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Dagiel

[11] **3,712,576**

[45] **Jan. 23, 1973**

[54] **WALER CLAMPING ASSEMBLY FOR A CONCRETE WALL FORM**

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[73] Assignee: **Symons Corporation,** Des Plaines, Ill.

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[21] Appl. No.: **134,667**

[52] **U.S. Cl.** .....**249/192,** 249/219 W

[51] **Int. Cl.** **E04g 11/00**

[58] **Field of Search**....249/19, 219 W, 192, 194, 219 R, 249/6, 47, 165, 166; 25/DIG. 29, 131 CM

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Assistant Examiner—John S. Brown
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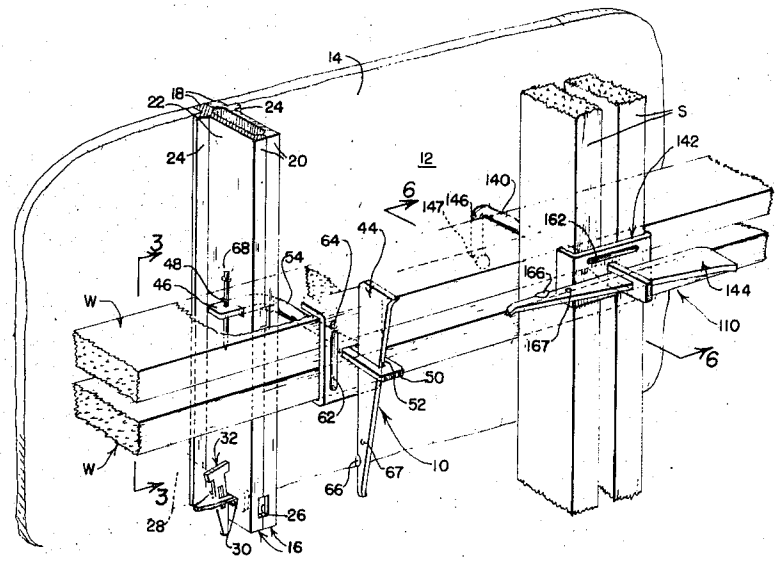
[57] **ABSTRACT**

A three-piece inseparable clamp assembly which, in one form thereof, is applied to the meeting edges of a pair of steel-studded concrete wall form panels in order to clamp a pair of walers in position against such panels, and in another form thereof, is applied to a waler in order to clamp a pair of strongbacks in position against the waler.

9 Claims, 7 Drawing Figures



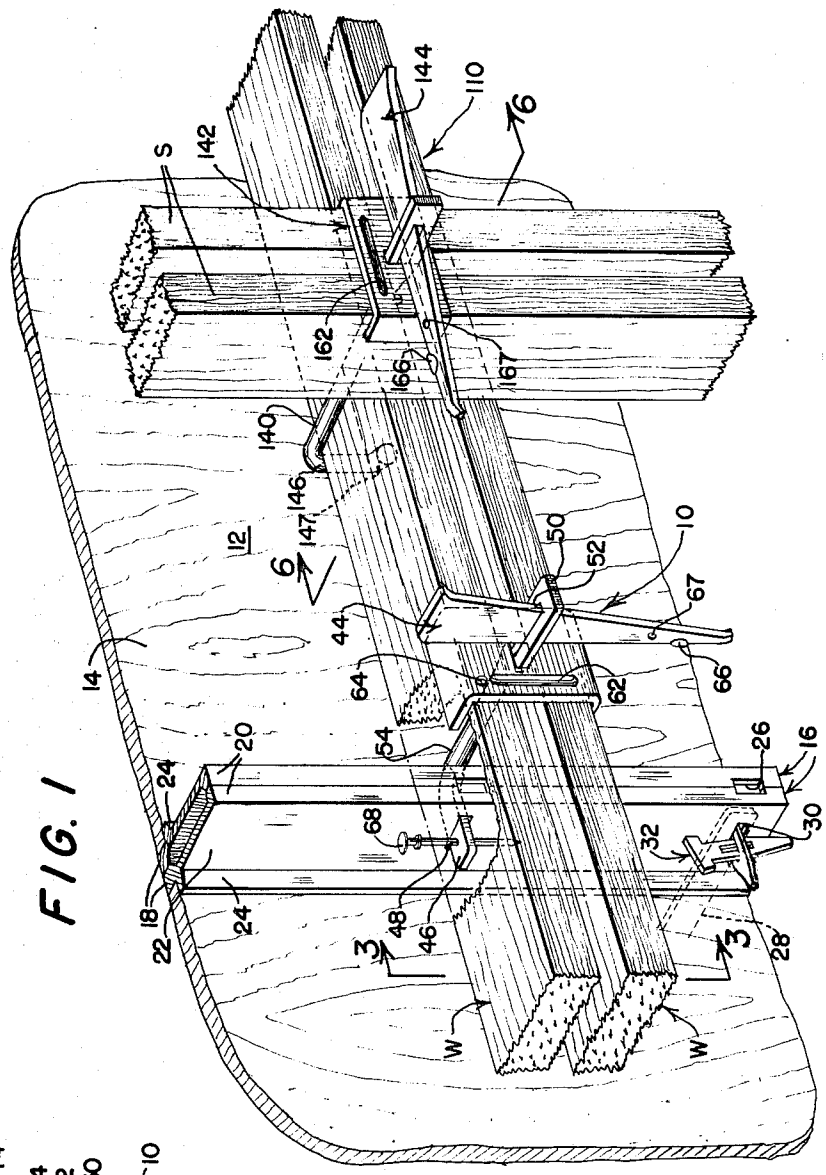


FIG. 1

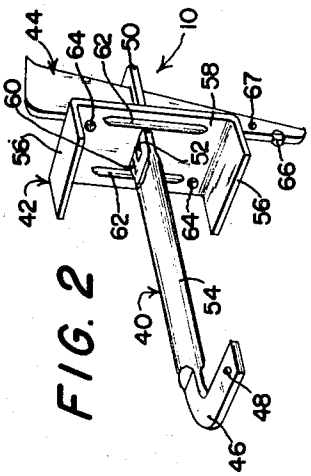


FIG. 2

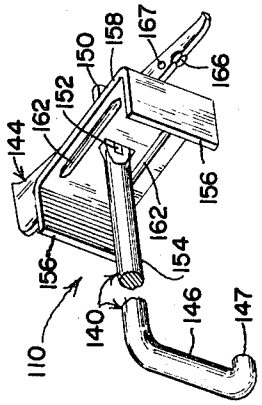


FIG. 5

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FIG. 3

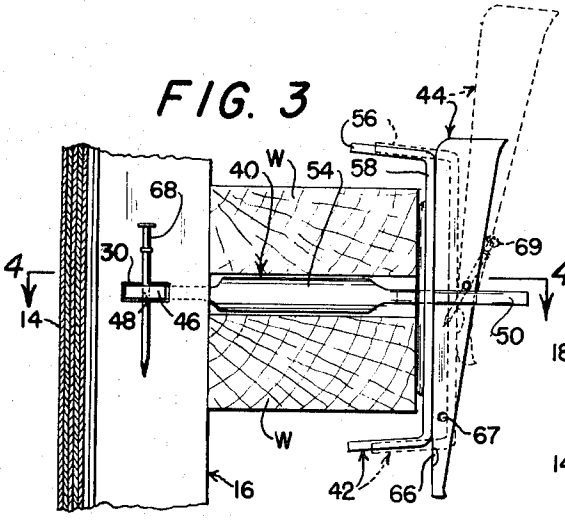


FIG. 4

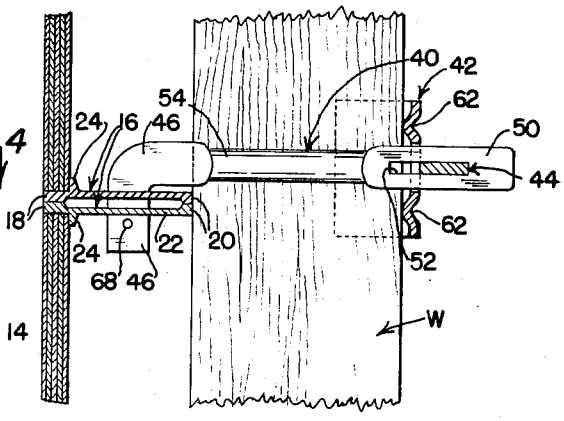


FIG. 6

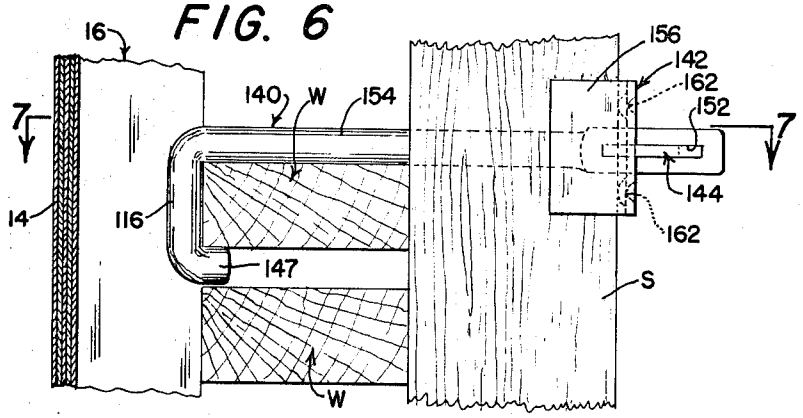
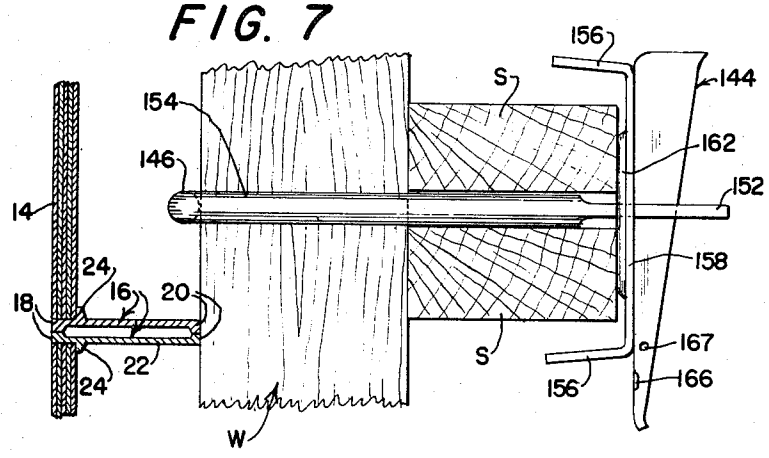


FIG. 7



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WALER CLAMPING ASSEMBLY FOR A CONCRETE WALL FORM

The present invention relates to a concrete wall form of the type wherein the opposed and spaced apart sides of the form are each constructed of a series of panels which consist of rectangular plywood facings and rectangular steel reinforcing frames around the edges of the facings and are disposed in upstanding and edge-to-edge relationship, the two form sides being adapted to have wet concrete poured into the space between them and being connected together by horizontally disposed, transversely extending combined tie rod and spreader devices so that they are properly held in place and prevented from outward bulging or displacement under the outward pressure of the poured wet concrete. Specifically, the invention is concerned with a novel clamp assembly which, in one form thereof, hooks into a slot in one of the vertical frame members of the marginal reinforcing frame of one of the panels and, thus, provides a clamping support for a pair of walers which are, by means of the clamp assembly, drawn hard against the one vertical frame member. In another form of the clamp assembly, the latter hooks behind an edge of a previously installed waler and, thus, provides a clamping support for a pair of vertical strongbacks which are, by means of the assembly, drawn hard against the waler. In either form of the invention, the basic novel clamping concept remains substantially the same. However, in order to distinguish the two forms of the invention from each other, the former type will be referred to herein as a waler-clamping assembly and the latter type will be referred to as a strongback-clamping assembly.

Briefly, the waler-clamping assembly of the present invention comprises three pieces, namely, a hook member, a clamping bracket, and a wedge. This assembly is designed specifically for use with a concrete wall form in which the panels thereof are of the "Steel-Ply" type, wherein each panel is provided with a rectangular marginal reinforcing frame including vertical and horizontal frame members. When the panels of one side of the concrete wall form are set up in edge-to-edge relationship, adjacent vertical frame members abut each other and are provided with registering openings for the reception therein of fastening bolts by means of which the two abutting frame members may be clamped together. "Steel-Ply" panels of this type are manufactured and sold by Symons Corporation of Des Plaines, Illinois, and are widely used in industry.

The hook member of the waler-clamping assembly is in the form of a tension rod which is provided with a lateral hook at one end and a wedge-receiving slot in its other end. The clamping bracket is slidably disposed on the tension rod and the wedge projects through the slot in the tension rod and is captured therein against removal. In the installed position of the waler-clamping assembly, the lateral hook projects through an unused pair of the aforementioned registering openings in a pair of abutting vertical frame members and the tension rod projects outwardly and horizontally away from the adjacent side of the concrete wall form. A pair of walers straddle the central portion of the tension rod and are forced against the abutting vertical frame members by means of the clamping bracket which, in turn, is forced against the walers by means of the wedge which

is driven to its home position in the slot through which it projects. The registering openings in the abutting vertical frame members thus constitute a reaction anchor for the assembly as a whole.

The strongback-clamping assembly of the present invention is physically and functionally the same as the waler-clamping assembly and it likewise comprises a hook member, a clamping bracket and a captured wedge. Whereas in the case of the waler-clamping assembly, the hook member is of a length which is adequate to span the width of a waler and allow for proper cooperation of its hook with the registering openings into which it extends, as well as for proper functioning of the wedge within the slot within which it is captured, in the case of the strongback-clamping assembly the hook member is of added length so that it may span the combined width of a waler and a strongback and likewise allow for proper hooking and wedging functions at its opposite ends. Since the hook member of the strongback-clamping assembly is adapted for cooperation with an edge of a previously installed waler at any available region therealong, the strongback clamping assembly is not necessarily used only with a concrete wall form which employs Steel-Ply panels, the assembly being entirely independent of steel reinforcing frames or, in fact, any portions of the particular wall form panels which may be employed. Otherwise, the structural make-up of the strongback-clamping assembly remains substantially the same as the structural make-up of the waler-clamping assembly, the clamping bracket of the former assembly cooperating with the strongbacks to force the same against the walers which, themselves, may be secured in position against the panels by means of a series of the waler-clamping assemblies of the present invention.

The principal object of the present invention is to provide a three-piece inseparable clamp assembly (regardless of which of the two forms it may assume) which is generally of new and improved construction and is characterized by ease of application to the associated concrete wall form in waler or strongback clamping position, ease of removal from the form at the time the latter is stripped from the hardened concrete wall, and low cost of construction.

Other objects of the invention and the various advantages and characteristics of the present clamp assembly will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by the claims at the conclusion hereof.

In the accompanying two sheets of drawings forming a part of this specification, two illustrative embodiments of the invention are shown.

In these drawings:

FIG. 1 is a fragmentary perspective view of a concrete wall form, the view being taken in the vicinity of the juncture region between a pair of adjacent concrete wall form panels and showing both forms of the present clamping assembly operatively applied thereto;

FIG. 2 is a perspective view of the clamping assembly in the form which it assumes when used for waler clamping purposes;

FIG. 3 is an enlarged sectional view taken on the vertical plane indicated by the line 3—3 of FIG. 1 and in the direction of the arrows;

FIG. 4 is a horizontal sectional view taken on the line 4—4 of FIG. 3;

FIG. 5 is a perspective view of the clamping assembly when it is used for strongback-clamping purposes;

FIG. 6 is a sectional view taken on the vertical plane indicated by the line 6—6 of FIG. 1 and in the direction of the arrows; and

FIG. 7 is a horizontal sectional view taken substantially on the line 7—7 of FIG. 6.

Referring now to the drawings in detail and in particular to FIG. 1 wherein two forms of the present clamping assembly are shown as being operatively installed in a concrete wall form, a first form is designated in its entirety by the reference numeral 10 and is employed for the purpose of clamping a pair of walers W in position on a concrete wall form, and a second form is designated in its entirety by the reference numeral 110 and is employed for the purpose of clamping a pair of strongbacks S in position on the previously mentioned walers W.

The concrete wall form which has been selected as a typical environment for these two forms of clamping assemblies 10 and 110 is only fragmentarily shown in FIG. 1 and the clamping assembly 10 serves securely to hold the walers W in position against the outer side of a rectilinear series of upright steel-studded concrete wall form panels forming one side of the wall form, the panels being disposed in edge-to-edge contiguity and each of the two walers bridging a number of the panels for alignment and reinforcing purposes as is well known in the art. The fragmentary portion of the concrete wall form which is shown in FIG. 1 represents only one side of the form and it is shown as including only two adjacent panels in the series of panels which cooperate to make up the aforesaid one side.

The panels, as previously mentioned, are of the Steel-Ply type, each panel being designated in its entirety by the reference numeral 12 and consisting of a rectangular plywood facing 14 and reinforcing frame which extends around the facing, is formed of steel or other suitable metal, and is applied to the outer side of the facing. Each reinforcing frame includes vertical frame members 16 and horizontal top and bottom frames members (not shown). Only the vertical frame members 16 and the plywood facings 14 of the panels 12 are illustrated in the drawings and the remaining portions of the panels bear no direct relationship to the waler clamp assemblies 10 and 110. For a full understanding of the nature of Steel-Ply panels such as the illustrated panels 12, reference may be had to U.S. Pat. No. 3,246,869, granted on Apr. 19, 1966 and entitled "WALER CLAMP AND TIE ROD ASSEMBLY FOR A CONCRETE WALL FORM." In this specification, the description of the panels 12 will be confined largely to the nature of the vertical frame members 16 and the manner in which adjacent vertical frame members are clamped together by the waler clamp assembly 10, as well as the manner in which the walers which are associated with the panels 12 are reinforced by strongbacks and the latter clamped against the walers by the strongback clamping assembly 110.

Specifically, each vertical frame member 16 is in the form of a structural steel bar which is of generally shallow U-shaped cross section and comprises spaced, marginal, outwardly extending parallel ribs 18 and 20 and a connecting web portion 22. On each web portion 22 is a shallow, longitudinally and inwardly extending rib 24 which defines a groove or recess for reception of the adjacent vertical edge region of the associated plywood facing 14. At vertically spaced regions along the vertical marginal frame members 16, the ribs 18 and 20 are provided with horizontally aligned notches 26 which accommodate the adjacent slotted ends of a vertical series of horizontal tie rods 28, only one tie rod being shown in FIG. 1, while the web portions 22 of the vertical frame members 16 are formed with horizontal rectangular slots 30 which are disposed at the same level as that of the notches 26 and are adapted to receive therethrough the bolts of conventional connecting bolt and wedge devices 32, only one such device being shown, and by means of which adjacent panels 12 of the concrete wall form may be clamped together.

The tie rod 28 of FIG. 1 is of conventional design and may be of the type which is shown and described in U.S. Pat. No. 2,948,045, granted on Aug. 9, 1960 and entitled "TIE ROD FOR CONCRETE WALL FORMS AND CONE THEREFOR." Briefly, such tie rod is in the form of a length of flat metal stock and has in one end region a slot which is designed for registry with the adjacent slots 30 in the web portions 22 of the vertical frame members 16 of the panels 12. The notches 26 in the ribs 20 of the vertical frame members 16 afford clearance regions for projection of the end region of the tie rod 28 between adjacent webs 22 of contiguous panels so that the tie rod may project laterally and outwardly beyond the plane of the plywood facings 14 on the one side of the concrete wall form in order to bring the slot in the end of the tie rod 28 into register with the aligned slots 30 in the vertical frame members 16, whereupon said end of the tie rod may be captured by the aforementioned bolt and wedge device 32 when the latter is installed in the slots 30.

The arrangement of parts thus far described is purely conventional and no claim is made herein to any novelty therein, the novelty of the present invention residing rather in the construction of the hereinafter described waler-clamping assembly 10 and strongback-clamping assembly 110 and the manner in which they are employed for securing the pair of walers W and the pair of strongbacks S respectively in position on the illustrated side of the concrete wall form.

Considering first the waler-clamping assembly 10, this assembly is comprised of three parts, namely, a hook member 40 (see FIG. 2), a clamping bracket 42 and a tapered wedge 44. This assembly 10 is designed for the purpose of clamping the two walers W in a horizontal position so that the inside surfaces thereof bear against the outside edges of the abutting vertical frame members 16 at substantially the horizontal level of a selected pair of registering slots 30, it being understood that the dual waler structure will extend horizontally along the illustrated side of the concrete wall form and traverse a number of abutting vertical frame members and be clamped thereto by identical waler clamping frame members and be clamped

thereto by identical waler clamping assemblies **10** in each instance.

As shown in FIGS. **2**, **3** and **4**, the hook member **40** of the waler-clamping assembly **10** is in the form of a short length of rod stock, the proximate or inner end of which is flattened and projects sidewise so as to provide a lateral hook **46**. A small nail hole **48** is formed in the distal or outer end region of the hook **46** and serves a purpose that will be made clear presently. The other end of the hook member **40** is flattened as indicated at **50** and has formed therein a longitudinally and horizontally extending slot **52**, this slot being designed for reception of the wedge **44** of the waler-clamping assembly **10**. The portion of the hook member which extends between the hook **46** and the flattened end **50** constitutes a hook shank **54** which is placed under tension when the assembly **10** is in actual use in its normal waler-clamping position on the concrete wall form.

The bracket **42** of the assembly **10** is in the form of a heavy gauge sheet metal stamping of wide U-shape cross section and has side flanges **56** and a connecting base portion **58**. The base portion **58** is in the form of a flat plate which is formed with a transverse slot **60**, this slot loosely receiving therethrough the flattened end **50** of the hook member **40**. The base portion **58** of the bracket **42** of the assembly **10** is provided with a pair of parallel longitudinally extending reinforcing ribs **62** on opposite sides of the slot **52** as best illustrated in FIG. **2**. Nail holes **64** also are provided in the base portion **58** of the bracket **42** in the vicinity of the flanges **58**.

As previously stated, the wedge **44** of the assembly **10** projects through the slot **52** in the flattened outer end **50** of the hook member **42**, and in order permanently to capture this wedge within the slot, this generally triangular wedge is formed with a lateral protuberance **66** near its small end, the protuberance being formed by upsetting the metal of the wedge so that this end thereof may not be passed through the slot **52**. A small nail hole **67** is also formed in the wedge **44** in the vicinity of the protuberance **66** and serves a purpose that will be described presently.

In the application of the waler-clamping assembly **10** to the concrete wall form for waler-clamping purposes, the hook member **40** is initially applied to a selected pair of registering slots **30** in the desired pair of contiguous vertical frame members **16**, the application being made by causing the flattened lateral hook **46** on the inner end of the hook member **40** to pass through such slots as clearly shown in FIGS. **1**, **3** and **4**. A nail such as that shown at **68** in FIGS. **1** and **3** is then passed downwardly through the nail hole **48** in the lateral hook **46** so as to capture or "hang" the hook member **40** on the form with the shank **54** being disposed in a substantially horizontal position. The wedge **44** is, at this time, retracted to the position in which it is shown in dotted lines in FIG. **3** with the lateral protuberance **66** closely underlying the slot **52** in the flattened outer end **50** of the hook member **40** so that the bracket **42** may be moved to its inclined retracted dotted-line position to afford a clearance for introduction of the two walers W into the general confines of the assembly **10**. In order to maintain the wedge **44** in such inclined position, a nail **69** (see FIG. **3**) is passed through the nail hole **67** after the latter has been brought above the level of the flattened outer end **50** of the hook member **40**.

It is to be noted that because the outer end of the shank portion **54** of the hook member **40** is flattened, manual release of the hook member will allow the latter to remain suspended in approximately the horizontal position which it assumes after its final position with respect to the concrete wall form. Thereafter, with the bracket **42** in its dotted-line retracted position, the upper of the two walers W will be caused to rest on the hook member **40** and the lower of the two walers W may be slipped beneath the hook member and brought to a position where its outer portion is caused to rest on the lower flange **56** of the bracket **42**, after which the bracket **42** may be pushed toward the adjacent form side, the nail **69** withdrawn from the nail hole **67**, and the wedge **44** driven to its home position as shown in FIG. **1** by the impact blow of a hammer or the like. If desired, after the wedge **44** has been thus driven to its home position, nails may be passed into the walers W through the nail holes **64**, although ordinarily such nails may be omitted unless gang forming operations are contemplated where large sections of the concrete wall form remain intact for subsequent handling bodily as a unit.

It is to be noted at this point that when the wedge **44** of the assembly **10** is driven home, the spreading action of the wedge is such that the bracket **42** is forced against the outer edges of both walers W and the latter, in turn, are caused to bear hard against the outer edges of the adjacent vertical frame members **16**.

Dismantling of the concrete wall form is accomplished by a reversal of the procedure outlined above in connection with installation of the walers W. Initially the wedge **44** is driven upwardly by an impact blow, thus loosening the bracket **42** and allowing the walers W to be removed. Finally, the nail **68** is withdrawn from the nail hole **48** in the lateral hook **46** of the hook member **40** and the latter, together with the captured bracket **42** and the wedge **44**, is removed from the adjacent side of the concrete wall form. The thus removed waler-clamping assembly **10** is available for reuse in a subsequent concrete wall form.

Considering now the strongback-clamping assembly **110**, inasmuch as this assembly is structurally and functionally similar to the previously described waler-clamping assembly **10**, in order to avoid needless repetition of description, similar reference numerals but of a higher order are applied to the corresponding parts as between the disclosures of FIGS. **6** to **8**, inclusive, on the one hand, and FIGS. **2** to **4**, inclusive, on the other hand, as well as between the separate clamping assemblies **10** and **110** that are shown in FIG. **1**.

In the strongback clamping assembly **110**, the hook member **140** is somewhat longer than the hook member **10**. Whereas the hook member **10** is of such length that the slot **52** in the flattened end **50** thereof will overhang the outer side faces of the walers W when the member is installed, the hook member **140** has an added length which is approximately equal to the width of the strongbacks. This difference in length, together with the fact that the lateral hook **146** which is provided on the hook member is not flattened and is provided with a short reentrant distal end portion or finger **147**, constitutes the only difference between the hook member **40** of the waler-clamping assembly **10** and the hook member **140** of the strongback clamping as-

sembly **110**. The brackets **42** and **142**, as well as the wedges **44** and **144**, remain precisely the same although small dimensional differences are contemplated in order to accommodate possible differences in the respective lumber thicknesses for the walers W and the strongbacks S.

Reference to FIG. **1** of the drawings will reveal the fact that whereas the position of the waler-clamping assembly **10** on the concrete wall form is dependent upon the location of the registering slots **30** in the vertical frame members **16** of the reinforcing frames of the panels **12**, the strongback-clamping assembly **110** may be disposed at any point along the length of the walers W to which the strongbacks S are to be applied. Wherever, when there is an unobstructed free inner edge region along the longitudinal extent of the upper waler W, the assembly **110** may be applied by the simple expedient of causing the lateral hook **146** to straddle such inner edge as shown at the right-hand side of FIG. **1** so that the shank **154** lies upon the upper surface of the upper waler, extends transversely outwardly thereacross, and overhangs the outer ends of such waler. In this position of the hook member **140**, the general plane of the flattened end **150** of the hook member **140** extends vertically so that the wedge **144** is adapted to be driven horizontally through the slot **152**.

Whereas the hook member **40** of the waler-clamping assembly **10** is adapted to pass horizontally between the space which exists between the upper and lower walers W, in the case of the hook member **140** of the assembly **110**, the same does not pass between the walers but it does pass horizontally between the two vertically disposed strongbacks S so that the bracket **142** may embrace the two strongbacks S in the same manner that the bracket **42** of the assembly **10** embraces the walers W. Thus, when the wedge **144** of the assembly **110** is driven to its home position as shown in FIG. **1**, the strongbacks S are forced against the walers W and the shank portion **154** of the hook member **140** is placed under tension. Since there is no gravitational force acting on the wedge **144** that would tend to urge it toward its home position, the hole **67** in the wedge has no function and no nail is inserted therein.

The invention is not to be limited to the exact arrangement of parts which are 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 this invention. Therefore, only insofar as the invention is particularly pointed out in the accompanying claim 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. In a concrete wall form, in combination, a wall form side including a series of individual upstanding panels disposed in edge-to-edge relationship, each panel including a rectangular plywood facing and a rectangular metal marginal reinforcing frame presenting vertical frame members, a vertical frame member of each panel abutting a vertical frame member of an adjacent panel, there being registering horizontal slots in each pair of abutting vertical frame members, a dual waler construction including upper and lower spaced apart walers positioned horizontally against the outer portion of said wall form side and bearing against the outer edges of the pairs of abutting vertical frame members in bridging relationship, and a three-piece waler clamping assembly serving to clamp said pair of walers hard against said outer edges of said pair of abutting vertical frame members, said assembly comprising a hook member formed of cylindrical rod stock and including a shank having a lateral hook at its inner end and formed with a longitudinal slot in the outer end region thereof, said lateral hook being flattened and projecting horizontally through said registering horizontal slots with the shank projecting horizontally and outwardly away from the form side and between the walers, a waler bracket including a vertical plate having an opening therein through which the outer end region of the shank loosely projects, said plate fitting against the outer faces of the walers in bridging relationship, and a tapered wedge projecting vertically through said slot in the outer end region of the shank of the hook member and serving to place the shank under tension and force the plate against the walers so that the latter, in turn, are forced against said vertical frame members.

2. In a concrete wall form, the combination set forth in claim **1** and wherein the opening in the said plate is in the form of a horizontally extending slot, and the slotted end region of the shank is flattened and, in combination with the horizontal slot through which it loosely projects, serves to prevent appreciable rotation of the plate about the axis of the shank.

3. In a concrete wall form, the combination set forth in claim **2** and wherein the flattened hook is provided with a nail hole therein, and a retaining nail projects through said nail hole and prevents dislodgment of the hook from said registering notches.

4. In a concrete wall form, the combination set forth in claim **3** and wherein the extreme lower end region of the wedge is formed with an enlarged protuberance thereon for preventing removal of the wedge from the slot through which it projects.

5. In a concrete wall form, the combination set forth in claim **4** and wherein the wedge is provided therein with a nail hole a slight distance above said protuberance, said latter nail hole being designed for the loose reception therein of a suspension nail by means of which the wedge may be maintained in an elevated position prior to driving of the wedge downwardly.

6. In a concrete wall form, in combination, a wall form side including a series of individual upstanding panels disposed in edge-to-edge relationship, each panel being reinforced by a waler which projects horizontally across the outer sides of the panels in bridging relationship, a pair of vertical strongbacks bearing against the outer edge of the waler and disposed in spaced apart parallel relationship, and a three-piece strongback-clamping assembly serving to clamp said pair of strongbacks against said waler, said assembly comprising a hook member formed of cylindrical rod stock and including a shank having a lateral hook at its inner end, the outer end region of said shank being flattened and provided with a longitudinally extending slot therethrough, said shank overlying said waler with the hook projecting downwardly and embracing the inner edge of the latter, a bracket including a vertical plate having a vertical slot therein through which the outer flattened end region of the slot loosely projects, said slot serving to prevent appreciable rota-

tion of the plate about the axis of the shank, a pair of inturned flanges on the side edges of said plate, said plate fitting against the outer edges of the strongbacks in bridging relationship with said inturned flanges straddling the strongbacks, and a tapered wedge projecting horizontally through said slot and serving to place the shank under tension and force the plate against the strongbacks so that the latter, in turn, are forced against said waler.

7. In a concrete wall form, the combination set forth in claim 6 and wherein the distal end of said downwardly projecting hook is formed with a reentrant finger which underlies the waler and normally serves to support the strongback-clamping assembly on the waler prior to positioning of the strongbacks against the waler.

8. In a concrete wall form, in combination, a wall form side comprised of a series of individual upstanding panels disposed in edge-to-edge relationship, a backing structure for said panels on the outer portion of the wall form and serving to reinforce the panels, and an inseparable three-piece clamping assembly for clamping a pair of boards against said backing structure to reinforce the latter, said clamping assembly comprising a hook member formed of cylindrical rod stock and including a shank having a lateral hook at its inner end and in engagement with an inwardly facing shoulder on the backing structure, said shank having a flattened outer end region which is formed with a longitudinally extending slot, a U-shaped bracket including a pair of side flanges and a connecting flat base having a slot therein through which said flattened end region of the shank loosely projects, said bracket collectively embracing the outer edges of said boards, and a tapered wedge projecting through said slot and serving to place the shank under tension and force said base of the bracket against the outer edges of said boards so that the latter, in turn, are forced against said backing structure.

9. In a concrete wall form, the combination set forth in claim 1 and wherein said waler bracket is at its upper and lower edges provided with inturned flanges which overlie and underlie said pair of walers.

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