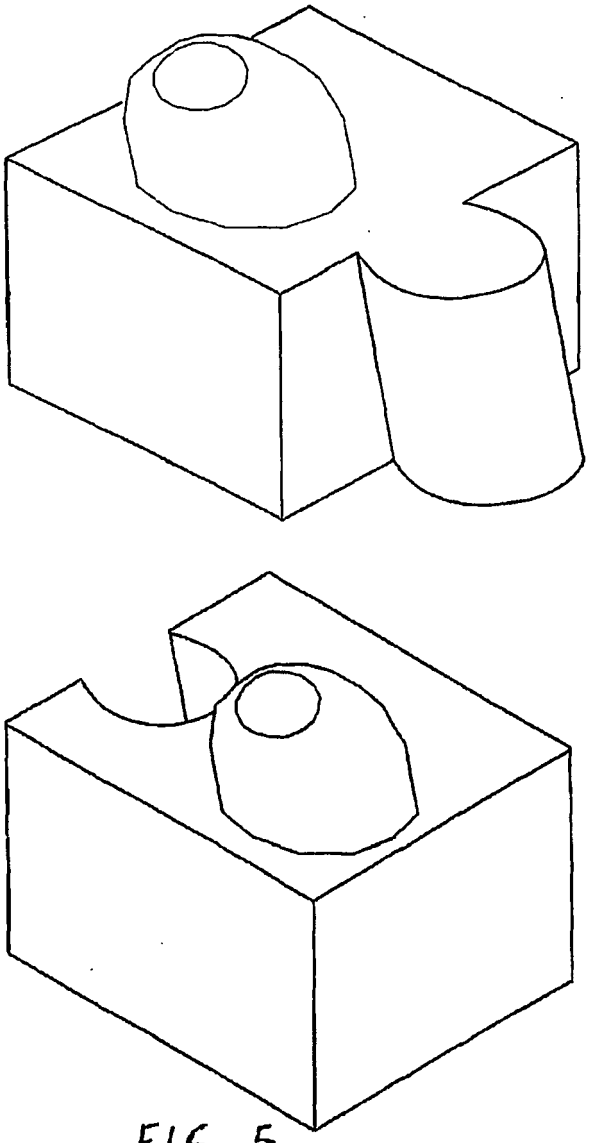

FIG. 5

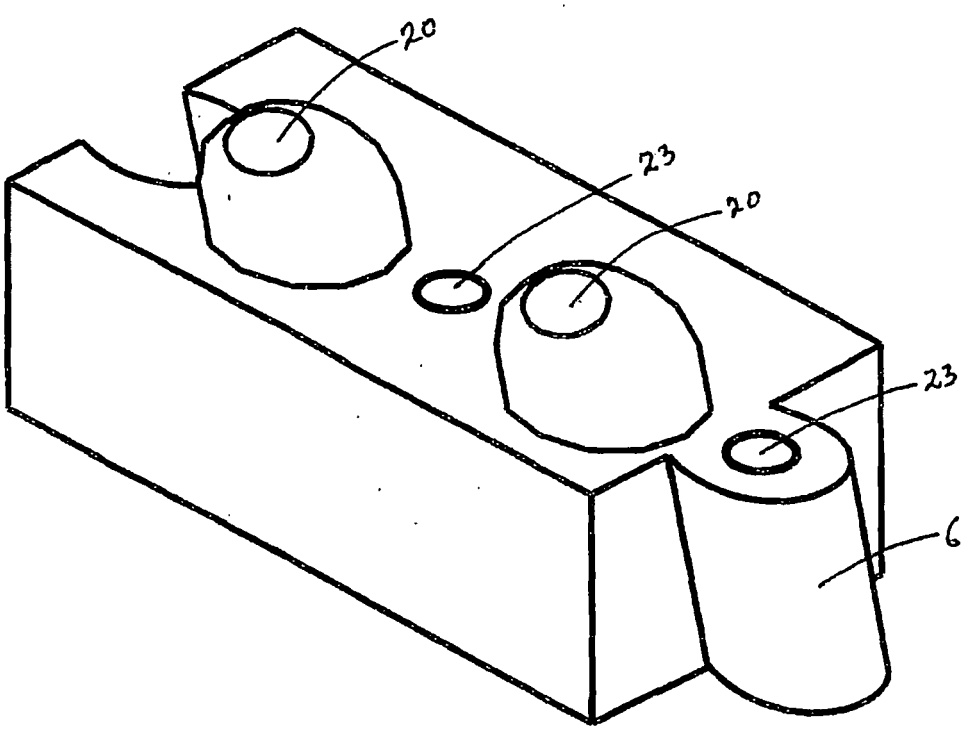


FIG. 6

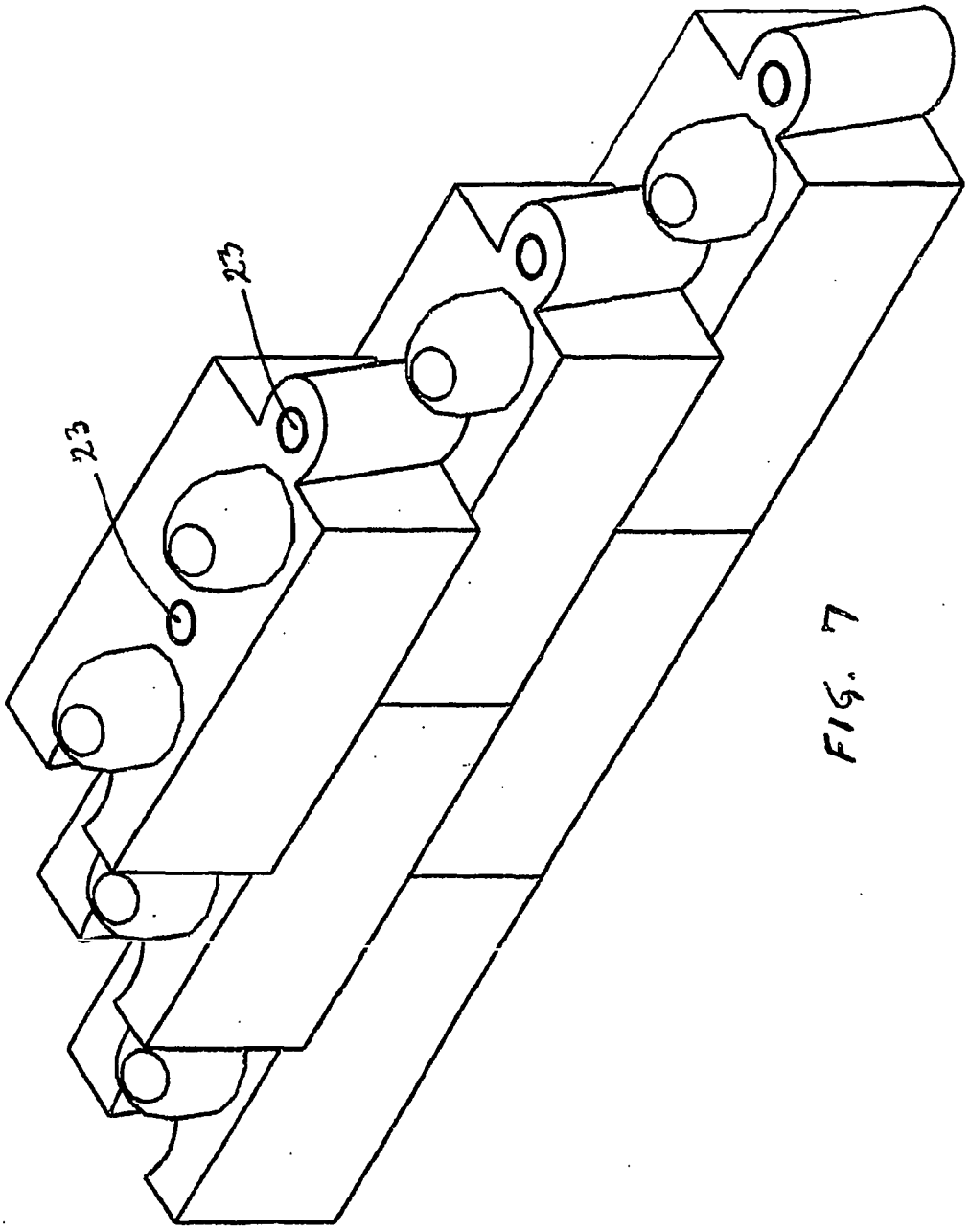


FIG. 7

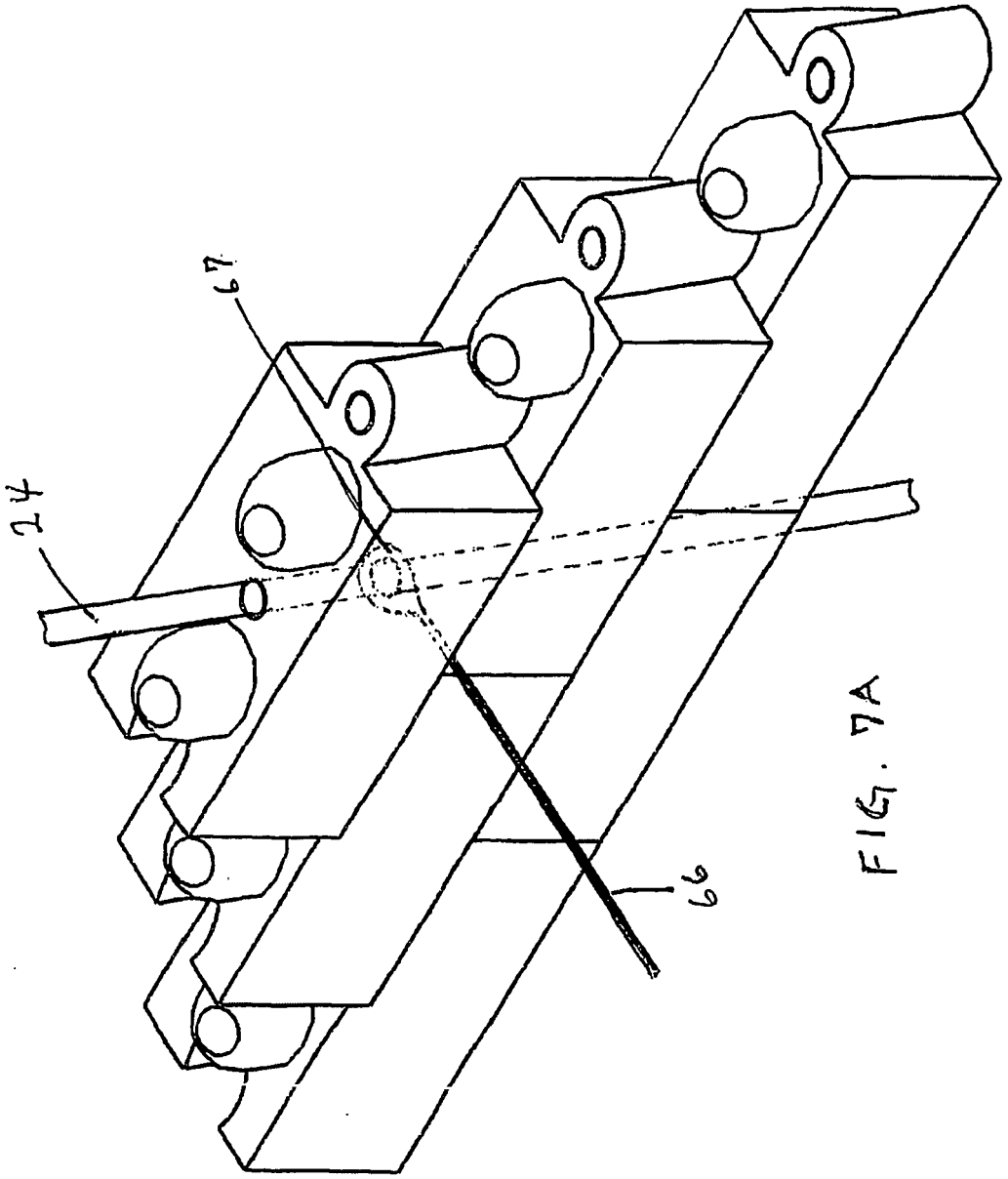


FIG. 7A

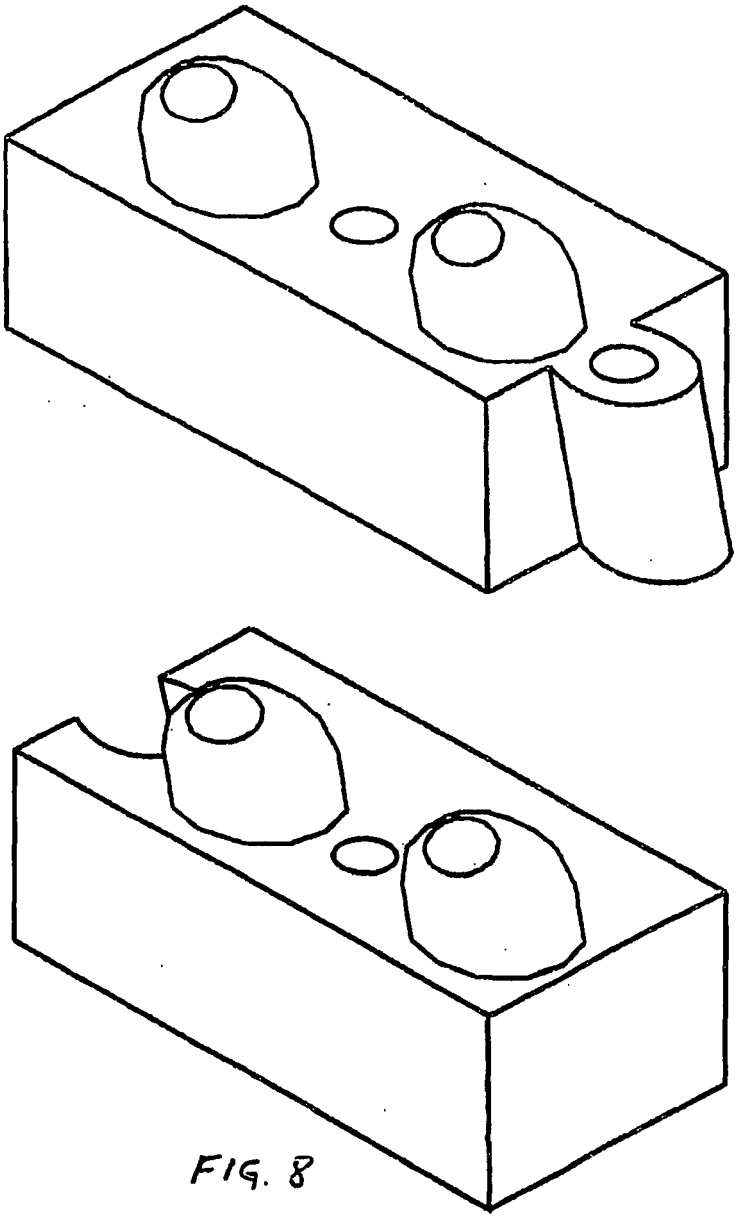

FIG. 8

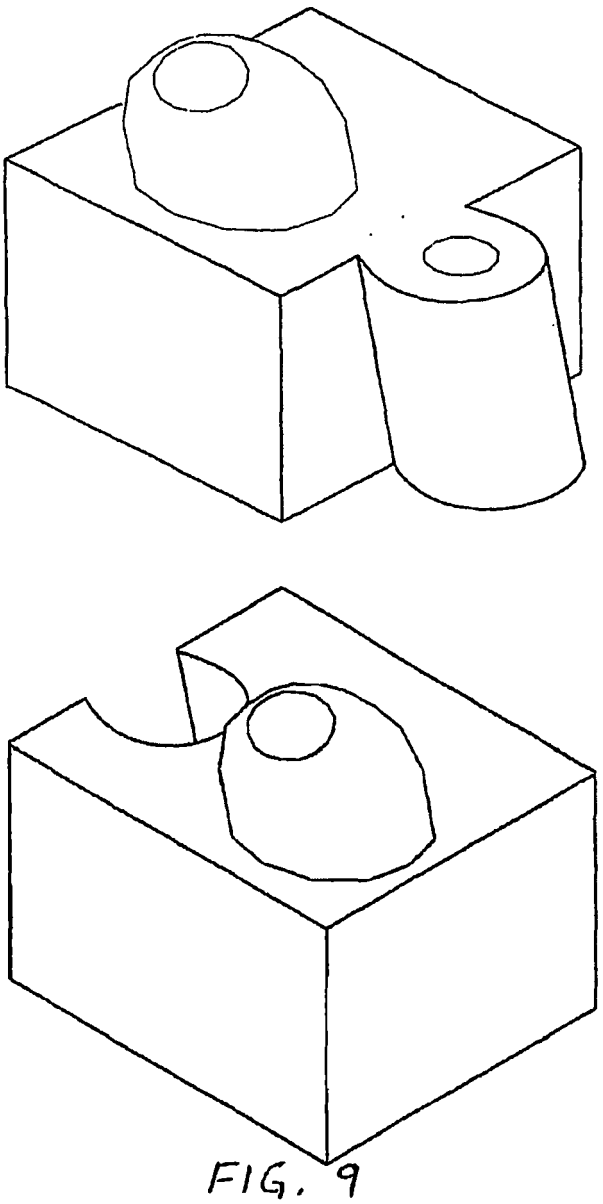

FIG. 9

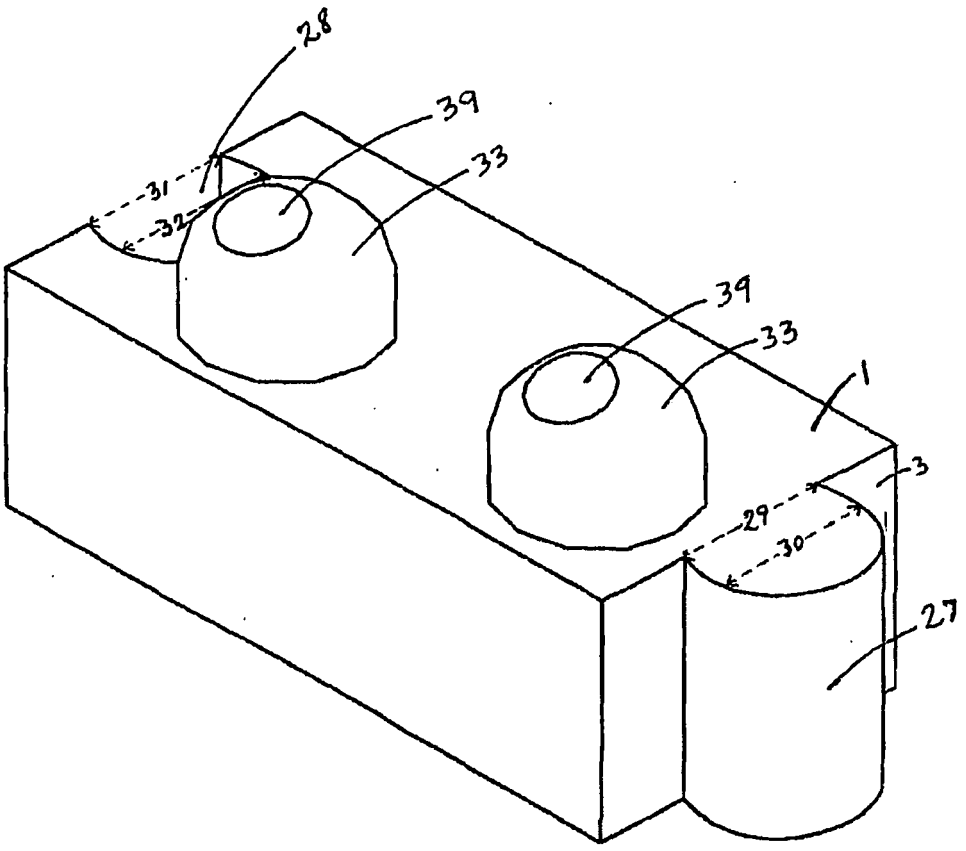


FIG. 10

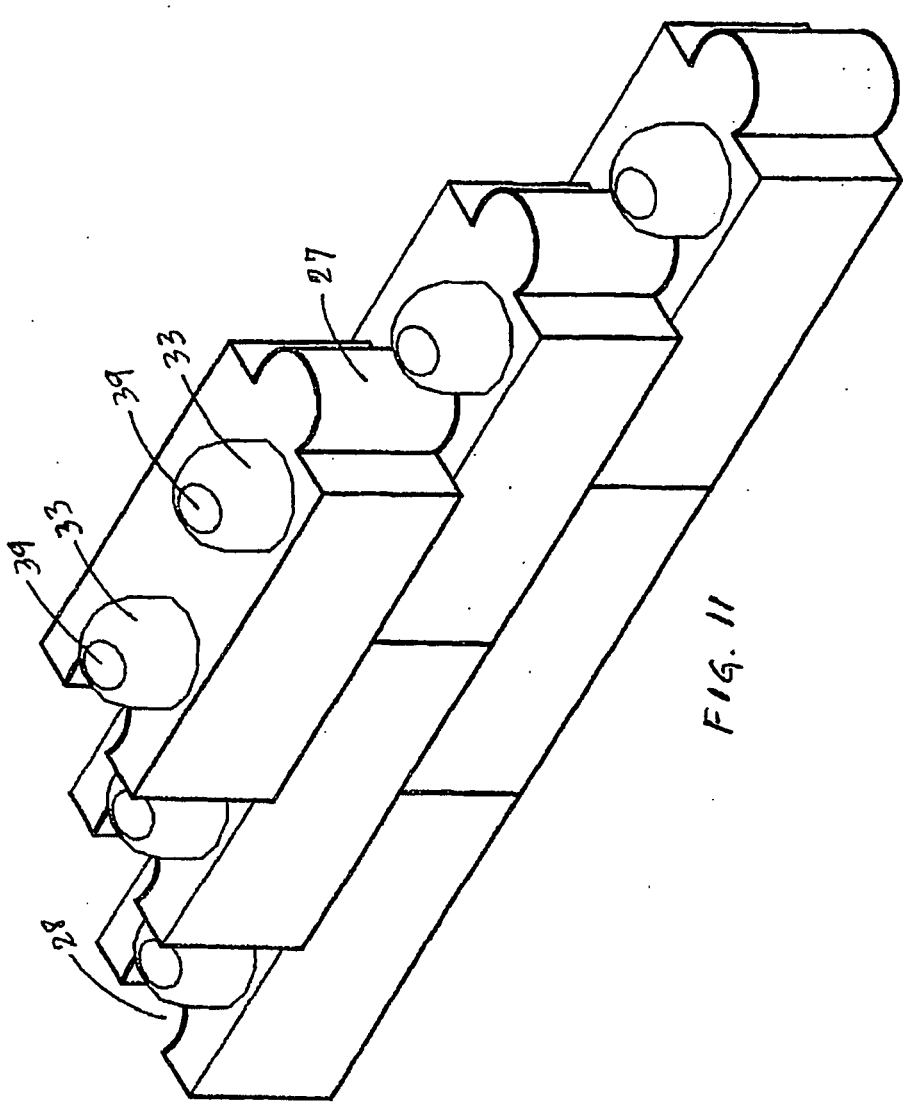


FIG. 11

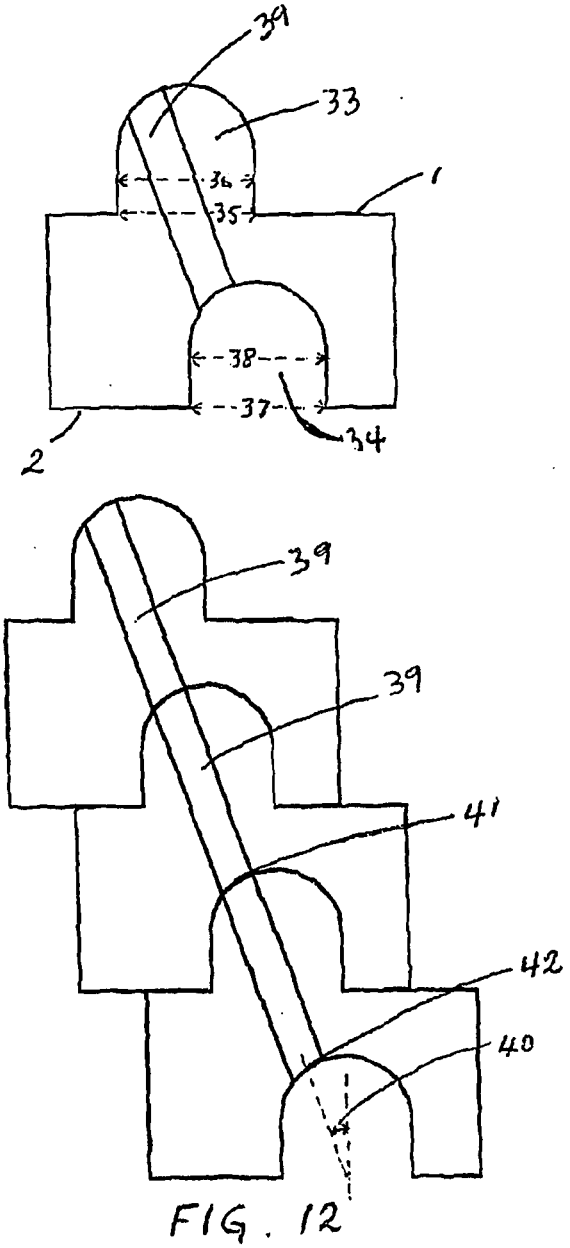


FIG. 12

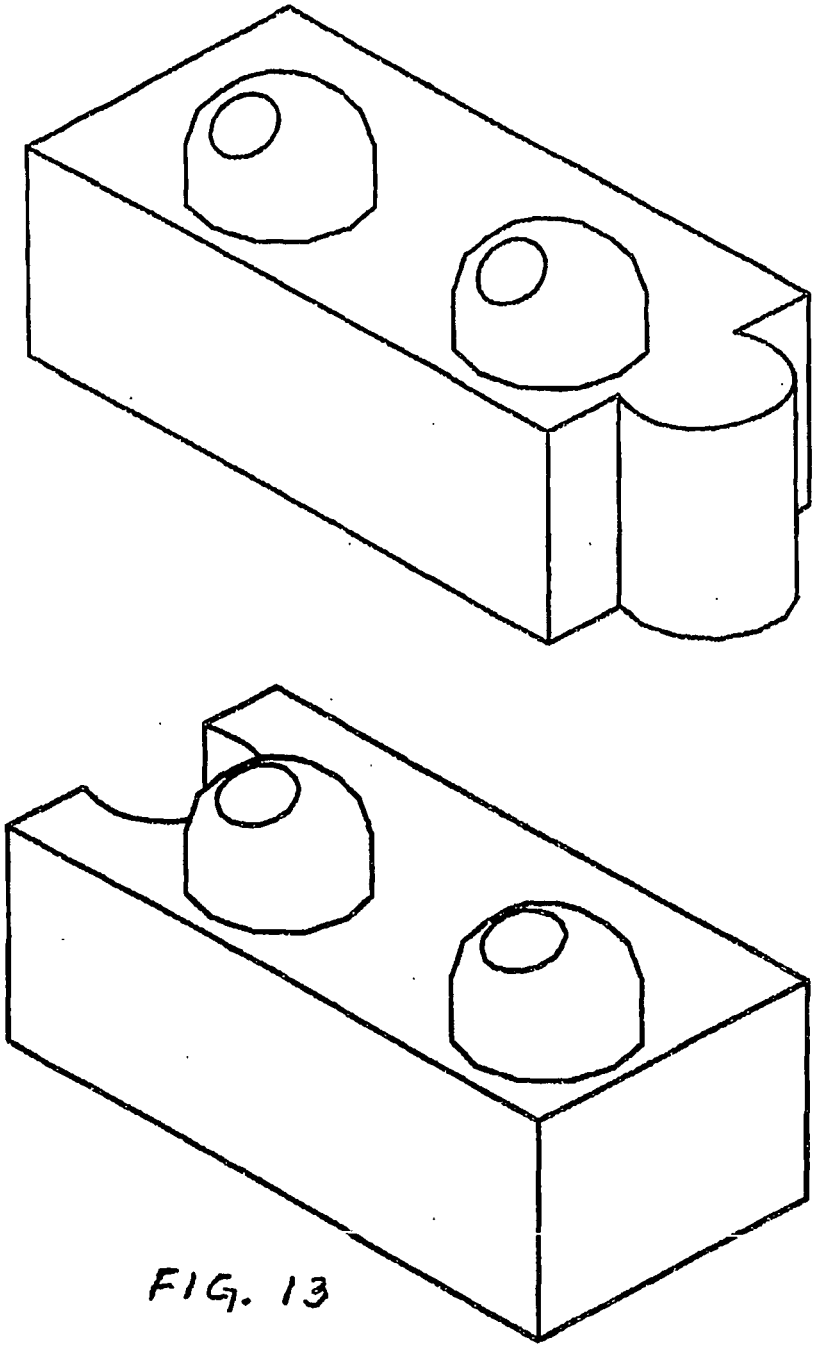

FIG. 13

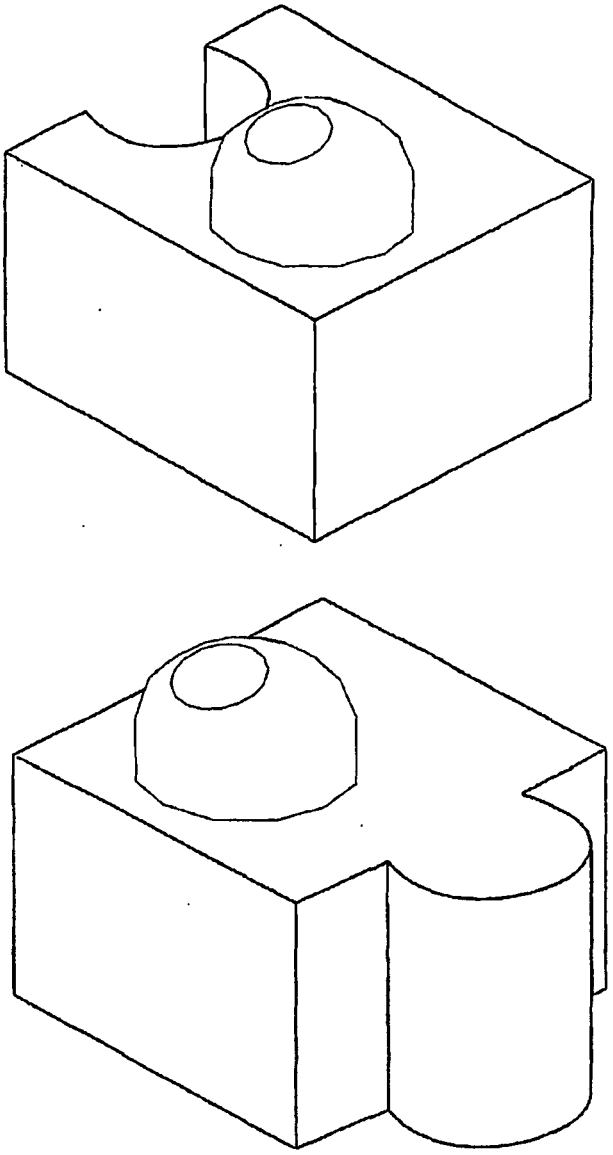

FIG. 14

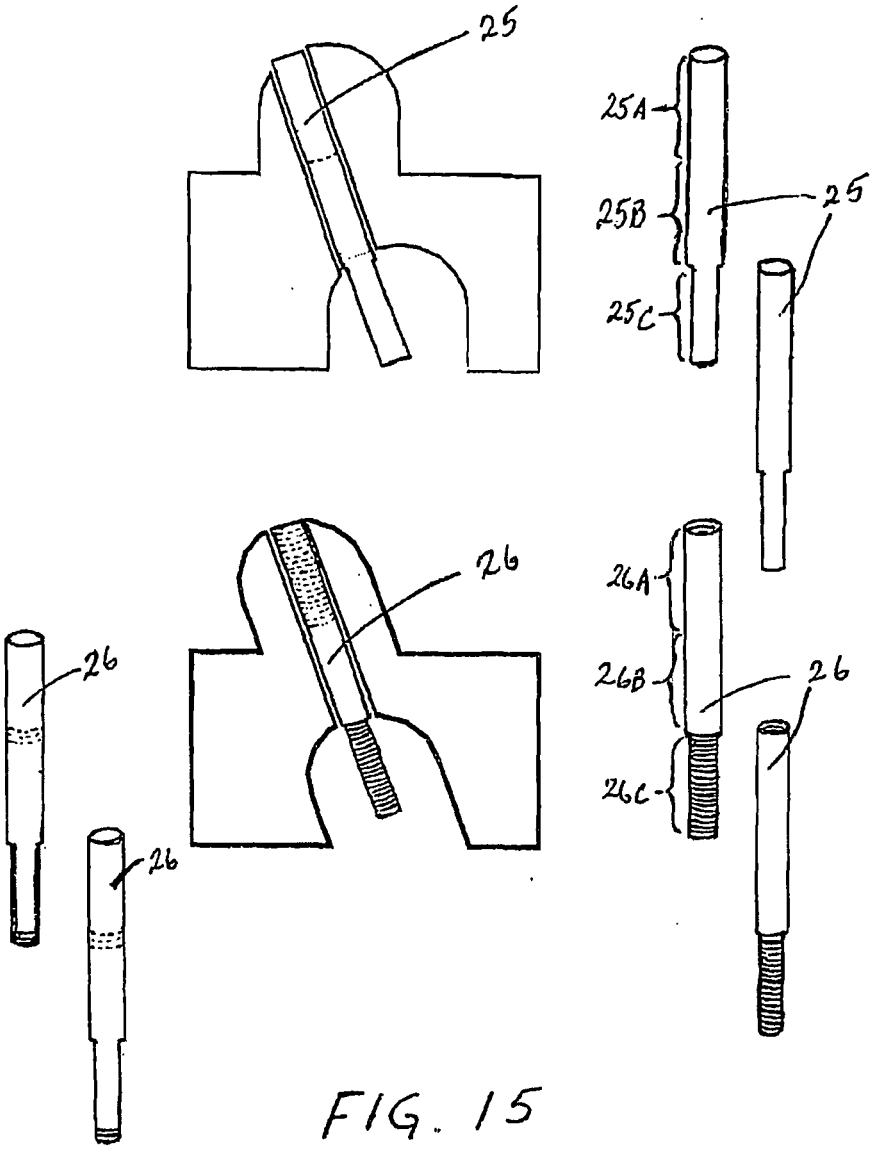


FIG. 15

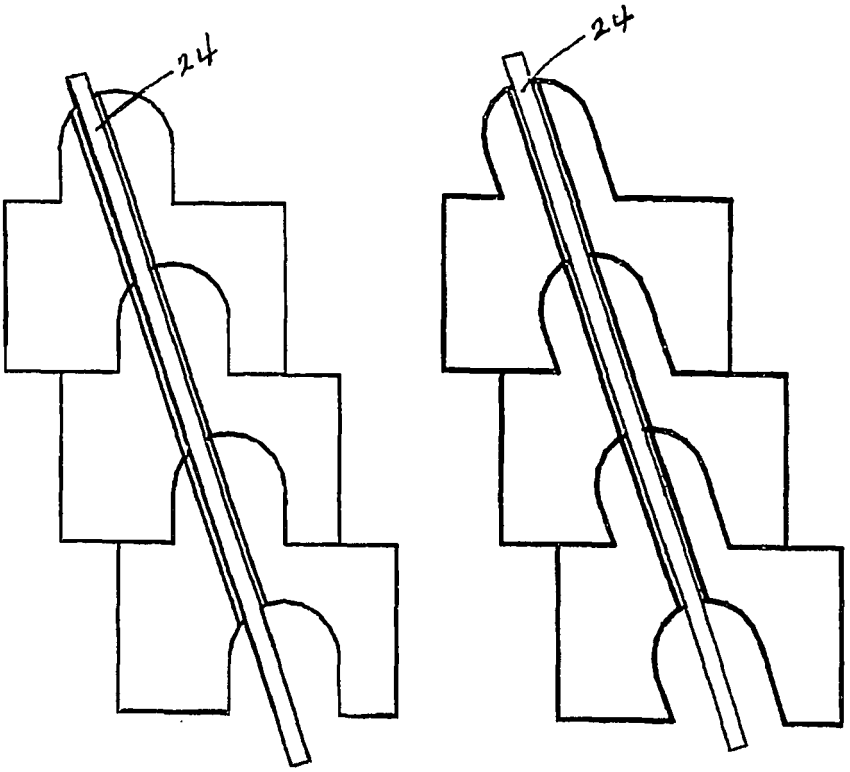


FIG. 16

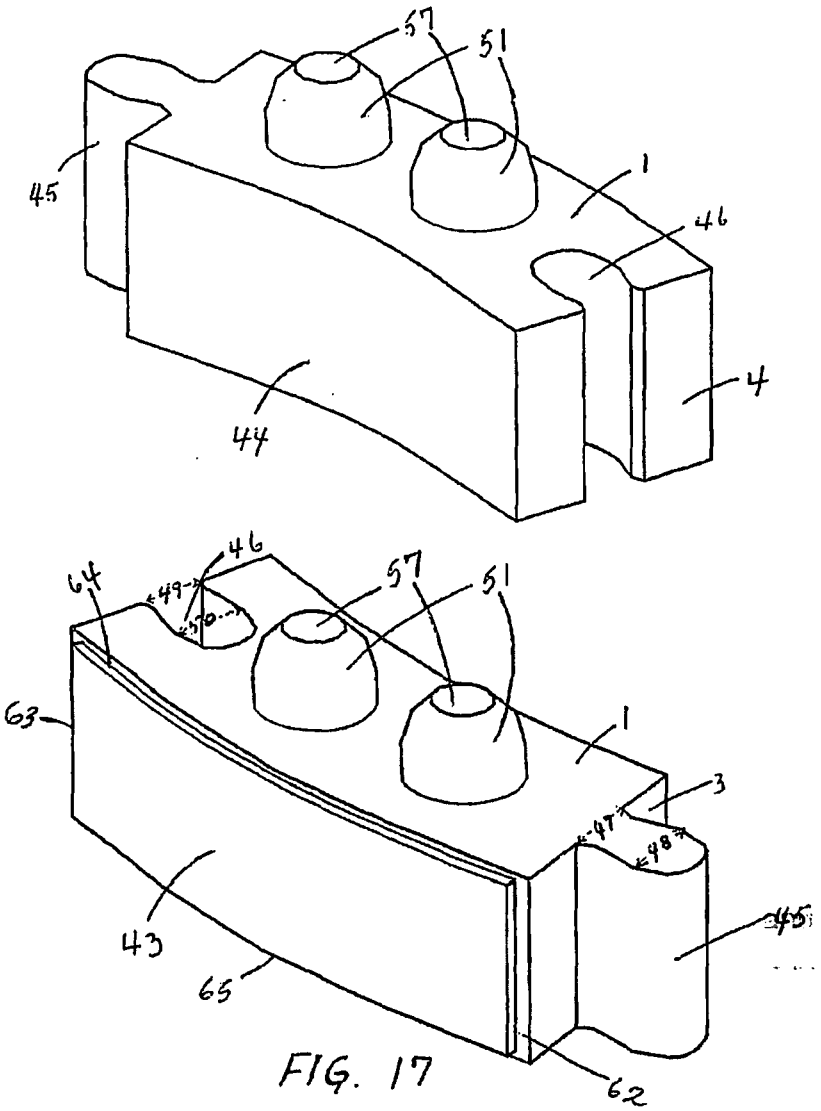


FIG. 17

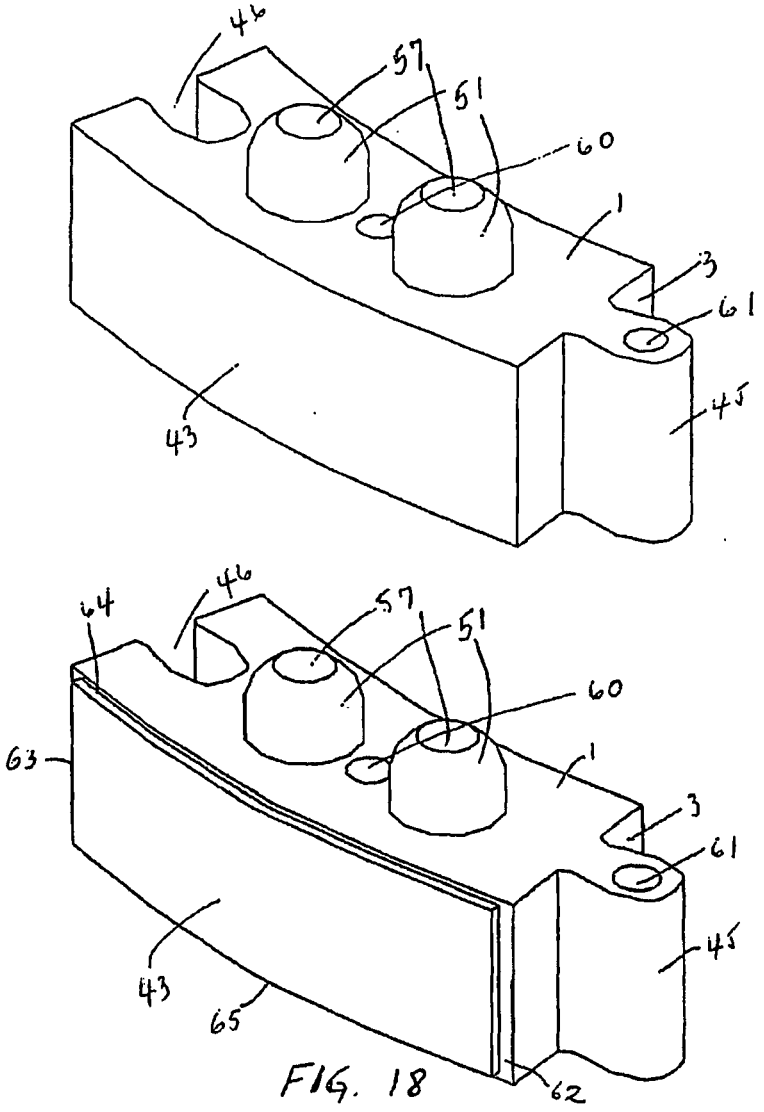


FIG. 18

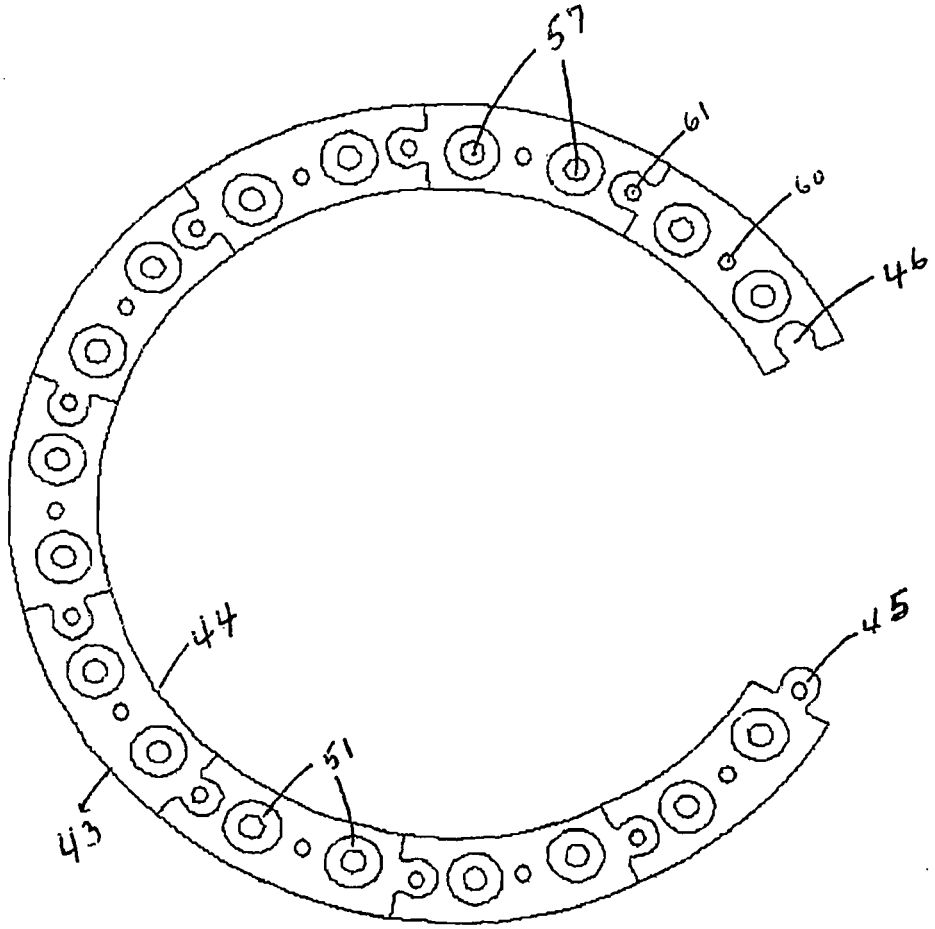


FIG. 19

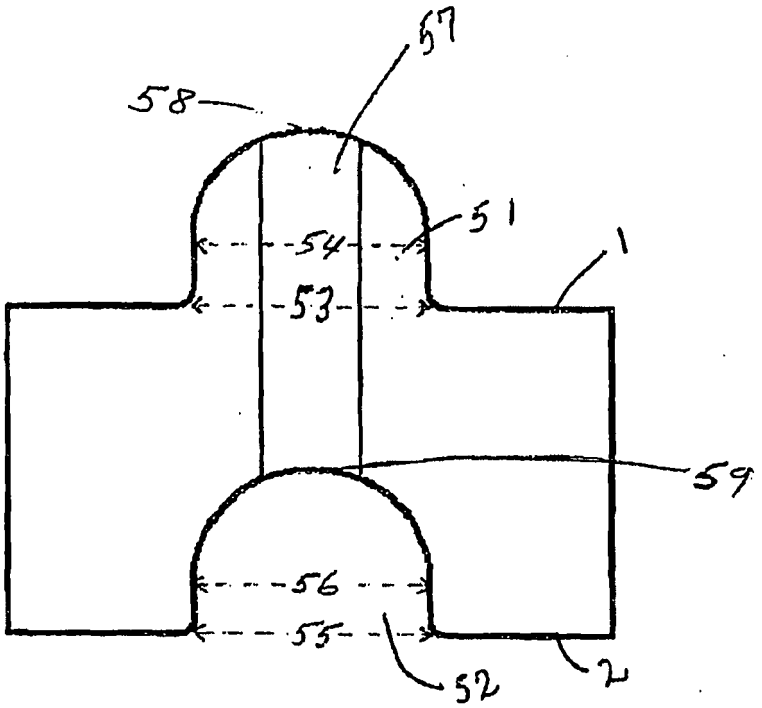


FIG 20.

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- US 6550208 B2 **[0004]**
- US 6105330 A **[0004]**
- US 6578338 B1 **[0004]**
- WO 06049234 A **[0006]**
- JP 4146330 A **[0008]**