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(54) **Hinge**

(57) A hinge comprising two pivoting elements adapted to hingedly join two articles, each pivoting element including attachment means for attaching to an article; wherein when attached to the two articles the hinge is rotatable with respect to the articles.

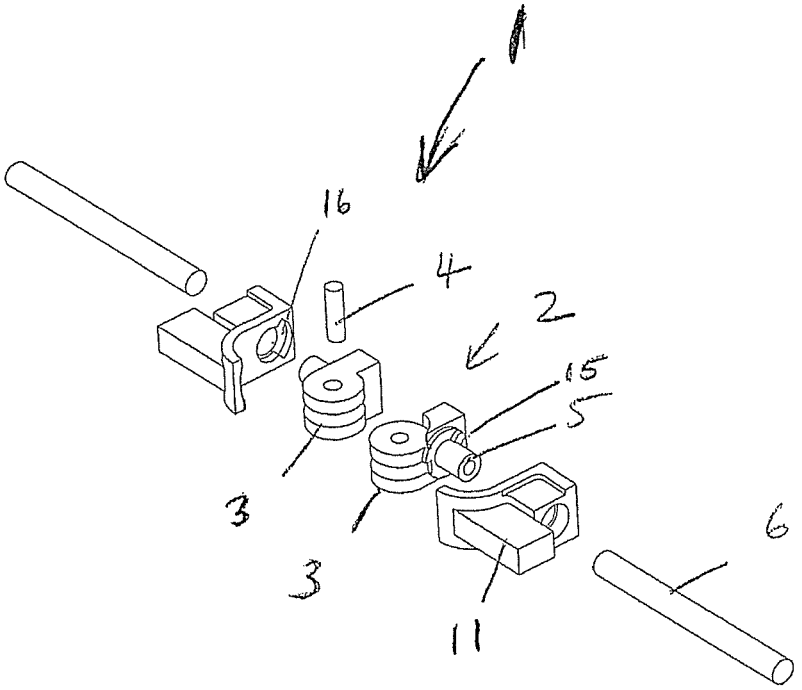

Figure 1

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Description

FIELD OF THE DISCLOSURE

[0001] The disclosure relates to a hinge.

SUMMARY OF THE DISCLOSURE

[0002] Disclosed is a hinge comprising two pivoting elements adapted to hingedly join two articles, each pivoting element including attachment means for attaching to an article; wherein when attached to the two articles the hinge is rotatable with respect to the articles.

[0003] In one form the hinge is rotatable with respect to the articles such that the direction of freedom of movement of the hinge is changed

[0004] In one form the hinge further comprises a hinge pin.

[0005] In one form the attachment means comprises a hinge collar adapted to be attached to one of the two articles, wherein the hinge is rotatable with respect to the hinge collar.

[0006] In one form the axis of rotation of the pivoting elements and the axis of rotation of the hinge are perpendicular to one another.

[0007] In one form the hinge is rotatable between a locked position and an unlocked position

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] To facilitate an understanding of the disclosure, reference is made in the description to the accompanying drawings illustrating a preferred embodiment of the hinge used in a folding chess board. It is to be understood that the hinge is not limited to the preferred embodiment as illustrated in the drawings.

[0009] In the drawings:

Figure 1 is an exploded perspective view of the hinge of one embodiment of the present invention;
Figure 2 is a front view of the hinge of Figure 1 without attachment means;
Figure 3 is a top view of the hinge of Figure 2;
Figure 4 is a side elevation view of the hinge of Figure 2;
Figure 5 is a perspective view of the hinge of Figure 2;
Figure 6 is a perspective view of the hinge of Figure 2 with the hinge element in a second position;
Figure 7 is a perspective view of the hinge of Figure 2 with the collar in a second position;
Figure 8 is an exploded perspective view of the hinge of Figure 1;
Figure 9 is a perspective view of the hinge of Figure 8 in a first position;
Figure 10 is a perspective view of the hinge of Figure 8 in a second position;
Figure 11 is a side exploded view of the hinge of Figure 8;
Figure 12 is a side view of the hinge of Figure 8 in a first position;
Figure 13 is a side view of the hinge of Figure 8 in a second position;
Figure 14 is a cross-sectional exploded side view of a hinge element of a second embodiment of the invention;
Figure 15 is a cross-sectional side view of the hinge of Figure 14;
Figure 16 is an exploded front view of the hinge of Figure 14;
Figure 17 is a front view of the hinge of Figure 14;
Figure 18 is an exploded perspective view of the hinge of Figure 14;
Figure 19 is an exploded perspective view of the hinge of Figure 14;
Figure 20 is a perspective view of the hinge of Figure 14;
Figure 21 is a perspective view of the hinge of Figure 14;
Figure 22 is a perspective view of the hinge of one embodiment of the present invention in use;
Figure 23 is a perspective view of the hinge of Figure 22 in use in a second position;
Figure 24 is a perspective view of the hinge of Figure 22 in use in a third position;
Figure 25 is a perspective view of the hinge of Figure 22 in use in a fourth position;
Figure 26 is a cross-sectional top view of an embodiment of the hinge in locked position in use;
Figure 27 is a cross sectional bottom view of the hinge of Figure 26;
Figure 28 is a perspective view of a second embodiment of a hinge;
Figure 29 is a front view of the hinge of Figure 28;
Figure 30 is an end view of the hinge of Figure 28;
Figure 31 is a perspective view of the hinge of Figure 28;
Figure 32 is a top perspective view of the hinge of Figure 28; and,
Figure 33 is a perspective end view of the hinge of Figure 28.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0010] Referring to the figures, there is shown a hinge 1 for allowing a relative motion between two solid articles. In the embodiment shown in the figures the solid articles are in the form of two chess board halves 30.

[0011] The hinge 1 comprises two pivoting elements 3. Each of the two independent pivoting elements 3 is attached to a hinge pin 4 such that at least one of the two independent pivoting elements is rotatable about the hinge pin 4. The two independent pivoting elements 3 are therefore rotatable in respect of one another.

[0012] Each of the two pivoting elements 3 further comprise a rotatable attachment means including connector 5, shaft 6 and collar 11.

[0013] The two pivoting elements 3 are moveable with respect to one another. As a result articles 30 attached with the pivoting elements 3 are moveable with respect to one another.

[0014] The connectors 5 are adapted to be fitted into the two solid articles 30, such that the two solid articles 30 extend outwardly from the connectors 5. As seen in Figures 22 through 25, in this form movement of the pivoting elements 3 brings the two solid articles 30 from a parallel and adjacent position as shown in Figure 22 to a colinear position as shown in Figure 25.

[0015] The shaft 6 adds strength and length to the hinge 1 to bear the load of the solid articles 30 beyond the pivoting elements 3.

[0016] Each hinge collar 11 is adapted to be rotatably attached with connector 5. Shaft 6 is provided with a screw thread or other means to engage with connector 5. Hinge collar 11 is positioned about shaft 6 or connector 5. The hinge 1 and connectors 5 can thus rotate with respect to the collars 11. The collars 11 are shaped to curve over the hinge element but can be any shape.

[0017] As shown in figures 26 and 27, the hinge collar 11 is attached to the solid articles 30 by way of set screws or other attachment means 26 and 27. Each shaft 6 sits in a bearing tube 7 inset into each solid article 30. Shaft 6 is able to rotate in bearing tube 7. The hinge 1 and the connectors 5 are thus rotatable with respect to the solid articles 30 about the axis of the shafts 6.

[0018] The hinge 1 is rotatable such that the direction of freedom of movement of the pivoting elements 3 with respect to the solid articles 30 is changed. This change in the direction of freedom of movement of the pivoting elements 3 with respect to the solid articles 30 allows the solid articles 30 to move in varying planes with respect to one another.

[0019] In effect, the pivoting elements 3 move such that the hinge pin 4 acts as an axis of rotation. When the hinge 1 is rotated through 90 degrees, the hinge pin 4 and the pivoting elements' 3 axis of rotation is rotated through 90 degrees. As a result the freedom of movement of the hinge is shifted through 90 degrees. Depending upon the size and shape of the solid articles 30 this results in the solid articles being moveable with respect to one another in a different plane or, in certain circumstances means the hinge 1 and pivoting elements 3 are locked so that the solid articles 30 cannot move with respect to one another. That is the hinge 1 is in a locked position.

[0020] The locked and unlocked hinge positions are best shown in use in a flat solid article such as two chess board halves. This is best shown in figures 22 through 25.

[0021] In the locked position shown in Figure 25, the orientation of the hinge 1 with respect to the solid articles 30 restricts the movement of the pivoting elements 3 with respect to one another. In the locked position the axis of rotation of the pivoting elements 3 is perpendicular to the only available axis of rotation of the solid articles 30. As a result the solid articles 30 are fixed in position in relation to one another.

[0022] The collar 10 is attached to or set into the articles 30 being hinged. Each collar piece 11 is inset on one side of the hinge joint 15 extending between the articles 30. Because the collar 10 is set into the two articles 30 the hinge 1 can be flush with the articles 30.

[0023] In use, in order to unlock the hinge 1, a user rotates the hinge 1 with respect to the articles 30. This rotates the connectors 5 and connecting shafts 6 in relation to the articles 30. The collar 11, on the other hand, is fixed with respect to the articles 30. The hinge element 2 can be rotated with respect to the articles 30.

[0024] The hinge can be rotated 90 degrees. A ridge 15 associated with the connectors 5 and an inset portion 16 associated with the collar interact to stop the hinge 1 from rotating an angle greater than 90 degrees.

[0025] In other forms the hinge can be rotated through up to 360 degrees by incorporating a ridge which interacts to stop the hinge from rotating more than 180 degrees, 270 degrees or any angle. When no ridge is incorporated the hinge can be rotated 360 degrees. When the hinge can be rotated through 360 degrees the direction of freedom of movement can be rotated through 360 degrees, allowing the solid articles 30 to move in varying planes with respect to one another.

[0026] In use, the position of the hinge 1 in the hinged article and the opening movement of the hinge 1 prevents the meeting of the articles 30 joined by the hinge 1 along the hinge joint 15. There is therefore no crunching or grinding or opportunity of wear between chess board halves along the hinge joint 15.

[0027] Further, the hinge 1 allows for no hyperextension beyond the position determined as the home position. When the connectors 5 are collinear to one another the pivoting elements 3 meet to prevent hyperextension of the hinge 1.

[0028] The collar 11 and hinge element 2 allows for staged fitting, whereby the collar 11 is attached to the hinged article. Subsequently the hinge element is attached.

[0029] The hinge element 2 is composed of metal, plastic or any other rigid durable substance.

[0030] In another embodiment, the centre of gravity of the hinge element is positioned such that gravity is utilised to automate the rotation of the hinge element 2 within the collar. In another form the rotation of the hinge is actuated automatically by a motor, spring, magnet or other external means.

[0031] In the embodiment described above, the two solid articles 30 comprise chess board halves. In other embodiments the two solid articles 30 may comprise any two solid articles requiring movement in respect to one another, for example scaffolding, flooring, two panels of an articulated dividing screen, a board game board, cupboard doors, and advertising panels.

[0032] Referring to Figures 28 - 33, disclosed is a further embodiment of a hinge 100 of the present disclosure. In this illustrated form the hinge 100 comprises two pivoting elements 103. Each of the two independent pivoting

elements 103 is engaged with a hinge pin 104 such that at least one of the two independent pivoting elements is rotatable about the hinge pin 104. The two independent pivoting elements 103 are therefore hingedly rotatable in respect of one another.

[0033] In the illustrated form, each of the two pivoting elements 103 further comprise a shaft 106 extending therefrom. The shaft 106 is fixed with respect to the pivoting element 103. In alternative forms the shaft may take another shape. A rotatable attachment element 105 is engaged with the shaft 106. In the illustrated form the attachment element is in the form of a cylindrical tube 107 shaped to engage the shaft by being positioned about the shaft 106.

[0034] The attachment means 105 are, in some forms, adapted to be fitted to two sections of an article such that the two sections are hinged with respect to one another. The shaft 106 adds strength and length to the hinge 100 to bear the load of the sections of the article. However, in alternative forms the shafts are shaped differently but allow for an attachment element to be rotatably or slideably attached thereto.

[0035] The pivoting elements 103 are therefore rotatable with respect to articles which are engaged with the attachment elements.

[0036] Rotation of pivoting elements 103 with respect to the articles changes the hinge moment or the direction of hinge movement with respect to the article. This change in the direction of freedom of movement of the pivoting elements 103 allows the articles to move in varying planes with respect to one another or alternatively allows for locking of the hing when the hinge moment is aligned with an axis extending perpendicular or at an angle to the articles rather than aligning with the articles.

[0037] In effect, the pivoting elements 103 move such that the hinge pin 104 acts as an axis of rotation. When the pivoting elements 103 are rotated through 90 degrees, the hinge pin 104 and the pivoting elements' 3 axis of rotation is rotated through 90 degrees. As a result the freedom of movement of the hinge is shifted through 90 degrees. Depending upon the size and shape of the articles this results in the articles being moveable with respect to one another in a different plane or, in certain circumstances means pivoting elements 103 are locked into position with respect to one another so that the solid articles cannot move with respect to one another. That is the hinge 1 is in a locked position.

[0038] In use, in order to unlock the hinge 1, a user rotates the pivoting elements 103 and hinge pin 104 1 with respect to the articles. This rotates the shafts 106 with respect to the articles while the attachments elements 105 remain fixed with respect to the articles.

[0039] In this and other forms the pivoting elements can be rotated through up to 360 degrees When the hinge can be rotated through 360 degrees the direction of freedom of movement can be rotated through 360 degrees, allowing the solid articles 30 to move in varying planes with respect to one another.

[0040] The hinge 100 is composed of metal, plastic or any other rigid durable substance.

[0041] The hinge 100 in the illustrated form allows for the hinge to be opened automatically without direct rotational contact with the pivoting elements. Pressure by a user against the hinge allows rotation of the hinge moment with respect to the articles and the attachment elements allowing for a shift in hinge moment without a user manually contacting the pivoting elements 103. This configuration can in turn allow for automatic unlocking of the hinge in, for example, a door.

Claims

1. A hinge comprising two pivoting elements, each pivoting element including a hinge element and an attachment means for attaching the hinge element to an article such that when the pivoting elements are attached to the article the hinge element is rotatable with respect to the article, the attachment means comprising a connector which, in use, extends into the article and is surrounded by the article, the connector being rotatably engaged with the article to allow rotation of the hinge element with respect to the article, the rotation of the hinge with respect to the article effecting a change in the direction of freedom of movement of the hinge.

2. A hinge as defined in claim 1, wherein the hinge further comprises a hinge pin.

3. A hinge as defined in claim 1, wherein the attachment means comprises a hinge collar adapted to be attached to one of the two articles and the hinge element is rotatable with respect to the hinge collar.

4. A hinge as defined in claim 2, wherein the attachment means comprises a hinge collar adapted to be attached to one of the two articles and the hinge element is rotatable with respect to the hinge collar.

5. A hinge as defined in any one of the preceding claims, wherein the axis of rotation of the pivoting elements with respect to one another and the axis of rotation of the hinge element with respect to the articles are perpendicular to one another.

6. A hinge as defined in any one of the preceding claims, wherein the connector comprises a shaft extending from each pivoting element.

7. A hinge as defined in any one of the preceding claims, wherein rotation of the hinge element moves the hinge between a locked position and an unlocked position.

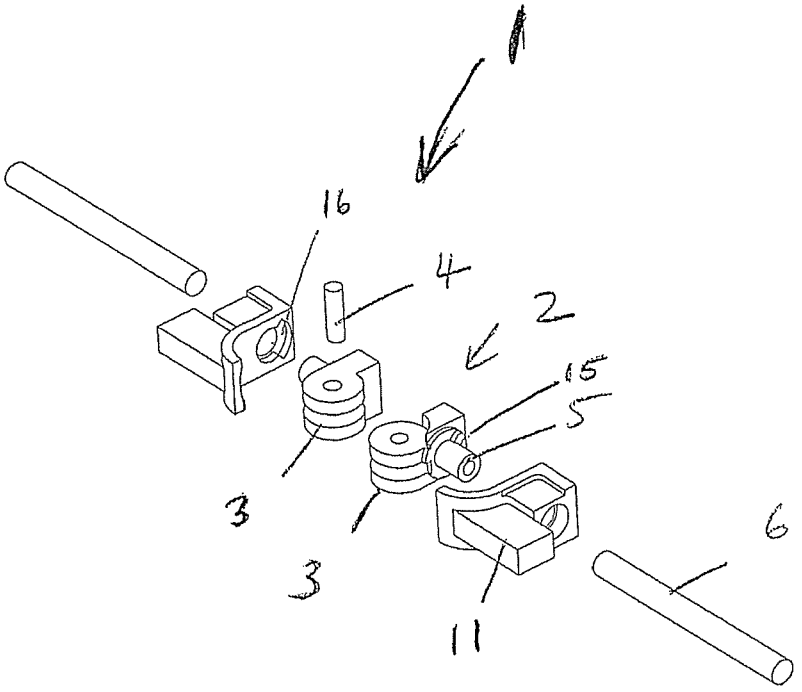


Figure 1

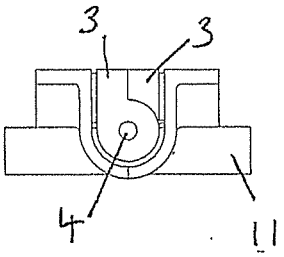
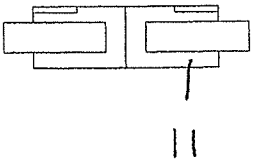


Figure 2



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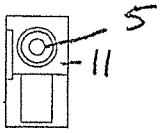
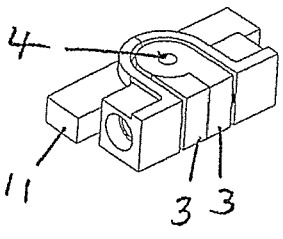


Figure 4



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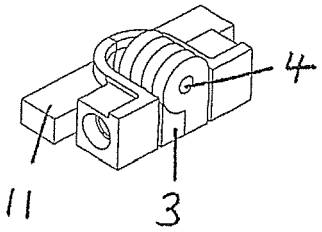

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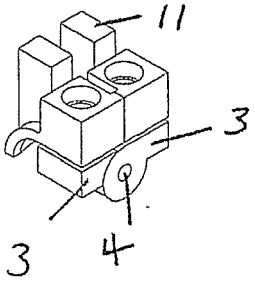


Figure 7

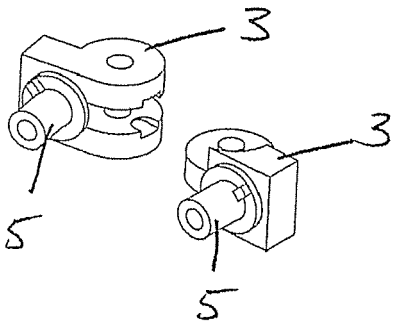
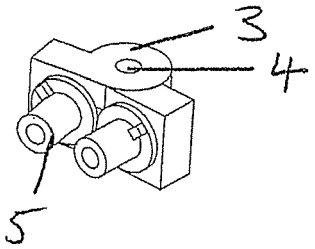


Figure 8



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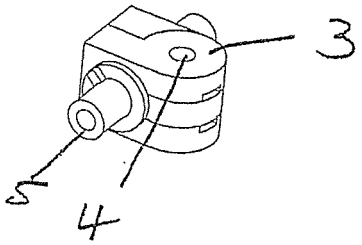


Figure 10

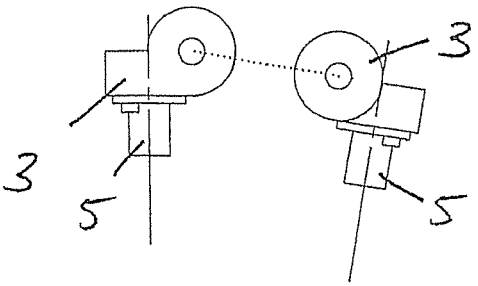


Figure 11

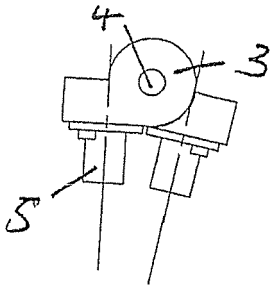


Figure 12

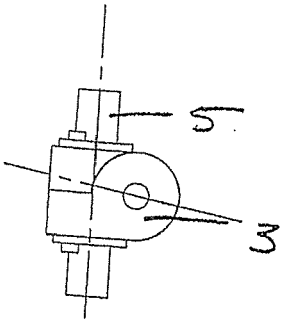
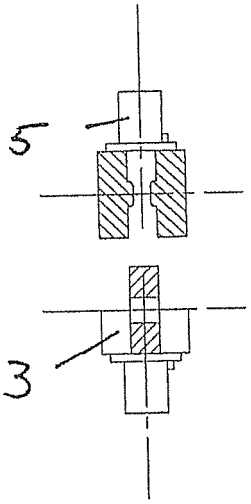


Figure 13



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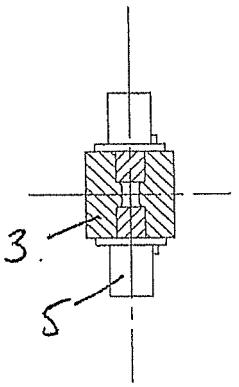
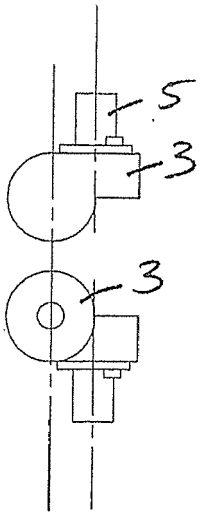


Figure 15



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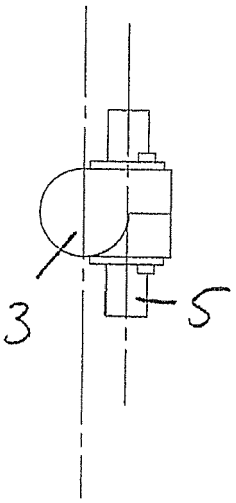
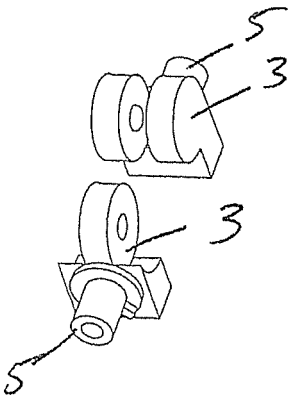


Figure 17



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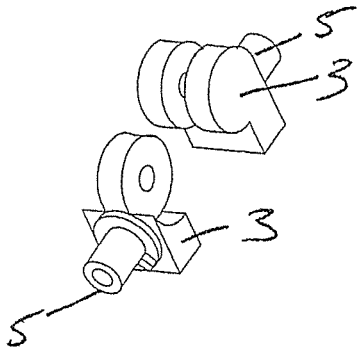
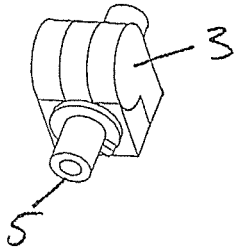


Figure 19



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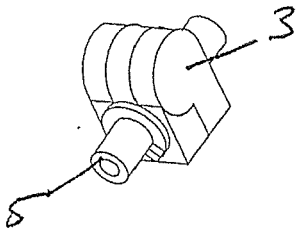

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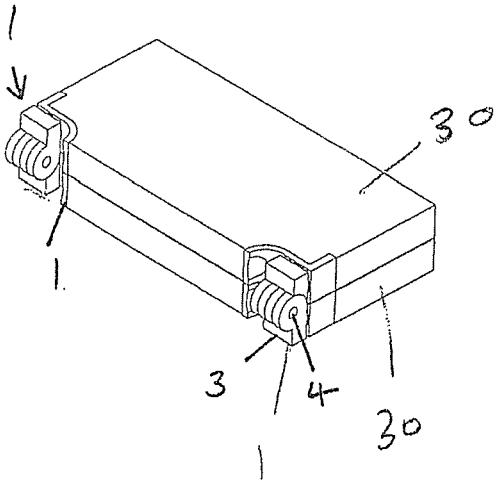
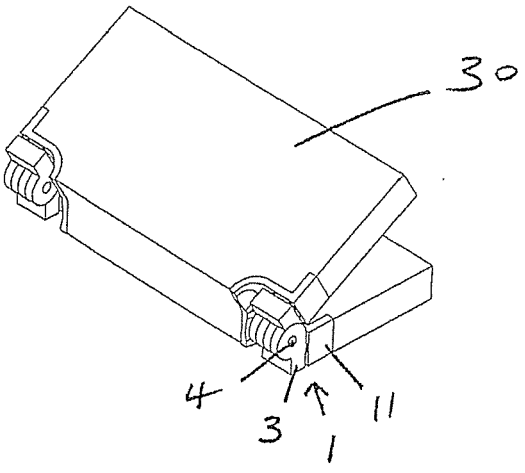


Figure 22



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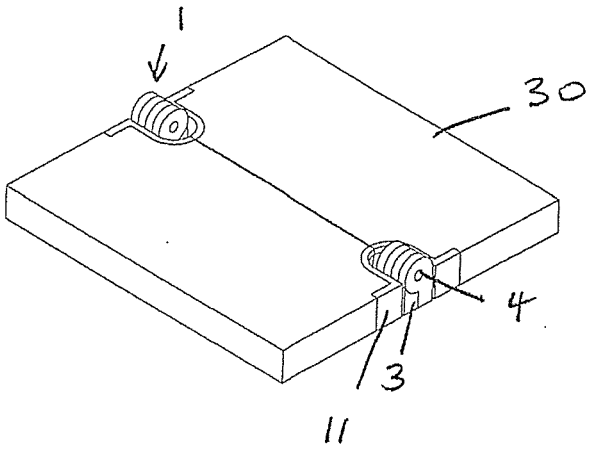

Figure 24

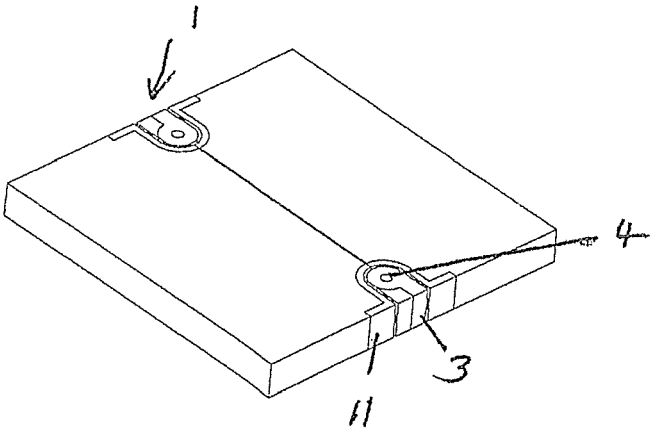

Figure 25

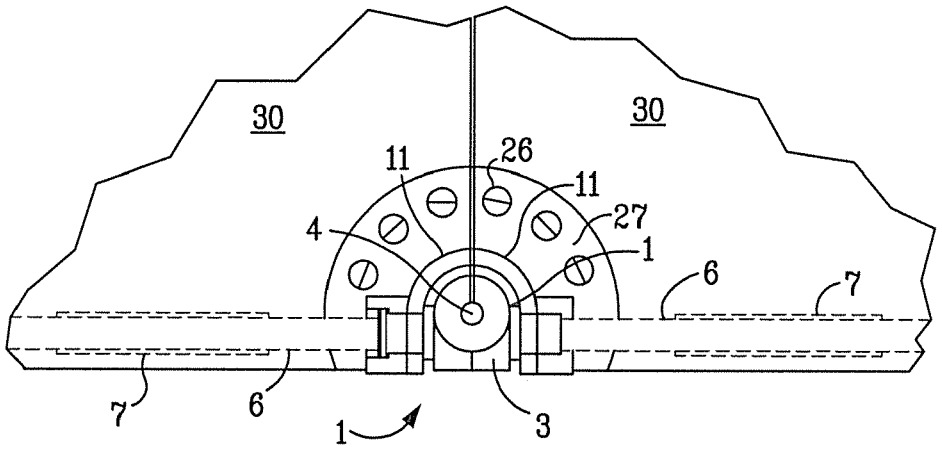

Figure 26

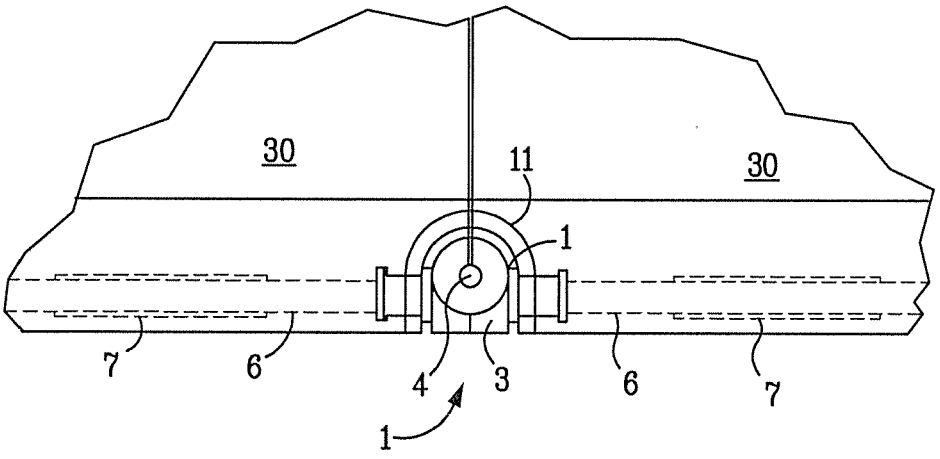

Figure 27

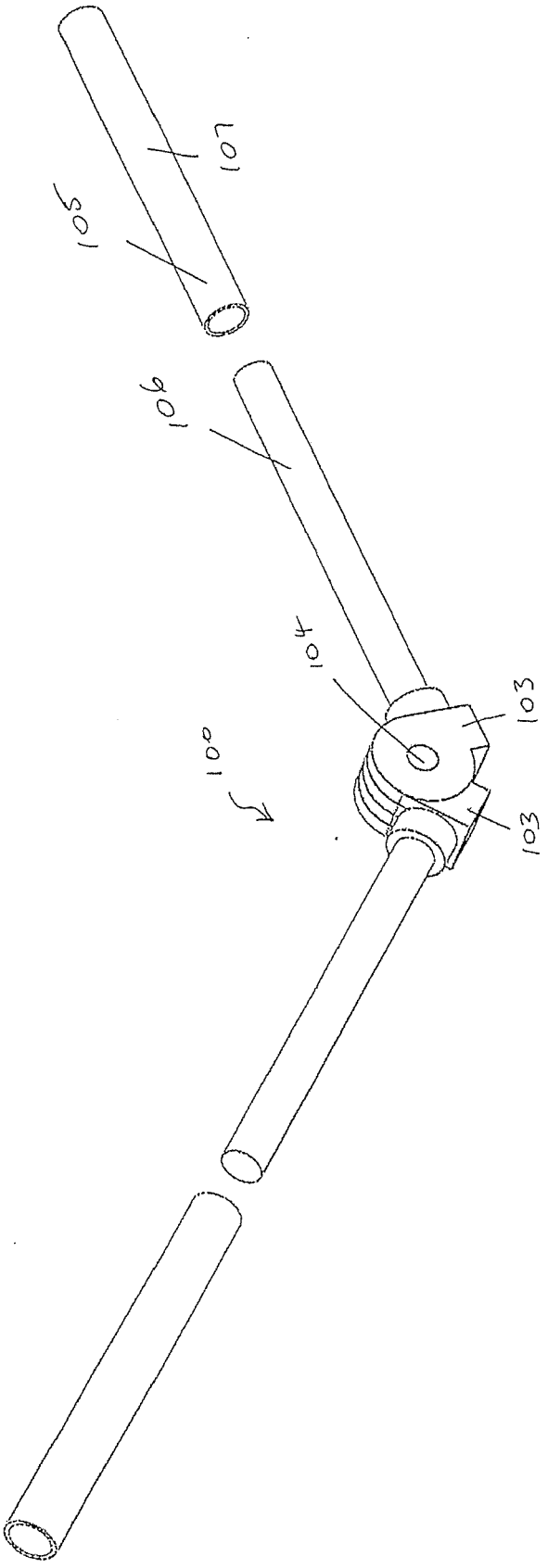

FIG 28

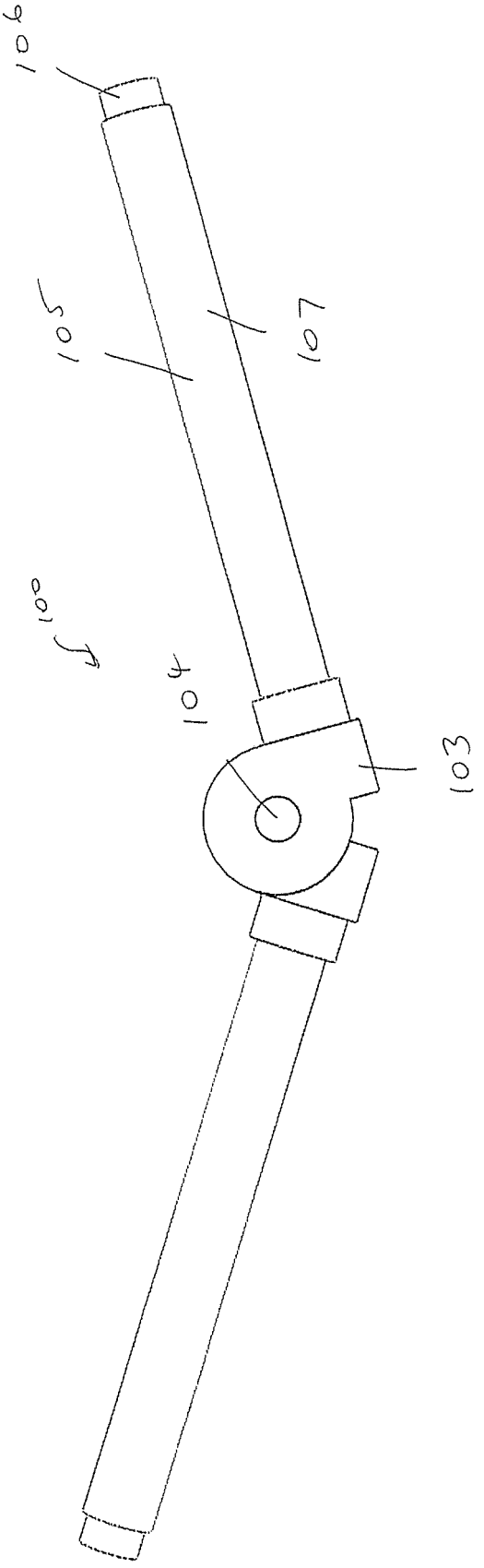

FIG 29

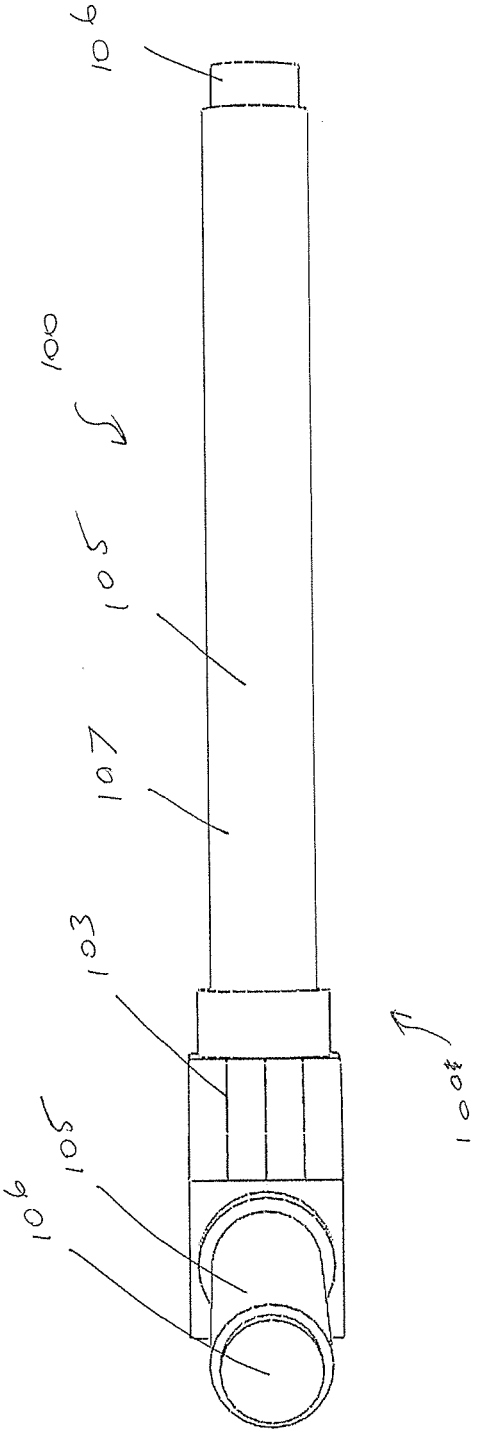

FIG 3a

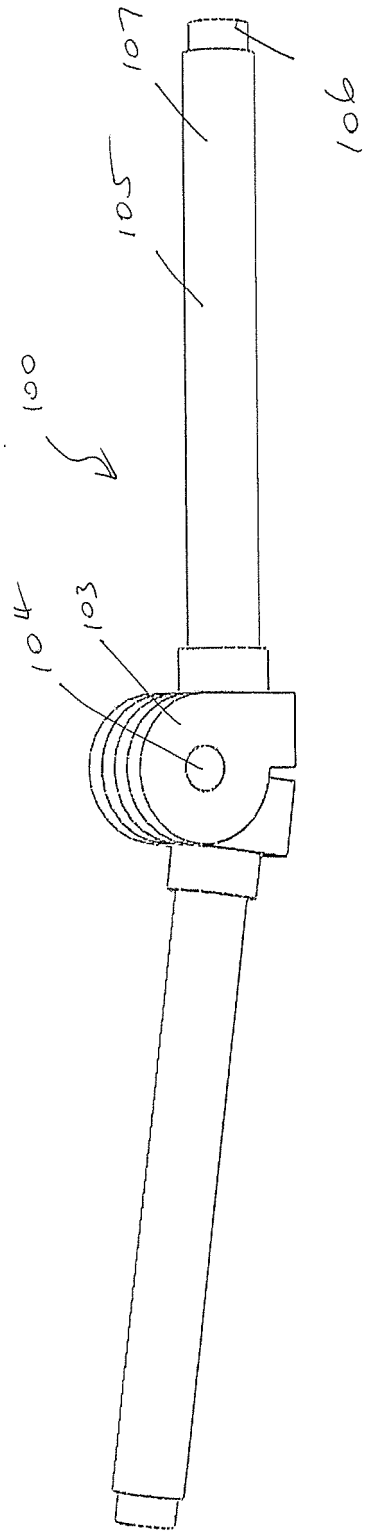

FIG 31

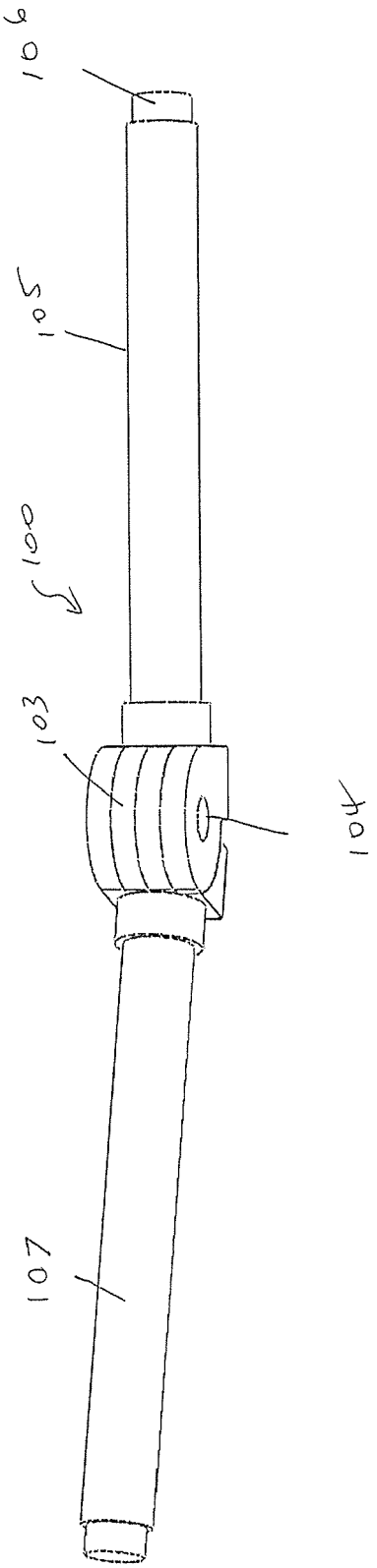

FIG 32

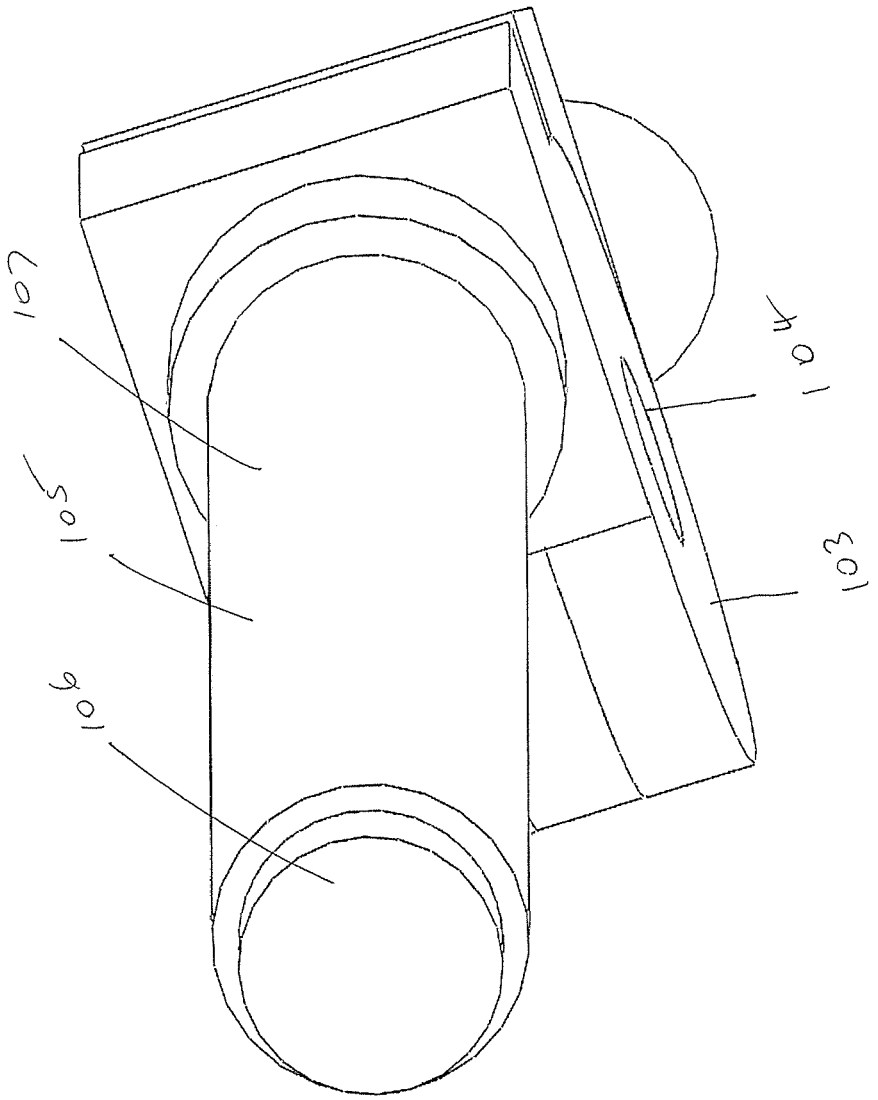

FIG 33

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EUROPEAN SEARCH REPORT

Application Number
EP 12 17 1050

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	US 4 111 574 A (RUNYON JOHN F) 5 September 1978 (1978-09-05) * column 2, line 3 - line 45 * * column 4, line 49 - column 5, line 37; figures 1-13 *	1-7	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 September 2012	Guillaume, Geert

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