Sept. 22, 1970 H. G. GATES 3,529,800

CONCRETE FORM TIE END LATCH

Original Filed Sept. 30, 1966

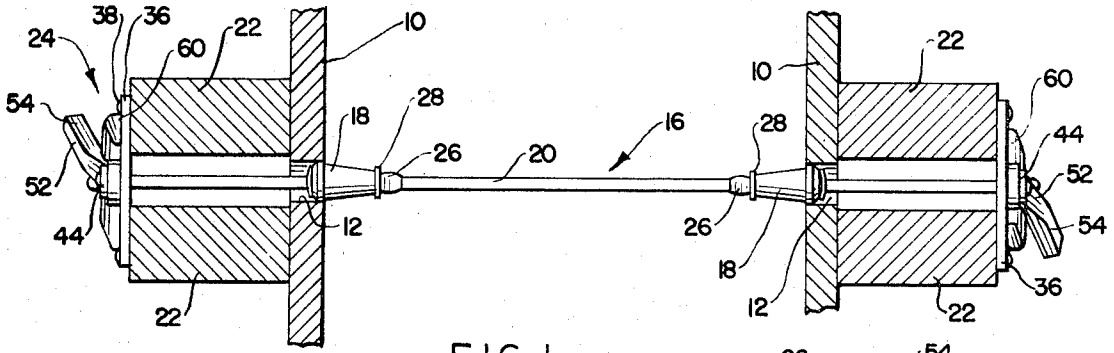


FIG. 1.

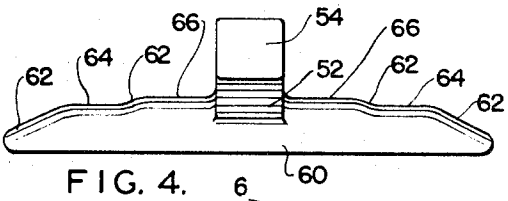


FIG. 4.

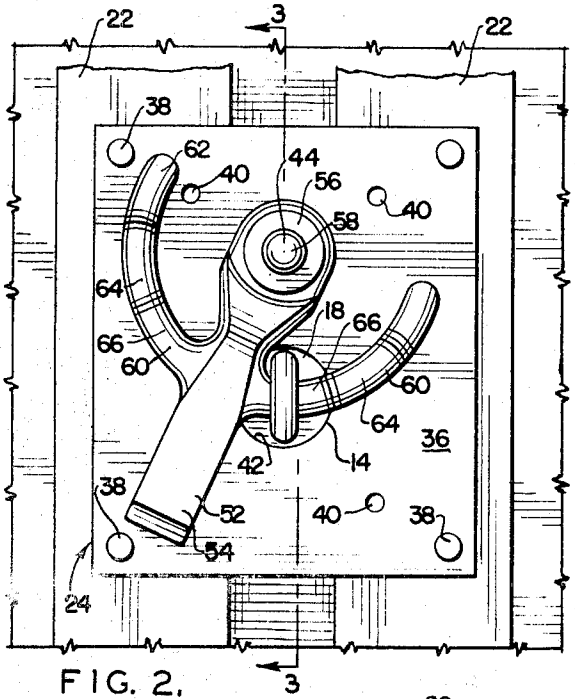


FIG. 2.

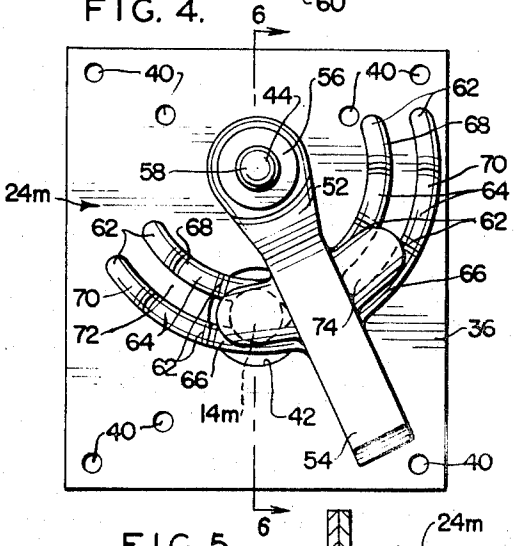


FIG. 5.

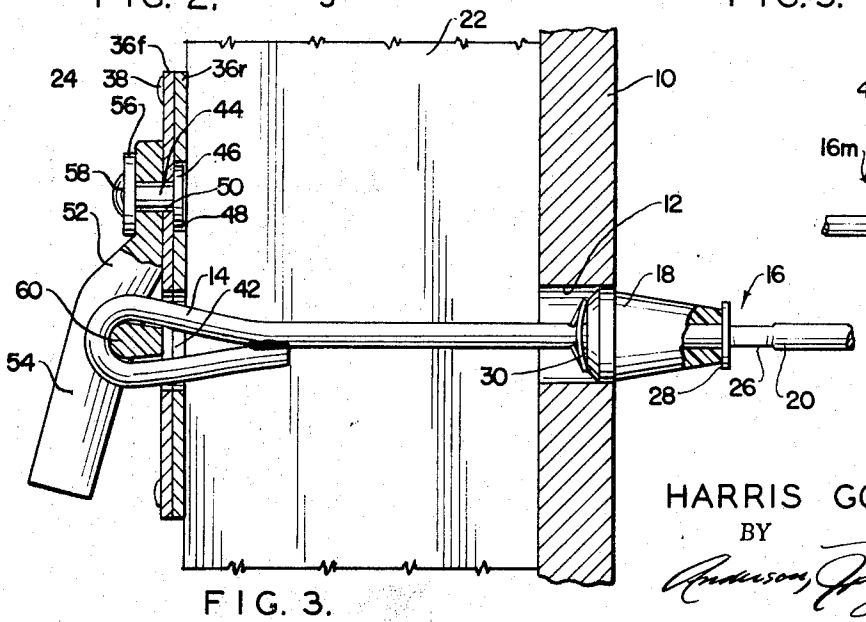


FIG. 3.

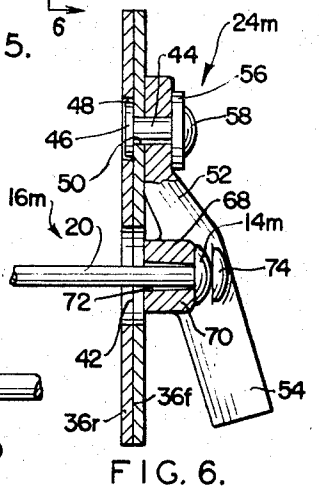


FIG. 6.

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United States Patent Office 3,529,800 Patented Sept. 22, 1970

3,529,800

CONCRETE FORM TIE END LATCH

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Continuation of application Ser. No. 583,248, Sept. 30, 1966. This application Dec. 11, 1969, Ser. No. 880,502
Int. Cl. E04g 17/06
U.S. Cl. 249—219 3 Claims

ABSTRACT OF THE DISCLOSURE

This disclosure relates to a tie end latch subassembly of the type forming the subject matter of my U.S. Pat. No. 3,141,224, which has been modified to include a flat apertured mounting plate adapted to be nailed to a pair of wooden 2 x 4 reinforcing timbers in bridging relation across a gap left therebetween sized to pass the projecting form tie ends. The plate mounts either the single or double-fingered versions of the tie-end latch element, the latter version having been improved to include a stop overhanging the tie end. The plate includes a socket for recessing the head of the tie end latch pivot on the inside and a friction fastener adapted to hold the latter element in selected rotary position.

This is a continuation of Ser. No. 583,248, filed Sept. 30, 1966, now abandoned.

In my U.S. Pat. No. 3,141,224, I disclose a tie end latch assembly for use in combination with a pair of metal channels that provide both reinforcement for the form walls and a track for said latch elements. The projecting end portions of the ties, whether of the loop-ended type or the so-called "button type," extend beyond the form walls and pass between the parallel metal rails that define the track into position for attachment to the latches that slide along said rails. The latches themselves can be of either the arcuate finger variety or the wedge-type as clearly illustrated in the aforementioned patent.

This patented system has proven quite satisfactory and is enjoying wide acceptance in the construction industry. Even so, it does possess certain drawbacks that prevent its being used more widely. The main problem is its expense due to the need for the special fabricated metal tracks. In large commercial structures where the tracks and latches can be used over and over again on successive stores, the additional expense presents no particular problem and the excellent results outweigh other factors. Even in residential construction where the contractor builds several houses having the same foundation plan, this type of form is entirely satisfactory.

About the only other problem with this type of poured concrete wall-forming system is the difficulty of adapting same to irregular shapes. For instance, in forming curved surfaces, the tracks must be specially fabricated at condesirable additional expense to the contractor and, unless additional structures of the same shape are to be built, the cost of these tracks becomes prohibitive.

Accordingly, it has now been found in accordance with the teaching of the instant invention that ahe aforementioned limitations inherent in the metal track forming system can, in large measure, be eliminated by using

ordinary wooden 2 x 4 reinforcing members arranged in spaced parallel relation to one another as the means for mounting the tie end latches. The 2 x 4's are, of course, considerably less expensive although not nearly as permanent or strong as the metal tracks. The wooden reinforcing members can be used over again a limited number of times, however, and they can be cut to different lengths more easily than the metal tracks if the particular forming problem requires that this be done. As for unusual shapes, long radius curves can oftentimes be accommodated by merely bending the 2 x 4's which is not possible with the metal rails. Short-radius curves, on the other hand, usually require that a prefabricated wooden laminate be made specially for the purpose but, even so, this can often be done at less expense than making curved metal rails.

As a result of this substitution of the wooden reinforcing members for the metal rails of my earlier patented forming system, considerable modification in the tie-end latch brackets was necessary and it is the latter that forms the subject matter of the instant application. The latches of the present invention no longer remain attached to the reinforcing members, but instead, are mounted thereon after the forms are erected. Also, no provision is made for sliding the latches along the tracks into position for attachment to the form tie ends as was the case with the earlier system. Now, the latches are merely nailed to the reinforcing members in proper position to hook onto or into the tie ends.

The locking elements themselves, with certain exceptions that will be pointed out presently, remain a good deal the same, but the supporting brackets therefor are simplified considerably due to the elimination of the casting required to hook over and slide along the track.

It is, therefore, the principal object of the present invention to provide an improved tie end latch for poured concerete gang forms.

A second objective is the provision of a device of the type aforementioned that is adaptable for use with either a loop-ended or button type concrete form tie.

Another object is to provide a tie end latch that employs a simplified bracket for pivotally mounting the locking element.

Still another objective of the invention herein disclosed and claimed is the provision of an improved locking element that includes two latched positions on each arcuate tongue or finger to accommodate variations in the thickness of the wooden reinforcing members.

An additional object is to provide an improved double-finger locking element for use with button-type ties that engages the head or upset end of the latter and prevents the form walls from moving toward one another.

Further objects are the provision of concrete form tie end latches that are simple, inexpensive, easy to install, rugged, versatile, compact, dependable, safe and ideally suited for low-cost gang forming operations.

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:

FIG. 1 is a fragmentary vertical section showing a gang form including form panels, wooden reinforcing timbers and a loop-ended tie connected in assembled relation by a pair of the tie end latches that form the subject matter hereof;

FIG. 2 is a front fragmentary elevation showing the

same assembly as in FIG. 1 but to a slightly enlarged scale;

FIG. 3 is a section taken along line 3—3 of FIG. 2;

FIG. 4 is a developed end view of the latch element alone showing the fingers straightened out to better reveal the profile of the cam surfaces;

FIG. 5 is a front elevational view showing the tie end latch modified to include a latch element of the type used on button type ties; and

FIG. 6 is a section taken along line 6—6 of FIG. 5.

Referring now to the drawings for a detailed description of the present invention and, initially, to FIG. 1 for this purpose, reference numeral **10** represents a pair of plywood pouring form panels having circular bored tie slots **12** therethrough sized to pass both the end **14** of the form tie **16** and the plug **18** carried on the shank **20** thereof that prevent the wet concrete from escaping through the tie slots. In gang forms such as illustrated in FIG. 1, the form panels **10** together with the walers **22** and the tie end latch assemblies that have been indicated in a general way by numeral **24** are frequently pre-assembled and erected before being fastened together with form ties. Accordingly, the ties must be passed through from the outside of one of the form walls thus necessitating tie slots **12** of a size and shape that will accommodate any projection on the tie. Of course, the tie end latch assemblies **24** of the instant invention are, by no means, limited to use on gang forms but are equally as useful on forms built on the job.

The particular form tie shown in FIGS. 1, 2 and 3, to which reference will now be made, has flattened sections **26** on its shank that retain washers **28** against which the plastic conical plugs **18** abut. As shown most clearly in FIG. 3, these same plugs are prevented from moving out on the shank of the tie by friction clips **30**. The plugs, in addition to sealing the tie slots, act to center the ties therein. Note also that these ties have welded loops **14** on their opposite extremities; whereas, those of FIGS. 5 and 6 are of a different so-called "button" design wherein the loop is replaced by an upset head **14***m*.

Returning again to FIG. 1, the reinforcing timbers **22** or walers are shown as 2 x 4's nailed or bolted to the outside faces of the plywood panels in spaced parallel relation to one another so as to leave a gap therebetween through which the ends of the ties pass. This gap is, of course, aligned with the row of tie slots **12**. A pair of 2 x 4's on edge provide ample horizontal reinforcement for most walls when the rows thereof are spaced about 16 inches apart. FIGS. 2 and 3 show the same parallel arrangement of the reinforcing timbers **22** but they extend vertically and are known in the trade as "stiff-backs" when in this position. It is obvious, of course, that in low-wall forming applications where less reinforcement is needed, the twin reinforcing timbers may be replaced by a single 2 x 4 laid with its face or side against the panel rather than on edge. In so doing, it becomes necessary to drill a hole through both the timber and panel to pass the tie end as there is no gap for this purpose.

The tie end latch assembly **24** can best be seen in FIGS. 2 and 3 to which specific reference will now be made. A face plate **36** sized to bridge the gap left between the reinforcing timbers is fastened to the latter with nails **38** or, in the case of a more permanent form, screws. Suitable apertures **40** are located at various points to receive these fasteners.

A large opening **42** sized to pass the end **14** of the tie, preferably about the same size as tie slot **12**, is located more or less midway between two of the side margins of the face plate. A pivot pin **44** projects from the front of the face plate in perpendicular relation thereto and spaced to one side of the large opening **42**. In the particular form shown, this pin **44** has a head **46** on the inner end thereof that rests against the hidden surface of the face plate as shown in FIG. 3. This head causes no particular problem if it projects from the rear surface of the face plate as long as two reinforcing timbers are used and it is placed in the gap therebetween. It should not, however, be allowed to rest against the reoinforcing timber and hold the face plate away therefrom as the assembly tends to wobble and the connection with the tie end is less secure. More significant, however, is the fact that the form panels and timbers must move closer together in order that the necessary connection can be made with the resultant reduction in thickness of the poured wall. Accordingly, it has found that the head should preferably be recessed into the back of the face plate to enable the latter to lay flush against the reinforcing timbers under all conditions. The socket **48** in the rear of the face plate into which the head **46** is recessed can be made in many ways; however, the simplest from a production standpoint seems to be to make the face plate in two parts and spot-weld them together. These parts are identified in FIGS. 3 and 6 as **36***f* and **36***r* and they are identical except that the opening **48** in plate **36***r* that recesses the pivot pin head is considerably larger than opening **50** in plate **36***f* that is sized to pass only the shank thereof.

Now, the latch member used with the loop-ended ties comprises a radially-extending arm **52** having one extremity thereof mounted on pivot **44** for rotational movement and the opposite free end offset in front of the face plate to form a handle **54**. This arm is secured to pivot pin **44** by means of a washer **56** and an upset end **58** that hold said arm in rather tight frictional engagement with the face plate. This is done so that, while the latch member can be moved with the operator's fingers, it will stay put and not unlock by itself. The arm is of a length to extend well beyond the large opening **42**.

Projecting from at least one side of arm **52** intermediate the ends of thereof is at least one arcuate finger **60** curved about the pivot pin **44** as its center of curvature. In the case of the latch member shown in FIGS. 2, 3 and 4 designed for use with loop-ended ties, the finger is displaced from the pivot pin a radial distance such that it will intersect the center of large opening **42** and, therefore, the loop **14** of the tie as shown in FIGS. 2 and 3. In the particular form illustrated, fingers **60** are provided on both sides of arm **52** so that the latch member may move into locked position from either side of opening **42** but, of course, a single finger would also work. In one sense, however, the provision of two fingers is preferable so that in instances where the plane of the loop is horizontal, one finger can always be dropped into the loop from the top as shown at the left in FIG. 1. This is preferable to passing the finger up through the bottom of the loop as shown on the right side of FIG. 1 for the simple reason that the latter can come unfastened much more easily than the former. These fingers are located on the arm such that they move in frictional contact with the front of the face plate and bear thereagainst at all times.

Next, with specific refgerence to FIG. 4, it will be seen that the fingers **60** are substantially planar on the bottom or rear face which bears against the face plate but have an inclined cam suface **62** on top thereof. This cam surface is inclined from the free end of the finger up to a point spaced outwardly of the point of attachment of the latter to arm **52** except that it is interrupted intermediate its ends with a first flattened portion **64** and at its terminal end by a second flattened portion **66** located at a slightly higher level than the first. The inclined cam surface, of course, acts upon the looped end of the tie **14** with a wedging action to pull the plug **18** into the tie slot in the form tie. Ordinarily, the loop will rest on flat **66** when the connection is complete; however, in the case of an oversize reinforcing timber **22**, it may be best to stop the loop at flat **64** so the form panels **10** will not be pulled to close together and result in a wall having less than the specified thickness.

Note in FIG. 3 that with a loop-ended tie, the finger **60** passing therethrough acts to hold the form walls in fixed spaced relation to one another and they cannot move

either away or toward one another. The cross section of the fingers as shown in FIG. 3 is selected such that it substantially fills the reverse bend in the loop **14**.

Finally, in connection with FIGS. 5 and 6, the modification of the tie end latch **24***m* for use on button type ties **16***m* will now be set forth in detail. The basic difference in the tie itself is that it terminates at both ends in an upset head **14***m* instead of a loop. It, of course, may be provided with the plugs, retaining washers, etc., of the loop-ended tie of FIG. 3 although these appurtenances have not been specifically illustrated in FIG. 6 as they form no part of the present invention.

The face plate **36**, pivot pin **44**, openings **40** and **42** and means (**56** and **58**) for holding the arm **52** of the latch member on the pin remain exactly the same as in the previously-described embodiment. All of the changes, therefore, are found in the latch member.

The first of these changes is found in the arcuate fingers **68** and **70** which lie in radially-spaced parallel relation and define an arcuate gap **72** therebetween that receives the shank **20** of the form tie. This gap is arcuate and curved about the pivot pin **44** as its center as are the inner arcuate finger **68** and outer arcuate finger **70**. Here, the slot **72** intersects the center of the large opening **42** in the face plate rather than the fingers which pass near the edges thereof. Individually, the fingers **68** and **70** have the same cam surface **62** and flats **64** and **66** as the previously-described fingers **60**. These inclined surfaces and flats are located in radial alignment with one another on each pair of fingers **68** and **70** so that the head **14***m* of the tie will reach same simultaneously. As before sets of fingers preferably project from both sides of arm **52** for the same reason previously elicited.

The other modification of the latch member comprises the provision of an integrally-formed ear **74** projecting out over the arcuate slot **72** from the side of arm **52**. These ears are spaced outwardly of the flats **66** on the fingers by a distance approximately equal to the thickness of head **14***m* of the tie and are designed to overlie same forming a stop. The reason for these ears is that button types ties have nothing to prevent their moving on out through the arcuate slot in the latch member and allowing the form panels to collapse by moving toward one another. These ears, of course, rest atop the head of the tie in fully-latched position and prevent movement of the form walls in either direction.

Having thus described the several useful and novel features of the tie end latch of the instant invention, it will be apparent that the many worthwhile objects for which it was designed have been achieved. Although but two specific embodiments have been illustrated, I realize that certain changes and modifications therein may well 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.

I claim:

1. The end latch for concrete form ties which comprises: at least one substantially flat rigid faceplate sized to bridge the gap left between a pair of spaced parallel wooden reinforcing timbers fastened to the outside of a pouring form panel having a row of tie slots aligned with said gap, said faceplate having a single large opening positioned intermediate the top and bottom margins thereof sized to receive an end of a concrete form tie passed through one of the tie slots and into the gap, and said faceplate having at least two smaller openings adjacent the edges thereof in position to receive fasteners attaching same to said reinforcing timbers; a pivot pin projecting from the exposed face of the faceplate in perpendicular relation thereto spaced to one side of the large opening; latch-forming means mounted on said pivot pin for sliding pivotal movement across the exposed face of the faceplate between an unlocked position uncovering the large opening and a latched position extending across said opening so as to engage and releasably fasten onto an end of a concrete form tie projecting therethrough, said latch-forming means including an arm-forming member pivotally attached to the pivot pin, slotted means carried by said arm-forming member having an arcuate slot therein spaced from the axis of rotational movement thereof and curved about the latter as its center, said arcuate slot being positioned to intersect said large opening and receive the shank of a button type form tie passing therethrough while the portions of said slotted means bordering the slot lock beneath the upset head of the tie, and an overhanging member carried by the arm-forming member projecting out over the arcuate slot, said member being positioned and adapted to move into a location atop the upset head of the form tie and prevent the latter from moving further out through the large opening in the faceplate when the latch-forming means is in fully-locked position.

2. The end latch for concrete form ties which comprises: at least one substantially flat rigid faceplate sized to bridge the gap left between a pair of spaced parallel wooden reinforcing timbers fastened to the outside of a pouring form panel having a row of tie slots aligned with said gap, said faceplate having a single large opening positioned intermediate the top and bottom margins thereof sized to receive an end of a concrete form tie passed through one of the tie slots and into the gap, and said faceplate having at least two smaller openings adjacent the edges thereof in position to receive fasteners attaching same to said reinforcing timbers; a pivot pin projecting from the exposed face of the faceplate in perpendicular relation thereto spaced to one side of the large opening; latch-forming means mounted on said pivot pin for sliding pivotal movement across the exposed face of the faceplate between an unlocked position uncovering the large opening and a latched position extending across said opening so as to engage and releasably fasten onto an end of a concrete form tie projecting therethrough, said latch-forming means including an arm-forming member having one end pivotally attached to the pivot pin and the other end projecting forwardly from the exposed face of the faceplate to define an operating handle, and means depending from said arm-forming member defining at least one arcuate cam curved about the pivoted end of the latter as a center and spaced radially therefrom so as to intersect the large faceplate opening, said cam surface including an inclined portion adapted to wedge behind an end of a form tie projecting through the large opening in the faceplate onto the exposed surface thereof, and said cam surface including two flattened sections separated by the inclined portions, said flattened sections being spaced outwardly from the exposed surface of the faceplate at different distances in substantially parallel relation thereto.

3. The end latch for concrete form ties which comprises: front and rear flat rigid plates fastened together in face-to-face relation and cooperating with one another to define a faceplate sized to bridge the gap left between a pair of spaced parallel wooden reinforcing timbers fastened to the outside of a pouring form panel having a row of tie slots aligned with said gap, said faceplate having a single large opening positioned intermediate the top and bottom margins thereof sized to receive an end of a concrete form tie passed through one of the tie slots and into the gap, and said faceplate having at least two smaller openings adjacent the edges thereof in position to receive nails fastening same to said reinforcing timbers, said rear plate having a second large opening therein spaced to one side of the first, and said front plate having still another small opening therein registering with the second large opening in the rear plate; a pivot pin having a head recessed in the second large opening in the rear plate and a shank portion projecting onto the exposed face of the face-

plate through said registering small opening in said front plate in perpendicular relation thereto; latch-forming means mounted on said pivot pin for sliding pivotal movement across the exposed face of the plate between an unlocked position uncovering said single large opening and a latched position extending across said single large opening so as to engage and releasably fasten onto an end of a concrete form tie projecting therethrough; and, fastener means mounted upon the pivot pin adapted to cooperate therewith to hold the latch-forming means flush against the exposed surface of the faceplate so as to produce substantial frictional contact therebetween.

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U.S. Cl. X.R.

249—213