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[54] **ROLL-APART TERMINAL BLOCK ASSEMBLY**

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[52] **U.S. Cl.** ..... **339/198 P**, 339/211

[51] **Int. Cl.** **H01r 9/00**

[58] **Field of Search** ..... 339/198 R, 198 C, 339/198 E, 198 G, 198 GA, 198 H, 198 V, 198 K, 198 S, 198 P, 198 M, 198 N, 62, 63 R, 63 M, 65, 66 R, 66 M, 66 T, 211, 43, 75, 4, 18 B, 17 LM

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Assistant Examiner—Robert A. Hafer
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[57] **ABSTRACT**

A terminal block assembly wherein the electrical connection is broken, and the blocks are separated, by pivoting or rolling one block apart from the other. The terminal block assembly includes first and second terminal blocks, each block having one side adapted to engage and mate with one side on the other block. One edge on one block defines a roll axis. An opposing surface on the other (usually mounted) block defines a fulcrum. The fulcrum surface engages the roll axis when the one block is rolled or pivoted apart from the other block to pivot its mating side away from electrical connection with the other block.

8 Claims, 9 Drawing Figures

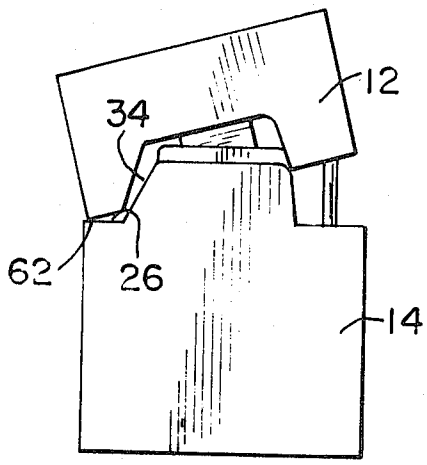
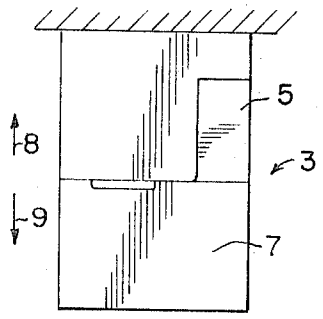


FIG. 1.



PRIOR ART

FIG. 2.

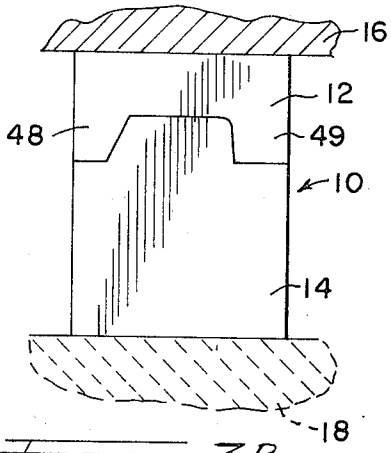


FIG. 3A.

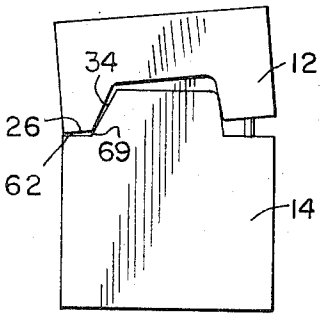


FIG. 3B.

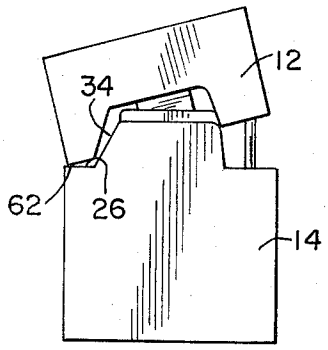


FIG. 3C.

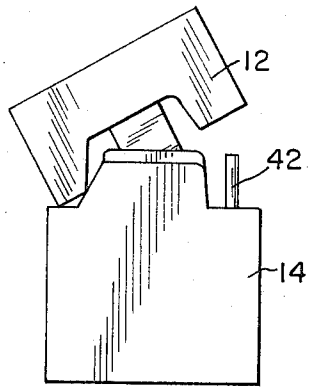
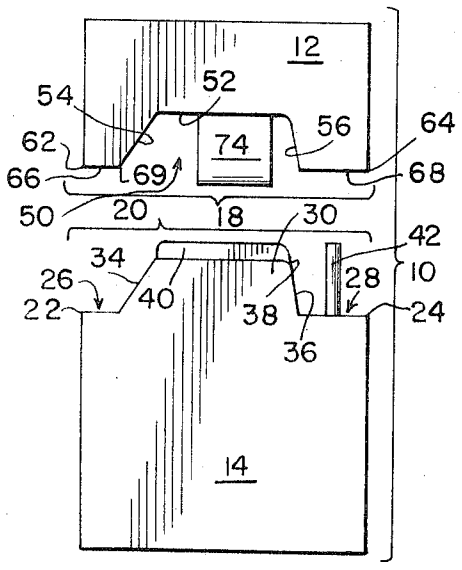


FIG. 4.



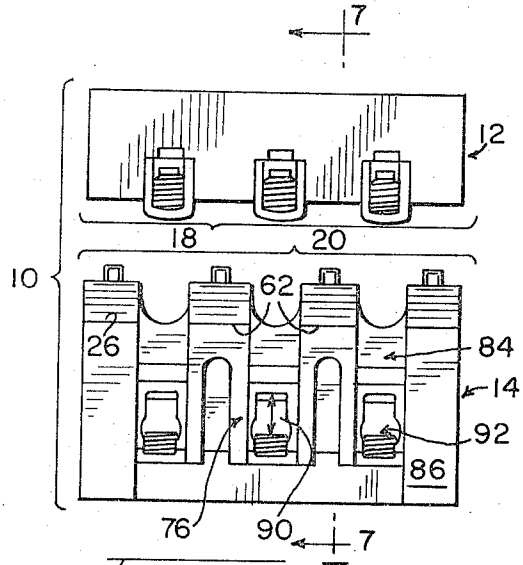


FIG-5-

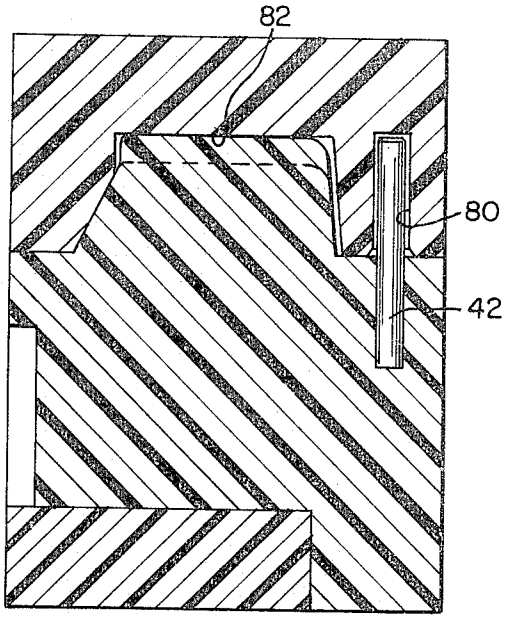


FIG-7-

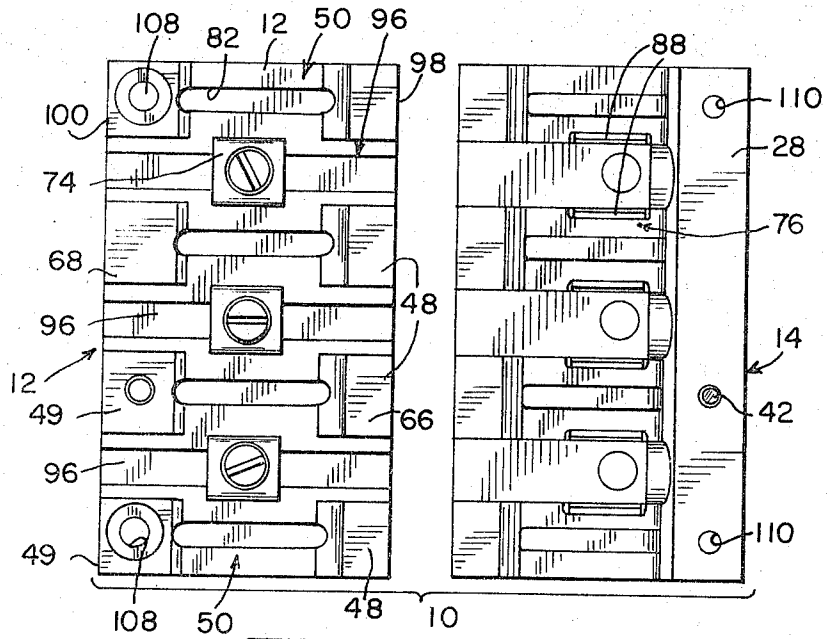


FIG-6-

ROLL-APART TERMINAL BLOCK ASSEMBLY

The present invention relates to a new and improved terminal block assembly wherein the blocks are separated by rolling one block apart from the other block.

Heretofore, it has been a common practice to form terminal block assemblies comprised of first and second terminal blocks having mating terminal connectors mounted on one side of each of the blocks. Typically the terminal connectors on one side of one block are female terminal connectors and the terminal connectors on one side of the other block are male terminal connectors adapted to frictionally engage the female terminal connectors. In most instances the terminal blocks are held together in assembled position by reason of the frictional engagement between the respective terminal connectors thereon.

In most uses of the assembly one of the blocks is fastened inside a metal cabinet or other type of junction box and wire conductors are connected to each one of the terminal connectors on the mounted block. Then wire conductors are connected to each of the terminal connectors on the other block and the other block is forced into mating frictional engagement with the mounted block. When it was desired to disconnect the terminal block assembly an operator would grasp the second block and pull it from the mounted block. Oftentimes the second block would separate from the mounted block with a jerk. Such jerking action was awkward and on occasion led to injury to the hand of the operator removing the second block. In this respect when the second block and the operator's hand holding the second block jerked loose from the mounted block the operator's hand would oftentimes engage an edge of the cabinet or cabinet door resulting in a scratch or laceration to the operator's hand. Also it was not uncommon for the operator to be slightly unbalanced as his hand jerked loose from the mounted terminal block such that portions of his body would also jerk from their previous position. When the assembly was mounted in a confined area this jerking motion of portions of the operator's body was somewhat of a nuisance and even dangerous since the jerking body portions such as an elbow, shoulder or head might strike pipes, equipment or walls in the confined area. This jarring impact could result in bruises or scratches to the operator.

To overcome the above described disadvantages incurred with a conventional pull-apart terminal block assembly the present invention provides for the rolling apart of one terminal block from a mounted terminal block. In this way a rolling or torque force is utilized in separating the terminal blocks as opposed to a linear pulling force and, accordingly, it is a primary object of the present invention to provide such a roll-apart terminal block assembly.

It is another object of the present invention to provide a roll-apart terminal block assembly including first and second terminal blocks having mating sides with complementary configurations.

It is a further object of the present invention to provide a roll-apart terminal block assembly of the type described in the preceding paragraph wherein each respective mating side extends between two edges of its respective block and one of the edges of one of the blocks defines a roll axis.

It is a further object of the present invention to provide a terminal block assembly of the type described in the preceding paragraph wherein the other block has, in the area adjacent the one edge thereof opposite and complementary to the edge on the other block defining the roll axis, marginal surface areas which define a fulcrum or bearing surface which engages the roll axis when one of the blocks is rolled apart from the other block.

It is another object of the present invention to provide a roll-apart terminal block assembly including first and second terminal blocks with each block having one side thereof which is adapted to mate with the one side of the other block, the respective mating sides extending between two edges of the respective blocks with one edge on the first block defining a roll axis and the surface areas adjacent the complementary opposite edge on the second block defining fulcrum surface areas on which the one edge defined in the roll axis pivots and slides when the first block is rolled apart from the second block.

It is a further object of the present invention to provide a roll-apart terminal block assembly including the two blocks with each block having one side thereof which is adapted to mate with the one side of the other block, one edge on one block defining a roll axis and the marginal surface areas on the mating side of the other block adjacent the edge complementary and opposite the roll axis defining a surface which engages the roll axis when the other block is rolled apart from the one block having the edge defining the roll axis.

For a more complete understanding of the nature and scope of the present invention reference may be had to the following description of a preferred embodiment of the invention taken in conjunction with the accompanying drawings wherein:

FIG. 1 is an end elevational view of a prior art pull-apart terminal block assembly;

FIG. 2 is an end elevational view of the roll-apart terminal block assembly of the present invention;

FIGS. 3*a*, 3*b* and 3*c* are end elevational views of the roll-apart terminal block assembly of the present invention as one block is being rolled apart from the other block;

FIG. 4 is an enlarged end elevational view of the separated terminal blocks of the roll-apart terminal block assembly of the present invention;

FIG. 5 is a side elevational view of the separated terminal blocks of the roll-apart terminal block assembly of the present invention;

FIG. 6 is a plan view of the mating sides of the terminal blocks of the roll-apart terminal block assembly of the present invention placed side-by-side;

FIG. 7 is a vertical sectional view of the terminal block assembly of the present invention taken generally along the line 7—7 of FIG. 5 when the separated terminal blocks in FIG. 5 are brought together in mating engagement.

Referring now to the drawings in greater detail, a pior part pull-apart terminal block assembly is generally indicated at 3 in FIG. 1 and includes first and second terminal blocks 5 and 7 which are adapted to be pulled apart in a direction indicated by the arrows 8 and 9. Typically one block, such as the block 5 is fixed and only the block 7 is pulled apart from the block 5 in the direction indicated by the arrow 9. Each of the terminal blocks, such as terminal blocks 5 and 7, includes mat-

ing contact means which frictionally engage each other when the terminal blocks are brought together to form the terminal block assembly. Then when it is desired to disconnect one block from the other block, one of the blocks such as the block **7** is pulled apart from the other block **7**, against the frictional force holding the blocks together. When the friction force holding the blocks together is relatively strong the block **7** will separate from the block **5** with a jerk and as a result an operator pulling the block **7** from the block **5** may be slightly unbalanced upon the jerking motion such that a portion of his body may engage an object with resulting slight injury to the operator.

The present invention overcomes these deficiencies by providing a terminal block assembly which is adapted to be rolled or pivoted apart. In this respect the roll-apart terminal block assembly of the present invention is generally indicated at **10** in FIG. **2** and includes first and second blocks **12** and **14.** For the purposes of illustration the block **12** is mounted on a surface **16** which is typically a panel of a cabinet or junction box. However, it is to be understood that the terminal block assembly can be mounted in a reverse or opposite manner by mounting the terminal block **14** to the panel or other surface as indicated by broken lines at **18.** In many electrical assemblies the mounting of the first terminal block **12** to a surface such as the surface **18** is preferred.

For the purpose of illustrating the manner in which one block is rolled apart from the other block in accordance with this invention, FIGS. *3a–3c* show block **12** in various positions with respect to block **14** as it is rolled apart from or pivoted with respect to the second block **14,** and of course, either block **12** or **14** could be attached, the other block being rolled or pivoted for separation.

Referring now to FIG. **4** of the drawings it will be apparent that the block **12** has one side **18** which is adapted to mate with one side **20** of the block **14** and in this respect the sides **18** and **20** have mating configurations as now will be defined in detail. From a consideration of the illustration of block **14** in the drawings, it will be apparent that the one side **20** extends between two edges **22** and **24** and that there are marginal surface areas **26** and **28** which extend along and inwardly of the block **14** from the edges **22** and **24.** In the illustrated embodiment these marginal surface areas **26** and **28** are shown as lying in the same plane although this is not essential.

As shown in FIG. **4** the second block **14** has at least one projection **30** extending outwardly from the plane containing the marginal surface areas **26** and **28.** In this respect the projection **30** has a top side **32** and first and second inclined side walls **34** and **36.** The side wall **34** inclines upwardly to the top side **32** from the marginal surface area **26** along a line spaced from and parallel to edge **22** and forms an obtuse angle with the plane of the marginal surface area **16.** In like manner the side wall **36** extends from the plane containing the marginal surface area **28** along a line parallel to and spaced from the edge **24** to the top side **32.** This side wall **36** also forms an obtuse, but smaller, angle with the plane containing the marginal surface **28.** Also the junction between the sidewall **36** and the top side **32** is rounded as indicated at **38.** Preferably, as shown in FIG. **4,** the projection **30** has a rib **40** extending from the top side **32.** Also preferably the block **14** is provided with a guide pin **42** which extends from the marginal surface area **28.**

From a consideration of the illustration of block **12** as shown in the drawings it will be apparent that between marginal extending portions **48, 49,** the block **12** includes at least one recess **50** which is defined by a bottom wall **52** and side walls **54** and **56** which are inclined so that the recess **50** has a configuration which is complementary to the configuration of the projection **30** and so that the recess **50** is adapted to receive the projection **30** therein as best shown in FIG. **2.** In this respect the mating side **18** of the first block **50** extends between two edges **62** and **64** on the first block and the mating side **18** of the first block **12** has marginal surface areas **66** and **68** which lie in the same plane and which extend inwardly of the first block **12** from the edges **62** and **64** thereof. The side wall **54** extends inwardly from the marginal surface area **66** along a line parallel to and spaced from the edge **62** with the junction between the side wall **64** and the marginal surface areas **66** defining an edge **69.**

As shown in FIG. **4** the first terminal block **12** has at least one male terminal connector **74** which is adapted to mate with at least one female terminal connector which is hidden from view in FIG. **4** and which is generally indicated at **76** in FIG. **6.** Also the block **12** has a guide pin receiving opening **80** which is hidden from view in FIG. **4** and which is best shown in FIG. **7.** Additionally the bottom of the recess **50** has a slot therein hidden from view in FIG. **4** which is shown at **82** in FIG. **7** and which is adapted to receive the rib **40** therein.

For the purpose of describing the manner in which the blocks **12** and **14** are rolled apart from one another, one edge **62** of the terminal block **12** is characterized as the first roll axis, i.e., the roll axis for block **12** when it is pivoted to be separated from mounted block **14,** and edge **22** is a second roll axis, i.e., the axis about which block **14** rolls when block **14** is pivoted to separate it from mounted block **12.** Furthermore the marginal surface area **26** on the second block **14** can be characterized as a sliding fulcrum surface against which axis **62** bears, and marginal surface **66** can be considered a fulcrum against which axis edge **22** can bear.

Block **12** can be rolled or pivoted away from the block **14** by pivoting about roll axis **62.** Then as the block **12** is rolled apart from the block **14** the roll axis **62** will usually slide as well as pivot on the fulcrum surface area **26** as best shown in FIG. *3b.* Then, as and when the frictional engagement between the male contact **74** and the female contact **76** is broken the marginal extending portion **48** will usually engage and slide against the inclined side wall **34** as best shown in FIG. *3c.*In this way a smooth roll-apart disconnection between the first and second terminal blocks **12** and **14** is obtained with the terminal block assembly **10** of the present invention.

The particular configuration of the sides **18** and **20** of the first and second blocks **12** and **14** facilitate this smooth roll-apart disconnection. In this respect it will be noted that the inclining of the side wall **36** of the projection **30** and the side wall **56** of the recess **50** plus the rounding of the junction between the top side **32** and the side wall **36** as well as the junction between the side wall **56** and the bottom wall **52** provides for a smooth mating and separating of the terminal blocks **12** and **14.**

An important aspect of the mating engagement between the blocks 12 and 14 is the cooperation between the roll axis 62 and the fulcrum surface area 26 which is readily apparent in FIGS. 3*a*, 3*b* and 3*c*. Of secondary importance is the sliding engagement between the extending portion 48 and the inclined side wall 34 of the projection 30. In this respect it will be apparent from FIG. 3 that there are two points of sliding and pivoting engagement between the blocks 12 and 14 as complete separation is effected. Namely, there is sliding and pivoting engagement between the roll axis 62 and the marginal surface area 26 and between the first secondary roll axis 69 and the side wall 34. This preferred provision of two points of sliding and/or pivoting engagement between the blocks 12 and 14 facilitates the smooth roll-apart separation of the blocks 12 and 14 in the manner just described.

Also it should be noted that with the configuration of the blocks 12 and 14 as shown in FIGS. 2–4 the guide pin receiving opening 80 need only be slightly larger than the guide pin 42 as best shown in FIG. 7.

When the first block 12 is mounted to a panel such as the panel 18, the block 14 can pivot about the edge 62 (and finally, possibly around edge 69) as the block 14 is rolled apart from the block 12. In this respect the marginal surface area 26 will ordinarily slide on and about the roll axis 62 and the side wall 34 will slide on and about the roll axis 69. Regardless of the precise axis of rotation, the electrical connectors 74, 76 slide in an arcuate path with respect to each other, and the adjacent structures in blocks 12, 14 must be of such a configuration that the arcuate relative motion of the connector means is not obstructed. Hence the invention is not to be llmited as to the provision of only one roll or pivot axis, or only one means for rolling or pivoting the blocks apart to separate the sliding connectors.

As noted above the block 14 has at least one projection 30 and the block 12 has at least one recess 50. However in a typical terminal block assembly 10 each block 12 and 14 is generally rectangular in shape and has several projections and/or recesses as best shown in FIGS. 5–7. Turning now to FIG. 5 it will be apparent that in the illustrated embodiment the second block 14 has four of the projections 30 which are separated and equally spaced apart by three identical cavities 84 in the block 14. Each of the cavities 84 opens onto the one side 18 of the block 14 and in the illustrated embodiment also opens onto a second side 86 of the block 14 which is adjacent to the side 20 and which intersects the plane of the marginal surface areas 26 to form the edge 62. Also since the cavities 84 extend to both sides 20 and 86 of the block 14 the marginal surface area 26 is discontinued and can be referred to as marginal surface areas or marginal surface area sections. Opposite side portions of each of the cavities 84 is recessed to accomodate legs 88 forming a female jack portion of the female connector 76 as best shown in FIG. 6. In the illustrated embodiment, each of the female connectors 76 also includes a lug and set screw assembly 90 as best shown in FIG. 5. It will be apparent from FIG. 5 that the block 14 is provided with three openings 92 which open onto the second side 86 of the block 14 which are adapted to receive and hold each one of the lug and set screw assemblies 90 and which provide access means for wire conductors so that wire conductors can be inserted into the block and secured to the lug and set screw assemblies 90 of each of the terminal connectors 75.

As best shown in FIG. 6 the marginal surface area 28 is continuous and is not interrupted by the cavities 84. In this respect it will also be noted that the areas between the projections 30 and upwardly from the continuous marginal surface area 28 is open to provide a space to accomodate wire conductors connected to the male terminal connectors 74 mounted on the block 12 when the blocks 12 and 14 are in assembled position.

As best shown in FIG. 6 the recesses 50 are spaced apart and separated by channels 96 each of which extends between opposite sides 98 and 100 of the block 12 which extend to the mating side 18 and intersect the plane of the surface areas 66 and 68. Also since the channels 96 extend completely across the one side 18 of the block 12 the surface areas 66 and 68 are discontinuous and are in effect surface area sections.

Each of the male connectors 74 is mounted in one of the channels 96 and as best shown in FIGS. 5 and 6 each of the male connectors 74 is generally box-shaped with a set screw 104 threadedly received within the box portion of the male connector 74. It will be apparent from FIGS. 5 and 6 that a wire conductor can be inserted into the channel 96 for being received and secured to the male connector 74 from either side 98 or 100 of the terminal block 12. The channels 96 extend completely across the block 12 and open onto the sides 98 and 100 of the block 12.

Preferably, the frictional engagement of connectors 74, 76 should be firm enough to assure that the connectors won't separate until manually pivoted or pulled apart.

For attachment of the block 12 to a panel or surface and for securing the blocks 12 and 14 together after they have been pressed together into assembled position, two counterbored through bores 108 are provided in the block 12 and ligned through bores 110 are provided in the block 14. If the block 14 is to be mounted on a panel or surface the through bores 110 can be counterbored for receiving the heads of mounting screws or nuts on a stud which extends through both blocks 12 and 14.

It will be apparent to those skilled in the art that modifications and variations can be made to the roll-apart terminal block assembly of the present invention without departing from the spirit or scope of the invention. Accordingly the scope of the present invention is only to be limited as necessitated by the accompanying claims.

I claim:

1. A roll-apart connect-disconnect terminal block assembly including separable first and second blocks, at least one first electrical contact means on one side of said first block, mating second contact means on one side of said second block for frictionally engaging said first contact means on said first block when said blocks are brought together, said one side of said first block having a recess configuration adapted to mate with a projection on said one side of said second block, said one side of said first block extending between two edges of said first block, one of said edges defining a roll axis, said one side of said second block extending between two edges and having marginal surface areas thereon adjacent one edge thereof between said edge and said projection, said surface areas defining a fulcrum surface which engages said one edge of said first

block defining said roll axis when said blocks are in a fully engaged position, said edge and said surface remaining in contact when one of said blocks is pivoted with respect to said other block around said axis, said first and second contact means being moved in an arcuate path with respect to each other as they disengage as said first and second blocks are pivoted with respect to each other.

2. The assembly of claim 1 wherein said second block has at least one projection extending outwardly from said one side thereof and said first block has at least one mating recess in said one side thereof adapted to receive said at least one projection.

3. The assembly of claim 2 wherein said projection has a side wall which faces generally toward said one edge of said second block and which lies in a plane of said marginal surface area, said recess in said first block being defined in part by a side wall which extends into said one side of said first block along a line parallel to and spaced from said one edge and which forms an obtuse angle with said one side of said first block, the junction between said one side of said first block and said recess side wall along said line defining an edge of said recess which slidingly engages said side wall of said projection when one of said blocks is being rolled apart from the other of said blocks.

4. The assembly of claim 2 wherein said projection has a side wall which faces generally in a direction toward the other or second edge of the second block and which is slightly inclined, extending outwardly from said one side of said second block and inwardly from said second edge.

5. The assembly of claim 2 wherein said projection, viewing same in a direction parallel to said roll axis, has a generally trapezoidal cross section and said recess has a complementary cross section.

6. The assembly fo claim 5 wherein said projection extends outwardly from said plane of said marginal surface areas and said trapezoidal cross section is defined by a first wall extending outwardly from said plane from a line in said plane parallel to and spaced from said one edge and inwardly from said one edge thereby forming an obtuse angle with said plane, a top wall, and a second wall which extends outwardly from said plane and inwardly from said edge to said top wall from a line in said plane parallel to and spaced from the other or second edge of said second block and inwardly from said second edge thereby forming an obtuse angle with said plane which is smaller than said obtuse angle formed by said first wall and said marginal surface areas, the junction between said second wall and said top wall being rounded and said recess in said first block having a complementary configuration.

7. The assembly of claim 1 wherein one of said blocks has a guide pin extending from said one side thereof and said other block has a guide pin receiving opening in said one side thereof which is slightly larger than said guide pin and which is adapted to receive said guide pin therein.

8. The assembly of claim 2 wherein said projection has a blunt end defined by a top wall and has a rib extending from said top wall, and said recess has a bottom wall with a slot therein adapted to receive said rib.

* * * * *