April 25, 1967 H. G. GATES 3,315,938

WEDGE-TYPE TIE END LATCHES AND TRACK ASSEMBLIES FOR USE THEREWITH

Filed Jan. 21, 1963 2 Sheets-Sheet 1

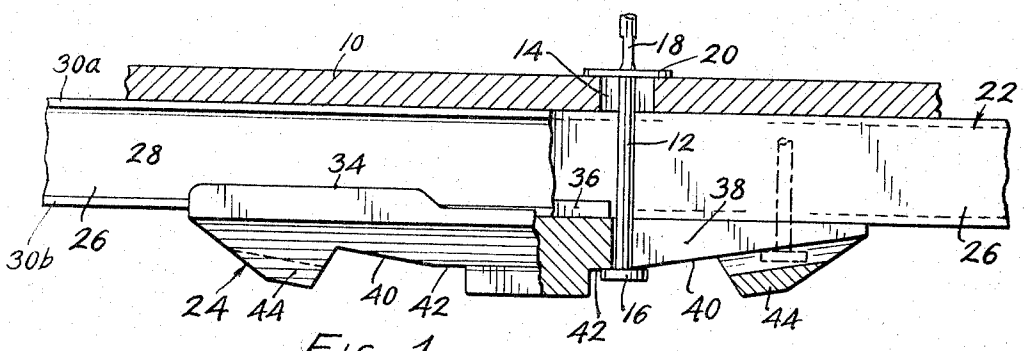


FIG. 1.

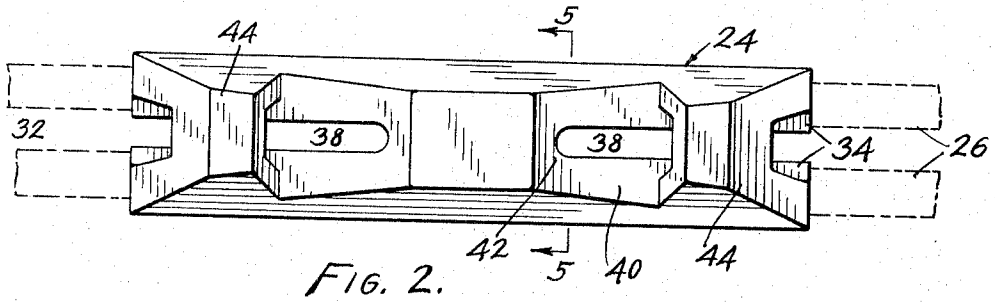


FIG. 2.

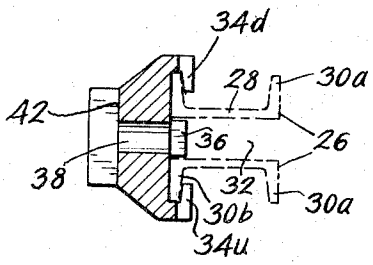


FIG. 5.

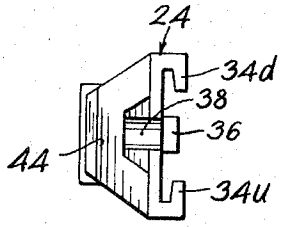


FIG. 4.

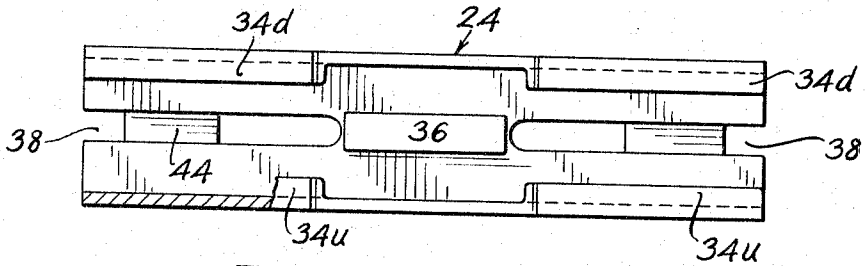


FIG. 3.

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WEDGE-TYPE TIE END LATCHES AND TRACK ASSEMBLIES FOR USE THEREWITH

Filed Jan. 21, 1963 2 Sheets-Sheet 2

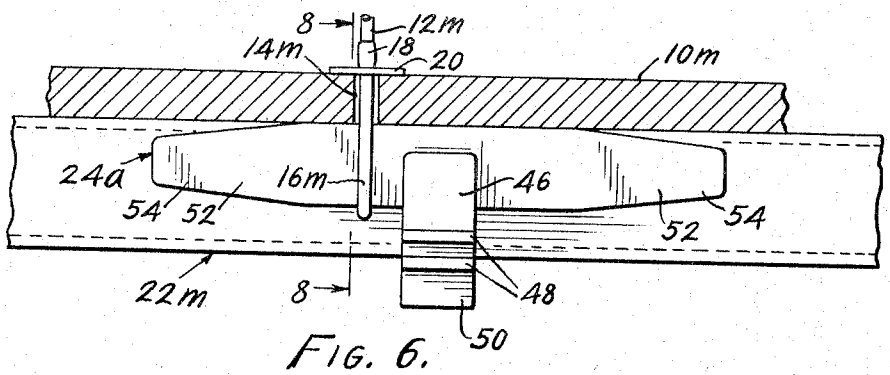


FIG. 6.

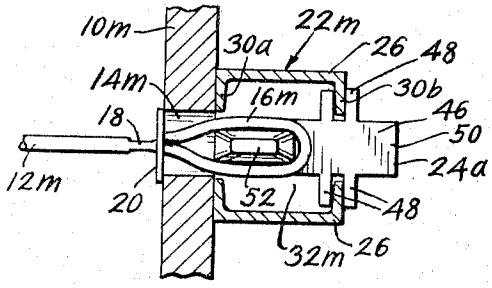


FIG. 8.

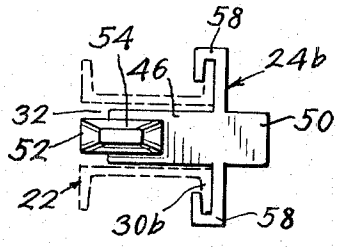


FIG. 9.

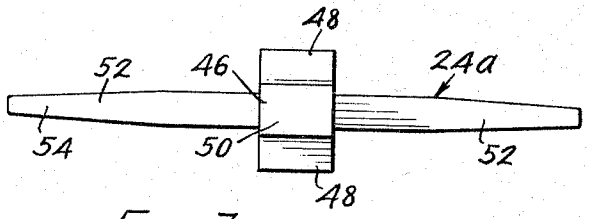


FIG. 7.

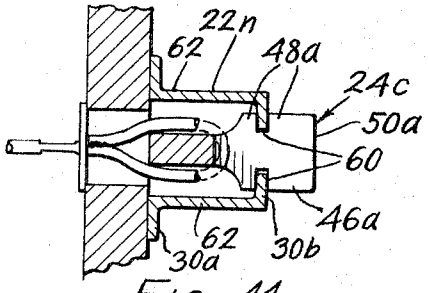


FIG. 11.

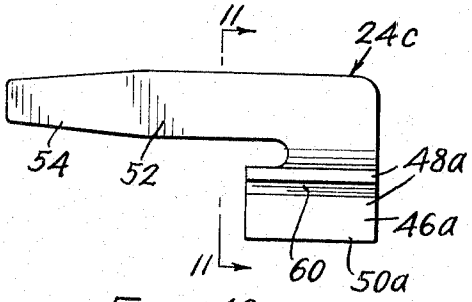


FIG. 10.

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3,315,938

WEDGE-TYPE TIE END LATCHES AND TRACK ASSEMBLIES FOR USE THEREWITH

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Filed Jan. 21, 1963, Ser. No. 252,996
5 Claims. (Cl. 249—46)

This application is a continuation-in-part of my co-pending application United States Serial No. 215,561, filed August 8, 1962, now Patent No. 3,141,224, issued July 21, 1964.

This invention relates to concrete forming systems and, more particularly, to tie end latch elements and tracks therefor that constitute reinforcing members.

In my co-pending application, I disclose a concrete forming system that utilizes a pair of channel-shaped reinforcing elements arranged in back-to-back relation as tracks upon which pivotal latch elements slide into position to engage the end of either a loop-ended or button type concrete form tie for the purpose of maintaining a pair of form walls in fixed spaced relation while concrete is poured therebetween. The invention which forms the subject matter of this application is similar to my co-pending application aforementioned in that it uses the same double channel tracks in two embodiments while in a third the channels are reversed so that they open toward rather than away from one another. The primary difference lies in the construction of the latch elements which do not pivot as before, but rather, operate on a fixed wedge principle to releasably engage the ends of either a loop-ended or button-type form tie. The latch elements herein disclosed each comprise a unitary structure having no moving parts that rely on an inclined plane to draw the form wall panel up snugly against the stop on the tie.

Functionally, the two systems accomplish the same end result with equal facility. The advantage of the present system over that which forms the subject matter of my earlier application, if any, is the fact that the one-piece latch elements herein disclosed are somewhat cheaper and require no assembly. As for disadvantages, the former system was operable by hand whereas this one generally requires that a hammer be used to drive the latch element into fully-locked position. These, of course, are relatively minor utilitarian differences and the choice between the two systems boils down largely to a matter of personal preference.

Accordingly, it is the principal object of the present invention to provide a novel and improved tie end latch and form wall reinforcing element that constitutes a track for the aforesaid latch elements.

A second object is the provision of tie end latch elements suitable for use with either the loop-ended or button-tipped ties.

Another objective of the invention herein claimed is the provision of track-mounted tie end latches that remain permanently mounted on their respective reinforcing elements thus producing a unitary assembly.

Still another object is to provide means for drawing the form walls up snugly against the stops on the form tie that have no moving parts yet are slidably affixed to reinforcing rails for movement into connecting position.

An additional objective of the invention is to provide tie end latches that, with minor modification, can be adapted to fasten onto a tie located on either side thereof.

Further objects are the provision of a tie lock and reinforcing element assembly that is simple to use, relatively inexpensive, extremely rugged, compact, versatile, capable of being used with several styles of form ties, one that is operable with the simplest of hand tools, and a unit that is

adaptable for use on a wide variety of concrete forming applications.

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

FIGURE 1 is a top plan view, portions of which have been broken away and shown in section revealing a double-ended wedge-type latch element specifically adapted for use with button-tipped form ties mounted on a track formed of web-to-web channels;

FIGURE 2 is a front elevation of the FIGURE 1 tie end latch showing the track in dotted lines;

FIGURE 3 is a rear elevation of the FIGURE 1 tie end latch;

FIGURE 4 is an end elevation of the FIGURE 1 tie end latch;

FIGURE 5 is a section taken along line 5—5 of FIGURE 2;

FIGURE 6 is a top plan view similar to FIGURE 1 with portions shown in section that reveals a modified form of the tie end latch specifically designed for use with loop-ended form ties and also showing a modified form of reinforcing element in which the channels are rearranged in flange-to-flange relation;

FIGURE 7 is a front elevation of the tie end latch for loop-ended ties shown in FIGURE 6;

FIGURE 8 is a section taken along line 8—8 of FIGURE 6;

FIGURE 9 is an end elevation similar to FIGURE 4 showing a further modification of the tie latch for loop-ended form ties adapted for use with the web-to-web channel of FIGURE 1;

FIGURE 10 is still another modification of the tie latch for loop-ended form ties similar to the FIGURE 6 modification except that it is of the single-ended type; and,

FIGURE 11 is a section taken along line 11—11 of FIGURE 10.

Referring now to the drawings for a detailed description of the present invention and, initially, to FIGURES 1–5 for this purpose, reference numeral 10 identifies one panel of a pair of concrete form walls maintained in fixed spaced relation by a plurality of form ties 12 that pass through tie slots 14 into the exterior surface of the forms. The particular tie 12 shown in FIGURE 1 is of the button-tipped variety terminating at both extermities in a flattened head 16. The aperture in the form panel is round to pass the head. Spaced inwardly of the head is a swaged enlargement 18 against which a washer-type stop 20 rests to maintain a minimum fixed spaced relation between the form walls. The above-described elements are old and well known to the art of concrete wall-forming and constitute no part of the present invention which relates to apparatus that is detachably connected to the end of the tie for the purpose of forcing the form wall against the tie stop and resisting the hydrostatic forces of the wet concrete tending to spread the form walls apart.

Ordinarily, the form ties are arranged in a series of horizontal rows at varying heights above the footing upon which the form walls rest. The reinforcing element of the present invention which has been identified in a general way by reference numeral 22 also forms a track upon which the tie end latch elements slide, the latter having been broadly designated by reference numeral 24. The track shown in FIGURES 1–5 is identical to that of my earlier co-pending application and comprises a pair of channels 26 arranged with their web portions 28 in fixed spaced parallel relation while their flange 30 faces outwardly in opposite directions as best revealed in dotted line in FIGURE 5. The fixed spaced relation between the channels is maintained, as before, by spacers and

rivets (not shown) that are located at intervals throughout the length of the reinforcing member. One pair of flanges 30*a* fit flush against the exterior surface of the form wall 10 while the other pair 30*b* form the rails upon which the tie end latch elements 24 slide. The slot 32 between the channels is aligned with the apertures 14 in the form panels and is sized to pass or receive the projecting tie end.

The tie end latch 24 comprises an elongate block of metal cast to provide on the rear or inner face thereof a pair of flange-engaging ribs 34, an upturned one 34*u* along the lower edge and a downturned one 34*d* along the upper edge, adapted to cooperate with one another in holding said latch element mounted on the rail-forming flanges 30*b* of the track for lengthwise sliding movement. In addition, in the particular embodiment shown in FIGURES 1–5, the rear face of the block is also provided with a centrally-located projection 36 positioned and adapted to ride in the slot 32 of the track. This embodiment of the tie latch can, of course, be slipped on either end of the track. The latter is, however, preferably formed to provide some type of stop (not shown) which will prevent the latch element from becoming disengaged therefrom and lost.

Both ends of the latch element are slotted as at 38 intermediate the side edges and these slots terminate just short of the central projection 36. Each slot registers with the slot 32 in the track and also the apertures 14 in the form wall so as to receive the projecting end portion of the tie. These slots 38 also open onto the exposed face of the latch element, more specifically, onto the inclined faces 40 thereof up which the head 16 or button of the tie rides into locked position. Thus, as can best be seen in FIGURE 1, the tie latch element is moved along the track in whichever direction is necessary to cause the projecting end of the tie to enter one of the slots 38 with the button or head thereof 16 riding up on the corresponding inclined planar surface 40 as indicated by dotted line position by hand, however, it must usually be driven with a hammer to place these elements in the relative positions indicated by full lines. The inclined planes of the latch, of course, act as wedges forcing the track tightly against the form wall and the latter against the form stop 20. The face of the tie latch element is preferably leveled off at 42 corresponding to the closed end of the slot 38 so that the head of the tie will rest on this surface and have no tendency to back out of the slot under load. In the form shown, the latch element is double-ended so that it will attach to a tie located on either side thereof; however, it would work just as well in a single-ended form assuming the tie was positioned to enter the slot.

Certain other features are worthy of specific mention although they are not absolutely necessary from the functional standpoint. Among these are the bridge portions 44 located adjacent the extremities of the latch elements that bridge the two legs defined by each slot 38. These bridge portions perform two principal functions, namely, providing a rugged projecting surface on both ends that can be struck with a hammer to lock and release the tie and, secondly, as a reinforcement for the extremities of the unit which will prevent the long and relatively slender legs from breaking off.

Next with reference to FIGURES 6, 7 and 8, a second embodiment of the tie end latch 24*a* has been illustrated with a slightly modified form of track 22*m*. First of all, however, the change in the form wall assembly that necessitate this modified latch should be briefly described. The form panel 10*m* is substantially the same except for the fact that the apertures 14*m* are customarily elongate slots to accept the looped ends 16*m* of a looped wire tie 12*m* rather than round to receive the button type head as before. Also, the loop 16*m* does not project all the way through the track as was the case with the button tie thus necessitating the use of a latch that will engage inside the slot 32.

The track 22*m* is different than the one previously described and which was disclosed in my previous application in that the channels 28 are reversed to place them in flange-to-flange rather than web-to-web relation. Thus, with the flanges 30*a* and 30*b* turned inwardly toward one another, the area 32*m* in which the latch elements 24*a* ride is considerably wider. As before, flanges 30*a* rest against the form panels 10*m* while the remaining flanges 30*b* constitute the rails along which the latch elements slide.

The channels are spaced apart a sufficient distance to pass the looped end 16*m* of the ties into the space 32*m* therebetween; however, as aforementioned, these loops terminate inside the track rather than projecting all the way through. The plane of the loops is normal to the direction of travel of the latch elements for obvious reasons.

The latch element 24*a* includes a central block portion 46 that has a pair of ears 48 projecting from both the upper and lower faces thereof that are spaced apart the distance necessary to receive the inturned flanges 30*b* therebetween for free sliding movement as best shown in FIGURE 8. These ears are located intermediate the inner and outer faces of the block portion 46 so as to leave a projection 50 exposed that can be struck with a hammer to lock and release the latch element.

In the particular form shown in FIGURES 6, 7 and 8, the latch element is of the double-ended type having blade-like portions 52 projecting laterally from the inner extremity of the block portion in opposite directions. The free ends of each of these blades are tapered slightly as indicated at 54 so that they will enter the loop readily and cam the form tie stop 20 up tightly against the inside of the form panel with a wedge-like action as before. While only the edge facing the ears 48 need be inclined to accomplish the foregoing, it is preferable to incline the inside edge also so that it will not hang up in the tie slots 14*m* of the form panel when the latch is moved over the surface thereof. The upper and lower surfaces of the blade are, likewise, inclined to produce a blunted point which will easily enter the tie loop.

Once again, the double-ended configuration enables the end-latch element to lock into a tie located on either side thereof.

Next, with brief reference to FIGURE 9, it will be seen that another modification of the lop-tie end latch 24*b* has been illustrated which differs from that just described in only one respect, namely, it is adapted for use with the web-to-web track 22 rather than the flange-to-flange track 22*m*. Accordingly, the only change is to substitute for the ears 48, a pair of generally J-shaped hook-forming elements 58 that hook over the edges of the outturned rail-forming flanges 30*b*. All other elements of latch 24*b* remain the same as latch 24*a* of FIGURES 6, 7 and 8 which has already been described in detail.

Finally, in connection with FIGURES 10 and 11, a further modification 24*c* has been illustrated that is almost identical with latch element 24*a* except that it is of the single-ended type. Instead of the ears 48*a* projecting from the sides of the block portion 46*a* as before, this block is widened out and the ears are formed by merely slotting the upper and lower faces of the block as at 60. Functionally, of course, the results are the same and the two block structures 46 and 46*a* are equivalent to one another. This slight change in design also widens out projection 50*a* giving a larger surface to hit with a hammer.

Now, latch element 24*c* will work with the flange-to-flange track 22*m* of FIGURES 6 and 8 or it can be used with still another track design 22*n* that is shown in FIGURE 11 and which substitutes Z-bars 62 for the channels 28. In this modification, the flanges 30*a* that bear against the form panel face outwardly, whereas, flanges 30*b* turn in. Obviously, the latch element 24*a* of FIG-

URES 6, 7 and 8 could be used with the Z-bar track **22***n* of FIGURE 11.

By now it should be obvious that minor changes in design well within the skill of the art can adapt any of the latch elements **24**, **24***a*, **24***b* or **24***c* for use with any of the tracks **22**, **22***m* or **22***n*. Furthermore, it is even a simpler matter to adapt the latch elements to either single-ended or double-ended use.

Accordingly, having thus described the several useful and novel features of the tie end latch and track assemblies of the present invention, it will be obvious that the many worthwhile objectives for which they were developed have been achieved. Although but a few specific forms of the invention have been specifically illustrated and described herein, I realize that certain changes and modifications therein may well occur to those skilled in the art within the broad concepts 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. In a concrete wall-forming system of the type having a pair of form walls interconnected by a plurality of ties projecting therethrough and adapted to maintain a fixed spaced relation therebetween, the improved means for reinforcing said form walls while simultaneously releasably securing same to the tie ends which comprises: an elongate combination form wall brace and tie end latch track having central longitudinal slot sized to receive the projecting form tie ends, an inner pair of coplanar flanges adapted to engage the exterior face of the adjacent form wall on both sides of the tie row, and an outer pair of coplanar flanges parallel to the inner pair thereof and spaced outwardly therefrom defining rails; and, at least one latch element mounted on each track element for slidable movement from end-to-end thereof; said latch element including slotted projections positioned and adapted to receive the rail-forming flanges of the track, at least one wedge-forming portion formed on said latch element extending in the direction of the slot in the track and adapted upon relative slidable movement to engage one of the form tie ends located therein, said wedge-forming portion including an inclined surface operative upon engagement with the tie end to draw the track up tight against the form wall, and a tool-engaging portion formed on said latch element projecting beyond the track in position to be struck with a tool in the directions to engage or disengage a tie end wherein the wedge-forming portion of the latch element comprises a tapered finger located within the slot in the track and extending in the direction of the length thereof, said finger being adapted to enter the loop in a loop-ended form tie extending into the slot in the track, the inclined surface of said wedge-forming finger being operative upon movement along the track to draw the tie outwardly.

2. In a concrete wall-forming system of the type having a pair of form walls interconnected by a plurality of ties projecting therethrough and adapted to maintain a fixed spaced relation therebetween, the improved means for reinforcing said form walls while simultaneously releasably securing same to the tie ends which comprises: an elongate combination form wall brace and tie end latch track having central longitudinal slot sized to receive the projecting form tie ends, an inner pair of coplanar flanges adapted to engage the exterior face of the adjacent form wall on both sides of the tie row, and an outer pair of coplanar flanges parallel to the inner pair thereof and spaced outwardly therefrom defining rails; and, at least one latch element mounted on each track element for slidable movement from end-to-end thereof; said latch element including slotted projections positioned and adapted to receive the rail-forming flanges of the track, at least one wedge-forming portion formed on said latch element extending in the direction of the slot in the track and adapted upon relative slidable movement to engage one

of the form tie ends located therein, said wedge-forming portion including an inclined surface operative upon engagement with the tie end to draw the track up tight against the form wall, and a tool-engaging portion formed on said latch element projecting beyond the track in position to be struck with a tool in the directions to engage or disengage a tie end wherein the track comprises a pair of identical channel irons fastened together in fixed spaced parallel relation with the flanged edges thereof turned inwardly and wherein the latch element includes outwardly opening slots adapted to receive one pair of the inturned flanges for slidable movement therein, and in which the wedge-forming portion of the latch element comprises a tapered finger located within the slot in the track and extending in the direction of the length thereof, said finger being adapted to enter the loop in a loop-ended form tie extending into the slot in the track, the inclined surface of said wedge-forming finger being operative upon movement along the track to draw the tie outwardly.

3. In a concrete wall-forming system of the type having a pair of form walls interconnected by a plurality of ties projecting therethrough and adapted to maintain a fixed spaced relation therebetween, the improved means for reinforcing said form walls while simultaneously releasably securing same to the tie ends which comprises: an elongate combination form wall brace and tie end latch track having central longitudinal slot sized to receive the projecting form tie ends, an inner pair of coplanar flanges adapted to engage the exterior face of the adjacent form wall on both sides of the tie row, and an outer pair of coplanar flanges parallel to the inner pair thereof and spaced outwardly therefrom defining rails; and, at least one latch element mounted on each track element for slidable movement from end-to-end thereof; said latch element including slotted projections positioned and adapted to receive the rail-forming flanges of the track, at least one wedge-forming portion formed on said latch element extending in the direction of the slot in the track and adapted upon relative slidable movement to engage one of the form tie ends located therein, said wedge-forming portion including an inclined surface operative upon engagement with the tie end to draw the track up tight against the form wall, and a tool-engaging portion formed on said latch element projecting beyond the track in position to be struck with a tool in the directions to engage or disengage a tie end wherein the track comprises a pair of identical channel irons fastened together in fixed spaced parallel relation with the flanged edges thereof turned outwardly and wherein the latch element includes hook-forming portions defining inwardly opening slots adapted to receive one pair of outturned flanges of the track for slidable movement, and in which the wedge-forming portion of the latch element has the inclined face thereof slotted to register with the slot in the track, the slot in said inclined face being adapted to pass the shank of a button-type form tie while engaging the head thereof and in which the wedge-forming portion of the latch element comprises a tapered finger located within the slot in the track and extending in the direction of the length thereof, said finger being adapted to enter the loop in a loop-ended form tie extending into the slot in the track, the inclined surface of said wedge-forming finger being operative upon movement along the track to draw the tie outwardly.

4. In a concrete wall-forming system of the type having a pair of form walls interconnected by a plurality of ties projecting therethrough and adapted to maintain a fixed spaced relation therebetween, the improved means for reinforcing said form walls while simultaneously releasably securing same to the tie ends which comprises: an elongate combination form wall brace and tie end latch track having central longitudinal slot sized to receive the projecting form tie ends, an inner pair of coplanar flanges, adapted to engage the exterior face of the adjacent form wall on both sides of the tie row, and an outer pair of coplanar flanges parallel to the inner pair

thereof and spaced outwardly therefrom defining rails; and, at least one latch element mounted on each track element for slidable movement from end-to-end thereof; said latch element including slotted projections positioned and adapted to receive the rail-forming flanges of the track, at least one wedge-forming portion formed on said latch element extending in the direction of the slot in the track and adapted upon relative slidable movement to engage one of the form tie ends located therein, said wedge-forming portion including an inclined surface operative upon engagement with the tie end to draw the track up tight against the form wall, and a tool-engaging portion formed on said latch element projecting beyond the track in position to be struck with a tool in the directions to engage or disengage a tie end wherein the track comprises a pair of elements having a central web with parallel flanges depending from each margin thereof extending in opposite directions to produce a generally Z-shaped cross-section, said elements having their web portions interconnected in fixed spaced parallel relation with the flanges on one face turned outwardly while the other pair is turned inwardly defining a slot between their adjacent free edges and wherein the latch element includes outwardly opening slots adapted to receive the pair of the inturned flanges for slidable movement therein, and in which the wedge-forming portion of the latch element comprises a tapered finger located within the slot in the track and extending in the direction of the length thereof, said finger being adapted to enter the loop in a loop-ended form tie extending into the slot in the track, the inclined surface of said wedge-forming finger being operative upon

movement along the track to draw the tie outwardly and which wedge-forming portion of the latch element comprises a tapered finger located within the slot in the track and extending in the direction of the length thereof, said finger being adapted to enter the loop in a loop-ended form tie extending into the slot in the track, the inclined surface of said wedge-forming finger being operative upon movement along the track to draw the tie outwardly.

5. The improvement as set forth in claim 1 in which the tapered finger includes a surface normal to the plane of the form tie loop separating the inclined surface from the portion of said latch element connected to the track, said normal surface providing means adapted to prevent accidental disengagement of the form tie loop when said finger is fully inserted therein.

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