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Vaught

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[54] **CONCRETE MOLD FORM WALE CONNECTOR**

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[52] **U.S. Cl.** ..... **249/219 W,** 52/752

[51] **Int. Cl.** **F16b 7/04**

[58] **Field of Search** ..... 52/758 H, 753 D, 753 C, 52/656, 698, 699, 751, 752; 403/231; 249/219 W, 190, 191; 269/41

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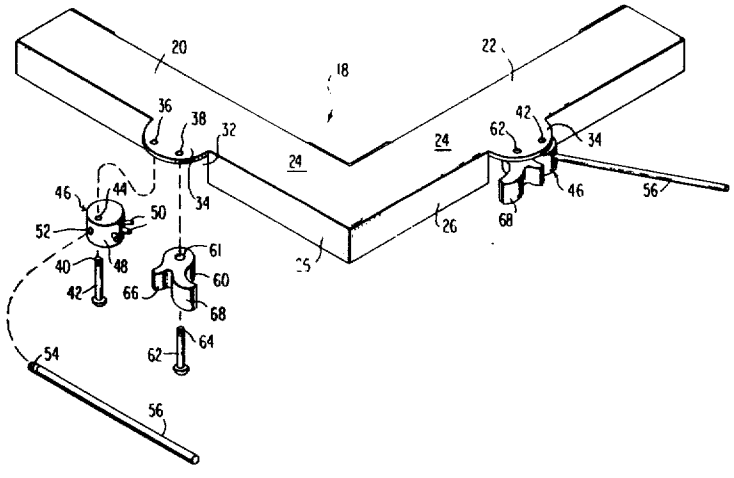
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[57] **ABSTRACT**

An L-shaped sheet metal connector body forms two right angle intersecting channel-like arms which receive and embrace the projecting ends of whale beams of a concrete molding form framework to be joined. An eccentric is pivotably mounted on each arm, to the side of the beam, for peripheral contact therewith. Rotation of the eccentric frictionally drives the beams toward the corner of the connector body to effect coupling and alignment. Rachet pins on the periphery of the eccentric facilitate frictional driving of the beam ends toward each other. A pivotable locking pawl mounted adjacent to the cam locks the eccentric in a position where the large radius portion of the eccentric which facilitates longitudinal movement of the beam ends relative to each other then presses the beam ends forcibly against the opposite sidewalls of arms to give rigidity and maintain alignment of the mold form framework.

8 Claims, 3 Drawing Figures



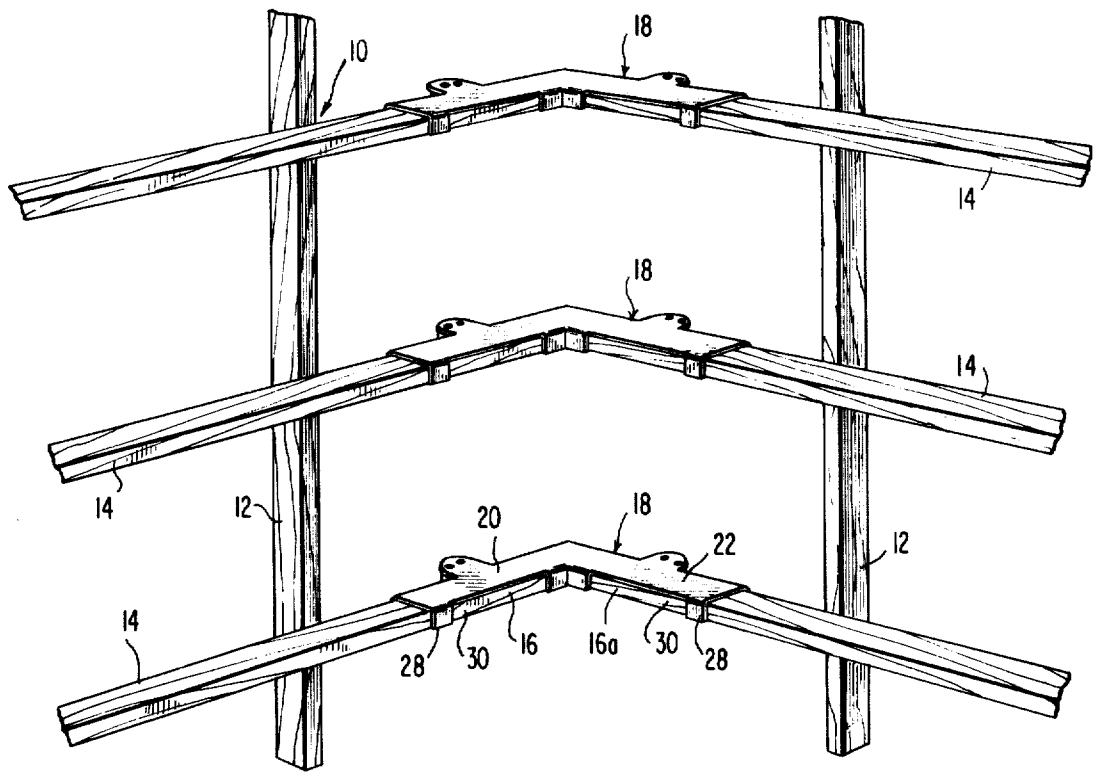


FIG. 1

FIG. 2

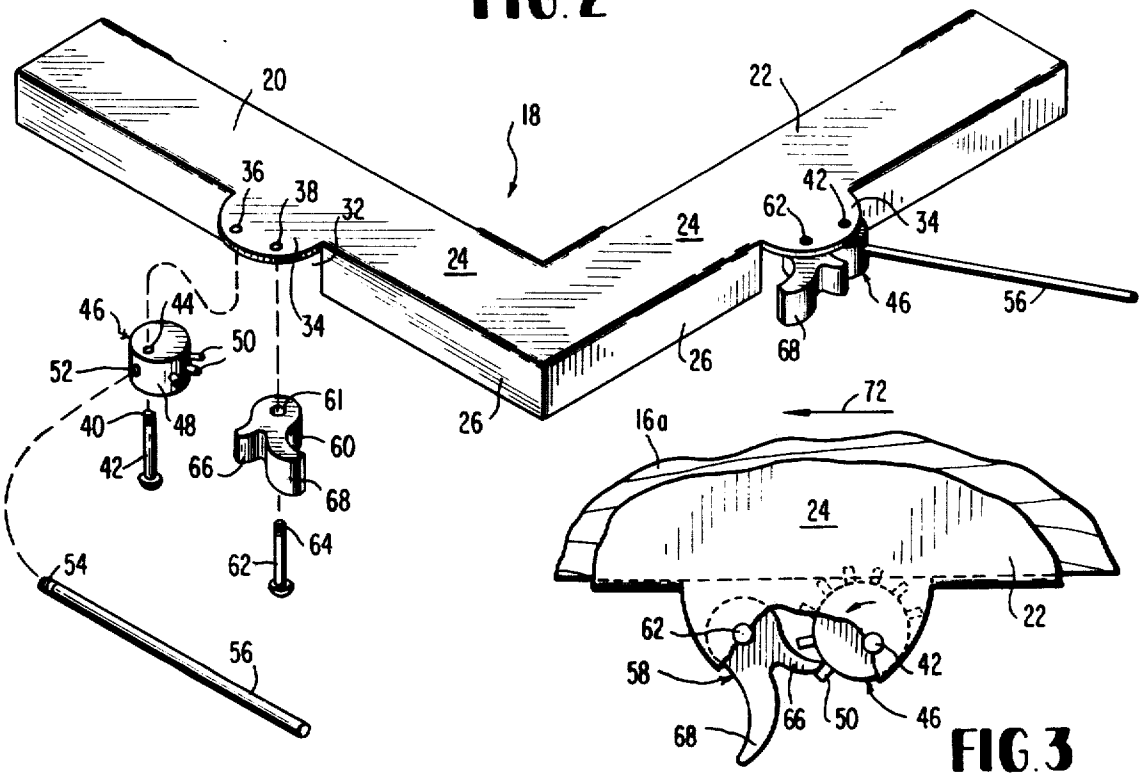


FIG. 3

CONCRETE MOLD FORM WALE CONNECTOR

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

This invention relates to connectors for aligning and locking concrete form frame members together and at a given angle, with respect to each other, and more particularly, to an improved lockable whale connector for locking the protruding ends of concrete form whale beams together.

2. DESCRIPTION OF THE PRIOR ART

In the building construction industry, concrete molding forms must be set up prior to pouring of the concrete and dismantled after the concrete hardens, and in many cases, the concrete forms are re-used. Particularly, in high rise buildings, the forms are employed in identical fashion at each floor and are simply moved from floor to floor as the poured concrete sections harden. It is difficult to position the concrete forms, maintain the desired alignment, and permit ready connection and disconnection of the forms to each other, particularly where the sectional forms intersect to form the corners of the poured concrete building components.

Normally, the concrete mold form includes a wooden framework formed of 2×4s, or similar wooden beams, to which is attached plywood sides or the like to form a hollow mold cavity within which the concrete is poured. Where such concrete forms are employed in the formation of vertical concrete walls and the like, the framework consists essentially of vertical 2×4s, in the form of studs, connected to a number of horizontal 2×4s, or whales, which are nailed or otherwise coupled to the studs at right angles to the studs. Attempts have been made to use right angle sheet metal connectors for coupling the projecting ends of the whales or horizontal beams together at the corners of the concrete mold formed thereby. Particularly, where the concrete forms are re-used and where the framework formed of the 2×4s may warp and the relative positions of the frame members may shift during use, it is difficult and sometimes impossible to align the intersecting projecting ends of the framework whales and to effectively couple the same together or to maintain a rigid framework.

SUMMARY OF THE INVENTION

The present invention is directed to an improved whale connector for concretet forms or similar frameworks which insures alignment of the beams and maintains the connection therebetween in a rigid but releasable nature. Each whale connector comprises an L-shaped sheet metal body consisting of integral, intersecting arms, forming channels which embrace the ends of respective whale beams being joined. The arms include opposed planar sidewalls overlying respective sides of the beam with the beams slidably inserted therein and movable towards the apex of the arms. Rotatable eccentrics are carried on both arms externally of one of the sidewalls of the connector body and mounted for rotation about an axis at right angles to the longitudinal axis of the arms and with the periphery of the eccentric in frictional engagement with the sides of the beam ends. By rotation of the eccentrics, the beams are pressed against the opposed sidewalls of each arm and are frictionally driven longitudinally towards each other. A latching pawl is pivotably mounted for rotation about an axis parallel to the pivot axis of the eccentric and adjacent thereto, the eccentric carries rachet pins circumferentially positioned about its periphery and the locking pawl includes a radial projection which contacts the eccentric periphery intermediate of the rachet pins to lock the eccentric against rotation to release the pressure exerted by the eccentric on the beam within its arm or to permit the beam to shift longitudinally, A removable eccentric operating handle is threadably coupled to the eccentric and extends radially of the periphery for rotating the eccentric through an arc sufficient to create the locking force and to shift the beam longitudinally within a given arm. Preferably, the locking pawl takes the form of a disc with a first short radial projection facing the eccentric periphery and a second longer projection to the side of the first projection opposite the eccentric to act as a thumb actuator to release the eccentric by rotating the locking pawl in a direction such that the smaller projection moves away from the periphery of the eccentric.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a concrete mold form framework employing a plurality of the lockable whale connectors of the present invention for connecting the ends of the framework whale beams together.

FIG. 2 is an enlarged, partially exploded, perspective view of one of the lockable whale connectors employed in conjunction with the concrete framework illustrated in FIG. 1.

FIG. 3 is a top plan view, partially cut away of a portion of one of the lockable whale connectors of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, the present invention has application to the creation of a concrete molding form of the type wherein a framework illustrated generally at **10**, is formed by joining vertical and horizontal wooden beams, such as 2×4s to create intersecting walls. In this respect, the framework **10** is generally vertical and is formed of left and right hand portions which intersect. The framework comprises a plurality of vertical studs such as **12** formed of wooden 2×4s and to which is affixed at various vertical heights whales **14**, also preferably formed of 2×4s, and wherein the projecting ends **16** and **16***a* of the whales for the respective left and right hand framework portions intersect at the corner of the framework. The whales **14** may be affixed to the studs **12** by nailing or the like. In order to achieve a concrete form framework whose sides are at right angles to each other and perfectly trued, the present invention makes use of individual, lockable whale connectors **18** for locking the projecting ends **16** and **16***a* of the whale beams together to form a corner for the framework at each whale location.

Reference to FIG. **2** shows in detail the make-up of the individual lockable whale connectors **18** and their manner of operation taken further in conjunction with FIG. **3**. Each connector **18**, is formed of a sheet metal body including right angle arms **20** and **22**, the arms defining beam receiving channels which are rectangular in cross section and have internal dimensions approximating the dimensions of the wooden beams forming whales **14**. Each arm, therefore, is formed of a flat base **24**, an outer sidewall **26**, and an inner sidewall **28**. Side-

wall **28** opens as at **30**, along the major portion of its length intermediate the ends of the arm, to make the connector as light weight as possible without affecting its capability to maintain alignment between and pressure on ends **16** and **16***a* of respective intersecting whales **14**. An opening **32** of somewhat shorter length is formed within the outside sidewall **26** of each arm, and the base **24** is provided with a half moon shaped integral projecting portion **34** which overlies the opening **30** and extends outwardly beyond sidewall **26**. A pair of tapped and threaded holes **36** and **38** are provided on the projecting portion **34** of base **24** for each arm. Hole **36** receives the threaded end **40** of a bolt **42**, the bolt **42** passing through a bore **44** within the locking cam or eccentric shown generally at **46**. The eccentric **46** comprises essentially a circular disc with the bore **44** being eccentric to the axis of the disc. Thus, when the bolt **42** is threadably engaged within the tapped and threaded hole **36**, rotation of the eccentric **46** causes its periphery **48** to move toward and away from opening **32**. The periphery **48** of the eccentric **46** for each arm is provided with a plurality of radially projecting pins **50** at spaced circumferential positions and the diameter of the eccentric **46**, the position of its pivot axis as defined by bolt **42** and the location of the tapped and threaded hole **36** is such that the rachet pins **50** protrude within opening **30** and engage the side of a given whale beam end **16** or **16***a*. The periphery **48** of eccentric **46** is also provided with a tapped and threaded hole **52** which extends inwardly to some distance and which receives the threaded end **54** of a removable, eccentric operating handle or tool **56**. Handle **56** is essentially a rod of a length sufficient to permit hand rotation of each eccentric for manual operation of the lockable whale connector **18**. To the side of the eccentric **46**, and mounted for rotation about an axis parallel to that of the eccentric, is a locking pawl indicated generally at **58** which is machined of metal in the form of a disc-like body **60** including an axial bore **61**. Bore **61** receives bolt **62** whose threaded end **64** is threadably received by the tapped and threaded hole **38** of the plate projecting portion **34**. The locking pawl **58** is provided with a first relatively short radial projecting **66** to the side of the locking pawl facing the eccentric, and a second projection **68** which projects radially outwards of the pivot axis defined by bore **62** to a much greater extent, and is curved away from projection **66**. The position of the two tapped and threaded holes **36** and **38** with respect to each other, the diameter of the eccentric, the diameter of the locking pawl and the radial extent of the projection **66** determine the locking effect of the locking pawl relative to the eccentric **46**.

In operation, the manner of effecting alignment of the whale projecting beam ends **16** and **16***a* and locking the whales together at their ends to define a corner to the framework **10**, may be best seen by reference to FIG. **3**. FIG. **3** illustrates the beam end **16a** within the channel arm **22** and being longitudinally movable therein. With the connector **18** embracing the ends **16** and **16a** of the whales **14** of the respective left and right hand sections of the framework **10**, the removable eccentric operating handle **56** is threaded into engagement with tapped and threaded hole **52** within the periphery **48** of the eccentric **46**. The eccentric **46** is then rotated, FIG. **3**, in a conterclockwise direction about its pivot axis as defined by bolt **42** and the pins **50** impinge against the side of the beam end **16***a* to force the beam end **16***a* to move towards the intersection of the two arms **20** and **22** from right to left as indicated by arrow **72**. During this counterclockwise rotation, the pins **50** move over the small radial projection **60** of the locking pawl **58**, if the locking pawl **58** is maintained in the position shown. Further, during this movement, due to the eccentric pivot axis of the eccentric **46**, its periphery **48** and thus the pins **50** projecting therefrom in moving into frictional contact with the side of the beam end **16***a* may in fact penetrate the beam and at the same time force the beam laterally towards the inside of the arm. Further, the beam is moved longitudinally in the direction of arrow **72**. The beam moves away from sidewall **26** and towards the opposite sidewall **28**. If the small radial projection **66** is moved in between two of the pins **50**, any attempt at retrograde movement, that is, clockwise rotation of the eccentric **46** and left to right movement of the beam end **16***a* within arm **22**, such action is resisted by a pawl and rachet action between pawl radial projection **66** and the pins **50** which act as rachet teeth.

The action with respect to beam ends **16** at each connector location is identical thereto and the locking of the beam ends axially relative to their channel like arms **20** and **22** as well as forcibly pressing each beam end **16** and **16***a* against the inner sidewall **28** of respective arms provides rigid resultant framework facilitating the creation of a rigid concrete form with perfectly trued and aligned intersecting and interconnecting framework sections. In order to disengage the projecting beam ends **16** and **16***a* of the whales **14**, it is only necessary to press on the thumb operator **68** which results in a slight counterclockwise rotation of the eccentric **46**, FIG. **3** for instance, thus releasing the pawl radial projection **66** from between the rachet pins **50**, and the beam ends **16** and **16***a* may be slid longitudinally out from the channel like arms **20** and **22** which receive the same and dismantling of the concrete molding may be readily accomplished. The connector body may be readily constructed of plate steel, and the eccentric locking pawl and handle may be formed of cold rolled steel stock, as desired.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A lockable whale connector for connecting and aligning the intersecting projecting beam ends of concrete molding form framework sections or the like, said lockable whale connector comprising:

a sheet metal body of L-shaped configuration having intersecting integral arms forming beam receiving channels of rectangular cross section,

an eccentric operatively mounted to the side of each arm for frictional peripheral contact with the side of the beam embraced by said arm;

whereby, rotation of each eccentric fictionally drives the beams axially within respective arms towards each other to effect proper alignment and positioning of the beams with respect to each other, while simultaneously pressing said beams against the sidewall of said arms opposite that carrying said eccentric.

2. The lockable whale connector as claimed in claim 1, further comprising: means for locking said eccentrics against rotation to prevent retrograde movement of the beam ends within respective guide arms.

3. The lockable whale connector as claimed in claim 1, wherein: each eccentric includes circumferentially spaced projections on the periphery of the same to insure frictional engagement between the said eccentric and said beam for respective arms.

4. The lockable whale connector as claimed in claim 2, wherein: each eccentric includes circumferentially spaced projections on the periphery of the same to insure frictional engagement between the said eccentric and said beam for respective arms.

5. The lockable whale connector as claimed in claim 2, wherein said means for locking said eccentric against rotation to prevent retrograde movement of the beam ends within respective guide arms comprises: a plurality of projections carried by the eccentric periphery at circumferentially spaced portions and a pivotable locking pawl mounted adjacent to said eccentric for pivoting about an axis parallel to the pivot axis of said eccentric and having a radial projection pivotal to a position between said projections, and wherein said radial projection of said locking pawl extends radially beyond the distance from the pivoted axis of the locking pawl to the periphery of the eccentric in a plane which includes the pivot axis of both said eccentric and said locking pawl.

6. The lockable whale connector as claimed in claim 5, wherein said locking pawl includes a second radial projection positioned to the side of the first projection away from the eccentric, and having a radius in excess of that of said first projection and acting as a thumb release for said locking pawl.

7. The lockable whale connector as claimed in claim 6, wherein: each arm is U-shaped in configuration including a base supporting laterally spaced inside and outside sidewalls, said outside sidewalls being provided with an opening intermediate its ends, said base including an integral projecting portion overlying said outside sidewall opening and extending outwardly from said sidewalls and said eccentric and said locking pawl are pivotably mounted to said base projecting portion such that the rachet pins project inwardly of said opening during rotation of said eccentric.

8. The lockable whale connector as claimed in claim 7, wherein: said eccentric includes a tapped and threaded hole extending inwardly from its periphery and an elongated rod having a threaded end is threadably received within said eccentric periphery hole and extends radially outward thereof away from said outside sidewall opening to permit manual rotation of said eccentric into beam locking position.

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