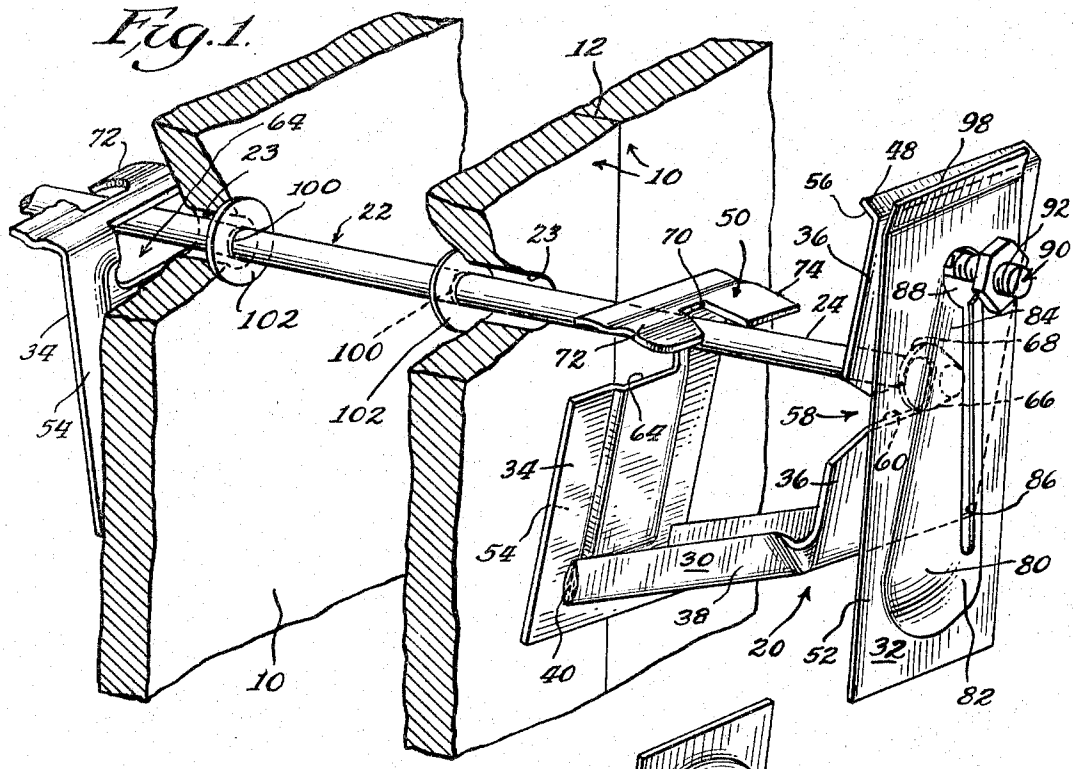
April 25, 1967 G. J. ERIKSSON 3,315,937

WALER CLAMP ASSEMBLY

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Fig. 1.



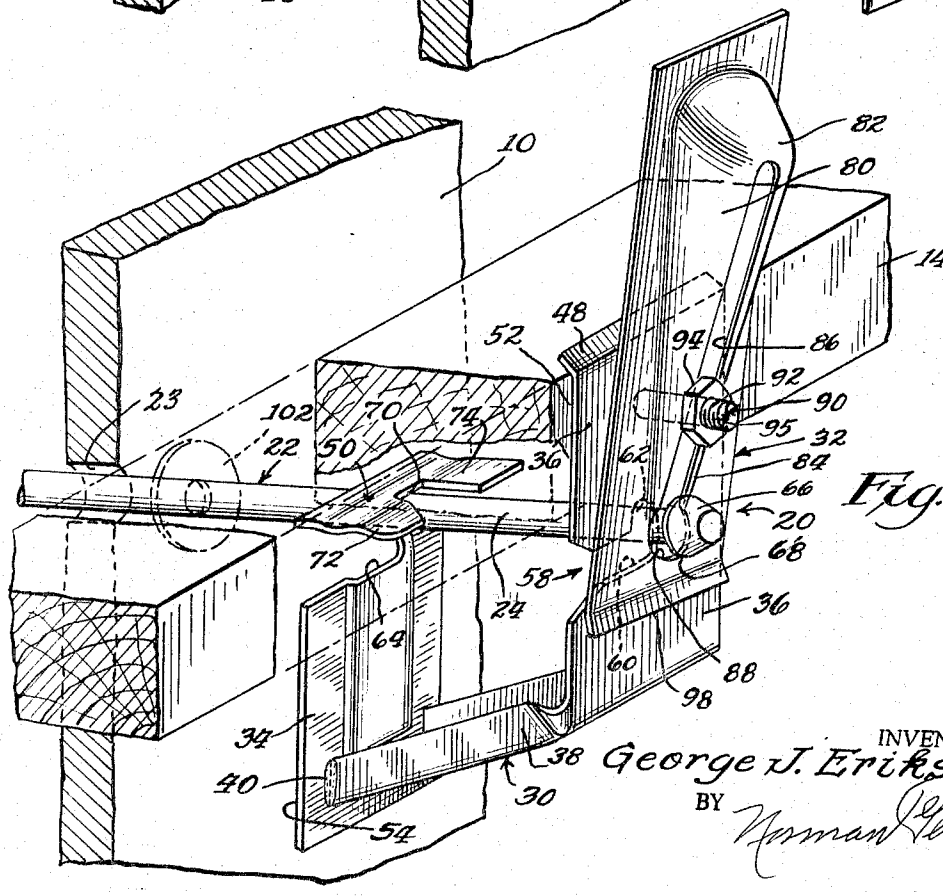


Fig. 2.

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WALER CLAMP ASSEMBLY

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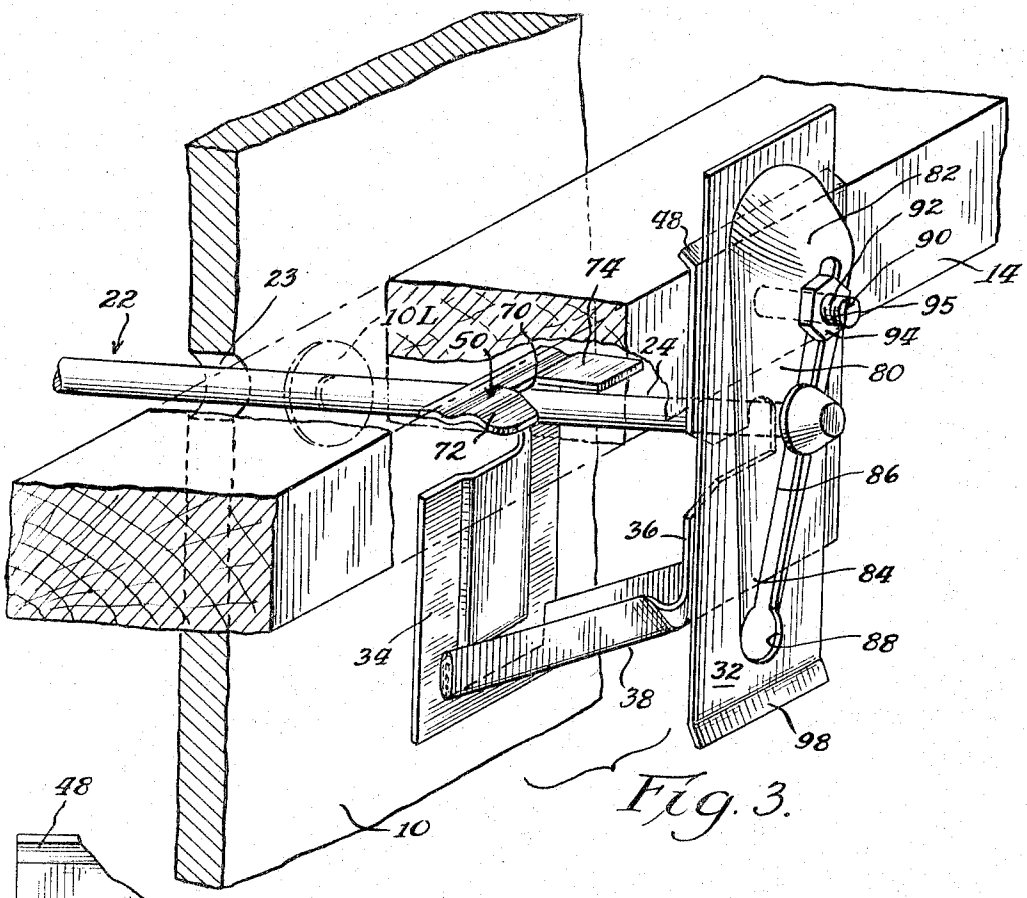


Fig. 3.

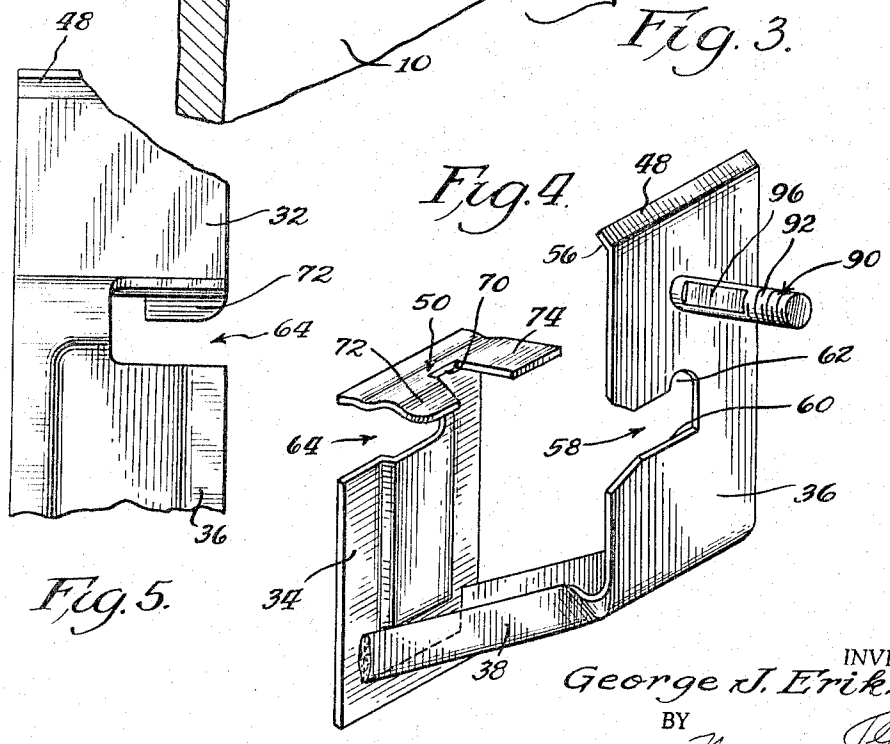


Fig. 4.

Fig. 5.

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WALER CLAMP ASSEMBLY

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3 Claims. (Cl. 249—44)

The present invention relates to concrete wall form hardware and has particular reference to a novel form of waler clamp assembly by means of which a comparatively heavy stringer or waler is held in a proper horizontal position across and against the outer side of a group of vertically extending rectangular concrete wall form panels which are arranged in a rectilinear series and edge-to-edge realtionship and constitute the side of a conventional or standard concrete wall form installation. The invention is specifically concerned with a waler clamp assembly of the type that is shown and described in United States Patent No. 3,060,541, granted on October 30, 1962, and entitled "Waler Clamp Assembly," and the principal object of the invention is to provide a waler clamp assembly which is an improvement upon, and has certain inherent advantages over, that of said patent.

The general objects of the present invention are substantially the same as those of the invention of the above mentioned Patent No. 3,060,541 and are, specifically, (1) to provide a waler clamp assembly having associated therewith effective wedging means for wedging the waler hard against the outside faces of the associated concrete wall form panels, such wedging means being operatively associated with a tie rod in such a manner that the latter serves as a reaction member for the wedge element of the assembly and the wedging action will be equally distributed in opposite directions between the tie rod and waler undergoing clamping; (2) to provide a waler clamp assembly which is comprised of but two principal parts, namely, a waler-supporting bracket and a wedge element, such two parts being capable of preassembly, one upon the other at the factory and prior to shipment to the field to the end that an assembly operation in the field is eliminated; and (3) to provide such an assembly which is so designed and constructed that the various concrete wall form panels which are associated with the assembly to make up one side of the concrete wall form installation may be readily set up in their approximate positions of orientation, the waler clamp assembly may be hung loosely on the associated tie rod in waler-receiving position, the waler may be placed on the previously hung assembly in its approximate operative position and, finally, the aforementioned wedge means or element may be easily driven home in order to clamp the waler hard against the panels for purposes of panel alignment and completion of installation of the assembly.

It is a specific object of the present invention to provide a waler clamp assembly which is generally like that shown and described in the aforementioned Patent No. 3,060,541 but in which novel means are provided for facilitating application of the assembly to the associated tie rod, thereby reducing labor costs to a minimum.

A further object of the invention is to provide a waler clamp assembly of the particular type or character under consideration and in which there is provided novel means for preventing the assembly from accidentally falling off the tie rod on which it is loosely suspended prior to installation of the waler thereon and prior to driving the wedge element to its home position.

Other objects and advantages of the invention not at this time enumerated will readily suggest themselves as the following description ensues.

In the accompanying two sheets of drawings forming a part of this specification, one illustrative embodiment of the invention is shown.

In these drawings:

FIG. 1 is a fragmentary perspective view of a concrete wall form installation, showing a waler clamping assembly embodying the principles of the present invention operatively applied to the installation and in a preliminary suspended position preparatory to application to said installation of a waler;

FIG. 2 is a fragmentary perspective view of one side of the concrete wall form installation, showing the waler loosely positioned with respect to the waler clamping assembly and also showing the wedge element of the waler clamping assembly in a secondary position preparatory to its being driven to its home position;

FIG. 3 is a fragmentary perspective view similar to FIG. 2 but showing the wedge element of the assembly driven to its home position and the waler securely clamped in its operative position;

FIG. 4 is a perspective view of the waler clamping bracket that is employed in connection with the present invention; and

FIG. 5 is a fragmentary rear view of the bracket of the assembly.

Referring now to the drawings in detail and in particular to FIG. 1, a concrete wall form installation is fragmentarily shown for the purpose of illustrating the mode of operation of the present waler clamp assembly, the installation embodying two similar opposed rectilinear series of upstanding, rectangular plywood or other panels **10** arranged in edge-to-edge relationship, the meeting edges of adjacent panels being designated by the reference numeral **12**. Alignment of the panels of each series of panels is effected by the use of horizontal stringers or walers, only on one which appears in FIGS. 2 and 3 of the drawings and is designated by the reference numeral **14**. The walers are pressed hard against the outside faces of the various panels by means of waler clamping assemblies embodying the principles of the present invention. But one waler clamp assembly is illustrated in the drawings and it is completely designated in its entirety by the reference numeral **20**.

The two series of panels are spaced apart a distance corresponding to the desired thickness of the concrete wall to be formed therebetween and are adapted to have wet concrete poured between them for wall-forming purposes. In order to prevent the panels from bulging under the weight of the wet concrete, as well as to maintain the panels properly spaced from one another across the form, horizontally and transversely extending tie rods **22** are employed and they extend across the concrete wall form installation, pass through holes **23** in the panels **10**, and serve to hold the oppositely disposed panels erect and in parallelism. After setting or hardening of the concrete, the waler clamp assemblies are removed, the panels **10** are stripped from the formed concrete wall, and the projecting end regions or portions **24** of the tie rods **22** are broken off or severed.

The use of serevarble tie rods is well known in the art as is also the use of such tie rods for waler clamping purposes and this is evidenced by aforementioned Patent No. 3,060,541. The present invention is specifically concerned with the character of the waler clamping assembly **20** and with the specific nature of the tie rod **22** that is associated therewith, the tie rod functioning to provide reaction points for assimilating the outward thrust of certain wedge means constituting a part of the assembly **20**.

Still referring to FIG. 1, the waler clamping assembly **20** that is illustrated therein is shown as being completely assembled, but in a non-clamping or released position

wherein it is hung, so to speak, loosely on one projecting end region 24 of the tie rod 22 preparatory to placement of the waler 14 thereon. In FIG. 2, the assembly 20 is shown in an intermediate position wherein the waler 14 is received thereon but prior to driving the wedge means of the assembly to its home position. In FIG. 3, the assembly is shown in a final position wherein the wedge means is driven home and the parts of the assembly are in their operative clamping position with the waler pressed hard against the outer faces of the associated panels 10. At the rear of the concrete wall form installation, as viewed in FIG. 1, the other projecting end region of the tie rod 22 is shown as having associated therewith another waler clamp assembly which is identical with the assembly 20 at the front of the concrete wall form installation so that a detailed description thereof is unnecessary.

Referring now to the various views of the drawing, the waler clamp assembly 20 is comprised of two principal parts, namely, a waler clamping bracket 30 and a wedge element 32. The bracket 30, although of unitary construction, is made up of two sections welded together, each section being in the form of a metal stamping. The two sections, when welded together to form the waler clamping bracket 30, provide a structure which is generally U-shape in side elevation and which, more specifically, is in the form of a parallelogram from which the upper side has been removed. Because of the design of the bracket, the latter, in effect, has inner and outer upstanding legs and an intermediate base at the lower ends of the legs. The bracket 30 of the waler clamp assembly includes an inner, vertically disposed bearing plate 34 which constitutes one leg of the U-shaped structure, an outer, vertically disposed clamping plate 36 which constitutes the other leg of the structure, and a lower, upwardly and forwardly inclined channel section 38 which constitutes the base of the U-shaped structure. The clamping plate 36 and the channel section 38 constitute one of the two aforementioned stampings, while the bearing plate 34 constitutes the other stamping. The lower end of the channel section 38 is welded as at 40 to the lower region of the bearing plate 34. The upper end region of the clamping plate 36 is turned or bent laterally and rearwardly on a 45° angle to provide a narrow upwardly and rearwardly inclined flange 48, the function of which will be described subsequently. The upper end region of the bearing plate 34 is turned or bent laterally and forwardly to provide a horizontal shelf 50, the function of which also will be explained presently.

The bracket 30 of the waler clamp assembly is so designed that the horizontal distance between the inside face 52 of the clamping plate 36 and the remote or rear face 54 of the bearing plate 34 is slightly greater than the width of a standard 2" x 4" wooden waler. Similarly, the vertical distance between the shelf 50 of the bearing plate 34 and the lower edge 56 of the flange 48 is substantially equal to the thickness of such a waler. These two dimensions in actual practice are about one-eighth of an inch less than the stated dimensions of a standard 2" x 4" wooden waler and the importance thereof will be made clear presently.

As clearly shown in FIG. 4, one edge of the clamping plate 36 has formed therein a relatively wide mouth-like slot 58 which is generally of L-shape design and includes a horizontal portion 60 which terminates in a short upwardly extending offset portion 62, the latter extending approximately on the vertical centerline of the clamping plate. At approximately the same elevation on the bearing plate 34 as the elevation of the slot 58, the corresponding edge of the bearing plate is formed with a horizontal slot 64 which extends somewhat beyond the centerline of the bearing plate. Due to the relatively shorter vertical extent of the bearing plate 34, the slot 64 is disposed close to the upper end of this plate and lies immediately below the shelf 50. The two slots 58 and 64 are adapted to receive therethrough the adjacent projecting end region 24 of the tie rod 22 so that the bracket 30 of the waler clamp assembly 20 may be hung, so to speak, on this projecting end region as illustrated in FIG. 1. In order to retain the thus supported bracket 30 in its suspended position on the projecting end region 24 of the tie rod 22, the extreme end of the tie rod is provided with a conical enlargement 66. The latter, as shown in the drawings, defines an inwardly facing annular shoulder 68. The over-all diameter of the enlargement 66 is greater than the width of the upwardly extending offset portion 62 of the slot 58. Thus, initial assembly of the bracket 30 on the projecting end region 24 of the tie rod 22 is made possible by simply advancing the bracket sidewise toward said projecting end region of the tie rod and causing the latter to enter the two slots 58 and 64. After so manipulating the bracket, the bracket is tilted forwards and downwards in order to cause the upper end of the upwardly extending offset portion 62 of the slot 58 to rest upon that portion of the tie rod 22 that is immediately behind the enlargement 66 as shown in FIG. 1. Due to the fact that the diameter of the enlargement 66 is greater than the width of said offset portion 62 of the slot 58, the clamping plate 36 of the bracket 30 cannot slip outwardly and become detached from the end region 24 of the tie rod. The inner regions of the bracket will be suported on the tie rod 22 inasmuch as the upper edge of the horizontal slot 64 will rest upon the tie rod, as will also the forward edge region of the horizontal shelf 50.

In order to prevent the bearing plate 34 of the bracket from slipping from the tie rod 22 sidewise, the front marginal portion of the shelf 50 is formed with a centrally located rectangular notch 70, thus establishing two ears 72 and 74 on opposite sides of the notch. The ear 72 is bent downwardly at a small angle and provides an interlock with that portion of the tie rod 22 which passes beneath the shelf 50 and bears against the inner edge of the slot 70. The clamping plate 36 is held from slipping sidewise from the tie rod by reason of the fact that the tie rod is confined between the vertical edges of the upwardly extending offset portion 62 of the slot 58.

Due to the fact that the two slots 58 and 64 are disposed near the upper ends of the clamping plate 36 and bearing plate 34, respectively, the center of gravity of the bracket 30 as a whole will lie below the axis of pivotal suspension of the bracket on the projecting end region 24 of the tie rod 22. Thus, the bracket will assume a degree of stable equilibrium wherein it extends vertically and lies, for the most part, below the level of the tie rod 22. With the bracket thus extending vertically, the waler 14 may be placed in a temporary position of rest upon the shelf 50 with the front lower edge portion of the waler resting upon the projecting end region 24 of the tie rod 22 as shown in FIG. 2. Since the waler 14 is also adapted to be supported on several other similar waler clamp assemblies which are similarly disposed at the same elevation along the one side of the concrete wall form installation and similarly positioned, the waler will find the necessary degree of stable support on the various assemblies to maintain it in its approximate position of installation. Thereafter, the wedge element 32 of the present invention, yet to be described in detail, is manipulated to dislodge the waler from its temporary position and force the same hard against the adjacent panel faces to a securely clamped position.

The wedge element 32 constitutes the other principal part of the waler clamp assembly 20 as heretofore described and it is in the form of a metal stamping from a length of flat sheet metal stock. The element is generally of rectangular configuration and the medial regions thereof are bowed forwardly as at 80 to provide an elongated tapering rib having a region of high offset 82 at one end thereof and a region of low offset 84 at its other end. The rib 80 is formed with an elongated slot 86 which extends longitudinally of the rib. A hole 88 is formed in

the wedge element **32** at the end of the slot **86** which is low in offset, the hole constituting an enlargement of the slot at such end.

The clamping plate **36** is provided with an outwardly or forwardly projecting flat-sided guide post and retainer stud **90** which serves the dual purpose of firstly receiving thereover the wedge and causing the latter to be retained as a permanent adjunct of the bracket **30** to the end that the wedge element will not become misplaced, and secondly, assisting the tie rod **22** in guiding the wedge member in a vertical path of sliding movement during operative positioning of the wedge element, particularly during wedge element driving operations, as will be set forth subsequently. The outer end of the stud **90** is cylindrical and embodies a screw thread **92** for a retaining nut **94**. The extreme outer end of the threaded area of the stud is deformed as at **95** to prevent removal of the nut **94**. The flat sides **96** of the stud **90** constrain the wedge element **32** as a whole against turning movement about the axis of the stud when the stud extends through the slot **86**.

The diameter of the hole **88** is greater than the overall diameter of the conical enlargement **66** on the extremity of the projecting end region **24** of the tie rod **22** in order to enable the rim of the hole **88** to be passed over the enlargement to the end that the flat-sided portion of the stud **90** may be caused to enter the slot **86** as shown in FIG. 2 preparatory to driving the wedge element **32** to a wedging position. The flat-sided portion of the stud **90** may enter the slot **86** in either of two positions. In one of these positions, the wedge element is inverted from the position in which it is shown in FIGS. 2 and 3. Ordinarily, such a posiiton of the wedge element is not contemplated, although under certain special circumstances, it may be found desirable to invert the wedge element and drive the same upwardly for tightening purposes.

The tapered slotted rib **80** constitutes, in effect, a wedge proper by means of which the waler **14** is driven hard against the adjacent concrete wall form panels **20**. After the waler **14** has been loosely disposed upon the shelf **50** in the manner previously described, the wedge element, in connection with the hanging position of the parts as shown in FIG. 1, is normally or usually suspended in a vertical position with the weight of the element resting on the rim of the hole **88**. Therefore, in order to effect clamping of the waler, the wedge element is caused to be inverted so that the enlargement **66** on the projecting end region **24** of the tie rod **22** may be threaded through the hole **88**. Thereafter, the wedge element is pushed manually downwardly to the position in which it is shown in FIG. 2 in order to take up any lost motion or slack which may exist between the enlargement **66**, the bracket **30**, the waler **14**, and the outside faces of the adjacent panels **10**. Stated otherwise, the distance which the projecting end region **24** of the tie rod **22** projects outwardly beyond the outer face of the adjacent panels **10** after it has been slid sidewise into the slot **64** in the bearing plate **36** is greater than the extent of the bracket **30** in a direction at right angles to the concrete wall form installation. It is not as great, however, as the combined extent of the bracket and the maximum degree of offset of the tapered rib **80**. Thus, the rib **80** may be employed to take up the lost motion or slack between the parts of the assembly **20** by interposing the rib between the shoulder **68** of the enlargement **66** and the outer flat face of the clamping plate **36**, and then driving the wedge element **22** downwardly to its home position. To facilitate the driving operation, the region of the wedge element above the large end of the tapered rib **80** extends above the level of the laterally and rearwardly extending flange **48** on the upper end of the clamping plate **36** and is provided with an out-turned upper edge **98** which is adapted to be engaged by a suitable impact tool such as a hammer.

In order to maintain the proper projected distance of the end regions of the tie rod **22** beyond the outside face

of the panels **10**, the tie rod is formed with an annular rib **100** at each juncture region between the main body portion of the tie rod and the projected end regions. The two ribs **100** appear in FIG. 1. Each rib serves as a reaction member for a spacer washer **102** which is placed on the adjacent projected end of the tie rod prior to formation of the rib **100**. The diameter of the enlargements at the ends of the tie rod is less than the diameter of the hole **23**, but the diameter of the washers **102** is greater than the diameter of the holes. Thus, said enlargements may be passed through the holes **23**, but the washers **102** may not.

In the erection of any given concrete wall form installation, the various panels **10** will first be set up in their approximate relative positions and then the end regions of the tie rods will be passed sidewise into the slots **58** and **64** in the clamping plates **36** and the bearing plates **34** of the brackets of the waler clamp assemblies in order that the assemblies will loosely hang on the projecting end regions of the tie rods in the manner previously described and as shown in FIG. 1. Thereafter, when the walers are positioned on the shelves **50**, the weight of the walers will force the shelves **50** downwardly against the tie rods and the inclined ears **72**, as well as the upwardly offset portions **62** of the slots **58**, will prevent the assemblies from falling off of the tie rods. The various parts of the waler clamp assemblies will thus be securely held in stable supported positions on their respective tie rods **22** until such time as the wedge elements **32** are driven to their home positions. The walers will be supported upon the waler clamp assemblies against either twisting or lifting by reason of the flanges **48** at the upper ends of the clamping plates **36**. These flanges overlie the outer edges of the walers, and because of their inclination they will accommodate walers which are either slightly oversize or undersize as to thickness.

In the case of a waler which is underside as to its width, for example, one which has been subjected to shrinkage because of dryness, upon driving of the wedge element **32** of the assembly **20** to its home position, the clamping plate **36** will flex inwardly to engage such a waler and force it hard against the adjacent panels **10**.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawings or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit or scope of the invention. Therefore, only insofar as the invention has particularly been pointed out in the accompanying claims is the same to be limited.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. A concrete wall form installation including as parts thereof: a pair of flat vertically extending panels arranged in edge-to-edge relationship and provided with means defining a hole at right angles to the plane in which the panels lie, a horizontally disposed tie rod having one end projecting through the hole, terminating a short distance outwards of the outer faces of the panels, and provided on its extremity with an enlargement defining an inwardly facing shoulder, a horizontal waler extending across and butting directly against the outer faces of the panels, and means for clamping the waler hard against the outer faces of the panels in bridging relation relative thereto, said means comprising an inseparable clamp assembly including a bracket part capable of a limited degree of flexing movement, and an attached but separately formed tapered wedge part, said bracket part being of U-shape design and comprising upstanding spaced parallel inner and outer legs and a connecting base extending between and connected to the lower ends of the legs, said legs being in the form of flat plates, the upper edge of the plate which constitutes the inner leg of the bracket part being formed with an outwardly projecting horizontally disposed shelf, the corresponding side edges of said plates being provided

therein with horizontally extending open-ended slots which are disposed at substantially the same horizontal level, said slots straddling the projecting end of the tie rod, the slot in the plate which constitutes the inner leg being in the upper end region of the plate, the slot in the plate which constitutes the outer leg being in the central region of the plate, said waler being disposed above the projecting end of the tie rod and resting upon the upper face of the shelf, said plate which constitutes the outer leg projecting upwardly above the other plate and having the upper end portion only of its inner face bearing against the outer side of the waler, said shelf being provided with an outwardly projecting downturned ear which extends below the horizontal tie rod on one side thereof and prevents lateral shifting of the tie rod in the open-ended slot in the plate which constitutes the inner leg, said tapered wedge part defining a tapered rib having a narrow axial slot therein and presenting a region of high offset and a region of low offset, said rib being interposed between the enlargement and outer face of the plate which constitutes the outer leg with the tie rod projecting loosely through said narrow slot, said last mentioned plate being adapted when the wedge part is driven to a home position in the direction of its small end to flex and thus constrict the bracket part and force the outer leg of the bracket part against the waler to, in turn, force the waler hard against the outer faces of the panels, an outwardly projecting guide post and stud carried by the plate which constitutes the outer leg adjacent to the upper end of the plate and projecting loosely through said narrow slot, and means on the outer end of the stud for preventing removal of the wedge part from said stud.

2. A concrete wall form installation as set forth in claim 1 and wherein the upper edge of the plate which constitutes the outer leg of the bracket part is turned laterally inwardly to provide an inclined flange which overlies a portion of the waler and prevents twisting or lifting of the waler from its position of rest on the upper face of said shelf.

3. A concrete wall form installation as set forth in claim 1 and wherein the inner end of the horizontal slot in the plate which constitutes the outer leg of the bracket part is provided with an offset extension through which the projecting end of the tie rod extends.

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