Dec. 24, 1968 W. E. RUGGER 3,417,958

CONCRETE FORM SECURING MEANS

Filed Jan. 26, 1967 2 Sheets-Sheet 1

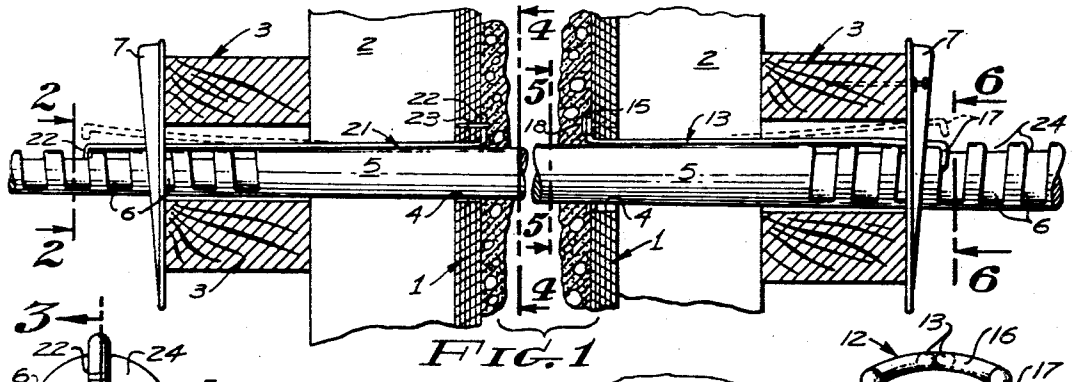


FIG. 1

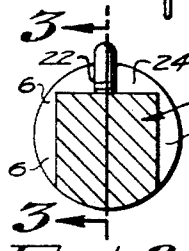


FIG. 2

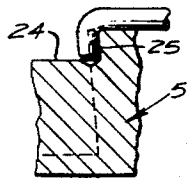


FIG. 3

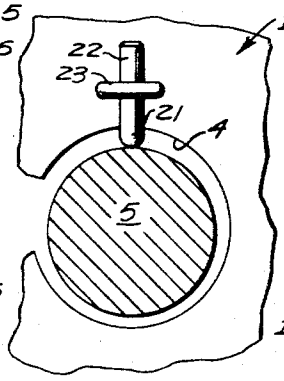


FIG. 4

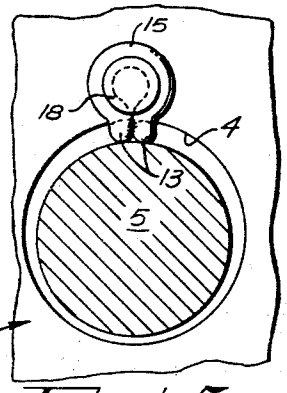


FIG. 5

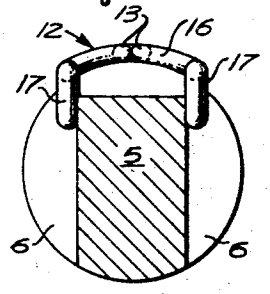


FIG. 6

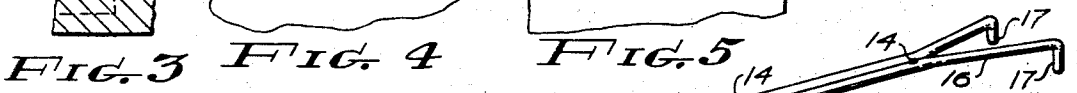


FIG. 7

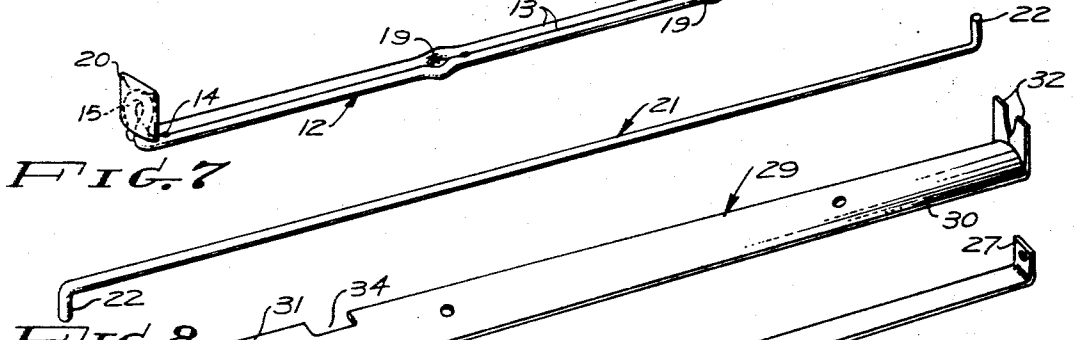


FIG. 8

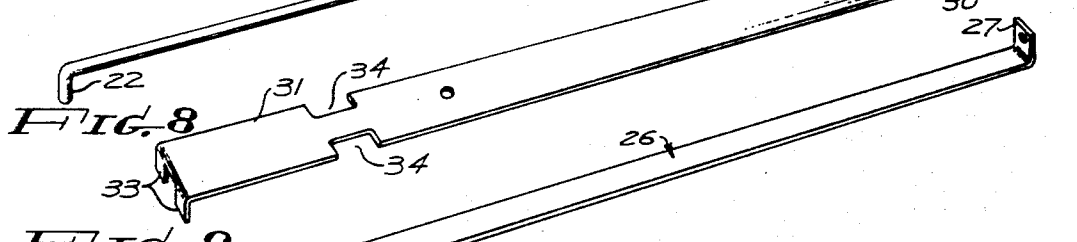


FIG. 9

FIG. 10

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CONCRETE FORM SECURING MEANS

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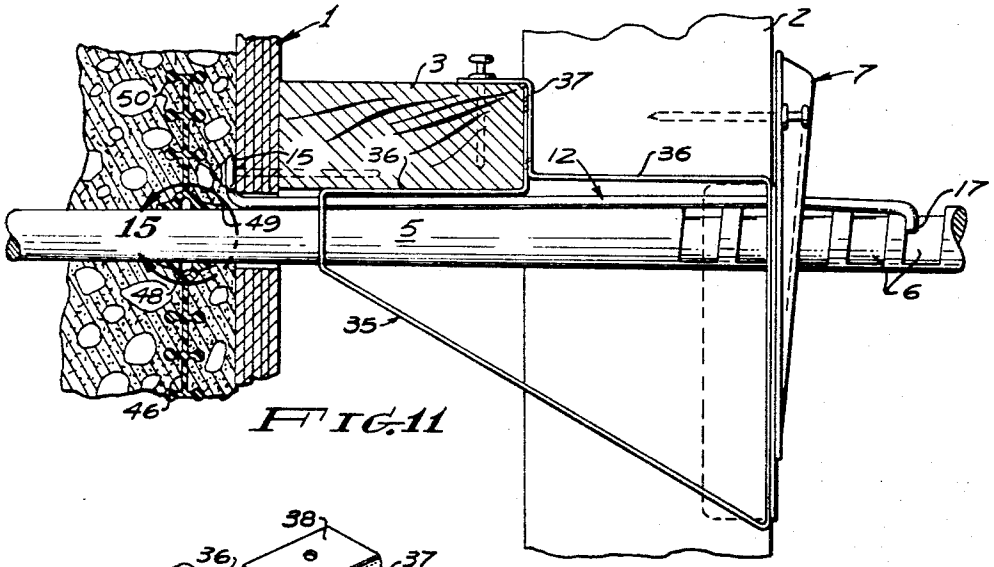


FIG. 11

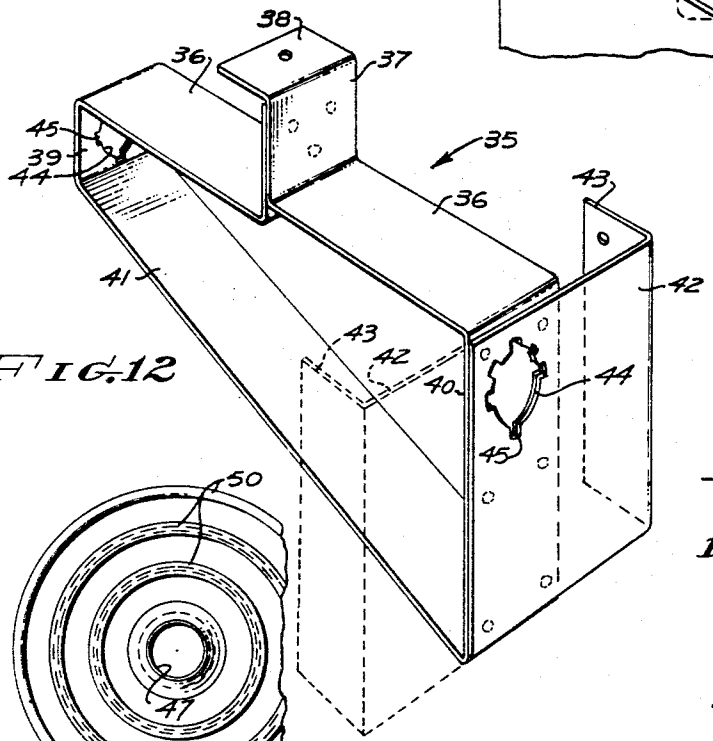


FIG. 12

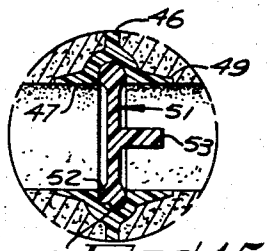


FIG. 15

FIG. 13

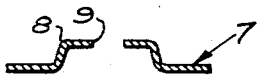


FIG. 17

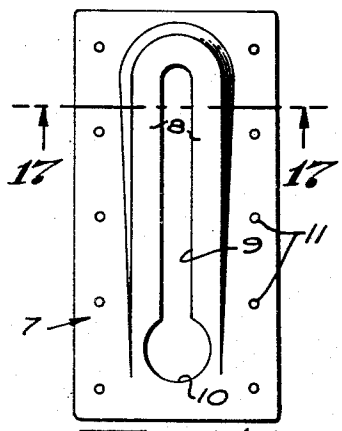


FIG. 16

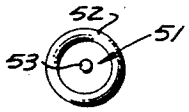


FIG. 14

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CONCRETE FORM SECURING MEANS

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Filed Jan. 26, 1967, Ser. No. 611,859
9 Claims. (Cl. 249—40)

ABSTRACT OF THE DISCLOSURE

The concrete form securing means utilizes a tapered rod which extends through opposed forms degning the wall to be constructed and is provided with a series of notches at each protruding extremity which receive fastening means that engage the studs or walers which reinforce the forms to restrain the forms from spreading. More particularly, the securing means incorporates a pair of special retainer members which extend alongside the tapered rod into the forms and have inner ends overlying the inner surfaces of the forms and outer, exposed ends arranged to be removably connected to the tapered rod near its extremities. One form of the securing means includes a bracket having means for securing a vertical stud and a horizontal waler to each other and also has spaced and aligned apertures dimensioned to receive the tapered rod as well as the retaining members. Still further, the securing means facilitates the casting of a seal element so as to close the opening in the wall formed by the tapered rod after the securing means and the forms have been removed.

Background of the invention

It is a well established practice to utilize notched tapered rods and wedge members for the purpose of preventing spreading of an opposed pair of forms; however, it is also necessary to prevent movement of the forms toward each other. One solution has involved temporary wooden blocks or spacers which are intended to be removed as the form is filled. This interferes with the concrete pouring operation and often the blocks are knocked out of place and sometimes are lost in the concrete.

Sometimes spacer sleeves have been placed over the tapered rods. These remain in the completed wall. Also sectional rods, the parts of which are screwthreaded together, or rods which have weakened portions at the selected locations have been used. In either case, the parts which remain in the concrete are expensive because of the large number required, and often introduce a problem in the finishing of the wall surface.

Summary

In the exercise of the present invention, special retained members are disposed alongside each tapered rod, the jnner ends of the retainer members engage the margins of the openings in the forms through which the tapered rods extend and the outer ends of the retainer members removably interlock with the tapered rod. The manner of connection is such that after the wall has been poured and set, the tapered bars may be removed. whereupon the forms, including the studs and walers, may be removed intact, if desired, with the retainer members in place so that the form is ready for reuse.

The present invention involves further a special bracket having several functions. The bracket facilitates the original construction of the form by providing means for joining the studs and walers, while also providing a guide and holder for the tapered rod and the retainer members.

Still further, a means is provided whereby the openings in the wall formed when tapered rods are removed are closed by a novel seal means.

Description of the drawing

FIGURE 1 is a fragmentary transverse sectional view showing a pair of form structures, and illustrating two forms of the retainer members, which form a part of this invention. The figure may be considered to be either in plan or side aspect.

FIGURE 2 is an enlarged transverse sectional view taken through **2—2** of FIGURE 1.

FIGURE 3 is a fragmentary longitudinal sectional view taken through **3—3** of FIGURE 1.

FIGURE 4 is an enlarged fragmentary transverse sectional view taken through **4—4** of FIGURE 1, with the form panel shown in elevation.

FIGURE 5 is an enlarged fragmentary transverse sectional view taken through **5—5** of FIGURE 1, also with the form panel shown in elevation.

FIGURE 6 is an enlarged transverse sectional view taken through **6—6** of FIGURE 1.

FIGURE 7 is a perspective view showing one form of the retainer member.

FIGURE 8 is a similar perspective view showing another form thereof.

FIGURE 9 is a perspective view showing a further form of the retainer member.

FIGURE 10 is a perspective view showing a still further form of the retainer member.

FIGURE 11 is a fragmentary sectional view, similar to FIGURE 1, and illustrates additionally a bracket structure and a seal means.

FIGURE 12 is a perspective view of the bracket structure.

FIGURE 13 is an end view of an insert member forming a part of the sealing means.

FIGURE 14 is an end view of the sealing plug utilized in the sealing means.

FIGURE 15 is an enlarged fragmentary sectional view taken within circle **15** of FIGURE 11, showing the complete sealing means after removal of the form.

FIGURE 16 is a side view of a wedge member.

FIGURE 17 is a transverse sectional view taken through **17—17** of FIGURE 16.

The securing means is intended to be utilized in connection with a pair of opposed form structures, intended to cast a concrete wall. Each form structure includes a plywood panel **1** backed by vertical studs **2**, and horizontal walers **3**. In some constructions, the studs are adjacent the panels; in other constructions, the walers are placed adjacent the panels. However, for purposes of illustration, in FIGURE 1, the studs are indicated as adjacent the plywood. Also, if needed, the studs or walers may be arranged in pairs. In any case, the panel **1** of each form structure is provided with a set of apertures or openings **4**, located adjacent the cross points of the studs and walers.

The openings in the panels of the two form structures are arranged in a line in pairs and receive tapered rods **5** which connect the two structures. The protruding ends of each tapered rod are provided with sets of side notches **6** which receive wedge plates or tie members **7**. One type of wedge plate is formed of sheet metal and is provided with a tapered boss **8**, having a slot **9**, enlarged at one end, as indicated by **10**, as shown best in FIGURES 16 and 17. The side margins of the wedge plate are provided with several nail holes **11**. It is preferred that the side notches **6** be slanted to correspond to the sloping margins of the slot **9**.

The wedge plates are driven between the studs or walers, whichever member is outermost from the plywood panel, and an appropriate pair of notches in the tapered rod. The construction thus far described may be considered as conventional; however, it lacks one essential feature, that is, several nails must be driven into the wedge plates in order to restrain movement of the form structures toward each other. This complicates the task of removing the forms, as all of the nails must be pulled before the wedge plates can be removed. Alternatively, wooden spacer blocks have been placed between the form structures, or permanent sleeves are fitted over the tapered rods. The rods are tapered so that they may readily driven from the wall after the concrete has set.

In exercise of the present invention, retainer members are provided. These may take various forms, as indicated in FIGURES 1 through 10. One form, designated **12**, is illustrated at the right side of FIGURE 1, in the sectional views FIGURES 5 and 6, and in the perspective view FIGURE 7. The retainer member **12** may be constructed from a folded length of wire which forms a pair of rods **13**, joined by welds **14**. The connected ends of the rods **13** are bent laterally and form a loop **15**. The other ends of the rods diverge forming a forked end **16**, terminating in right angularly directed anchor tines **17**.

Each retainer member **12** extends alongside the tapered rod **5**, its inner end passing through an opening **4**, and the loop **15** positioned so as to overlie the margin of the opening, and if desired, receive a nail **18** driven into the plywood panel **1**. The other, or outer, end or forked end **16**, is secured to the tapered rod by means of the tines **17** which fit into a pair of the side notches **6**. Each retainer member is of sufficient length as to extend beyond the corresponding wedge plate and utilize the slot **9** therein.

A form structure utilizing the retainer members **12** may be constructed as follows:

The openings **4** may be preformed at desired locations in the panel **1**. The studs and walers are nailed to each other and to the panel. The retainer members are inserted through the openings and secured by means of nails driven through the loops **15**. This may be done before the panel is set in position. After preparing a pair of form structures, the tapered rods **5** are inserted and the wedge plates **7** are driven into place. Before or after fixing the wedge plates, the forked ends **16** are engaged in the appropriate side notches **6**. The longitudinal dimensions of the tapered rods and the locations of the notches are such that when the ends of the retainer members are secured, they will determine the minimum spacing between the form structures. After the retainer members **12** have been positioned, the wedge members are driven into place so as to bear against the studs or walers and place the retainer members **12** under tension.

After the wall or portion thereof has been poured and set, the form structures are removed by first removing the wedge plates **7**. Thereupon the retainer members **12** are sprung free of the tapered rods **5**. In this regard, it should be noted that the retainer members are formed of spring material. The tapered rods are then withdrawn, whereupon the form structure may be moved to a new location without disturbing the retainer members **12**. Then, merely by reinserting the tapered rods and the wedge plates, the form structures are in condition for the pouring of another section of wall.

In some cases it is desirable to secure the retainer members intermediate their ends, and for this purpose, nail openings **19** are provided. Also, if desired, the looped ends **15** may be provided with expendable plastic caps **20**, which serve to facilitate removal of the retainer members **12** with the form structure.

In some cases a simpler retainer member **21** may be provided, as shown in FIGURE 8, and at the left side of FIGURE 1. In this case, the retainer member is in the form of a single wire, having a tine **22** at each end, which may be identical. One tine is positioned so as to engage a margin of an opening **4** in the plywood panel **1**, and may be held there by a staple **23**. In order to accommodate the other tine, the tapered rod **5** is provided with a series of top notches **24**, each having a groove **25** to prevent lateral displacement. The retainer member **21** operates in the same manner as the retainer member **12**.

In place of the single wire retainer member **21**, the retainer member may be in the form indicated by **26**. That is, formed as a strap having an inner tine **27** and an outer tine **28**, as shown in FIGURE 10. Still further, the retainer member may be in the form of a relatively wide strap, as indicated by **29**, in FIGURE 9. In this case, the inner end of the retainer member, designated **30**, is semi-cylindrical in cross section, while the outer end **31** is flat. The inner end is provided with tines **32**, and the outer end with tines **33**. The tines **32** form a notch to receive a nail or other securing means; whereas, the tines **33** are separated so as to engage in the side notches **6**. Also, the retainer member **29** is provided with side notches **34** to fit the slot **9** of the wedge plate **7**. The flat outer end **31** enables the retainer member **29** to spring free of the tapered rod **5** in the manner of the retainer member **12**.

Reference is now directed particularly to FIGURES 11 and 12. In this construction, a bracket **35** is provided, which not only secures the studs **2** and walers **3** in proper relation but also provides a guide for the tapered rod **5** and retainer member as well as an abutment surface for the wedge plate **7**. The bracket is formed of a metal strap, bent to provide an upper side **36**, the ends of the metal strap meeting at the central portion of the upper side and turned upwardly to form a vertical web **37**, from which continues a horizontal flange **38**. At the extremities of the upper side **36**, there is formed a relatively short inner side **39** and a longer outer side **40**. The lower extremities of the sides **39** and **40** are joined by an under side **41**. The bracket is thus trapezoidal form. Secured to the outer side **40** is a lateral web **42**, terminating in a flange **43**. The lateral web **42** may extend in either direction, as indicated by solid lines and by dotted lines, or may extend in both directions.

The inner portion of the upper side **36**, vertical web **37**, and flange **38** partially embraces a waler located next to the plywood panel. The lateral edge of the bracket adjacent the outer side **40**, the lateral web **42** and the flange **43** partially embrace a stud located outwardly from the waler and at right angles thereto. The stud may be on either side of the bracket, depending upon the position of the lateral web **42**, or two studs may be provided if two lateral webs and flanges are provided.

The bracket may, however, be turned at right angles to the position shown in FIGURE 12, so that the lateral edges of the strap forming the bracket constitute the upper and lower sides. In this case, a vertical stud is received under the flange **38**, and one or more horizontal walers are received above or below the flanges **33**.

The inner side **39** and outer side **40** are provided with aligned guide apertures **44**, which also align with corresponding openings **4** in the panel **1**. The apertures **44** receive the tapered rods **5** and also receive the retainer

members such as the retainer members **12**. For this purpose, the apertures **44** are bordered by accommodation notches **45**. The size and number of these notches depends upon the type of retainer member employed. Several sets of notches may be provided so that the retainer members may be placed below, above, at one side, or in angular relation to the tapered rod **5**.

By reason of the fact that perforations are left in the concrete wall when the tapered rods **5** are withdrawn, it is often essential that these perforations be sealed. This is accomplished by seal rings **46**, each of which include a central opening **47**, which receives a tapered rod **5**, and is provided with a central annular channel **48**, and axially directed marginal lips **49**. Also, to secure the insert ring in place and to minimize migration of fluid around the insert ring, the insert ring is provided with annular flanges **50**. After removal of the tapered rod **5**, a seal disk **51** is inserted in the central opening of each insert ring. Each seal disk includes a peripheral rib **52**, which fits the annular channel **48**, and is provided with a central handle **53**. The seal disk is formed of an elastomer so that it may be distorted and forced into place, the handle being grasped by a pair of pliers or similar tool.

While particular embodiments of this invention have been shown and described, it is not intended to limit the same to the details of the constructions set forth, but instead, the invention embraces such changes, modifications and equivalents of the various parts and their relationships as come within the purview of the appended claims.

I claim:

1. In a concrete form structure including a pair of form panels each backed by studs and walers, said form panels having pairs of perforations and rods extending therethrough, the rods receiving cross members for removably securing said rods to said studs and walers to restrain said form panels against movement in a direction to increase the space therebetween, the combination of means for securing said form panels against movement toward each other, comprising:

(a) a member extending alongside each rod inwardly through a perforation in a form panel;

(b) a first attachment element extending laterally from the inner end of said member and overlying the margin of said perforation;

(c) a second attachment element at the outer end of said member adapted to be removably connected to said rod.

2. A means for securing in fixed spaced relation a pair of concrete form structures, each form structure including form panels reinforced by studs and walers and having pairs of aligned openings, said securing means comprising:

(a) a plurality of rods extending through said openings and beyond said studs and walers;

(b) tie members overlying said studs and walers;

(c) means including interlocking elements incorporated in said rods and tie members whereby said rods and tie members secure said form panels against movement in a direction to increase the space therebetween;

(d) a pair of restraining members disposed alongside each rod, each restraining member having an inner end extending through a corresponding opening and an outer end extending beyond said studs and walers;

(e) a first attachment means at the inner end of each restraining member extending laterally from the corresponding rod and overlying a margin of the corresponding opening;

(f) and a second attachment means at the outer end of each restraining member engageable with the corresponding rod, whereby said pair of restraining members secure said form panels against movement in a direction to decrease the space therebetween.

3. A securing means, as defined in claim **2**, which further includes a bracket at each end portion of each rod, each bracket comprising:

(a) a horizontal side including means for attachment to a waler;

(b) a vertical side including means for attachment to a stud, thereby to secure a stud and waler in right angular relation;

(c) and means defining a pair of spaced apertures for receiving a rod and a corresponding restraining member;

(d) one of said sides forming an abutment surface for a tie member.

4. A securing means, as defined in said claim **2**, wherein:

(a) said second attachment means is a hook adapted to engage an interlocking element of the corresponding rod;

(b) and said restraining member is flexible to permit said hook to disengage said interlocking element.

5. A securing means, as defined in said claim **2**, wherein:

(a) the interlocking elements of each rod comprise a series of paired notches;

(b) said restraining member comprises a pair of rod elements welded together, said first attachment element is a loop adapted to receive a fastening means, said second attachment element is a yoke having hook extremities fitting a selected pair of notches.

6. A securing means, as defined in said claim **2**, wherein:

(a) said restraining member is a strap arcuate in cross section at its inner end and flat in cross section at its outer end, the outer end being flexible thereby to permit said second attachment means to disengage said bar.

7. A means for securing in fixed spaced relation a pair of form structures each including form plates backed by studs and walers, said means comprising:

(a) a bracket structure including a pair of right angularly related bracket elements adapted partially to embrace a stud member and waler member and having holes to receive nails thereby to secure said stud and waler in right angle relation;

(b) said bracket structure also including two parallel sides one disposed adjacent to form plate, the other spaced outwardly therefrom, said sides having aligned apertures;

(c) a tension rod dimensioned to be received in the apertures of coaxially disposed pairs of said brackets secured to an opposed pair of form structures, there being accommodation openings in said form plates;

(d) a pair of tie members for said tension rod adapted to bear against said bracket structures;

(e) and means including interlocking elements incorproated in said tie members and said tension bar to restrain said form structures against separation.

8. A means, as defined in claim **7**, which further comprises:

(a) a restraining member for each form structure disposed alongside said tension rod and extending inwardly through a corresponding opening in said form plate;

(b) a first attachment means at the inner end of said restraining member overlying a margin of said opening;

(c) and a second attachment means at the outer end of said restraining member engaging said tension rod thereby to restrain each form structure against movement toward the other form structure.

9. In combination with a securing means for forms employed to cast a concrete wall therebetween, wherein tension rods extend between said forms and are later

removed from the concrete wall, a means for sealing the hole formed by each of said tension rods, comprising:

(a) a yieldable circular plate fitting said rod and disposed adjacent a side of said wall and cast as an insert in said wall, said disk having an annular channel initially sealed by said rod;

(b) and a yieldable disk having an annular rim dimensioned to be forced into said channel after removal of said tension rod.

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