Jan. 30, 1962 H. G. GATES 3,018,538

COMBINED TIE LOCK AND REINFORCING TIMBER CLAMP

Filed Oct. 12, 1959 2 Sheets-Sheet 1

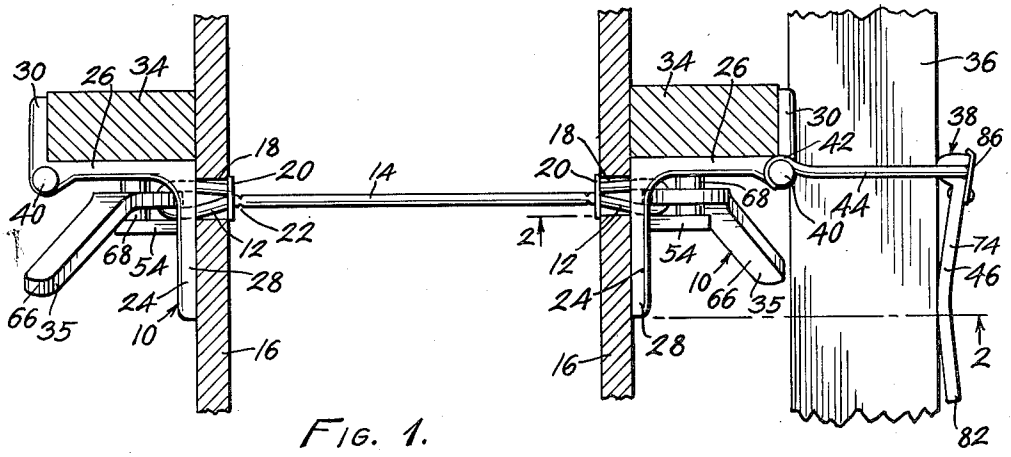


FIG. 1.

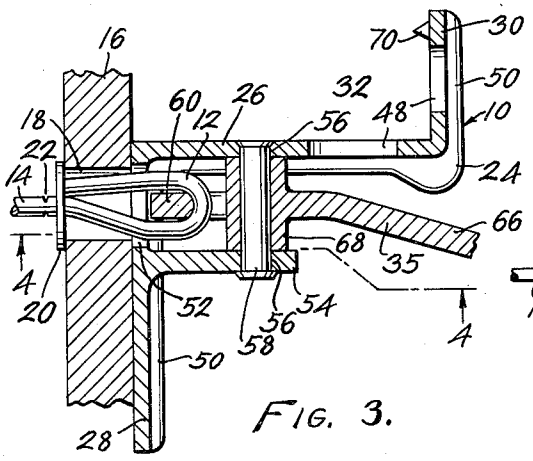


FIG. 3.

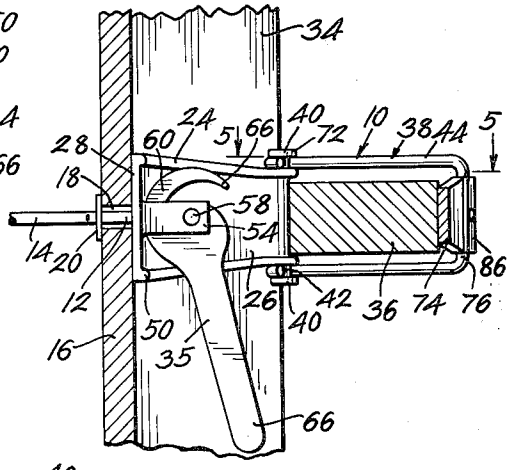


FIG. 2.

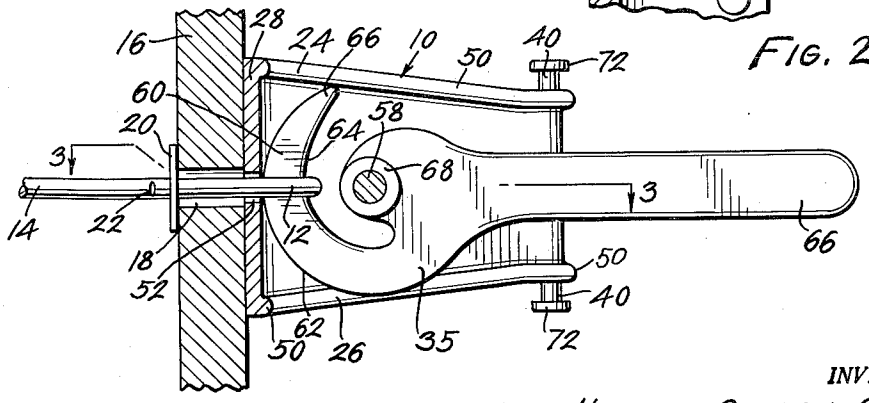


FIG. 4.

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COMBINED TIE LOCK AND REINFORCING TIMBER CLAMP

Filed Oct. 12, 1959 2 Sheets-Sheet 2

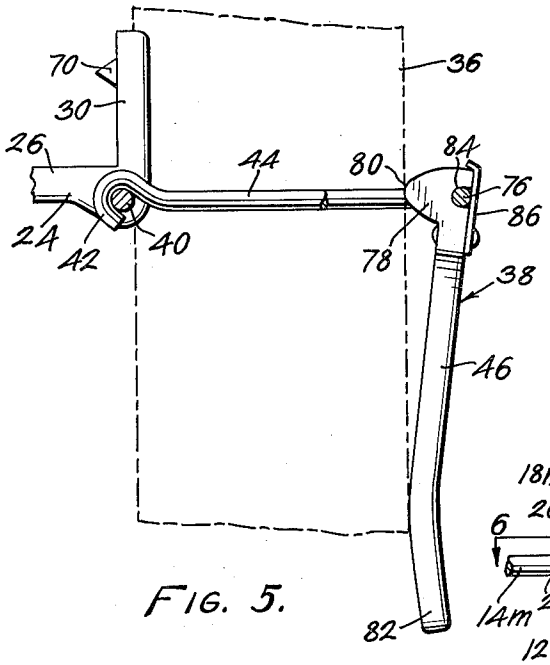


FIG. 5.

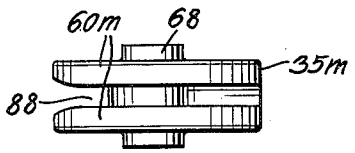


FIG. 8.

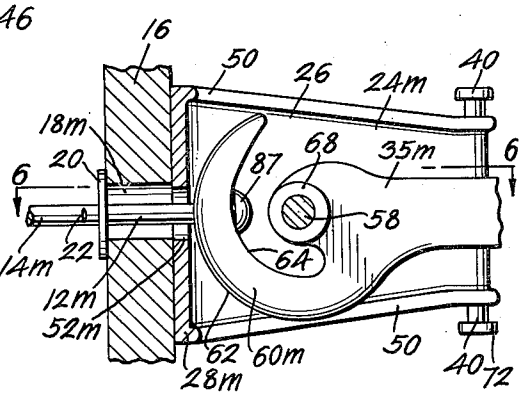


FIG. 7.

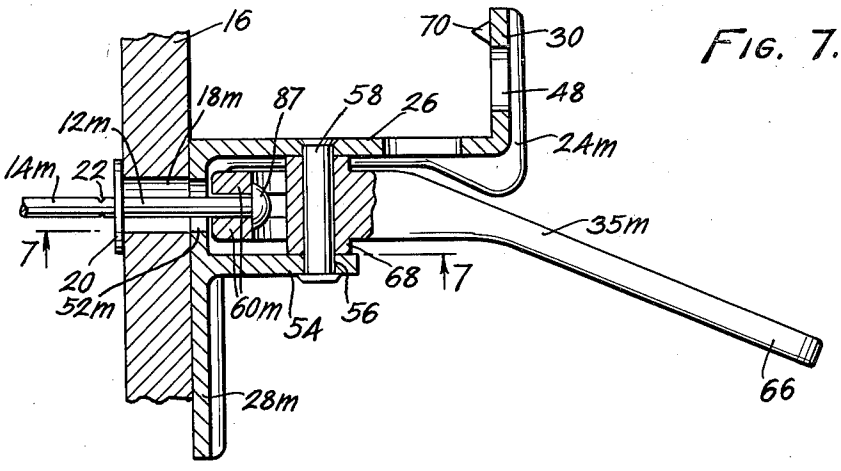


FIG. 6.

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3,018,538
COMBINED TIE LOCK AND REINFORCING TIMBER CLAMP

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Filed Oct. 12, 1959, Ser. No. 845,960
5 Claims. (Cl. 25—131)

This invention relates to concrete forming accessories and more specifically, to a combination tie lock and waler clamp.

In the construction of poured concrete wall structures, it is customary to erect a pair of wooden form walls on a suitable footing and interconnect them in fixed spaced relation by means of a plurality of form ties. If the wall structure is extra high or thick, it is also customary to reinforce the form walls with wooden 2 x 4 walers to resist the hydrostatic pressure exerted by the wet concrete at the base of the form. These walers usually extend horizontally although, under certain conditions, they also are reinforced by vertical strongbacks at various points along the form wall.

The form ties generally include spacers or stops located on the shank or medial section thereof adapted to bear against the interior surface of the form panels to maintain a minimum spacing therebetween. The form panels are usually provided with tie slots through which the ends of the form ties project onto the exterior surface of the panels in position to receive some type of locking device adapted to cooperate with the spacers or stops and maintain a fixed maximum spacing between the form walls. These locking devices may take several forms such as rods, pipes, various types of wedges, clips and other types of removable fasteners.

In the past, the accepted practice has been to nail the walers to the outside of the form panels and then brace them with suitable ground-supported 2 x 4 braces. The locking devices used on the tie ends were, therefore, separate from the waler assembly and were functionally interrelated only insofar as both cooperated to maintain the form panels in fixed spaced relation to one another. There are, however, a number of distinct disadvantages to such a system, especially when considered in the light of todays high labor and material costs.

One of the most significant problems associated with the aforementioned prior art forming systems is the time involved in erecting the forms. Fastening the locking devices to both ends of each tie and nailing the walers along with their braces in place becomes most expensive from the standpoint of labor costs. The same is true of the stripping operation in which the forms are removed from the newly-poured concrete wall structure after it has set.

Another problem is that of increased material costs, not so much from the standpoint of their initial expense as that of waste. In other words, while substantially the same amount of material in the form of plywood panels, walers, braces, etc., is needed in aforementioned prior art forming system as in the one which will be described presently in connection with the combination tie lock and waler clamp that comprises the present invention, in the latter all the materials with the exception of the ties are reusable, whereas, with the former system, many of the walers, braces and even the panels are damaged during the stripping operation to an extent where they cannot be used again. Accordingly, many contractors have found that the savings occasioned by reducing the waste following a concrete forming operation on a single large job are enough to cover the initial cost of the many combination tie lock and waler brackets required.

It is, therefore, the principal object of the present invention to provide a novel and improved combination tie lock and waler bracket for use with panel-type concrete forming systems.

A second object is to provide a device of the type aforementioned that completely eliminates the need for nailed walers and waler braces thus enabling all but the ties to be reused over and over again and effecting a substantial reduction in overall material costs.

Another objective of the instant invention is the provision of a combined tie lock and waler support that enables the form walls to be erected and dismantled or stripped in much less time and at a considerable saving in labor cost when compared with the prior art devices for this purpose.

Still another object is to provide a waler supporting device that includes means adapted to receive and clamp both the walers and the strongbacks to the exterior surface of a panel form without the use of any other type of fastener.

An additional objective is the provision of a tie lock that is easily adapted for use with looped-wire ties, strap ties having openings in the ends thereof, button-type ties, twisted-wire ties with looped ends, and many other types and styles of commercially-available ties.

Further objects are to provide a concrete forming accessory of the class described which is relatively inexpensive, rugged, compact, easy to use, versatile, and decorative in appearance.

Other objects will be in part apparent and in part pointed out specifically hereinafter in connection with the description of the drawings that follow, and in which:

FIGURE 1 is a vertical section through a pair of spaced apart panels of the type used in forming a poured concrete wall structure showing the combination tie lock and waler clamp of the present invention in place on the looped-ends of a wire concrete form tie and positioned to support both a waler and a strong-back, certain portions having been broken off to conserve space;

FIGURE 2 is a fragmentary section taken along line 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary section taken along line 3—3 of FIGURE 4 showing the device without the reinforcing members or the strong-back bail and latch;

FIGURE 4 is a fragmentary section taken along line 4—4 of FIGURE 3;

FIGURE 5 is a fragmentary side elevation, portions of which have been broken away to better reveal the construction, showing the detachable bail and cam latch used to clamp a strong-back to the form system;

FIGURE 6 is a fragmentary section taken along line 6—6 of FIGURE 7 illustrating a modified form of the combination tie lock and waler clamp especially adapted for use with button-type form ties;

FIGURE 7 is a fragmentary section taken along line 7—7 of FIGURE 6; and,

FIGURE 8 is an end view showing the bifurcated fingers of the tie latch used in the modification of FIGURES 6 and 7.

Referring now to the drawings for a detailed description of the combination tie lock and waler clamp of the present invention, and in particular to FIGURES 1 and 2 for this purpose, it will be seen that this device, which has been identified in a general way by numeral 10, is connected to the ends 12 of a concrete form tie 14 that project onto the exterior of a plywood form panel 16 through tie slots 18 located therein. The tie 14 shown in FIGURES 1 through 4, inclusive, is of the wire-type in which the ends 12 are formed to provide closed loops. Spacers or stops 20 in the form of disks are welded or otherwise permanently attached to the central section of

the tie in spaced relation to one another and in position to engage the interior surface of the form panels **16** maintaining a minimum spacing therebetween. The tie has also been shown to include pairs of opposed fracture nicks **22** located adjacent to but inside the stops **20** for the purpose of breaking off the looped ends **12** inside the poured concrete wall structure once it has set and the form panels **16** have been removed therefrom. The tie just described, along with the button-type tie **14***m* of FIGURES 6 and 7, have no patentable significance insofar as the present application is concerned apart from the fact that they cooperate with the combination tie lock and waler clamp claimed herein to support same and hold the form panels in fixed spaced relation against the stops **20**.

The panels **16** are also conventional and usually consist of one-half inch or thicker plywood sheets supported in edge-to-edge abutting relation on a poured-concrete footing. The tie slots **18** are customarily elongated for use with a loop-ended wire tie or round, as at **18***m*, when a button-type tie is used. For purposes of the present invention a so-called "heavy-duty" concrete forming system has been illustrated of the type used in the erection of above-grade wall structures that are generally thicker and higher than those required for residence foundations; however, the combination tie lock and waler clamp of the present invention is equally adapted for use with light weight twisted-wire ties and low-wall forms constructed from sheeting rather than plywood panels.

Now, it can be seen that the combined waler clamp and tie lock **10** includes a bracket **24** having a generally Z-shaped cross section formed by a web **26** having a downturned flange **28** along the inner edge thereof and an upturned flange **30** along the outer edge. These flanges **28** and **30** extend in opposite directions from the web **28** in substantially normal relation thereto and parallel relation to one another. Downturned flange **28** is adapted to rest flush against the exterior surface of the form panel **16** while the web **26** and upturned flange **30** cooperate with one another and with the form wall to define a channel **32** (FIGURES 3 and 6) sized to receive a wooden waler **34** positioned to extend horizontally along the outside of both the inner and outer form panels as shown. In general, channel **32** is of a size to receive a 2 x 4 laid with one of its four inch (actually 3¾ inch) faces down although it could easily be adapted to accomodate 2 x 6's or some other size waler. A latch member **35**, which will be described in detail presently in connection with FIGURES 3 and 4, is pivotally attached to the underside of the web **26** in position to connect with the loop **12** of the form tie thus fastening the bracket **24** to the face of the form panel in supporting relation to waler **34**.

When extra-high or thick walls are to be formed, it is desirable to provide additional reinforcement for the form panels **16** over and above that provided by the walers **34**. Vertically extending reinforcing members are usually used for this purpose and are commonly denominated "strongbacks," one of which has been shown in FIGURES 1 and 2 and identified by reference numeral **36**. Here again, accepted practice dictates the use of a 2 x 4; however, timbers of other sizes can also be used with good results. The combination waler clamp and tie lock **10** of the instant invention is designed to include a detachable strong-back clamp that has been designated generally by reference numeral **38**. Integrally-formed pin-like elements **40** project from the side edges of the web **26** of the bracket adjacent the upturned flange **30** and provide the means adapted to receive and retain the hooked ends **42** of the generally U-shaped wire bail **44** that comprises a portion of the strong-back clamp **38**. Bail **44** is sized to rather loosely receive the strong-back **36** and a latch element **46** is provided on the outer extremity of the bail adapted to engage the strong-back and hold the same snugly against the upturned flange **30** of the bracket **24** in a manner which will be set forth in detail presently in connection with FIGURE 5.

With specific reference to FIGURES 3 and 4 of the drawings, it will be seen that the particular bracket **24** illustrated herein is an iron casting that includes one or more apertures **48** adapted to reduce the weight thereof along with an integrally-formed rib **50** extending up both sides of the downturned flange, thence outwardly on the underside of the web at the sides thereof, and upwardly along the side edges of the upturned flange to define with the latter a channel adapted to maintain the strong-back centered therein and to stiffen the entire bracket. The bracket may, however, be welded or stamped from relatively heavy-gage sheet metal and still provide a unit that is entirely satisfactory.

An opening **52** is provided in the downturned flange **28** of the bracket positioned adjacent the web **26** thereof and sized to pass the looped end **12** of the form tie. In the particular form illustrated in FIGURES 1–4, inclusive, where the bracket is designed for use with loop-ended ties **14**, the opening **52** can be elongated slightly to register with the tie slot **18** in the form panel; however, as will be explained presently, a more universal shape adapted to pass both the loop-type and button-type ties can be employed to advantage especially when both the single-finger latch element **35** and double-finger latch element **35***m* can be used interchangeably on the same bracket **24**.

The downturned flange **28** has an integrally-formed ear **54** depending therefrom that projects outwardly in spaced substantially parallel relation to web **26** of the bracket and adjacent the lower edge of opening **52**. The web and ear of bracket **24** are provided with vertically-aligned openings **56** adapted to receive pivot pin **58** with a relatively tight friction fit. The latch element **35** shown in FIGURES 1–4, inclusive, is of a type designed for use with loop-ended ties and includes a single arcuate finger **60** mounted on pin **58** for pivotal movement through the loop **12** of tie **14**. The outer edge **62** of finger **60** is preferably circular about pin **58** as a center; whereas, the inner edge **64** thereof comprises a segment of a spiral that converges toward pin **58** as its pole. Thus, the inner and outer edges of the finger **60** intersect one another to define a pointed end **66** adapted to enter the looped-end **12** of the tie while the steadily converging inner edge **64** forms a cam surface adapted to pull the stop **20** of the tie up tight against the inside face of the form panel. At the same time, however, this finger cooperates with the tie and stop thereon to pull the down turned flange of the bracket snugly up against the exterior of the form panel while clamping the waler **34** between the latter and the upturned flange **30** of the bracket.

The means for moving the latch element **35** between its latched and unlatched positions comprises a handle **66** positioned on the opposite side of the pin **58** from the hub **68** thereof. In the particular form shown, the handle is inclined downwardly relative to the web **26** of bracket **24** to clear rib **50** thereof and also to prevent injury to the knuckles of the operator's hand as they pass underneath. Due to the fact that the 2 x 4's used as walers have been found to vary in width as much as ¼ inch, a pair of tooth-like projections **70** positioned in laterally-spaced relation on the inside face of the upturned flange **30** of the bracket **24** are useful to take up any slack produced by an extra-narrow waler and also to dig into the edge thereof maintaining the latter in a securely clamped position.

The detachable strong-back clamp **38** can best be seen in FIGURES 1, 2 and 5 wherein it will be noted that the hooked ends **42** of the generally U-shaped wire bail **44** are detachably connected to the pin-like elements **40** which depend from the side edges of the web **26**. As shown, the pin-like elements are provided with integrally-formed heads **72** that function to prevent the hooked-ends of the bail from spreading apart and detaching

themselves from the bracket. As aforementioned, the bail is sized to loosely receive the strong-back **36** which is customarily a 2 x 4 although other timber sizes may also be used. Also, the ribs **50** that project outwardly from the side margins of the upturned flange are spaced apart to receive the thickness of the strong-back therebetween thus maintaining the latter centered with respect to the bracket.

The latch element **46** of the strong-back clamp **38** comprises a handle **74** pivotally attached at one end thereof to the transverse portion **76** interconnecting the legs of the bail. A rounded foot **78** projects forwardly in substantially normal relation to the handle at the point of connection of the bail therewith. This foot is of a length to engage the strong-back with a caming or prying action pressing the latter tightly against the upturned flange of the bracket as the handle **74** is moved downwardly into latched position. Note in this connection that the rounded end or heel **80** of the foot passes over center as the handle **74** moves into latched position against the outer edge of the strong-back thus preventing accidental release of the clamp.

In the particular form shown herein, the free end **82** of the handle **74** is bent outwardly as viewed in the latched position of FIGURES 1 and 5 to provide access for the operator's hand to release same. Also, the outer face of the handle is provided with a transverse groove **84** adjacent one end thereof adapted to receive portion **76** of the bail which is releasably locked in place by a coverplate **86** pinned to the handle.

Next, with reference to the remaining figures of the drawing, namely, FIGURES 6, 7 and 8, the embodiment of the combined waler clamp and tie lock that is especially adapted for use with button-type form ties will be explained in detail. First of all, it should be mentioned that the button-type tie **14***m* substitutes a straight section **12***m* for the looped end **12** of FIGURES 1 through 4, and this straight section terminates in some type of enlargement such as the head or button **87**. The stop **20** has been shown in the form of a disk welded to the shank of the tie which is identically to that used on the loop-ended tie **14**. The tie slot **18***m* in the form panel has been illustrated as being circular rather than elongate although either shape can be used if properly sized. The same is true of the opening **52***m* in the downturned flange **28***m* of the modified bracket **24***m*; however, this slight modification is intended as being merely illustrative of the fact that differently shaped openings can be used when, in actuality, the bracket used for both the button-type and loop-type ties would be identical. The only substantial change is in the design of the operating lever or cam latch **35***m* which is of the double-finger type rather than the single-finger of the style shown in FIGURES 1–4. In other words, a pair of finger **60***m* having their inner and outer edges **62** and **64** shaped exactly like those of the single-finger latch **35** are arranged in spaced parallel relation to one another defining a slot **88** therebetween of a width to pass the shank **12***m* of the button-type tie **14***m* while engaging the head **87** thereof as shown. Pin **58** of the bracket **24** is removable to permit interchange of the latch elements **35** and **35***m* to accommodate either type tie. Of course, the strong-back clamp **38** remains unchanged as it is functionally independent of the tie construction.

Finally, a few of the less obvious advantages of the instant combined tie lock and waler clamp should be pointed out specifically. Note that with the tie latch **35** in closed or locked position as best shown in FIGURE 2 that the outer end of the bracket **24** is unobstructed and free to receive the strong-back and clamp therefore. Secondly, the location of the connection between the arm **35** and the tie **14** in relation to the bracket is such that very little stress is applied to the flanges and web thereof, the forces being primarily those of compression. Also, the weight distribution of the assembly in relation to the tie as an axis is such that the bracket tends to remain upright at all times thus facilitating insertion of the waler.

Having thus described the several useful and novel features of the combination tie lock and waler clamp of the present invention, it will be apparent that the several worthwhile objectives for which it was designed have been achieved. Although only two specific embodiments of the invention have been illustrated in the accompanying drawings, I realize that certain changes and modification therein may occur to those skilled in the art within the broad teaching hereof; hence, it is my intention that the scope of protection afforded hereby shall be limited only insofar as said limitations are expressly set forth in the appended claims.

What is claimed is:

1. A combined tie lock and reinforcing timber clamp for use with concrete form ties having wall-engaging stops to attach a pair of form walls together in fixed spaced relation which comprises: a generally Z-shaped bracket including a web of a length corresponding to the width of a reinforcing waler, an upturned flange located on the outer end of the web in substantially normal relation thereto, a downturned flange located on the inner end of the web in substantially normal relation thereto and in spaced parallel relation to the upturned flange but extending in the opposite direction, said downturned flange having an opening therethrough sized and adapted to pass the end of a concrete form tie into position underneath the web, and a pivot pin depending from the web extending downwardly therefrom opposite the opening in the downturned flange; and, a latch element mounted on the pin for pivotal movement between an unlocked position and a locked position releasably connected to that end of the form tie projecting through the opening in the downturned flange, said latch element including a hub rotatable on the pivot pin, at least one generally arcuate finger curving transversely across the opening in the downturned flange with one end depending from the hub and the free end thereof positioned to receive the projecting end of the form tie, said finger including a cam surface on the edge thereof opposite the opening in the downturned flange adapted to engage the projecting end of the form tie and pull the wall-engaging stop up snug against the form wall upon pivotal movement of the latch element from unlocked to locked position, and handle-forming means depending from the hub adapted upon actuation to move the finger between locked and unlocked positions.

2. The combined tie lock and reinforcing timber clamp as set forth in claim 1 in which at least one tooth-forming means is provided on the inner face of the upturned flange adapted to dig into the outer edge of a reinforcing waler maintaining the latter in clamped relation between the upturned flange and adjacent form wall when the bracket is attached to the latter with the downturned flange in face-to-face relation thereto.

3. The combined tie lock and reinforcing timber clamp as set forth in claim 1 in which, a pair of pin-forming means project laterally in opposed but aligned relation from the side edges of the web, a generally U-shaped bail having the free ends thereof attached to the pin-forming means projecting from the web of the bracket, and locking means adapted to cooperate with the portion of the bail lying opposite the upturned flange to urge a reinforcing strong-back passed between the legs of the bail into clamped position against the bracket.

4. The combined tie lock and reinforcing timber clamp as set forth in claim 1 in which the edge of the finger opposite the cam surface comprises a circular segment about the pivot pin as a center and turns against the outer face of the downturned flange on opposite sides of the opening therethrough.

5. The combined tie lock and reinforcing timber clamp as set forth in claim 3 in which the locking means comprises a rounded foot pivotally attached to the bail at

a point opposite the upturned flange and extending inwardly therefrom, and a handle element depending from the foot in substantially normal relation thereto operative upon movement from an open position to a closed position against the outer edge of a reinforcing strongback resting against the bracket to turn the foot against said timber and past center to maintain the latter in clamped position against the upturned flange.

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