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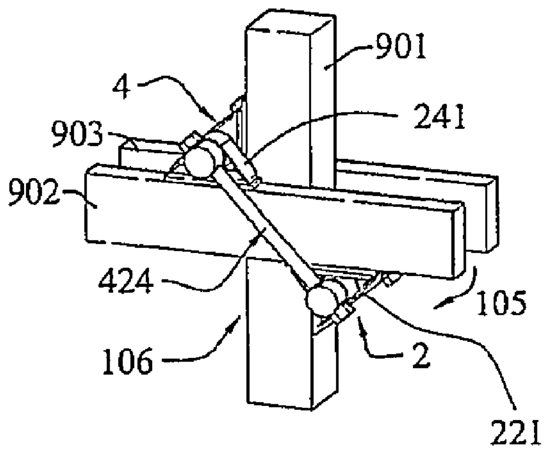

(57) Abrégé/Abstract:
A rolling block restraint connector for forming a moment resisting connection at a joint intersection between a continuous column and at least a first continuous beam is disclosed. The connector comprises first and second restraint assembles each including (i) a beam pressure block, (ii) a column pressure block, and (iii) a tubular shaft that passes through tubular channels of the corresponding beam pressure blocks and the corresponding column pressure block, wherein the second restraint assembly is configured to be located diagonally across the joint intersection from the first restraint assembly; a first linkage that couples the first restraint assembly with the second restraint assembly, and a second linkage that couples the first restraint assembly with the second restraint assembly.

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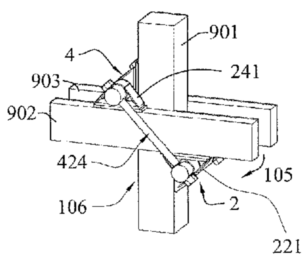

Fig.1A

(57) **Abstract:** A rolling block restraint connector for forming a moment resisting connection at a joint intersection between a continuous column and at least a first continuous beam is disclosed. The connector comprises first and second restraint assembles each including (i) a beam pressure block, (ii) a column pressure block, and (iii) a tubular shaft that passes through tubular channels of the corresponding beam pressure blocks and the corresponding column pressure block, wherein the second restraint assembly is configured to be located diagonally across the joint intersection from the first restraint assembly; a first linkage that couples the first restraint assembly with the second restraint assembly, and a second linkage that couples the first restraint assembly with the second restraint assembly.

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ROLLING BLOCK RESTRAINT CONNECTOR

FIELD OF INVENTION

[0001] The present invention relates to a connector that is used for the purpose of making structural connections at joints where structural framing members cross and in particular, a joint which resists relative rotation of the members at the connection, such connection being a moment resisting rigid connection which is useful for satisfying many construction framing design requirements.

GENERAL BACKGROUND

[0002] Connections are formed and made to hold the structural framing members together to build physical structures such as walls, floors, roofs, towers, bridges, toys, and furniture. Various methods are utilized to form and make connections at the joints where structural framing members cross. Rigid moment connection joints made by processes such as welding, bolting or gluing are time consuming, complicated to make and need to be specifically designed on a case by case basis for the specific materials, size and sectional shapes to be joined. A connector that relies on external forces applied to the outside surface of structural members provides a moment resisting rigid connection independent of size, sectional shape and material joined. Such a connection would be highly valued to the general public for use as an element for structural framing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] Embodiments of the invention are illustrated by way of example and not by way of limitation in the figures of the accompanying drawings, in which like references indicate similar elements in which:

[0004] FIG. 1A shows a first embodiment of a pin-less single RBR connector joining rectangular member.

[0005] FIG. 1B shows a second embodiment of a pin-less single RBR connector joining rectangular member.

[0006] FIG. 2 shows a pressure block, shaft and linkage parts, assemblies and blow up.

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[0007] FIG. 3 shows an assembly of a single rolling block restraint (RBR) connector that provides restraint for one rotational direction.

[0008] FIG. 4 shows a pressure block and pressure pad inserts.

[0009] FIG. 5 shows a pinned single RBR connector joining rectangular member.

[0010] FIG. 6 shows a pinned double RBR connector joining rectangular member.

[0011] FIGS. 7A and **7B** show linkage parts and assembly for a pinned RBR connector.

[0012] FIGS. 8A and **8B** show pin parts and assembly for a pinned RBR connector.

[0013] FIG. 9 shows a pinned double RBR connector joining rectangular members at a skewed angle.

[0014] FIG. 10 shows a pinned double RBR connector joining structural steel C and W section members.

[0015] FIG. 11 shows a pinned double RBR connector joining structural steel C and tube steel section members.

[0016] FIG. 12 shows a pinned double RBR connector joining structural steel C and round section members.

[0017] FIG. 13 shows two single RBR connectors spaced longitudinally at an overlapping 3 member joint consisting of rectangular members to form a rigid straight splice between the members.

[0018] FIG. 14 shows the same connectors as **FIG. 13** with the side members rectangular shaped and the main member as a pipe section to form a rigid straight splice connection.

[0019] FIG. 15 shows a single RBR connector in straight tightly clamped three member connection.

[0020] FIG. 16 shows a single RBR connector in skewed angle tightly clamped three member connection.

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[0021] **FIG. 17** shows three single RBR connectors joined together to form a gable roof building frame also referred to as portal building frame.

[0022] **FIG. 18** shows three single RBR connectors joined together to form a portal building frame with reinforced haunches at the column to beam joint.

[0023] **FIG. 19** shows two double RBR connectors joined together to form a moment resisting rigid frame with side members (SM) as header and main member (MM) as columns.

[0024] **FIG. 20** shows two double RBR connectors joined together to form a moment resisting rigid frame with MM as header and SM as columns.

[0025] **FIG. 21** shows a double RBR connector with structural steel C sections for support of column and beam configuration.

[0026] **FIG. 22** shows double RBR connectors with a link spoke hub type linkage.

[0027] **FIG. 23** shows double RBR connectors joining four structural members.

[0028] **FIG. 24** shows a single RBR connector joining two structural members.

DETAILED DESCRIPTION

[0029] Some structural member connection types may be referred to as "pinned," which generally means the members are free to rotate. Other structural member connection types may be referred to as moment resisting rigid connections, by which the members are restrained from rotation at the point where they cross and transmit a bending moment through the joint connection. Typical moment resisting rigid connections use a combination of fasteners including screws, bolts, rivets, glue, welding, rods, inserts and/or plates installed at the joint to restrict the rotation and transfer the moment from one member through the connection. These types of connections are time consuming, complicated to make and need to be specifically designed on a case by case basis for the specific materials, size and sectional shapes to be joined and reduce member strength in way of the joint. In contrast, this disclosure provides for a moment resisting rigid connection using a connector that exerts external surface force and thus maintains full member section and strength in way of the joint to eliminate need for supplemental strengthening. Herein, a rolling block

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restraint (RBR) connector is disclosed that provides rigid restraint to the external surface of a structural member connection.

[0030] As used herein, the terms "connector" is generally defined as a device and a "connection" may be the overall joint formed by the use of a connector to couple two or more structural framing members, which that provides moment resisting rigid restraint at the intersection of structural framing members.

[0031] The RBR connector is engineered and designed for joining intersecting (e.g., crisscrossing) structural members to provide adequate strength for the forces that will occur at any intersection angle.

[0032] A single RBR connector provides a moment resisting rigid connection in one direction. A double RBR connectors with a pin provides a moment resisting rigid connection in both directions such as for a wood moment resisting rigid frame. A RBR connector may be used in forming a connection for: (i) structures that are permanent or temporary, (ii) the erection of a structure, or (iii) the repair of a structure. The members and connections may be reusable. The RBR connector may be configured to restrain 2, 3, 4 or more members as shown in the accompanying figures.

[0033] In **FIG. 1A**, a three member single RBR connector **106** used to restrain main member (MM) **901**, side members (SM) SM1 **902** and SM2 **903** for member forces in a first direction indicated by arrow **105** is shown. The single RBR connector **106** includes the block and shaft assemblies **2** and **4**, and two rod linkages 424_1 and 424_2, as seen in **FIGS. 2** and **3**. Each of the block and shaft assemblies **2** and **4** includes a plurality of pressure blocks as illustrated in greater detail in, for example, **FIGS. 2** and **3**. Referring briefly to **FIG. 2**, the block and shaft assembly 2 is shown to include pressure blocks 221 and 222, which are configured to contact the SM1 902 and the SM2 903, and pressure block 120, which is configured to contact the MM 901. The block and shaft assembly 2 also includes pressure block shaft 320 that passes through a tubular channel (e.g., a cutout) of each of the pressure blocks 120, 221 and 222. Similarly, the block and shaft assembly 4 includes pressure blocks 241 and 242, which are configured to contact the SM1 902 and the SM2 903, pressure block 140, which is configured to contact the MM 901 and pressure block shaft 340 that passes through a tubular channel of each of the pressure blocks 140, 241 and 242. As is further illustrated in **FIG. 2**, the two rod linkages 424_1 and 424_2 couple the block and shaft assemblies 2

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and 4 such that the pressure blocks 120 and 140 are aligned, the pressure blocks 221 and 241 are aligned, and the pressure blocks 222 and 242 are aligned.

[0034] Now referring back to **FIG. 1A**, the single RBR connector 106 is configured to hold MM **901** and SM1 **902** and SM2 **903** in place when loaded provided the friction force is greater than external forces. Friction forces occur from the equal and opposite restoring couple forces pressing on the sides of SM1 **902** and SM2 **903** and MM **901** by the pressure blocks of block and shaft assemblies **2** and **4** and is proportional to the product of static coefficient of friction and the force reaction caused by the load at the point of contact. Additionally, the inward pressures are perpendicular to the surface and in the case of wood grain, this will and increase the strength against some modes of failure. A practical use for this pin-less configuration could be for providing lateral strength resistance when installed between two existing structural columns. Referring now to **FIG. 1B**, a second embodiment of a pin-less single RBR connector joining rectangular member is shown. The illustration of **FIG. 1B** illustrates block and shaft assemblies **2** and **4** having rectangular-shaped pressure blocks 243 and 223, in contrast to pressure blocks 241 and 221 of **FIG. 1A** that include a side having a curved shape.

[0035] As shown in **FIG. 4**, two examples of pressure block assemblies **100_1** and **100_2**. The pressure block assembly **100_1** may include a tubular shaft housing **101**, connected to two compression struts **102** that are attached to pressure pad **103**. The pressure block **100_2** may be a single piece of stock and, in some embodiments, may include a tubular channel. The surface area of the pressure pad **103** and insert pad **701** are each sized to distribute acceptable non-crushing bearing pressure to MM **901**, SM1 **902** and SM2 **903**, illustrated in **FIGS. 1, 5, 6** and **9-21** and discussed below, in order to maintain full sectional strength of these members at the connection when loaded. Component **702** represents an insert for increasing the section modulus and/or changing the characteristic of the joint, such as a length of steel strap to form a composite with wood, or flexible material like neoprene rubber to provide cushion or change coefficient of friction, or a material which will crush when a high load condition occurs to serve as a type of structural fuse. Component **703** represents an insert which has a flat face to interface (e.g., physically contact) with pressure plate **103**, component **702**, or component **703** and a face shaped to conform to MM **901**, SM **902** or SM **903** (e.g., illustrated as a concave face) based on the shape of one MM **901**, SM **902** or SM **903**. The pressure block design for a wood rectangular member or a steel W section

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will be different because the bearing capacity of wood is much lower than steel and a steel member is stiffer in way of the webs which necessitates the block be made stronger in that area of bearing.

[0036] The pressure blocks **120**, **140**, **221**, **222**, **241** and **242** are made of any material such as steel, aluminum or plastic that withstands design loads and by any construction method such as cutting from a solid piece of material, casting, extrusion or fabrication of separate parts. Further, the pressure blocks **120**, **140**, **221**, **222**, **241** and **242** need not all be comprised of the same material. The type of block construction shown by 100_1 may be made with a gap between parts 101 and 103. A comparison of the gap measured in the unloaded and loaded condition may be used for estimating or calibrating block loading.

[0037] Referring to **FIG. 3**, an exploded view of the components used to form the single RBR connector 106 are shown. **FIG. 3** illustrates the two pressure blocks **221** and **241** configured for coupling with SM1 **902**, two pressure blocks **120** and **140** configured for coupling with MM **901**, and two pressure blocks **222** and **242** configured for coupling with SM2 **903**, pressure block shafts **320** and **340**, and two adjustable threaded rod linkages **424**. Pressure block shafts **320** and **340** may be solid or tubular such as pipe and have holes made at their ends which may be threaded to receive rod linkages **424_1** and **424_2**. In one embodiment. The rod linkages **424_1** and **424_2** may be threaded. The pressure block shafts **320** and **340** are inserted through shaft housings **101** on each of the six pressure blocks **120, 140, 221, 222, 241** and **242** as shown in **FIG. 2**. Adjustable threaded rod linkages **424_1** and **424_2** include a threaded rod coupling **401**, which may be, *inter alia*, a bolt or threaded rod, linkage nut **402,** and linkage washer **403**. Linkage washer **403** may be a flat washer or shaped washer that conforms to the shaft surface of contact. Alternatively, the rod linkages **424_1** and **424_2** may be solid bars and welded to the pressure block shafts **320** and **340** at the ends after the connection is tightened. The block and shaft assemblies **1, 2, 3,** and **4** of **FIG. 6** each includes three pressure blocks and one shaft corresponding to quadrant **1, 2, 3** and **4** of the connection. For example, assembly **2** is comprised of shaft **320** and pressure blocks **221**, **120**, and **222**. The pressure blocks **221**, **120**, and **222** rotate freely on the shaft **320** and position the pressure pads **103** in alignment with the member surfaces. For example pressure block **241** rotates on shaft **340** and follows the deflected shape of SM1 as it is loaded. The pressure plate **103** is supported at the ends by compression struts **102** so deflection does not occur over the length of the plate between these supports. As a result, the pressure applied to the member is even and the entire surface of the plate

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is efficient and easily designed to transfer force less than the crushing strength of the material of the MM and/or SM.

[0038] Referring now to **FIG. 5**, an exemplary illustration in which a pin assembly **600** is installed through the neutral axis of the members. In particular, such an embodiment may be used for conditions where external forces are greater than the friction holding capacity. Briefly referring to **FIGS. 8A** and **8B**, the pin assembly **600** may include a pin **601**, a pin housing **602**, pin nuts **603** and pin washers **604**. In an embodiment of a RBR connector that utilizes the pin assembly 600, the pinned linkages **513** and **524**, as shown in **FIGS.** 7**A** and 7**B**, are used in place of the rod linkages $\mathbf{424_1}$ and $\mathbf{424_2}$. Alternatively, a link spoke hub **500**, as shown in **FIG. 22**, could be used in place of the pinned linkages **513** and **524** (e.g., when independent link length adjustments, inserts and member sizes do not change from the linkage crossing angle of the hub design).

[0039] Referring to **FIG. 6**, a double RBR connector which restrains MM **901** and SM1 **902** and SM2 **903** for loads from either direction is shown. As illustrated in **FIG. 6**, the double RBR connector uses pressure block assemblies **1** and **3** coupled by bi-lateral pinned linkage assembly **513** and pressure block assembly **2** and **4** coupled by bi-lateral pinned linkage assembly **524** to form the connection. Although not shown, bi-lateral pinned linkage assemblies **513** and **524** are used in a similar manner with respect to the portion of the connection involving SM2 **903**.

[0040] Referring to **FIGS.** 7**A** and 7**B**, pinned linkage assembly **513** is shown. The pinned linkage assembly **513** includes a center link **501** with a hole for a pin **601**. In one embodiment, spoke coupling **502** is drilled and tapped for threaded link spoke **504** and is coupled to center link **501** by transition component **503.** The combined part including center link **501**, spoke coupling **502** and transition component **503** may be a physical connection such as a weldment, a casting, a forging or the like. The thickness of center link **501** may be half the width of spoke coupling **502**. In an alternative embodiment, the thickness of the center link **501** may be thinner than half of the width of the spoke coupling **502**. Yet in another embodiment, the thickness of the center link **501** may be thicker than half of the width of the spoke coupling **502**. In one embodiment, a washer is installed between center link **501** and SM1 **903** and the center link 501 and SM2 **903** so that all four link spokes **504** will be aligned in the same plane with an extension of their centerline intersecting at a common point. The side surface of center link **501** may be sized according to a

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size of the spoke coupling **502** and transition component **503** (e.g., so as to avoid interference due to a coupling of the pinned linkage assembly **513** with one or more pinned linkage assemblies).

[0041] Referring now to **FIGS. 8A** and **8B**, a pin **600** assembly is shown. The pin assembly **600** includes pin **601**, pin housing **602**, pin nuts **603** and pin washers **604**. The pin housing **602** facilitates holding alignment while assembling. The pin housing **602** is sized and designed for the loads, material and section of MM **901** and SM1 **902** and SM2 **903**. For example, the pin housing **602** may be installed as a fabricated weldment for W or C sections. The bending strength loss of MM **901** and SM1 **902** and SM2 **903** from installing pin housing **602** is relatively small because the material removed from the member in making the hole is close to the neutral axis where bending stress is zero, or substantially zero as is known in the art.

[0042] Referring to **FIG. 9**, an embodiment is provided illustrating the flexibility to utilize a double RBR connector for a range of different skew angles is shown. The double RBR connector 910 includes two sets of pinned linkage **513** and **524**, which may be adjusted to form the connection illustrated in **FIG. 9**, e.g., SM1 902 and SM2 903 coupled to the MM 901 at an angle other than 90 degrees, while the components of the pressure block assemblies **1**, **2**, **3** and **4** remain the same. In the embodiment shown in **FIG. 9**, the length of the pinned linkage **513** differs from the length of the pinned linkage **524**. In one embodiment, the pinned linkages **513** and **524** may have adjustable lengths

[0043] Referring to **FIGS. 10-12**, the RBR connector **910** may be used for moment resisting rigid connections with MM and SMs of different sections as shown by: (i) the illustration of **FIG. 10**, which shows the joining of a MM steel W section **911** with SM steel C sections **912** and **913**, (ii) the illustration of **FIG. 11**, which shows the joining of a MM tube steel section **921** with SM steel C sections **912** and **913**, and (iii) the illustration of **FIG. 12**, which shows the joining of a MM steel pipe section **931** with SM steel C sections **912** and **913**. Pipe pad insert **703** provides transition between the flat pressure pad **103** and round pipe surfaces of MM **931** and is also shown in **FIG. 1**. This is the method for making an RBR connector mate with shapes not having a flat bearing surface.

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[0044] Referring to **FIG. 13**, a moment resisting rigid splice using two longitudinally spaced RBR connectors to join rectangular SM1 **902** and SM2 **903** with rectangular MM **1300** is shown. Such an embodiment is useful for installations that include an adjustable length member.

[0045] Referring to **FIG. 14**, a moment resisting rigid splice using two longitudinally spaced RBR connector to join rectangular SM1 **902** and SM2 **903** with pipe section MM **1400** is shown. Such an embodiment is useful for installations that include a transition from rectangle to pipe or an adjustable length member.

[0046] Referring to **FIG. 15**, a two direction limiting motion moment resisting rigid splice using one RBR connector to join rectangular SM **1502** and SM **1501** with rectangular MM **1500** is shown. Such an embodiment is useful for installations that include a flexible connection with hard rigid stops as well. The limit of angular rotation is controlled by the adjusted length of threaded rod linkage **413**.

[0047] Referring to **FIG. 16**, the connection is shown to illustrate limiting motion. The length of threaded rod linkage **413** may be adjusted for MM **1500** to be positioned at an angle with respect to SM **1502** and SM **903**.

[0048] Three RBR connectors are used to construct a frame such as a gable roof rigid building frame, also known as a portal building frame, are shown in **FIG. 17**. Specifically, a single RBR connector **1700** is used to connect two first columns **1701_1-1701_2** to a first gable **1702**, the first gable **1702** to two second gables **1703_1-1703_2** at a ridge, and the two second gables **1703_1-1703_2** to a second column **1704**. A double RBR connector, not shown, can be used to provide additional lateral support in the embodiment shown in **FIG. 17**, or for any single RBR connector shown herein. With portal building frame rigid moment design, the structural member strength is used more efficiently by restraining the structural members at each connection, which allows either greater spans or frame spacing for the same size structural members compared to unrestrained framing.

[0049] Referring to **FIG. 18**, an illustration of three RBR connectors used to construct the portal frame **1800** is shown. Such an embodiment uses a first RBR connector **1807** to connect two first columns **1801_1-1801_1** to a first gable **1803** and a first support **1802**, a second RBR connector **1808**

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to connect the first gable **1803** to two second gables **1804_1-1804_2** at a ridge, and a third RBR connector **1809** to connect the two second gables **1804_1-1804_2** and two second supports **1805_1-1805_2** to a second column **1806**. The haunch at the roof beam-to-column connection is made deeper to withstand the frame's largest moments that occur in this location. Making the haunch deeper can be done by doubling the beam's depth with the same section of material and adjusting the threaded rod linkages of the second RBR connector **1808** to accommodate the deeper section. Alternatively, a steel strap may be inserted and fastened to one or more structural members to form a composite instead of utilizing an insert between a pressure block and a structural member (e.g., as illustrated by component **702** in **FIG. 4**).

[0050] Two moment resisting rigid frames are shown in **FIG. 19** and **FIG. 20**. Referring to **FIG. 19**, two double RBR connectors, RBR connector **1901** and RBR connector **1902**, are used to form a moment resisting rigid frame **1900**. Specifically, MM **1903_1-1903_2** are used as columns and SM **1904_1-1904_2** are cross beams coupled to the columns via RBR connector **1901** and RBR connector **1902**. Referring to **FIG. 20**, two double RBR connectors, RBR connector **2001** and RBR connector **2002** are used to form a moment resisting rigid frame **2000**. Specifically, SM **2003_1-2003_2** are used as columns coupled to cross beam MM **2004** by the double RBR connector **2001** and SM **2003_3-2003_4** are also used as columns coupled to the cross beam MM **2004** by the double RBR connector **2002**.

[0051] Referring to **FIG. 21**, an example by which an RBR connector may be configured over a new or existing structure is shown. For example, the coupling of column **2101** and beam **2102** may be an existing structure (e.g., may be lacking in support). In such an embodiment, the double RBR connector **2100** may be configured over the existing coupling along with the insertion of beams **2103** and **2014** to add support to the coupling. Beams **2103** and **2104** may be attached or locked into member beam **2102** as needed based on a case-by-case basis.

[0052] Referring to **FIG. 22**, an exemplary illustration of a link spoke hub **500** is shown. For example, the link spoke hub **500** may be configured to for use when independent link length adjustments, inserts and member sizes do not change from the linkage crossing angle of the hub design. In an alternative embodiment, a pin independent of any linkage may be installed that passes through the column **2201** and the beams **2202** and **2203**.

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[0053] Referring to **FIG. 23**, an example by which a double RBR connector is used to form a four member connection is shown. Specifically, double RBR connector **2300** includes the block and shaft assemblies **1**, **2**, **3** and **4**, the pinned linkages **513** and **524**, and the pin assembly **600**. The double RBR connector **2300** is shown as coupling SM **2302_1-2302_2** to MM **2301_1-2301_2** at a first skew angle.

[0054] Referring to **FIG. 24**, an example by which a RBR connector is used to form a two member connection is shown. Specifically, RBR connector **2400** includes the block and shaft assemblies **2** and **4**, the pinned linkage **524**, and the pin assembly **600**. The RBR connector **2400** is shown as coupling MM **2401** to SM **2402** such that member forces are restrained in the direction indicated by arrow **2403**.

[0055] In the foregoing description, the invention is described with reference to specific exemplary embodiments thereof. It will, however, be evident that various modifications and changes may be made thereto without departing from the scope of the present invention. For instance, the RBR connector can be made of any material and used by anyone for any assemblies that benefit having rigid connections. Hence, the specification and drawings are accordingly to be regarded in an illustrative rather than in a restrictive sense.

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Claims

1. A rolling block restraint connector for forming a moment resisting connection at a joint intersection between a continuous column and at least a first continuous beam that intersects the continuous column, the connector comprising:

a first restraint assembly including (i) a first beam pressure block, (ii) a first column pressure block, and (iii) a first tubular shaft that passes through tubular channels of the first beam pressure block and the first column pressure block;

a second restraint assembly including (i) a second beam pressure block, (ii) a second column pressure block, and (iii) a second tubular shaft that passes through tubular channels of the second beam pressure block and the second column pressure block, wherein the second restraint assembly is configured to be located diagonally across the joint intersection from the first restraint assembly;

a first linkage that couples the first restraint assembly with the second restraint assembly, wherein the first linkage passes through a first end of the first tubular shaft and a first end of the second tubular shaft, wherein the first linkage is configured to be located on an exterior of the first continuous beam relative to the joint intersection; and

a second linkage that couples the first restraint assembly with the second restraint assembly, wherein the second linkage passes through a second end of the first tubular shaft and a second end of the second tubular shaft.

2. The connector of claim 1,

wherein the first restraint assembly includes a third beam pressure block, and

wherein the second restraint assembly includes a fourth beam pressure block.

3. The connector of claim 2, wherein the second linkage is configured to be located on an opposite side of the continuous column relative to the first linkage.

4. The connector of claim 1, wherein the first column pressure block is configured to contact an exterior of the continuous column.

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5. The connector of claim 4, wherein the second column pressure block is configured to contact the exterior of the continuous column opposite the first column pressure block.

6. The connector of claim 1, wherein the first column pressure block has a rectangular shape.

7. The connector of claim 1, wherein the first column pressure block includes a curved surface configured to contact the continuous column and a flat surface configured to contact the first continuous beam.

8. The connector of claim 1, further comprising:

a beam insert configured for placement in between the first continuous beam and the first-beam pressure block, the beam insert including a flat side and a concave side, wherein the concave side is configured to contact a rounded portion of the first continuous beam.

9. The connector of claim 1, further comprising:

a column insert configured for placement in between the continuous column and the first column pressure block, the column insert including a flat top and a concave bottom, wherein the concave bottom is configured to contact a rounded portion of the continuous column.

10. The connector of claim 2, further comprising:

a third restraint assembly including (i) a fifth beam pressure block, (ii) a third column pressure block, and (iii) a third tubular shaft that passes through tubular channels of the fifth beam pressure block and the third column pressure block;

a fourth restraint assembly including (i) a sixth beam pressure block, (ii) a fourth column pressure block, and (iii) a fourth tubular shaft that passes through tubular channels of the sixth beam pressure block and the fourth column pressure block, wherein the fourth restraint assembly is located diagonally across the joint intersection from the third restraint assembly;

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a third linkage that couples the third restraint assembly with the fourth restraint assembly, wherein the third linkage passes through a first end of the third tubular shaft and a first end of the fourth tubular shaft; and

a fourth linkage that couples the third restraint assembly with the fourth restraint assembly, wherein the fourth linkage passes through a second end of the third tubular shaft and a second end of the fourth tubular shaft.

11. The connector of claim 10, wherein the third restraint assembly includes a seventh beam pressure block, and

wherein and the fourth restraint assembly includes an eighth beam pressure block.

12. The connector of claim 1, wherein the first linkage comprises a rod linkage.

13. The connector of claim 1, wherein the first linkage comprises a pinned linkage.

14. The connector of claim 13, further comprising:

a pin assembly including a pin and two pin nuts, wherein the pin passes through a channel of each of the continuous column and the first continuous beam, and the pin is held in place by a pin nut at each end of the pin.

15. A method for installing a rolling block restraint connector to form a moment resisting connection at a joint intersection between a continuous column and at least a first continuous beam that intersects the continuous column:

placing a first restraint assembly at the joint intersection, wherein the first restraint assembly includes (i) a first beam pressure block, (ii) a first column pressure block, and (iii) a first tubular shaft that passes through tubular cutouts of the first beam pressure block and the first column pressure block;

placing a second restraint assembly at the joint intersection, wherein the second restraint assembly includes (i) a second beam pressure block, (ii) a second column pressure block, and (iii) a second tubular shaft that passes through tubular cutouts of the second beam

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pressure block and the second column pressure block, wherein the second restraint assembly is located diagonally across the joint intersection from the first restraint assembly; and

coupling the first restraint assembly with the second restraint assembly via a first linkage, wherein the first linkage passes through a first end of the first tubular shaft and a first end of the second tubular shaft.

16. The method of claim 15,

wherein the first restraint assembly includes a third beam pressure block,

wherein the second restraint assembly includes a fourth beam pressure block, and

wherein a second linkage passes through a second end of the first tubular shaft and a second end of the second tubular shaft.

17. The method of claim 15, wherein the second linkage is located on an opposite side of the continuous column relative to the first linkage.

18. The method of claim 15, wherein the first column pressure block has a rectangular shape.

19. The method of claim 15, wherein the first column pressure block includes a curved surface configured to contact the continuous column and a flat surface configured to contact the first continuous beam.

20. The method of claim 15, wherein the first linkage comprises a rod linkage.

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Fig.1A

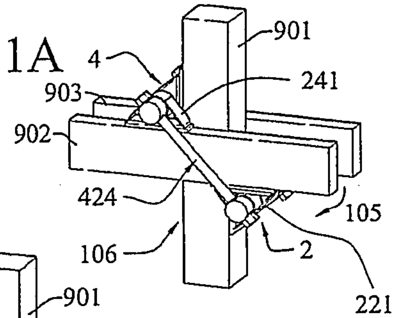

Fig. 1B

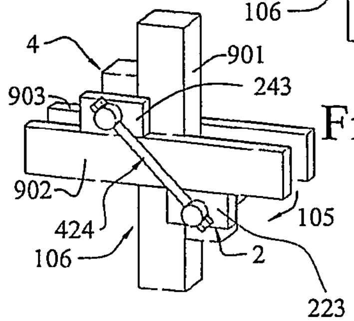

Fig. 2

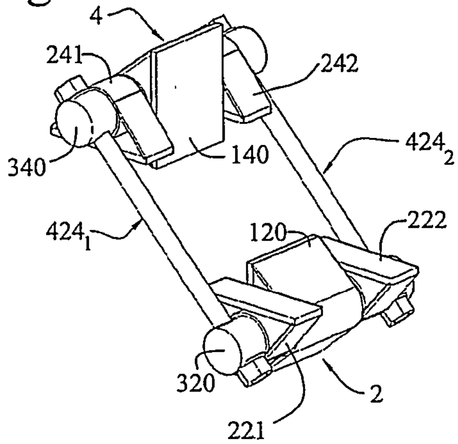

Fig. 3

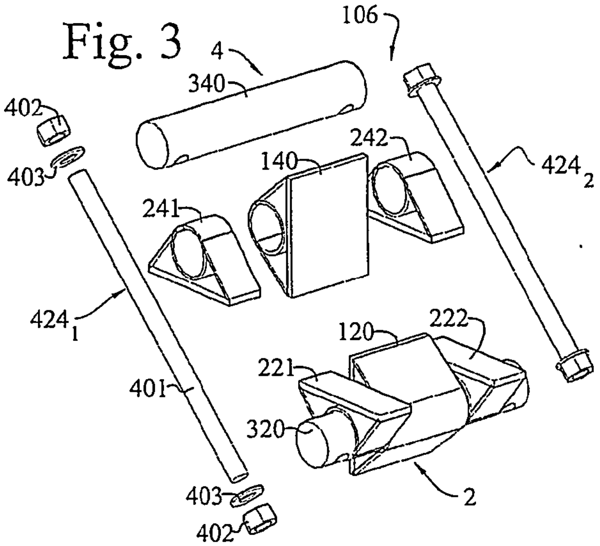

Fig. 4

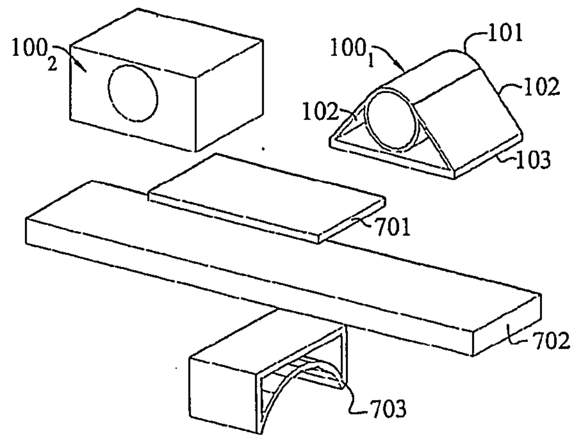

Fig. 5

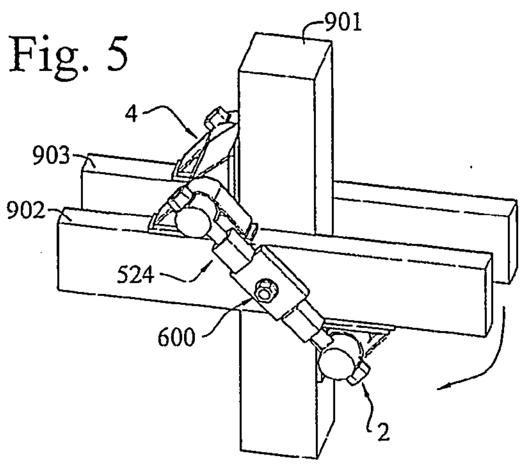

Fig. 6

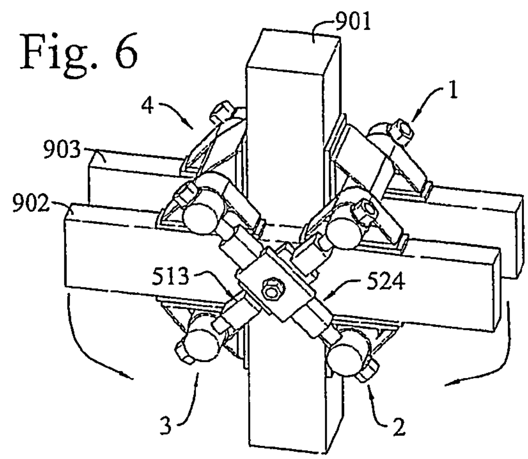

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Fig. 7A

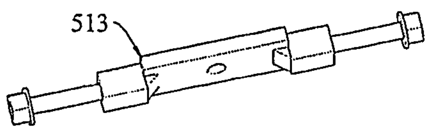

Fig. 8A

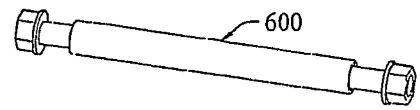

Fig. 7B

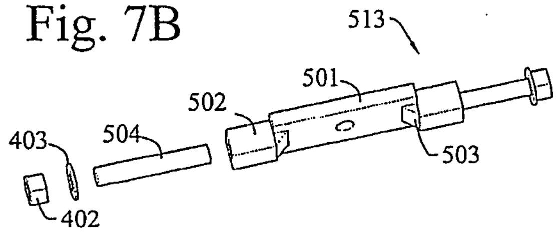

Fig. 8B

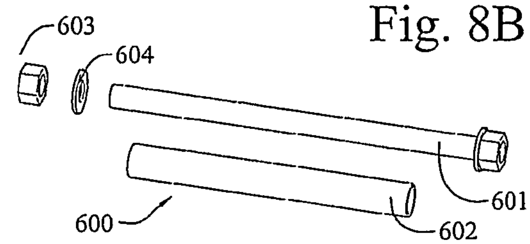

Fig. 9

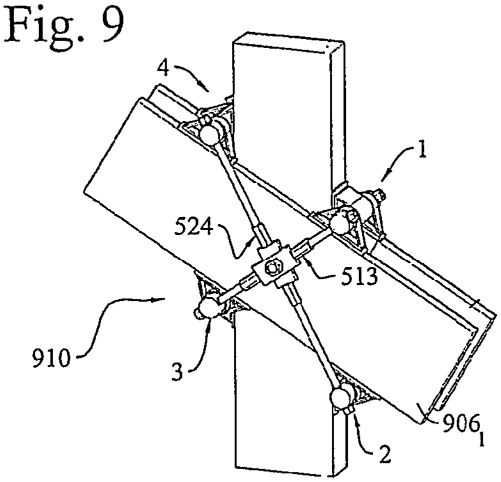

Fig. 10

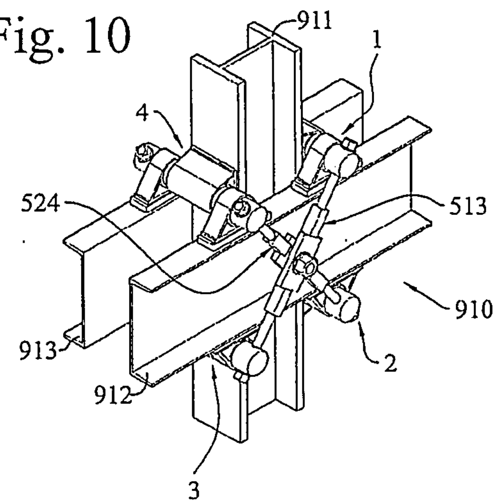

Fig. 11

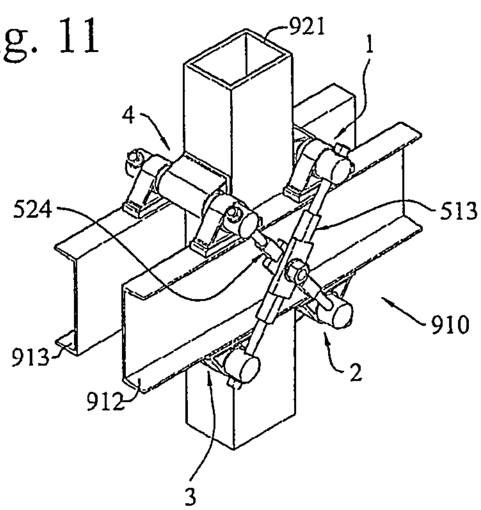

Fig. 12

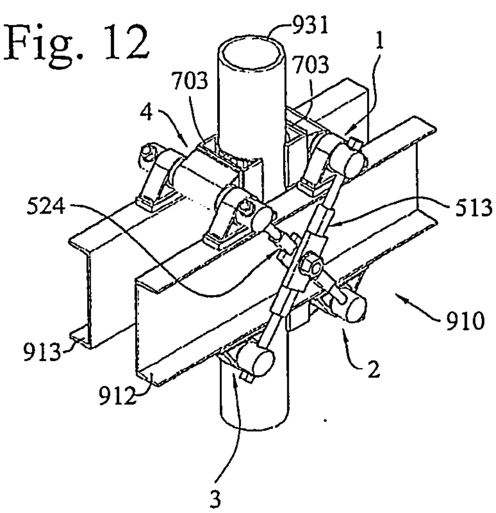

Fig. 13

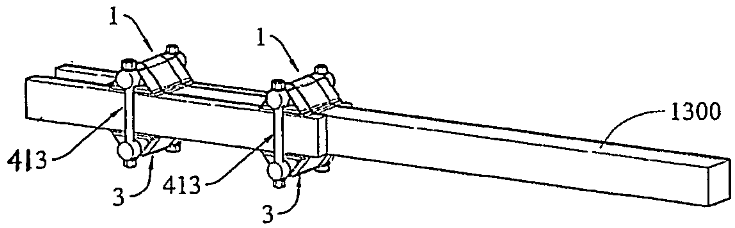

Fig. 14

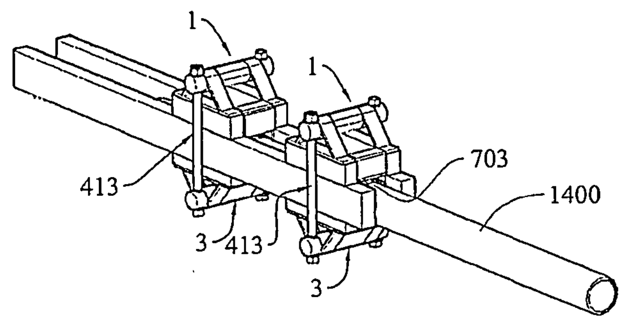

Fig. 15

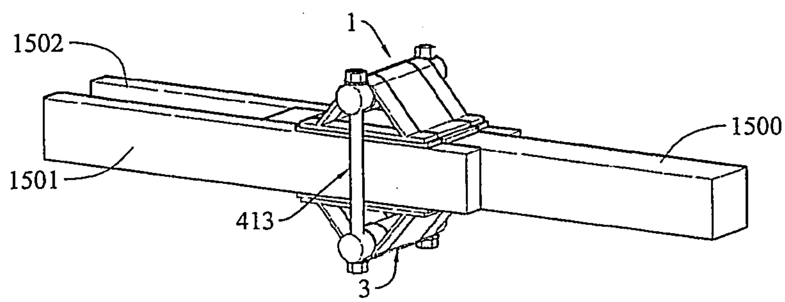

Fig. 16

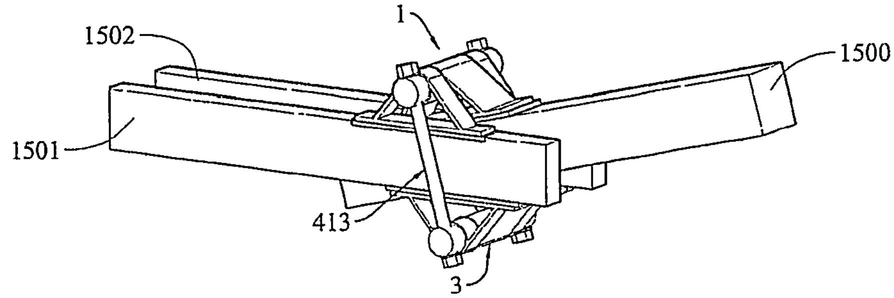

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Fig. 17

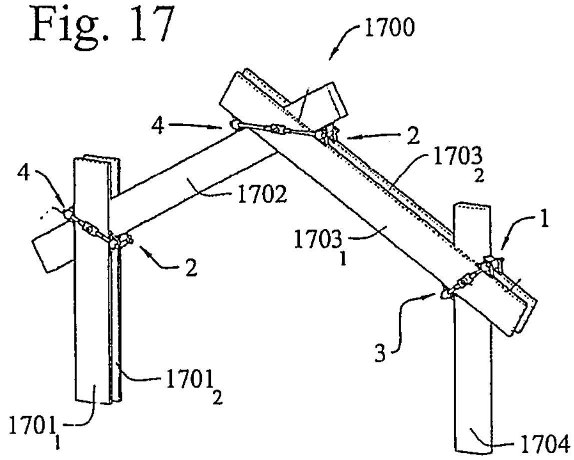

Fig. 18

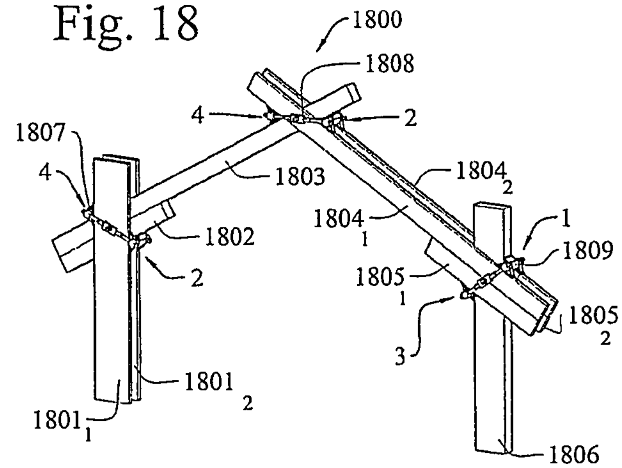

Fig. 19

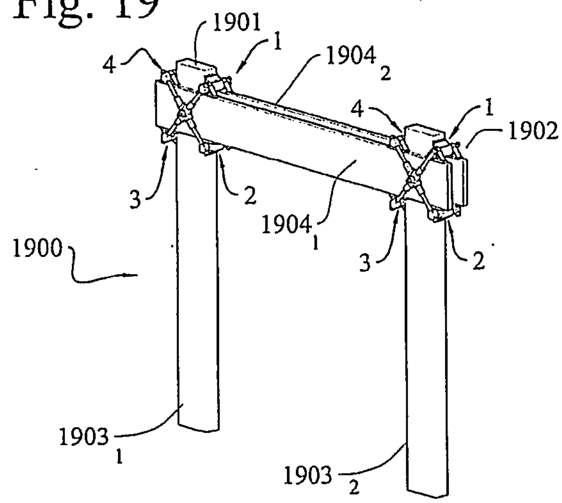

Fig. 20

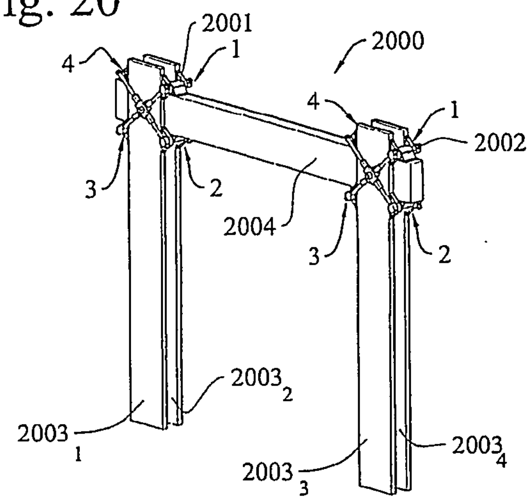

Fig. 21

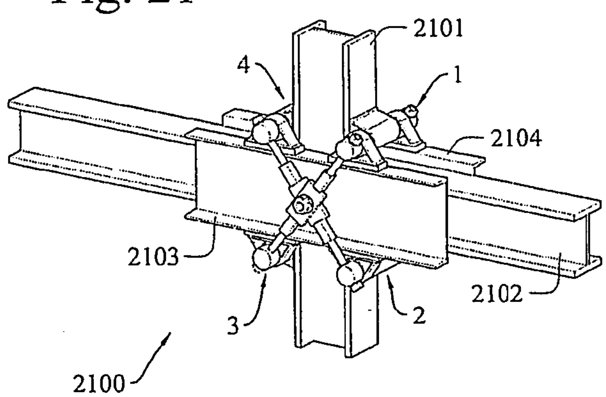

Fig. 22

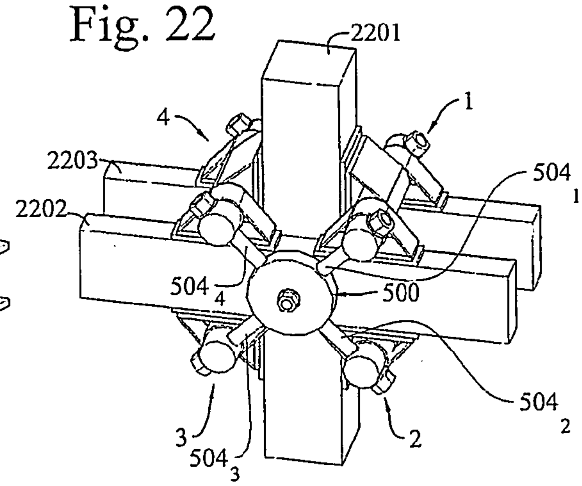

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Fig.23

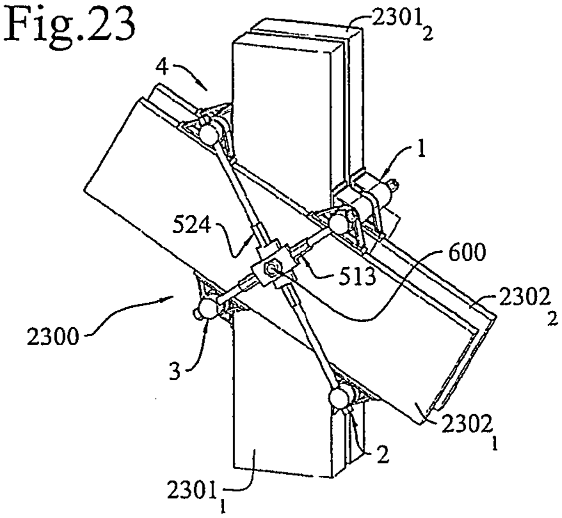
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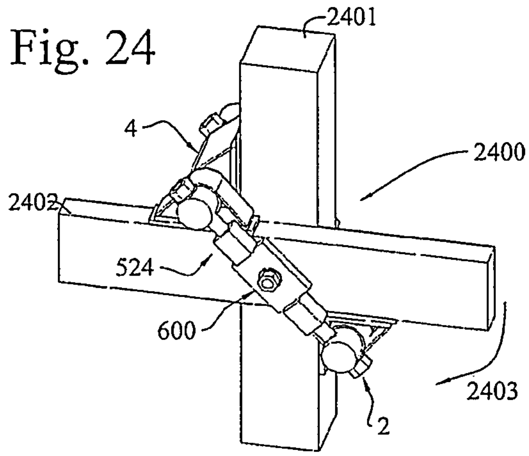
Fig. 24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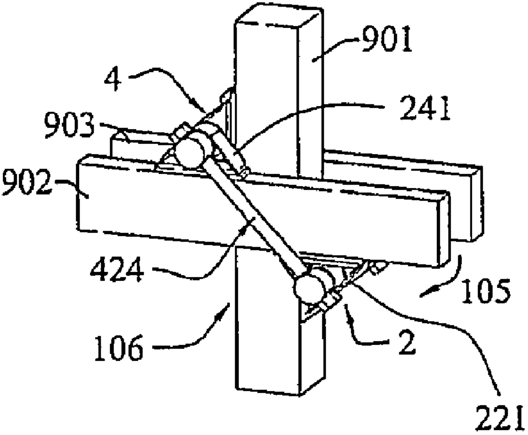

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