

Oct. 30, 1962

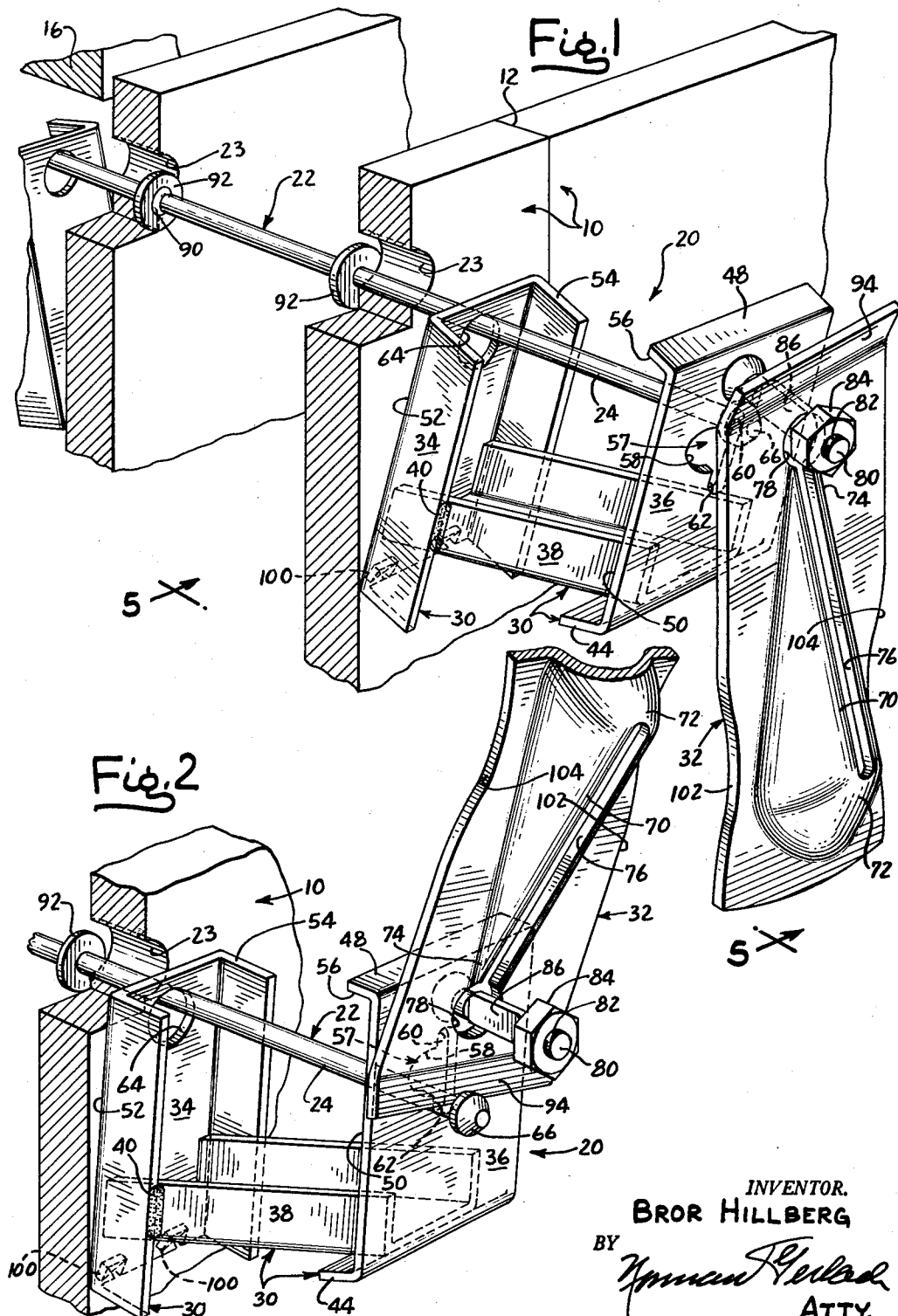
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3,060,541

WALER CLAMP ASSEMBLY

Filed March 7, 1960

3 Sheets-Sheet 1



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WATER CLAMP ASSEMBLY

Filed March 7, 1960

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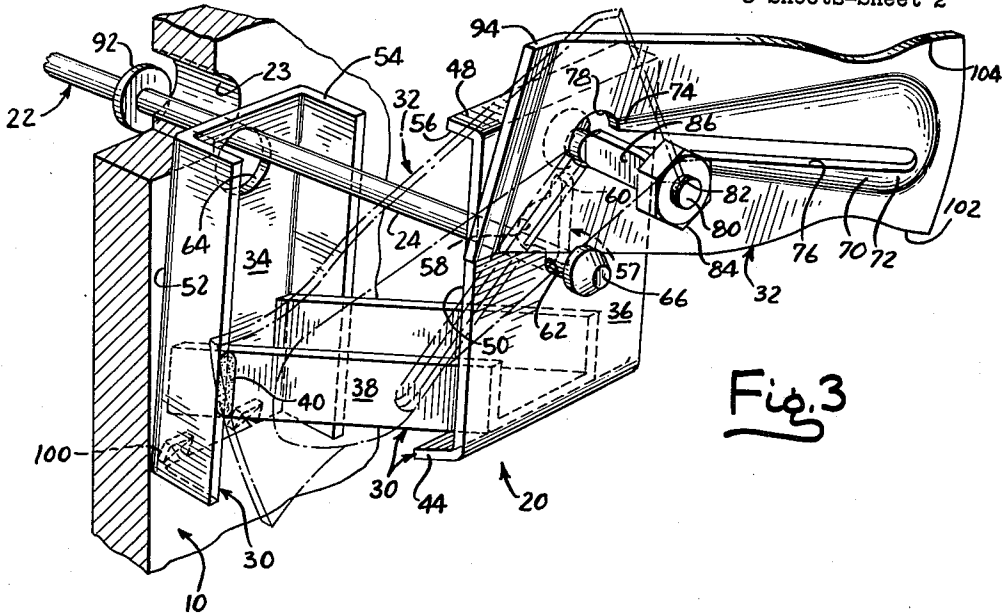


Fig. 3

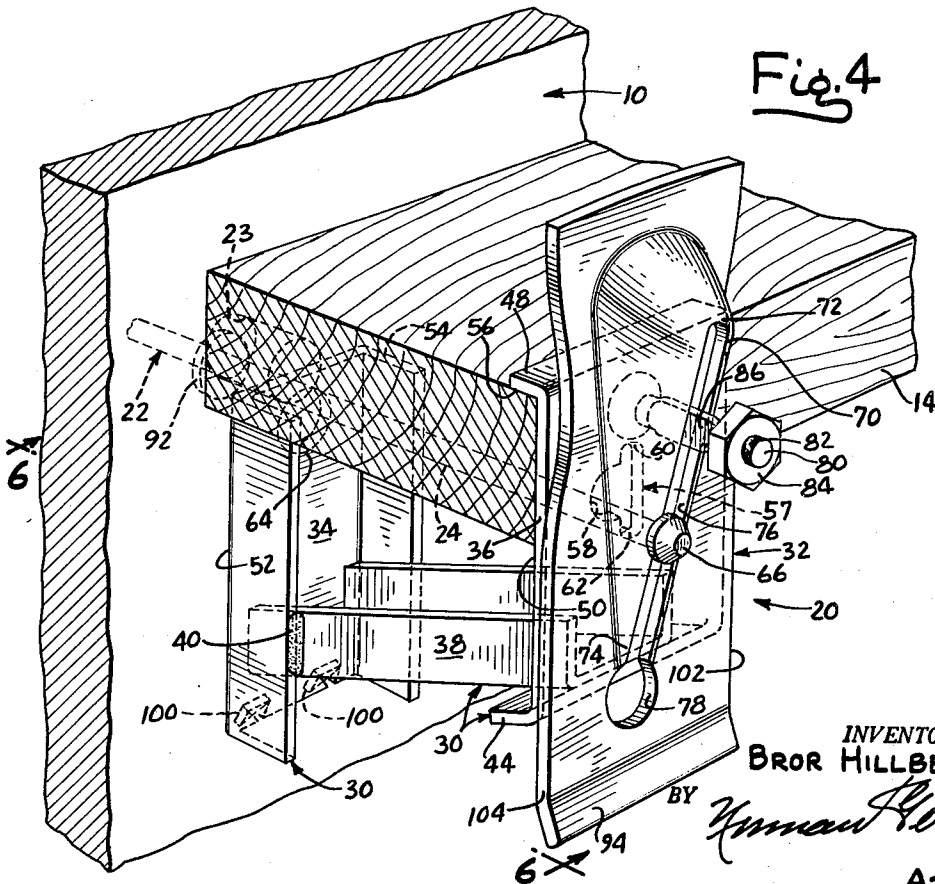


Fig. 4

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WATER CLAMP ASSEMBLY

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Fig. 5

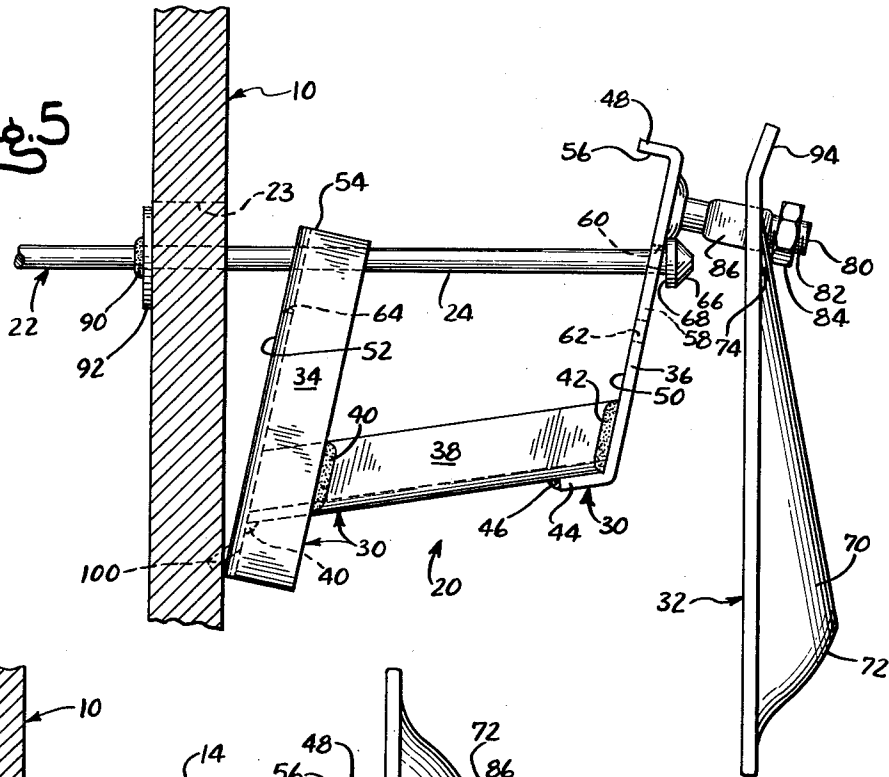
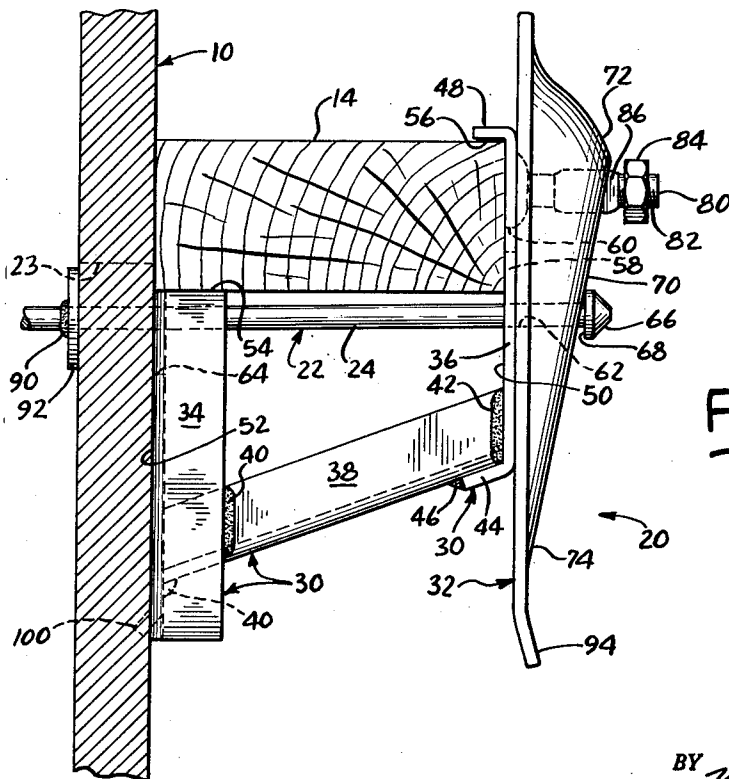


Fig. 6

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3,060,541

WALER CLAMP ASSEMBLY

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7 Claims. (Cl. 25-131)

The present invention relates to concrete hardware and has particular reference to a novel form of waler clamp assembly by means of which heavy longitudinal stringers or walers that extend horizontally across the outer sides of a group of rectangular panels, assembled in edge-to-edge relationship to effect panel alignment, are held in position on the panels.

The improved waler clamp assembly comprising the present invention has been designed primarily for use in connection with concrete forms of the well known panel type wherein the form walls are constructed of a group of rectangular panels assembled in edge-to-edge relationship, there being two spaced apart walls between which the concrete is poured, and the walls being connected by tie rods to prevent the walls from bulging under the thrust of the wet concrete.

It is among the general objects of the invention to provide a waler clamp assembly which is an improvement upon, and has certain inherent advantages over, previously designed assemblies intended for the same purpose and is comparatively simple in design and construction, effectively fulfills its intended purpose, and is capable of being assembled and dismantled with facility.

A more specific object of the invention is to provide such a waler clamp assembly having associated therewith novel wedging means for wedging the walers hard against the outside faces of the panels, such wedging means being operatively associated with a tie rod in such a manner that the latter may serve as a reaction member for the wedge proper so that the wedging action will be equally distributed in opposite directions between the tie rod and the waler undergoing clamping.

Another object of the invention is to provide a waler clamp assembly of this character which is comprised of but two principal parts, namely a waler-supporting bracket and a wedge element, the two parts being capable of preassembly, one upon the other, prior to shipment to the field so that assembly operations in the field are eliminated.

Another and important object of the invention is to provide such an assembly wherein the various panels which cooperate to make up the form may be set up in their approximate positions of orientation, the waler clamping assemblies hung loosely on the tie rod ends in waler receiving positions, the walers placed on the thus hung assemblies in their approximate positions, and finally the aforementioned wedge means driven home to clamp the walers hard against the panels for alignment purposes to complete the assembly.

In carrying out this last mentioned object, the invention contemplates the provision of a two-piece assembly including a waler-supporting bracket adapted to underlie the waler when the latter is in position on the form, and a wedge member for exerting a clamping action on the bracket to constrict the same and cause the bracket to bear against the waler and, in turn, force the latter into firm engagement with the outside faces of the adjacent

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panels which cooperate to make up the wall form. The bracket and wedge member are preassembled at the factory with the two parts being loosely connected together to preclude against separation and consequent loss of misplacement of either part, and, in its loose condition, the assembly is designed to be loosely positioned or hung on the projecting end of a tie rod which spans the opposed sides of the wall form with the parts assuming a position wherein the bracket may receive thereon and support the weight of a waler to be operatively applied to the form. Thereafter, the parts may be readjusted to position the wedge in an operative position preparatory to driving the same to its home position for waler clamping purposes.

The purpose of loosely hanging the assembly on the projecting end of the tie rod is that, in connection with the normal operations of erecting the form, the various panels may be set in their approximate positions, the tie rods associated therewith installed, and the waler clamping assemblies hung on the tie rods so that all that remains to be done is to place the waler in position against the panels so that it is supported on the row of assemblies which extends along the form. Thereafter, the operator may walk along the form, driving the wedge members of the assemblies successively to their home positions, thus automatically bringing the panels into alignment and completing the form.

Simplicity of operation and ease and rapidity of installation are paramount considerations of the present invention and the waler clamping assembly of the present invention is so designed that it is readily adaptable to manipulation during erection of the concrete wall form. The nature of the assembly is such that little attention or orientation of parts is necessary to hang the same in a waler-receiving position on the end of a tie rod and, when so hung, the possibility of its slipping off the end of the tie rod is precluded.

The tie rod is provided with a locking protuberance at its end and the bracket part of the assembly has a bayonet slot therein of special design so that when the rod is passed through the bayonet slot and the bracket released, the slot and protuberance cooperate in such a manner as to latch the bracket in position on the rod so that it will not slip off the end of the rod. The wedge member, which is loosely connected to the bracket, may, under the influence of gravity, assume any one of four positions with respect to the tie rod. In three of these positions, the wedge member serves to hold the tie rod in register with one part or branch of the bayonet slot. In the fourth position, the wedge member serves to hold the tie rod in register with another part or branch of the bayonet slot. When in register with either branch of the slot, dislodgment of the bracket from the tie rod is impossible. After hanging the bracket on the tie rod and release thereof, the wedge member is obliged to assume one of the four positions outlined above so that the operator need take no special care upon releasing the assembly to insure against dislodgment thereof. There are no intermediate positions of the wedge member.

It is a still further object of the invention to provide a waler clamping assembly of the character briefly outlined above having associated therewith novel means for maintaining the waler bracket proper in a vertical position at the time it is hung on the end of the tie rod so that the four positions of rest capable of being assumed

by the wedge member as explained above may selectively be attained upon release of the wedge member.

Numerous other objects and advantages of the invention, not at this time enumerated, will become more readily apparent as the following description ensues.

In the accompanying three sheets of drawings forming a part of this specification, one illustrative and preferred embodiment of the invention has been shown.

In these drawings:

FIG. 1 is a fragmentary perspective view of a concrete wall form showing a waler clamping assembly embodying the principles of the present invention applied thereto in one of four preliminary positions of which it is capable of assuming preparatory to placement of a waler thereon;

FIG. 2 is a fragmentary perspective view similar to FIG. 1 but showing the waler clamping assembly in another of the four preliminary positions of which it is capable of assuming;

FIG. 3 is a fragmentary perspective view similar to FIGS. 1 and 2 but showing the waler clamping assembly in a third preliminary position and illustrating in dotted lines a fourth preliminary position of the assembly;

FIG. 4 is a fragmentary perspective view similar to FIGS. 1 to 3, inclusive, but showing the waler clamping assembly in its final operative clamping position on the waler;

FIG. 5 is a sectional view taken substantially along the line 5—5 of FIG. 1; and

FIG. 6 is a sectional view taken substantially along the line 6—6 of FIG. 2.

Referring now to the drawings in detail, the wall form shown fragmentarily in FIG. 1 for the purpose of illustrating the mode of operation of the present waler clamping bracket assembly is adapted for use in the formation of a concrete wall (not shown) and is comprised of two similar and opposed series of upstanding plywood or other panels 10 arranged in edge-to-edge relationship, the meeting edges of adjacent panels being designated at 12. Alignment of the panels in the two series of panels is effected by the use of stringers or walers, two of which have been shown herein at 14 and 16 on opposite sides of the form respectively, these walers being pressed hard against the outside faces of the various panels by means of waler clamping assemblies constructed in accordance with the principles of the present invention and designated in their entirety at 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 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, a series of tie rods 22 extend across the wall form, pass through holes 23 provided for them in the panels 10, and serve to hold the panels erect and in parallelism. After setting or hardening of the concrete, the assemblies 20 are removed, the panels 10 stripped from the formed concrete wall, and the projecting end regions 24 of the tie rods 22 are broken off or severed.

The use of severable tie rods is well known in the art as is also the use of such tie rods for waler clamping purposes as evidenced by United States Patent No. 2,904,870, granted on September 22, 1959 and entitled "Concrete Wall Form." The present invention is specifically concerned with the character of the waler clamping assembly 20 and with the specific nature of the tie rods 22 associated therewith, the latter functioning to provide reaction points for assimilating the outward thrust of certain wedge means associated with the assemblies 20.

Still referring to FIG. 1, of the waler clamping assembly 20 fully illustrated in this view has been shown as being completely assembled but in a non-clamping or released condition wherein it is hung, so to speak, loosely on a projecting end of one of the tie rods 22 preparatory to placement thereon of the waler 14. The same assembly 20 in

FIG. 4 is shown as having received thereon the waler 14 with the parts of the assembly being in their operative clamping position wherein the waler is pressed hard against the outer faces of the adjacent panels 10. At the rear of the wall form assembly as viewed in FIG. 1, the other projecting end 24 of the tie rod 22 has associated therewith waler clamping assembly 20 by means of which the waler 16 is held in position against the outside faces of the rear panels 10. This latter assembly 20 is identical with the assembly at the front of the wall form as viewed in FIG. 1 so that a detailed description thereof is unnecessary.

Referring now additionally to FIGS. 5 and 6, each waler clamping assembly 20 is comprised of two principal parts, namely, a waler clamping bracket 30 and a wedge member 32. The bracket 30, although of integral one-piece construction, is made up of short sections of standard channel stock and flat strip stock welded together to provide a structure which is generally U-shape in side elevation as seen in FIGS. 2 and 3 and which, more specifically, is in the form of a parallelogram from which one side has been removed.

The integral bracket 30 includes an inner vertically disposed channel length 34 which constitutes one leg of the U-shaped structure, an outer vertically disposed length of flat stock 36 which constitutes the other leg of the U-shaped structure, and a lower inclined channel length 38 which constitutes the base of the U-shaped structure. The channel length 38 is slightly narrower than the channel length 34 so that the lower end region of the former channel length may fit within the lower region of the latter channel length with a fairly snug fit. The extreme lower end of the channel length 34 projects below the lower end of the channel length 38 and the two parts are welded together in their regions of contiguity as indicated at 40 with the longitudinal axes of the two parts extending at an angle of approximately 70°. The lower end region of the length of flat stock 36 is butt-welded as at 42 to the upper end of the channel length 38, while the extreme end of the stock is turned laterally beneath the inclined channel length 38 as at 44 and is welded as at 46 thereto. The upper edge or end of the length 36 of flat stock is turned laterally at a right angle to the plane of the stock to provide a narrow horizontal flange 48, the function of which will be made clear presently.

The horizontal distance between the inside face 50 of the length of flat stock 36 and the remote face 52 of the channel length 34 is designated in FIGS. 2 and 3 by the dimension D. This dimension is fairly critical and is equal to, or slightly greater than, the width of a standard 2" x 4" wooden waler. Similarly, the vertical distance between the upper edge 54 of the leg 34 and the underneath face 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. The importance of these dimensions will likewise be made clear presently.

As best seen in FIG. 2, the medial region of the leg 36 is formed with a T-shaped slot 57 therein including a relatively wide horizontal branch 58, and upwardly and downwardly projecting branches 60 and 62 respectively. At approximately the same elevation on the leg 36 as the elevation of the slot 57 there is provided a circular hole 64. The slot 57 and hole 64 are adapted to receive there-through the projecting end region 24 of the tie rod 22 so that the waler supporting bracket 34 may be hung, so to speak, on this projecting end region as shown at the left hand side of 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 22 is provided with a conical enlargement 66 defining an inwardly facing annular shoulder 68. The over-all diameter of the enlargement 66 is greater than the transverse width of the branches 60 and 62 of the slot 57, but it is

less than the transverse width of the branch 58 or the diameter of the hole 64 in the leg 34. Thus, initial assembly of the bracket 30 on the projecting end region 24 of the tie rod 22 is made possible by a simple threading operation wherein the end of the tie rod 22 is threaded through the hole 23 and slot 57 in the order named. After the bracket 30 has been assembled over the projecting end 24 of the tie rod 22 in the manner outlined above, release of the bracket will cause the vertical branch 60 of the T-shaped slot to embrace the cylindrical end 24 as shown in FIG. 1. Due to the fact that the diameter of the enlargement 66 is greater than the width of the vertical branch 60, the bracket 30 cannot slip outwardly and become detached from the end region 24 of the tie rod. The end portion of the vertical branch 60 of the T-shaped slot will rest by gravity upon the end region 24 of the tie rod 22 and thus support the outer regions of the bracket 30. The inner regions of the bracket will be supported on the uppermost point on the rim of the circular opening 64 in the leg 34 of the bracket 30, thus lending support to the inner regions of the bracket.

In the position of the bracket 30 just described above, and as illustrated in FIG. 1, the bracket will be loosely suspended from the projecting end of the tie rod 22. Due to the fact that the hole 64 is disposed near the top of the leg 34, the center of gravity of the bracket 30 as a whole will lie below the point of pivotal suspension of the bracket. Therefore, the bracket will assume a degree of stable equilibrium wherein it extends vertically. With the bracket thus extending vertically, the waler 14 may be placed in a temporary position of rest upon the upper edge 54 of the leg 34 with a portion of the waler resting by gravity directly on the projecting end region 24 of the tie rod 22 as shown in dotted lines FIG. 2. Since the waler is also adapted to be supported on several other waler clamping assemblies 20 which are similarly disposed at the same elevation along the form and similarly positioned, the waler will find the necessary degree of stable equilibrium on the various assemblies to maintain it in its approximate position of installation. Thereafter, the clamping or wedging means of the present invention, yet to be described, is manipulated to dislodge the waler 20 from its temporary position and force the same hard against the panel faces to its home position.

The wedge member 32 previously referred to constitutes the other principal part of the assembly 20. It is in the form of a metal stamping, made from a length of flat sheet metal stock. The member 32 is generally of rectangular configuration and the medial regions thereof are bowed outwardly as at 70 to provide an elongated tapering rib having a region of high offset 72 adjacent one end thereof and a region of low offset 74 at the other end thereof. The rib 70 is formed with an elongated slot 76 therein which extends longitudinally of the rib. A hole 78 is formed in the member 32 at the end of the slot 76 which is low in offset. The hole 78 communicates with the elongated slot 76 at one end of the latter.

The leg 36 of the bracket 30 has projecting outwardly therefrom a flat-sided retainer stud or rod 80 which is provided for the dual purpose of firstly receiving thereover the wedge member 32 and causing the latter to be retained as a permanent adjunct of the bracket 30 so that the wedge member will not become misplaced, and secondly, to assist the tie rod 22 in guiding the wedge member in a vertical path of sliding movement during operative positioning of the wedge, particularly during wedge-driving operations as will be set forth subsequently. The outer end of the rod 80 is cylindrical and is threaded as at 82 and receives thereover a retaining nut 84. The flat sides 86 of the rod 80 constrain the wedge member 32 as a whole against turning movement about the axis of the rod when the rod extends through the slot.

The diameter of the hole 78 is greater than the overall diameter of the conical enlargement 66 on the end of the tie rod 22 to enable the rim of the hole 78 to be passed

over the enlargement so that the flat-sided portion of the rod 80 may be caused to enter the slot 76 as shown in FIG. 3 preparatory to driving the wedge member 76 to a wedging position. Although the flat-sided portion of the rod 80 may enter the slot 76 in either of two positions, one such position is without effect and, in the other position of the rod within the slot, the wedge member is positioned vertically as shown in FIG. 3 with the hole 78 being disposed below the slot 76.

The tapered and slotted rib 70 constitutes, in effect, a wedge proper by means of which the waler 14 is driven hard against the panel facings. After a waler has been loosely disposed upon the upper edge 54 of the leg 34 of the bracket 30 in the manner previously set forth above, the wedge member which, in the hanging position of the parts shown at FIG. 1, is suspended in a vertical position with the weight of the member resting on the rim of the hole 78, is caused to be inverted so that the enlargement 66 on the end of the tie rod 22 may be threaded through the hole 78. Thereafter, the wedge member is pushed manually downwardly to take up any lost motion or slack which may exist between the enlargement 66, the bracket 30, the waler 14, and the outside face of the adjacent panel 10. Stated otherwise, the distance which the end region 24 of the tie rod 22 projects outwardly beyond the outer face of the panel 10 after it has been passed through the hole 23 in the latter is greater than the extent of the bracket 30 in a direction transversely of the form. It is not as great, however, as the combined extent of the bracket and the maximum degree of offset of the tapered rib 70. Thus, the rib 70 may be employed to take up the lost motion between the parts by interposing the rib between the shoulder 68 of the enlargement and the outside flat face of the leg 36 of the bracket 30, and then driving the wedge member 32 downwardly as indicated by the arrow in FIG. 1. To facilitate the driving operation, the region of the wedge member above the large end 72 of the tapered rib 70 extends above the level of the laterally turned flange 48 on the leg 36 and is provided with an upper edge 79 which is adapted to be engaged by a suitable impact tool such as a sledge hammer.

In order to maintain the proper projected distance of the end region 24 of the tie rod 22 beyond the outside face of the panel 10, the tie rod is formed with an annular rib or enlargement 90 at the juncture regions between the main body portion of the tie rod 22 and the projected ends 24 thereof. The two ribs 90 appear in FIG. 1. Each rib 90 serves as a reaction member for a spacer washer 92 which is placed on the adjacent projecting end 24 of the tie rod prior to formation of the enlargement 62. The diameter of the enlargements 66 is less than the diameter of the holes 23, but the diameter of the washers 92 is greater than the diameter of the holes. Thus, the enlargements 66 may be passed through the holes 23 but the washers 92 may not.

The lower edge region 94 of the wedge member 32, as viewed at the right hand side of FIG. 1, is turned laterally at a slight angle to facilitate initial threading of the hole 78 over the enlargement 66 by making it possible to more intimately seat the lower regions of the wedge member against the outer face of the leg 36 due to a slight clearance being afforded along the lower edge of the member 32 during manipulation thereof.

As may best be visualized in FIGS. 1 and 6, initial driving of the wedge member 32 downwardly will serve initially to force the waler bracket 30 inwardly of the form and toward the panels 10. In the case of an under-size waler, for example one which is dry and consequently has been subjected to shrinkage, the bracket 30 will be shifted from its inclined hanging position shown in FIG. 1 to a vertical position wherein the leg 34 engages the adjacent 10 coextensively in face-to-face relationship. After the leg 34 is thus seated on the outside face of the panel, further driving of the wedge member 32 will cause the flat leg 36 to flex inwardly and engage the outside face

of the waler so as to clamp the waler hard against the panel. In the case of a normal size waler, initial driving of the wedge member 32 will bring the leg 34 into face-to-face contact with the panel 10, and, immediately thereafter, upon further driving of the wedge member 32, the clamping action will take place with no appreciable flexing of the leg 36. In the case of an oversize waler, the latter will be clamped against the panel 10 as soon as the wedge member is driven downwardly and thereafter the leg 34 of the waler bracket 30 will assume a slight angle relative to the face of the panel 10 with the lower edge only of the leg 34 engaging the panel.

The position of the parts shown in FIG. 1 and described above is one that is readily attainable under the influence of gravity when, in actual installation procedure, a clamping assembly 20 is hung on an end of a tie rod and immediately thereafter released. Ordinarily, an operator will release the entire assembly as soon as he has caused the conical enlargement to pass through the bayonet slot 57. The probability that the parts will naturally assume the position in which they are shown in FIG. 1 is relatively great since it represents the free-fall position of the wedge member 32 as the latter pivots about the axis of the retainer rod 80.

In some instances the waler bracket 30 may be loosely hung on the projecting end of the tie rod 22 with the parts assuming the position in which they are shown in FIG. 2. Here the wedge member 32 extends vertically and is inverted from the position shown in FIG. 4 so that the impact edge 79 is inserted between the shoulder 68 of the enlargement 66 on the end of the tie rod 22 and the outer face of the leg 36 of the bracket 30. To render such a position of the entire assembly 20 as a whole more stable, the extreme lower edge of the leg 34 of the waler bracket 30 is formed with one or more stab-type projections 100 thereon which are adapted to penetrate the wood material of the adjacent panel 10 at the time the bracket 30 is initially hung on the tie rod. The projection may be forced into the wood by manually urging the bracket against the panel. However, under certain circumstances, as, for example, if a hard spot such as a knot is encountered in the wood of the panel, a single sharp blow by a hammer or other impact tool will suffice to effect the necessary penetration by the projection 100.

The positions of the parts shown in FIG. 3, i.e., in dotted and full lines respectively, represent two additional positions in which the wedge member 32 may be placed, or in which it may fall by gravity upon release of the assembly after hanging the waler bracket 20 on the projecting end of the tie rod 22. In the full line position, the longitudinal edge 102 of the wedge member 32 rests upon the rod 22 in the vicinity of the shoulder 68. In the dotted line position, the longitudinal edge 104 rests upon the rod immediately behind the shoulder 68. In either of these two positions, the waler clamping assembly is unstable and there is a normal tendency for the same to tilt about the axis of the rod 22. However, the provision of the projections 22 stabilizes the bracket 30 and prevents such tilting of the assembly.

It is to be noted at this point that whereas in the position of the parts shown in FIG. 1, the hanging position of the waler bracket 30 is such that the rod 22 is in register with the upwardly projecting branch 60 of the bayonet slot 57, in the three positions of the parts illustrated in FIGS. 2 and 3 the rod is in register with the downwardly projecting branch 62 of the slot. Because the branches 60 and 62 are narrower than the diameter of the enlargement 66 on the end of the tie rod 22, the waler bracket 30 will be retained on the tie rod in any one of the four hanging positions described above.

From the above detailed description of the novel waler clamping assembly 20 which comprises the present invention, it is thought that the construction, operation and many advantages thereof will be readily understood without further elaboration. However, it is to be noted at this

point that the tie rod assemblies including the tie rods 22 proper and their loosely carried washers 92 may be pre-assembled permanently at the factory for shipment to the field. Likewise, the integral bracket 30 and its associated wedge member 32 may be assembled for permanent association prior to shipment to the field.

In the erection of any given concrete wall form assembly, the various panels 10 may be set up in their approximate relative positions, the end regions 24 of the various tie rods 22 passed through the holes 23 provided for them in the panels 10, and the various waler clamping assemblies 20 loosely hung on the projected end regions of the tie rods at both ends of each rod in the manner previously described. Thereafter, when the walers 14 and 16 are positioned on the loosely hung assemblies 20, the weight of the walers will force the extreme end regions of the tie rods downwardly into the downwardly extending branches 62 of the T-shaped slots 57 so that, until such time as the clamping assemblies are tightened, the loosely disposed assemblies cannot slip off the ends of the tie rods, this being due to the existence of the inwardly facing shoulders 68 of the enlargements 66 which engage the side margins of the branch 62 of the slot 57.

While the invention is susceptible of various modifications and alternative constructions, there is shown in the drawings and has been described herein the preferred embodiment representing one commercial adaptation of the invention. It is to be understood that it is not intended to limit the invention to the form disclosed, but is intended to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

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

1. A concrete wall form including as parts thereof: a pair of flat vertically extending panels arranged in edge-to-edge relation 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 abutting 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 a clamping assembly including a bracket part capable of a limited degree of flexing movement, and a separate 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 formed with aligned openings through which the projecting end of the tie rod extends, the opening in the inner leg being in the upper end of said inner leg and the opening in the outer leg being in the central portion of said outer leg, said inner leg bearing against the outer face of one of the panels, said waler being disposed above the projecting end of the tie rod and having its lower inner corner resting on the upper extremity of the inner leg, said outer leg projecting upwardly above the inner leg and having the upper end portion only of its inner face bearing against the outer side of the waler, said tapered wedge part having its wedge surfaces interposed between the enlargement and outer face of the outer leg and adapted when the wedge part is driven 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 directly and hard against the outer faces of the panels.

2. A concrete wall form as set forth in claim 1 and wherein the inner leg of the bracket part is channel-shaped in cross section and the inner lower corner of said waler rests loosely on the upper end of the inner leg prior to driving of the wedge part into place.

3. A concrete wall form including as parts thereof: a pair of flat vertically extending panels arranged in edge-to-edge relation 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 abutting 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 a two-part inseparable clamping assembly including a bracket part capable of a limited degree of flexing movement, and a 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 end of the legs, said legs being formed with aligned openings through which the projecting end of the tie rod extends, the opening in the inner leg being in the upper end of said inner leg and the opening in the outer leg being in the central portion of said outer leg, said inner leg bearing against the outer face of one of the panels, said waler being disposed above the projecting end of the tie rod and having its lower inner corner resting on the upper extremity of the inner leg, said outer leg projecting upwardly above the inner leg and having the upper end portion only of its inner face bearing against the outer side of the waler, the upper end of said outer leg being turned inwardly and providing a retaining flange overlying the outer upper corner of the waler, said tapered wedge part being formed with a longitudinally extending slot therethrough through which the projecting end of the tie rod extends, said tapered wedge part having its wedge surfaces interposed between the enlargement and outer face of the outer leg and adapted when the wedge part is driven 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 directly and hard against the outer faces of the panels, and a retaining stud on said outer leg of the bracket part and passing through said slot for maintaining said bracket and wedge parts against separation.

4. A concrete wall form as set forth in claim 3 and wherein said slot in the wedge part is formed with an enlarged opening at one end thereof and wherein said stud is formed with flat sides engageable with the side edges of the slot to prevent turning of the wedge part on the stud, the overall size of the opening in the wedge part being sufficiently large as to permit the wedge part to turn on the stud when the stud and opening are in register.

5. A concrete wall form including as parts thereof: a pair of flat vertically extending panels arranged in edge-to-edge relation 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 abutting 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 a two-part inseparable clamping assembly including a bracket part capable of a limited degree of flexing movement, and a 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 formed with aligned openings through which the projecting end of the tie rod extends, the opening in the inner leg being in the upper end of said inner leg and the opening in the outer leg being in the central portion of said outer leg, said inner leg being channel-shaped in transverse cross section and bearing against the outer face

of one of the panels, said waler being disposed above the projecting end of the tie rod and having its lower inner corner resting on the upper extremity of the inner leg, said outer leg projecting upwardly above the inner leg and having the upper end portion only of its inner face bearing against the outer side of the waler, the opening in the outer leg of the bracket part being in the form of a T-shaped bayonet slot having a relatively wide horizontal branch and communicating upwardly and downwardly extending relatively narrow branches respectively, said wide branch permitting initial passage of the enlargement through the opening in the outer leg and said narrow branches being designed for cooperation with the enlargement to prevent dislodgment of the bracket from the projecting end of the tie rod endwise, said tapered wedge part being formed with a longitudinally extending slot therethrough through which the projecting end of the tie rod extends, said tapered wedge part having its wedge surfaces interposed between the enlargement and outer face of the outer leg and adapted when the wedge part is driven in the direction of its small end to flex and thus constrict the bracket part and force the outer leg of the bracket against the waler to, in turn, force the waler directly and hard against the outer faces of the panels, and a retaining stud on said outer leg of the bracket part and passing through said slot in the wedge part for maintaining said bracket and wedge parts coupled.

6. A concrete wall form as set forth in claim 5 and wherein said slot in the wedge part is formed with an enlarged opening at one end and wherein said stud is formed with flat sides engageable with the side edges of the slot in the bracket to prevent turning of the wedge part on the stud, the overall size of the opening in the wedge part being sufficiently large as to permit the wedge part to turn on the stud when the stud and opening are in register.

7. A concrete wall form including as parts thereof: a pair of flat vertically extending panels arranged in edge-to-edge relation 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 abutting 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 a two-part inseparable clamping assembly including a bracket part capable of a limited degree of flexing movement, and a wedge part, said bracket part being of U-shape design and comprising upstanding spaced parallel inner and outer legs and a connecting base formed of channel-shaped stock and extending between and connected to the lower ends of the legs, said legs being formed with aligned openings through which the projecting end of the tie rod extends, the opening in the inner leg being in the upper end of said inner leg and the opening in the outer leg being in the central portion of said outer leg, said inner leg being channel-shaped in cross section and bearing against the outer face of one of the panels, said waler being disposed above the projecting end of the tie rod and having its lower inner corner resting on the upper extremity of the inner leg, said outer leg projecting upwardly above the inner leg and having the upper end portion only of its inner face bearing against the outer side of the waler, the upper end of said outer leg being turned inwardly and providing a retaining flange overlying the outer upper corner of the waler, said tapered wedge part being formed with a longitudinally extending slot therethrough through which the projecting end of the tie rod extends, said tapered wedge part having its wedge surfaces interposed between the enlargement and outer face of the outer wedge and adapted when the wedge part is driven in the direction of its small end to flex and thus

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constrict the bracket part and force the inner leg of the bracket part against the adjacent panel and cause the outer leg forcibly to engage the waler and clamp the same directly and hard against the panels.

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