United States Patent [19]

Eisenhardt

[11] **3,817,642**

[45] **June 18, 1974**

[54] **CONNECTOR**

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[73] Assignee: **Alloway Manufacturing, Inc.,** Fargo, N. Dak.

[22] Filed: **Jan. 29, 1973**

[21] Appl. No.: **327,739**

[52] **U.S. Cl.** **403/385**

[51] **Int. Cl.**...**A01b 15/02,** A01b 23/00, A01b/15/12

[58] **Field of Search** 403/385, 389, 400, 390

[56] **References Cited**

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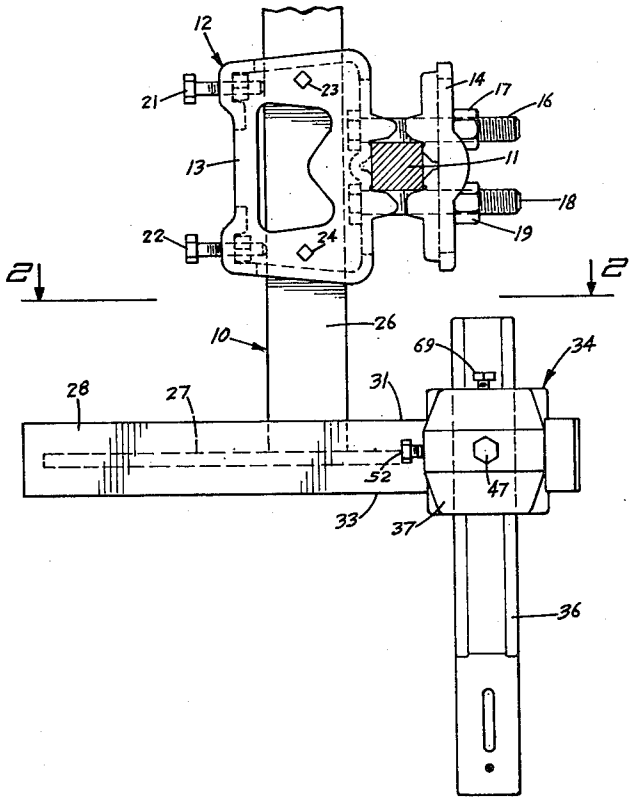
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Primary Examiner—Geo. V. Larkin

[57] **ABSTRACT**

A tool holder having an upright standard and converging side arms connected to a horizontal plate. A clamp holds the standard on a tool bar. A pair of identical connectors mounted on the side arms carry brackets adapted to support earth working tools, as knives or discs. The connector has an upright passageway for the bracket. Transverse and longitudinal clamping bolts hold the bracket on the connector. One side of the connector has a longitudinal horizontal dovetail groove accommodating an arm. The groove extends at an angle to the longitudinal plane of the passageway. A clamping bolt holds the connector in fixed relation on the arm. The connector is reversible on either arm and is used to change the angular relationship between the arm and bracket.

11 Claims, 7 Drawing Figures



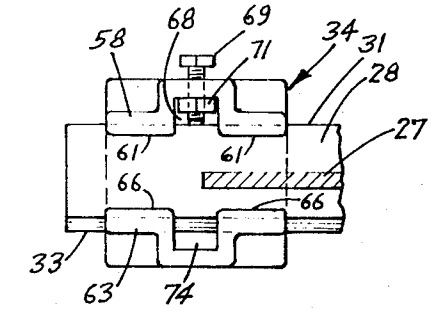


FIG. 7

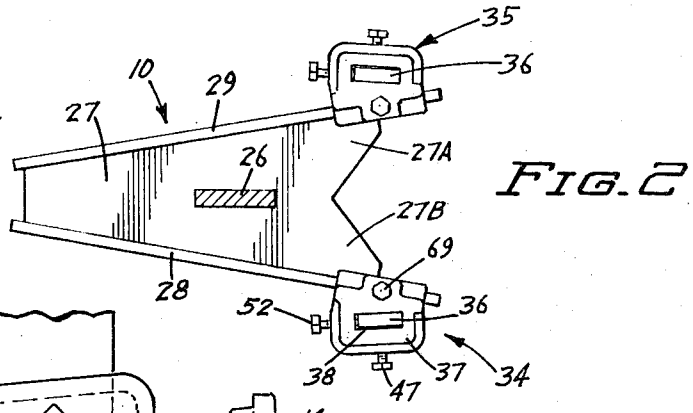


FIG. 2

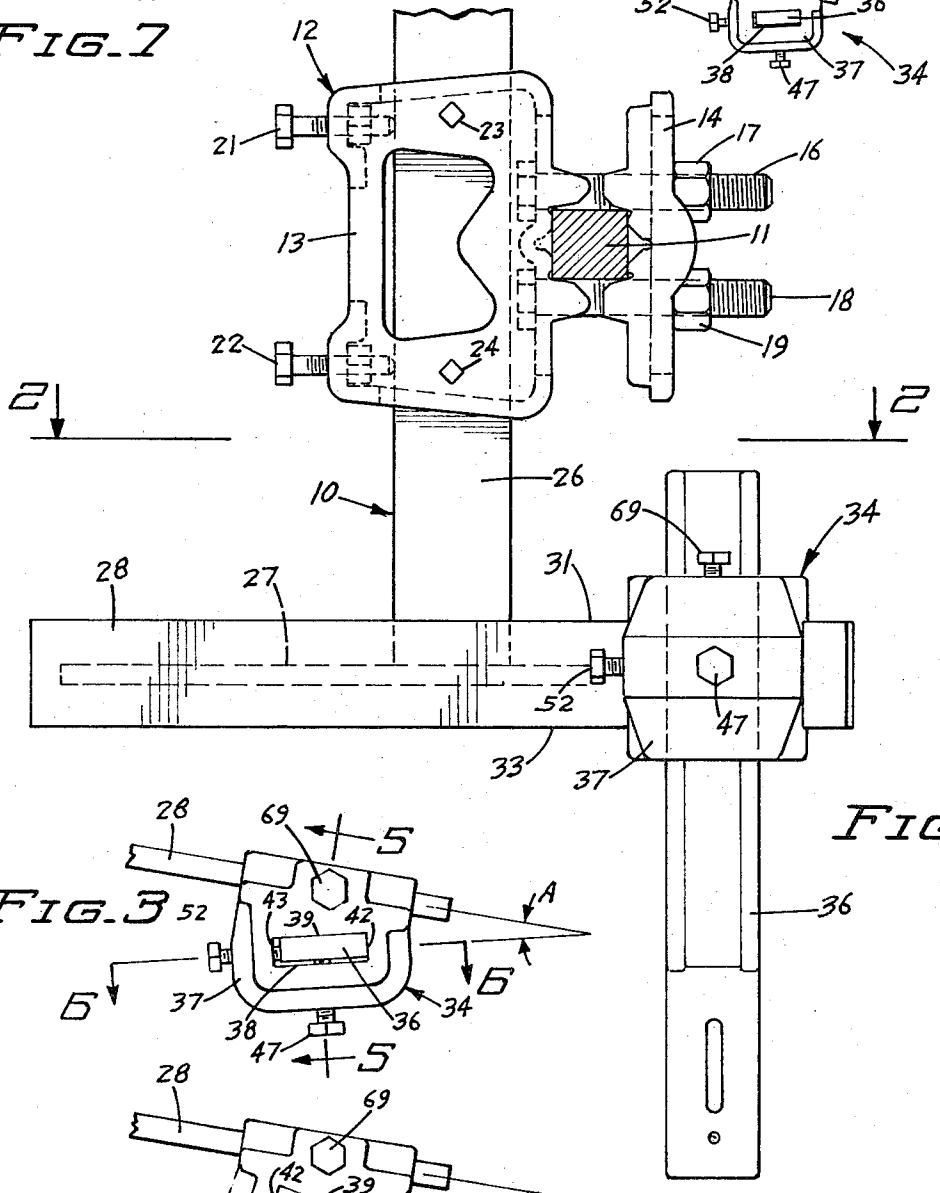


FIG. 1

FIG. 3

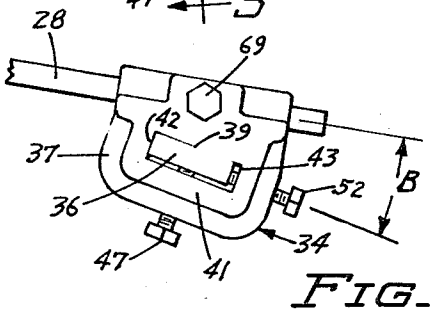


FIG. 4

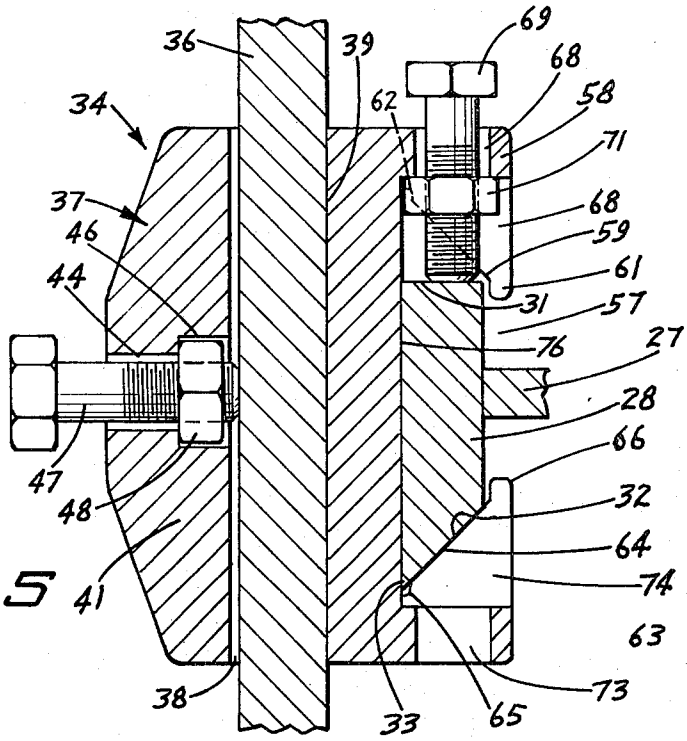

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FIG. 5

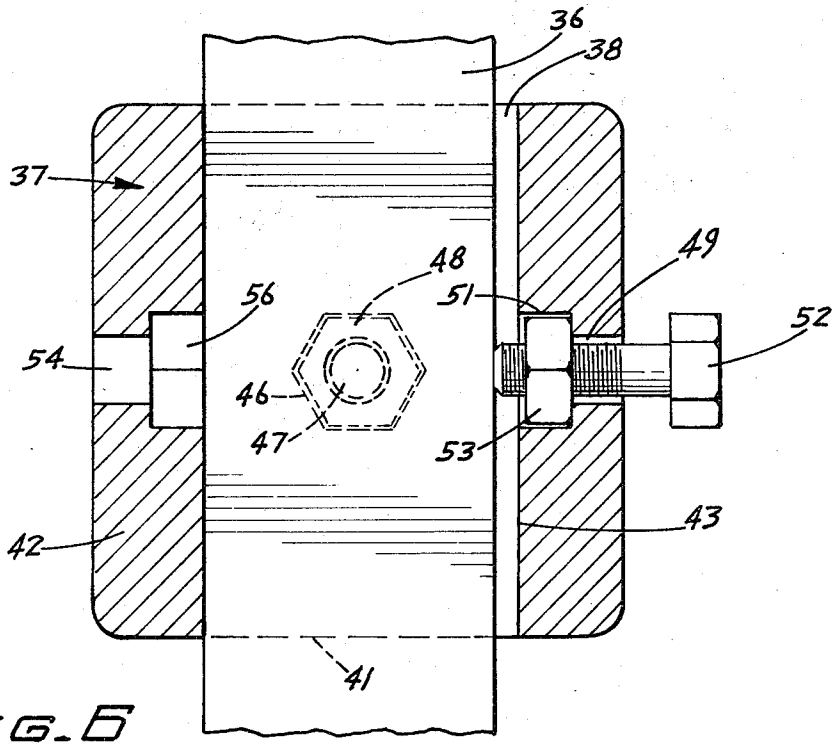

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FIG. 6

CONNECTOR

BACKGROUND OF INVENTION

Row crop cultivators have transverse tool bars carrying a plurality of tools to work the soil between the rows of crops. An example of a row crop cultivator is shown by Tonsfeldt in U.S. Pat. No. 3,680,648. Earthworking tools, as knives and discs, are mounted on a tool holder attached with a clamp to the tool bar. Tonsfeldt discloses in U.S. Pat. No. 3,693,725 a tool holder having an upright standard and converging mounting plates. A clamping member is attached to the mounting plates to carry the earthworking tools. Clamp members with different pitches are used to provide a change in the working angle or pitch of the earthworking tools. The clamp members also have configurations whereby the left member can only be mounted on the left mounting member and a right member can only be mounted on the right mounting member. Part of the clamp member is provided with a twist about a vertical axis to fix the angular working pitch of the earthworking tool. Once the pitch is fixed, it cannot be changed. In cultivating row crops, as sugar beets, small distances of the earthworking tools relative to the row crops are important. The tilting and lateral shifting of the earthworking tool is undesirable and results in constant checking and adjusting to insure proper alignment of the earthworking tools with the rows of crops. It is also desirable during the growing season to change the pitch or angle of the earthworking tool in accordance with growth of the crop.

SUMMARY OF INVENTION

The invention relates to a connector for mounting a tool holding member on a tool holder. The tool holder has at least one generally horizontal arm having a downwardly inclined bottom. The connector has a body with an upright passage for accommodating a portion of the member. The member is held in a fixed position on the passage with a first means mounted on the body and in engagement with the member. The first means can be a captive nut held by the body and a bolt threaded through the nut and engageable with the member. The body has a longitudinal generally horizontal groove along one side of the body. The groove is defined by a generally upright back wall and upper and lower portions spaced from and extended adjacent the back wall. Each portion has an inclined inside face. The inclined faces are complementary to the inclined bottoms of the arms whereby the same connector can be mounted on both of the arms in inverted positions. The back wall is located along a plane which is angularly positioned relative to a plane through the passage. This angular relationship between the passage plane and the groove plane permits adjustment of the pitch of the earthworking tool by reversing the connector on the arm.

An object of the invention is to provide a one-piece member which can be used on both sides of a tool holder and in two positions on each side of the tool holder to mount a tool carrying member on the tool holder. A further object of the invention is to provide a connector for mounting a member on a tool holder which is longitudinally adjustable on each side of the tool holder. A further object of the invention is provide a connector which has lateral and longitudinal adjustment of the tool mounting member to insure precision

adjustment of the tool mounting member. Still another object of the invention is to provide a connector which can be easily and economically manufactured without machining and which uses standard nut and bolt assemblies to attach the connector to a tool holder and a tool mounting member.

IN THE DRAWINGS

FIG. **1** is a side elevational view of the tool holder and connector of the invention mounted on a tool bar;

FIG. **2** is a sectional view taken along the line **2—2** a reduced scale;

FIG. **3** is plan view of the connector of FIG. **1** in its first position;

FIG. **4** is a plan view similar to FIG. **3** showing the connector in its second or reverse position;

FIG. **5** is an enlarged sectional view taken along the line **5—5** of FIG. **3**;

FIG. **6** is an enlarged sectional view taken along the line **6—6** of FIG. **3**; and

FIG. **7** is an elevational view of the back side of the connector of FIG. **1.**

Referring to the drawings, there is shown in FIG. **1** a tool holder indicated generally at **10** connected to a transverse tool bar **11** with a clamp **12.** Clamp **12** is disclosed in U.S. Pat. application Ser. No. 176,169. The subject matter of this application is incorporated herein. A related clamp is shown in U.S. Pat. No. 3,642,333. Clamp **12** has a body **13** and a retaining member **14.** A pair of bolts **16** and **18** carry nuts **17** and **19** respectively to clamp the body and retaining member **14** on the transverse tool bar **11.** Tool bar **11** can have a diamond, square or T shape. Body **13** has a first pair of clamp means **21** and **22** and a second pair of clamp means **23** and **24** normally disposed with respect to the first pair of clamp means. The clamp means **21,22** and **23,24** engage an upright standard or shank **26** of the tool holder **10** which projects through an upright opening in the body.

The tool holder **10** has a generally horizontal base or plate **27.** The lower end of standard **26** is secured by welds or the like to the midportion of the base **27.** As shown in FIG. **2,** the outer edges of base **27** converge toward each other in a forward direction. A pair of generally horizontal arms **28** and **29** are secured to the outer edges of base **27.** The base **27** has rearwardly directed extensions **27A** and **27B** secured to the rear portions of arms **28** and **29** to reinforce these portions of the arms. The arms **28** and **29** converge at an angle of approximately 20° relative to each other. The arms **28** and **29** can be located at other angles.

Referring to FIG. **5,** arm **28** has a generally flat top **31** and an upwardly and outwardly inclined bottom **32.** The bottom terminates in a linear bottom edge **33.** Arm **29** has identical structure.

Returning to FIGS. **1** and **2,** connector **34** is mounted on arm **28.** An identical connector **35** is mounted on arm **29.** The following description is limited to connector **34** since the connectors **34** and **35** are identical in structure and use. The connectors are used to hold brackets **36.** Brackets **36** extend in a generally downward direction and are adapted to support earthworking tools (not shown), as discs and weeder knives, as shown in U.S. Pat. No. 3,693,725. Conventional attaching structures, as nut and bolt assemblies and bearings, are used to connect earthworking tools to the

lower portions of brackets **36.** The lower portions of the brackets can be vertically offset.

Connector **34** has a one-piece body **37** of metal, preferably cast ductile metal. Body **37** has a generally upright rectangular passage **38** of a size which is slightly wider and longer than the cross section dimensions of bracket **36.** The long dimension of passage **38** defines the longitudinal vertical plane of the passage.

Body **37** shown in FIG. **5** has an upright back wall **39,** a front or outside wall **41** joined to end walls **42** and **43,** defining generally rectangular passage **38.** Wall **41** has a transverse horizontal hole **44** having an inside cavity **46.** Cavity **46** has a generally hexagonal shape to accommodate and captivate a nut **48.** Bolt **47** is threaded through nut **48** and engages the bracket **36** to clamp the bracket **36** into engagement with wall **39.**

Referring to FIG. **6,** body **37** has a generally longitudinal hole **49** in wall **43.** Hole **49** opens to a cavity **51.** Cavity **51** has a generally hexagonal shape to accommodate and captiviate a nut **53.** Bolt **52** threaded through nut **53** engages the edge of bracket **36,** clamping the bracket into engagement with wall **42.** Wall **42** has a horizontal hole **54** opening to a hexagonal shaped cavity **56.** A nut and bolt holding means can be placed in hole **54** and cavity **56** to clamp the bracket into engagement with the wall **43.**

Returning to FIG. **5,** body **37** has a longitudinal dovetail groove **57** along one side of the body to accommodate the arm **28.** Wall **39** is integral with a top longitudinal flange **58.** Flange **58** has an upwardly and inwardly inclined face and a downwardly directed lip **61.** Face **59** extends to a horizontal recess **62** separating wall **76** from face **59.** Facing flange **58** is a bottom flange **63** having an upwardly and outwardly inclined face **64** joining an upwardly directed lip **66.** Lip **66** faces the lip **61** and is vertically spaced therefrom a distance smaller than the height of arm **28.** The lower portion of face **64** extends into a longitudinal recess **65** for accommodating the linear edge **33** of arm **29.**

As shown in FIG. **7,** lips **61** and **66** are separated from each other by recesses **68** and **74** respectively. The sides of recess **68** are spaced from each other to captivate a nut **71.** A bolt **69** extended through a hole **67** is threaded through nut **71.** The bolt **69** engages the top **31** of arm **28,** forcing the beveled face **32** into engagement with the inclined surface **64.** This wedges the outside face of arm **29** into firm engagement with upright wall **76,** thereby fixing the position of connector **34** on the arm **28.** The lower flange **63** has an upright hole **73** opening into a recess **74.** A nut and bolt clamping assembly similar to the nut and bolt assembly **69,71** can be used with the hole **73** and recess **74** when the connector is in the inverted position.

Wall **76** extends in a linear direction in a longitudinal vertical plane at approximately 12° with respect to the longitudinal linear direction of the longitudinal vertical plane of passage **38** for bracket **36.** Other angles between the groove plane and passage plane can be used in the connector. As shown in FIG. **3,** the connector **34** is mounted on arm **28** so that the angle A is a converging angle whereby the longitudinal plane of the bracket **36** and the longitudinal plane of arm **28** converge in a rearward direction at an angle of approximately 12°. This angle can vary from 10°–15°. Also, other angles can be used between the respective planes.

Referring to FIG. **4,** the connector **34** is in an inverted position wherein the angle B diverges in a rearward direction whereby the horizontal plane of bracket **36** extends away from the horizontal plane of arm **28** in the rearward direction. This change in the angular position of bracket **36** relative to arm **36** changes the angular inclination or pitch of the earthworking tool attached to the lower portion of bracket **36.** This change in the angular inclination of the earthworking tool can be made without the use of specially shaped brackets **36** nor the adjustment of separate parts. The connector **34,** being a onepiece member, is used to accurately and positively hold the bracket in its selected angular position.

In use, tool holder **10** can be used for dual purposes. The earthworking discs similar to discs **13** and **14** shown in U.S. Pat. No. 3,642,333 can be mounted on the front or leading portions of the arms **28** and **29.** Connectors **34** and **35** are used to attach brackets **36** to the rear portions of arms **28** and **29.** Weeder knives similar to knives **30** shown in U.S. Pat. No. 3,693,725 can be attached to the lower portions of brackets **36.** Alternatively, additional earthworking discs can be rotatably mounted on the lower portions of brackets **36.** The bolts **47** and **52** are operable to clamp bracket **36** into a fixed postion with respect to the body **37** of the connector **34.** Bracket **36** can be vertically adjusted, whereby the earthworking tool is at the desired position. Clamp **12** is also adjustable to change the earthworking positions of all the tools connected to the tool holder **10.** Bolt **47** provides for side clamping of bracket **36.** Bolt **52** functions to clamp the edge of bracket **36** whereby the bracket is held in position by both the longitudnal and transverse clamping forces.

The arm **29** is located in the dovetail groove **57.** The connector **34** is longitudinally movable along the arm to a selected position. The bolt **71** is turned to clamp the lower inclined edge **32** of arm **29** into engagement with the edge **64.** This forces the wall **76** of body **37** into flat engagement with the outside face of arm **29** and fixes the position of the connector **34** relative to arm **29.**

As shown in FIGS. **3** and **4,** the connector **34** is useable in upright or inverted positions to change the angular relationship of the bracket **36** relative to arm **28.** Bracket **35,** being identical with bracket **34,** is also useable in inverted positions to change the angular relationship of bracket **36** relative to arm **28.**

While there has been shown and described a tool holder and connector, it is understood that other types of tool holders can be used with the connector. The body **37** is preferably formed of a one-piece metal casting. It can be a welded member or made from other structural material, as reinforced plastic. Also, the angular relationship between wall **76** and passage **38** may be changed. It is understood that various other changes, substitutions and deletions may be made by those skilled in the art without departing from the spirit and scope of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows.

1. A connector for mounting a member on a tool holder, said tool holder having at least one generally horizontal arm, said arm having a downwardly inclined bottom comprising: a body having an upright passage for accommodating a portion of the member, first means on the body to hold the member in a fixed position relative to the body, said body having a longitudi-

nal generally horizontal groove along one side of the body, said body having a generally upright back wall, and upper portion having an inclined inside face, and a lower portion having an inclined inside face defining said groove, said inclined bottom of the arm being in general surface engagement with one of the inclined inside faces when the connector is mounted on the arm, and second means on the body engageable with the arm to hold the body on the arm.

2. The connector of claim **1** wherein: the upper portion of the body is a flange having an upwardly inclined face and the lower portion of the body is a flange having a downwardly and inwardly inclined face.

3. The connector of claim **2** including: first lip means on the end of the flange on the upper portion and second lip means on the flange on the lower portion, said first lip means projected toward the second lip means and spaced from the second lip means.

4. The connector of claim **1** wherein: the body has recesses open to the passageway for non-rotatably retaining nuts and holes concentric with and open to said recesses, said first means comprising nuts located in said recesses and bolts extended through said holes, threaded into the nuts and engageable with the member.

5. The connector of claim **1** wherein: the first means comprises a first clamp bolt engageable with the member in a transverse direction and a second clamp bolt engageable member in a longitudinal direction.

6. The connector of claim **1** wherein: the body has a generally upright wall on one side of the passage, said wall extended in a general longitudinal direction, said back wall of the body extended in a general longitudinal direction at an angle to the upright wall.

7. The connector of claim **6** wherein: said angle is about 10° to 15°.

8. The connector of claim **1** wherein: the passage has a generally rectangular shape and the first means comprises a first clamp bolt engageable with the member in a transverse direction and a second clamp bolt engageable member in a longitudinal direction.

9. The connector of claim **1** wherein: the second means is a clamp bolt engageable with the top of the arm.

10. The connector of claim **1** wherein: the upper and lower portions of the body have recesses for non-rotatably retaining nuts and holes concentric with and open to said recesses, said second means comprising a nut located in the recess in the upper portion and bolt extended through the hole in the upper portion and threaded through said nut into engagement with the top of the arm.

11. The connector of claim **10** wherein: the body has opposite end walls, a side wall and a back wall defining said passage, a pair of said recesses are in said opposite end walls and a third recess is in a side wall.

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