Feb. 16, 1954 W. A. SEEMANN 2,669,000

FORM AND HOLDING MEANS THEREFOR

Filed March 8, 1952 2 Sheets-Sheet 1

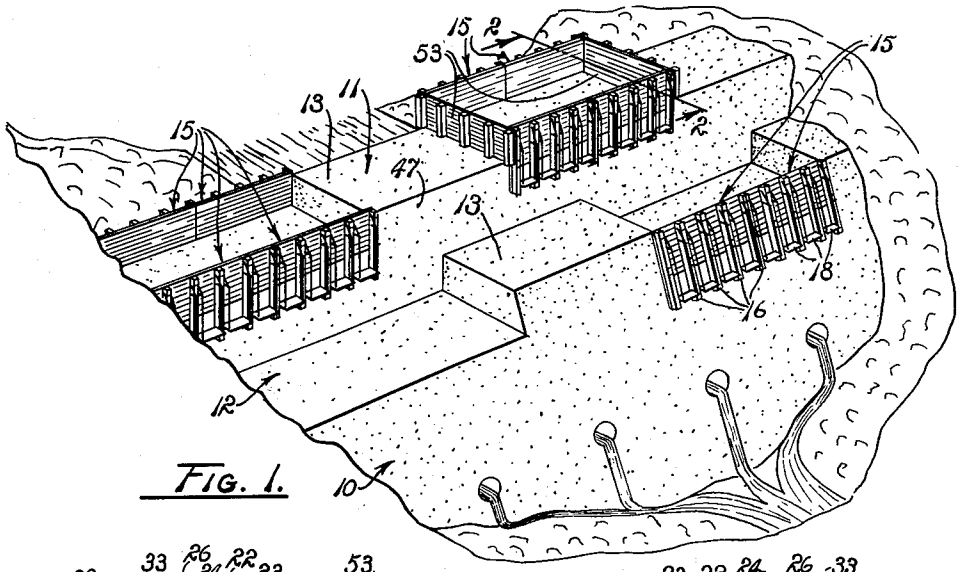


FIG. 1.

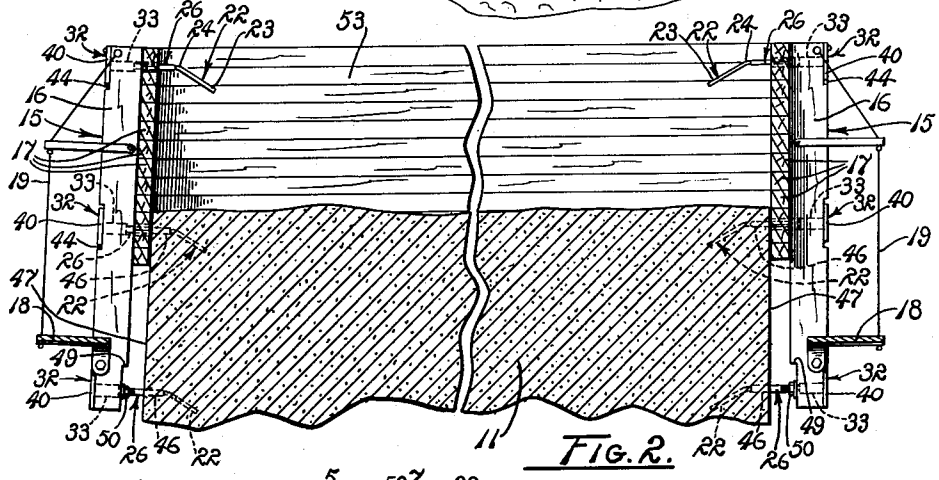


FIG. 2.

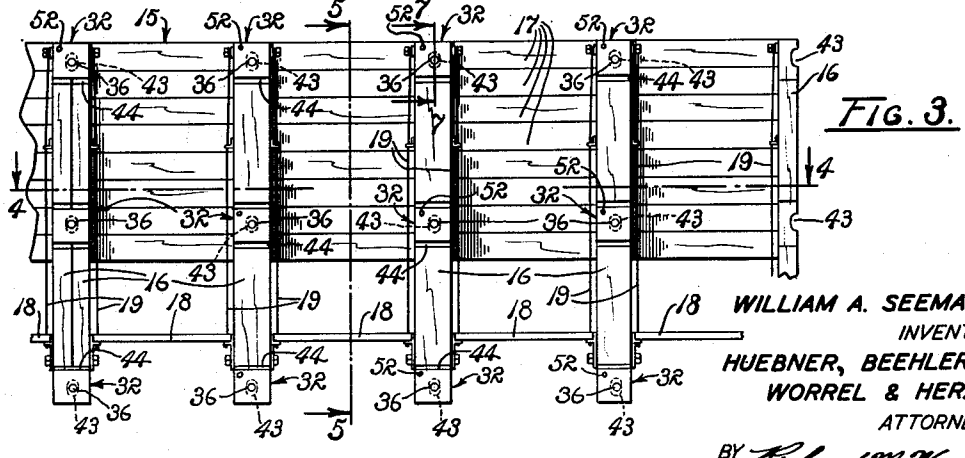


FIG. 3.

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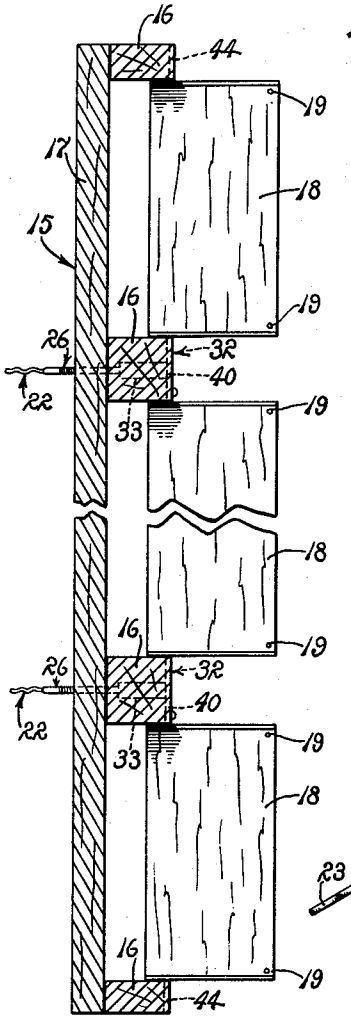


FIG. 4.

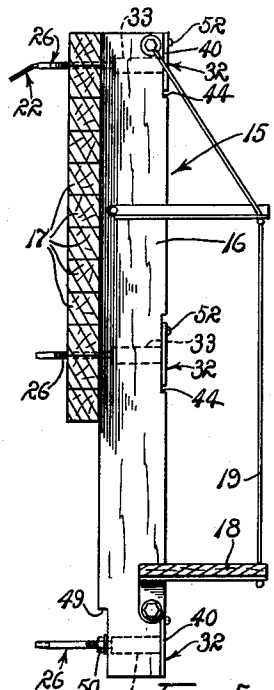


FIG. 5.

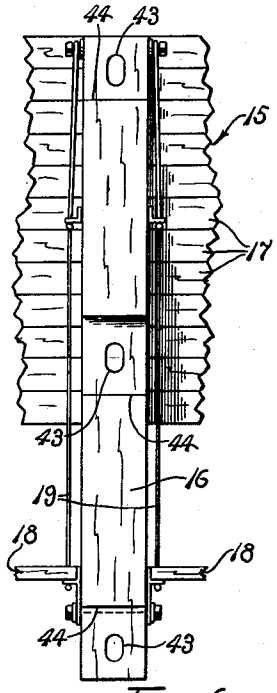


FIG. 6.

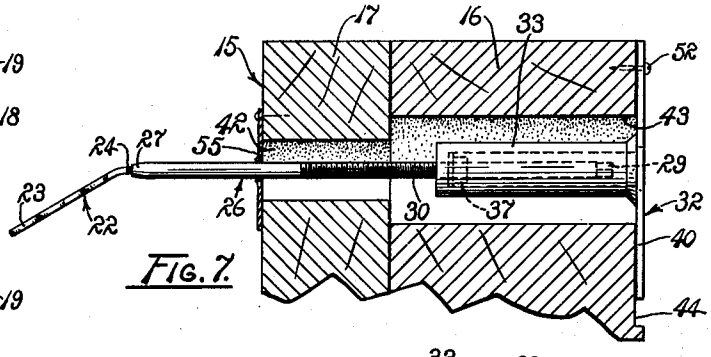


FIG. 7.

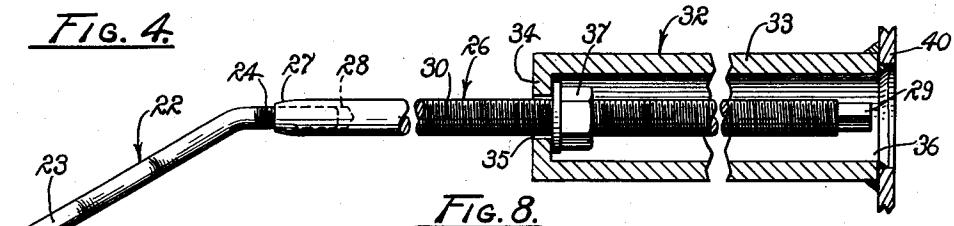


FIG. 8.

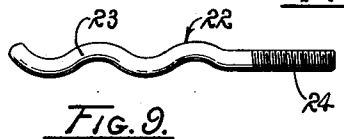


FIG. 9.

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FORM AND HOLDING MEANS THEREFOR

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Application March 8, 1952, Serial No. 275,587

7 Claims. (Cl. 25—131)

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The present invention relates to concrete forms and the like and more particularly to the combination of such a form with improved holding means therefor.

In the construction of dams and other massive structures formed of concrete, it is the usual practice to pour the concrete in successive batches which when hardened are so integrated as to form the resultant structure. It is the usual practice to permit preceding batches to "set" preliminary to the pouring of a successive batch so that the preceding batches are utilized to hold forms and such batches themselves frequently constitute portions of the form.

It is the usual practice to embed anchor pins, referred to as hair pins, in predetermined positions as each new batch of concrete is poured so that the pins can be used in anchoring the forms in new positions for successive batches. In mounting the forms on the previously located anchor pins, the forms temporarily are held in desired position by means of cranes or the like and drawn tightly against the previously set batches of concrete by means of "she bolts" extended through the forms and screw-threadably tightened onto the anchor pins.

The conventional practice just described, is subject to certain disadvantages which the instant invention has overcome. The she bolts are exposed in positions where they are frequently struck by buckets of concrete lowered adjacent thereto for adjacent pours. Inasmuch as the buckets of concrete are of great weight, the she bolts are snapped off whenever engaged thereby. Inasmuch as the she bolts are relied upon to hold forms in place, the breaking thereof is of serious consequence, normally releasing forms held thereby permitting displacement from precisely predetermined position. If the form has already received fresh concrete which has not yet hardened, such a release of a portion of a form results in a waste of concrete and jeopardy to workmen and materials working or positioned in proximity thereto.

The removal of a broken she bolt is a difficult and frequently hazardous task. Its replacement is a time-consuming operation. The cost of the she bolts thus broken in dam construction is frequently large. For example, in a large dam currently under construction, $100,000 worth of she bolts were broken in the pouring of the first million cubic yards of concrete.

An object of the present invention is therefore to provide an improved holding means for concrete forms and the like.

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Another object is to eliminate the expense, inconvenience, hazard, and waste incident to the breaking of she bolts in concrete construction, as described above.

Another object is to provide a combination of concrete form and holding means therefor in which the holding means is housed by the form and thus shielded from damage.

Another object is to provide a holding means for concrete forms of the character described in the preceding paragraph which are adjustable so as to facilitate precise form positioning.

Further objects and advantages will become apparent in the subsequent description in the specifications.

In the drawings:

Fig. 1 is a perspective of a dam under construction showing forms positioned for subsequent batches of concrete, illustrative of the operational environment of the subject invention.

Fig. 2 is an enlarged foreshortened vertical section taken on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary side elevation of a combined form and holding means embodying the principles of the present invention.

Fig. 4 is a horizontal section taken on line 4—4 of Fig. 3.

Fig. 5 is a vertical section taken on line 5—5 of Fig. 3.

Fig. 6 is an enlarged fragmentary elevation of a portion of the form shown in Fig. 3.

Fig. 7 is an enlarged fragmentary vertical section taken on line 7—7 of Fig. 3.

Fig. 8 is a side elevation of a holding means embodying the principles of the present invention, a portion thereof being shown in vertical section and foreshortened for illustrative convenience.

Fig. 9 is a top plan view of an anchor pin utilized in mounting concrete forms.

Referring in greater detail to the drawings:

In Fig. 1, a partially constructed dam of concrete is indicated generally at 10 for illustrative purposes only. The dam is shown as formed of an upstream layer 11 and a downstream layer 12. As shown, the upstream layer has progressed higher than the downstream layer and thus the upstream layer is utilized as a portion of a form for pouring each successive batch of concrete in the downstream layer. Further, it will be noted that successive islands of concrete 13 are upwardly extended from each layer in spaced relation so that islands also constitute portions of a form for successive pours.

Movable form sections 15 are conventionally

formed of wood and usually employ substantially erect studding 16 and transversely located planks 17 mounted thereon. The strength and weight of the form sections are readily appreciated when it is observed that the studding are usually 12 x 12 timbers, the planks usually 6 x 6 timbers and the sections approximately 20 feet long.

The form sections 15 are usually swung into place by means of a crane, or the like, not shown, and bolted into position by means of the she bolts by operators supported on retractable catwalks 18 pivotally mounted between the studdings 16 for retraction inwardly between the studdings. The catwalks are supported in outwardly extended position by means of cables 19, shown in Fig. 2. The structure described to this point is essentially conventional and attention is now directed to the improvements of the present invention.

In a manner which will subsequently become apparent, anchor pins 22 are embedded in the concrete in sets of vertically spaced pins arranged in predetermined positions. As shown in Figs. 8 and 9, each anchor pin preferably has a corrugated portion 23 and a male threaded portion 24. The corrugated portion is preferably confined to a common plane to which the male threaded portion is angularly relayed.

As evident in Figs. 7 and 8, an elongated bolt 26 having a tapered end portion 27 is provided in which an internally threaded bore 28 is formed which is releasably engageable with the male threaded portion 24 of the anchor pins 22. Each of the bolts has an opposite end providing a wrench head 29 and an elongated externally screw-threaded portion 30 adjacent to the wrench head.

A thimble 32 is provided having a hollow substantially cylindrical central sleeve portion 33. The sleeve portion has an inwardly turned end providing an annular shoulder 34 defining a bore 35 cencentrically of the sleeve. For descriptive convenience the end of the sleeve portion providing the annular shoulder is referred to as the substantially closed end and the opposite end of the sleeve as the open end 36. The sleeve portion 33 is loosely mounted on the bolt 26 with the bolt slidably positioned in the bore 35 with the wrench head 29 thereof within the sleeve and the tapered end 27 extended endwardly of the sleeve. A nut 37 is screw-threadably mounted on the threaded portion 30 of the bolt within the sleeve engageable with the annular shoulder 34.

The thimble 32 also provides a mounting plate 40 weldably secured thereto, or cast integrally therewith, and radially extended in circumscribing relation to the open end 36 of the sleeve portion.

A plurality of bores 42 are formed through each of the form sections 15 in longitudinally spaced relation in each of the studdings 16. Each of the bores is substantially larger than the bolts 26 and are preferably elongated longitudinally of the studdings inasmuch as a wider range of vertical adjustment is required in positioning the form sections than the range of horizontal adjustment. A counterbore 43 is formed in alignment with each of the bores and similarly is preferably vertically elongated for adjustment purposes. The counterbores 43 are oppositely disposed in the studdings from the planks 17 and recessed areas 44 provided thereabout.

Operation

The operation and utility of the present invention are believed to be clearly apparent and are briefly summarized at this point. For descriptive convenience, it is assumed that a previous mass of concrete has been hardened with the anchor pins 22 arranged therein in predetermined positions. It will be observed that the pins are embedded in the concrete with the threaded portions 24 thereof housed in pockets 46 formed in substantially erect surfaces 47 of the concrete mass. The threaded portions 24 are substantially horizontally disposed.

Preliminary to forming an island on the upstream layer 11, as illustrated in Figs. 1 and 2, any required number of form sections 15 are positioned against the surfaces 47 and upwardly extended therefrom in cantilever arrangement. The bores 42 and counterbores 43 are aligned with the pockets 46 and the bolts 26 extended through the bores and counterbores and screw-threadably mounted on the anchor pins 22. This is conveniently accomplished by an operator supported on the catwalks 18 while the form is supported in position by a crane or the like. Any suitable socket wrench adapted to fit the wrench head 29 may be employed to tighten the bolt onto the pin and tightly to seat the tapered end 27 of the bolt in its pocket 46.

The operator then slides the thimbles 32 into the counterbores 43 with the annular shoulders 34 slidably fitted over the bolts 26. As evident in Fig. 7, the sleeve portions 33 are loosely fitted to the bores 42. Nuts 37 are screw-threadably mounted on the bolts and drawn inwardly against the annular shoulders 34 also by means of any suitable socket wrench, not shown. The recessed areas 44 are substantially larger than the mounting plates 40 so that preliminary to tightening the nuts into place, the form sections may be precisely positioned. Subsequent to tightening of the nuts the form sections are dependably held in position against the surfaces 47.

It will be noted in Fig. 2 that the lower ends of studs 16 are notched at 49 and inner adjustment nuts 50 screw-threadably mounted on the bolts 26 in engagement with the studs. The extent of the notching is exaggerated in the drawing more clearly to show the structure. When the notched portions 49 are as deep as shown in Fig. 2, it is necessary to employ thimbles of somewhat reduced length, for obvious reasons. By adjusting the nuts 37 and the adjustment nuts 50 inwardly and outwardly on their bolts 26, the precise attitude, within relatively narrow limits, of the upwardly extended studs 16 and the planks 17 can be precisely determined.

The lowermost planks 17 are engaged against the surfaces 47 and define an upwardly extended wall therefrom. Adjacent to the upper ends of the studs the described bores 42, counterbores 43, and recessed areas are provided as described. In order to locate anchor pins 22 in fresh concrete to be poured into the form, the thimbles 32 and bolts 26 are mounted therein as shown, and anchor pins 22 screw-threadably mounted in the bores 28 of the bolts in the precise positions desired in the newly formed island or pour. To retain the bolts and thimbles in assembled relation in the bores and counterbores at the upper ends of the studs, screws 52 are extended through the mounting plates 40 and engaged in the studs. The screws are employed only to hold the uppermost thimbles, bolts and pins in position while a new pour is made. Further, if desired, a piece of sheet metal 55 may be frictionally mounted on

each of the bolts **26**, holding the pins **22** to be embedded in the new concrete, in engagement with the back sides of the form sections. The sheet metal facilitates the holding of the bolts and pins in desired positions in the forms and yet permits the removal of bolts from the bores **42** and counterbores **43** after the new concrete has hardened. The desired frictional engagement is readily achieved by simply driving the bolts through light sheets of such material preliminary to installation on their respective pins. The tapered ends **27** of the bolts **26** are preferably greased to preclude adherence of concrete thereto.

Ends of form sections **15** are interconnected by transverse form sections **53** of any suitable form bolted or otherwise secured to opposite ends of the sections **15**, as shown in Fig. 1, when an upwardly extended island **13** is to be formed. When making a fill between upwardly extended islands in an elevated layer, only a pair of form sections **15** is required inasmuch as islands at the opposite ends of the fill take the place of transverse form sections **53**. In forming a fill between spaced islands in a lower layer, only a single form section is required, as indicated.

When it is desired to employ a plurality of form sections **15** in endwardly abutting relation, the studs **16** at the end of the section are conveniently of only half the normal width and fitted against studs at the end of an adjacent section and the bores **42**, counterbores **43**, and recessed areas **44** formed therebetween, as evident in Fig. 3. In such instances, the mounting plates **40** span the juncture of sections **15** and dependably hold the endwardly adjacent sections in place.

When the form sections are installed, concrete is poured therebetween and settled about the anchor pins **22** and tapered ends **27** of the bolts **26**. When the concrete has set, the screws **52** are removed from the mounting plates **40** of the uppermost thimbles **42**, the nuts **37** released from the bolts in these thimbles and the bolts unscrewed from their respective anchor pins **22**, leaving the anchor pins embedded in the newly set concrete with the pockets **46** thereabout formed by the tapered ends **27** of the bolts. Similarly, the other nuts **37** are removed, releasing the thimbles **32**, and permitting the unscrewing of the bolts from the previously set anchor pins **22**.

The present invention has proved dependable in holding concrete forms precisely in position. The loose fitting of the thimbles **32** and bolts **26** to the counterbores **43** and bores **42** accommodate adjustment of the form sections **15** into precisely desired position preliminary to tightening the nuts **37** to draw the mounting plates **40** tightly against the recessed areas **44**. Inasmuch as the nuts **37**, bolts **26**, and thimbles **32** are completely housed during use, there is no danger of their breakage or displacement incident to inadvertent engagement by heavy buckets of concrete or the like and thus, the expense of she-bolt replacement as well as the hazards, inconveniences, and readjustment expenses have been obviated.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices and apparatus.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination with a concrete form or the like having a bore, a counterbore aligned with the bore, and a recessed area circumjacent to the counterbore; a hollow substantially cylindrical sleeve loosely mounted in the counterbore having an outwardly disposed open end and an inwardly disposed end provided with an inwardly directed annular shoulder defining a bore concentric to the sleeve; a mounting plate radially extended from the outer end of the sleeve slidably engaged with the recessed area of the form; an elongated bolt extended through the bore of the sleeve having an end disposed within the sleeve and an opposite end loosely extended through the bore of the form; means engaged with the extended end of the bolt rigidly mounting the bolt in predetermined position; and means adjustably positioned longitudinally of the bolt in engagement with the shoulder of the sleeve to draw the sleeve, plate and form toward the rigid mounting means for the bolt.

2. In combination with a concrete form having a bore, a counterbore aligned with the bore, and a recessed surface area circumjacent to the counterbore; a hollow substantially cylindrical sleeve loosely mounted in the counterbore having an inwardly disposed end provided with an inwardly directed annular shoulder defining a bore concentric to the sleeve and said sleeve having an outwardly disposed open end; a mounting plate rigidly mounted on the outer end of the sleeve and radially extended therefrom in sliding engagement with the recessed surface area of the form; an elongated bolt slidably mounted in the bore of the sleeve having an end disposed within the sleeve and opposite tapered end loosely extended through the bore of the form provided with an internally screw-threaded longitudinal bore; and a nut screw-threadedly mounted on the bolt within the sleeve in engagement with the annular shoulder thereof.

3. In concrete construction, the combination of a plurality of rigidly mounted pins having substantially horizontally disposed male screw-threaded ends; a elongated bolts screw-threadedly mounted on the screw-threaded ends of the pins in housing relation thereto and endwardly extended therefrom; a concrete form having bores formed therein loosely fitted over the bolts, counterbores concentric to the bores oppositely disposed from the pins, and recessed surface areas circumjacent to the counterbores, the bolts being endwardly extended from the pins a distance less than the combined lengths of the bores and the counterbores; thimbles loosely fitted into the counterbores of the forms having hollow central portions received in the counterbores in circumscribing relation to the bolts, substantially closed ends slidably mounted on the bolts, opposite open ends, and mounting plates radially extended from the open ends in engagement with the recessed areas of the forms; and nuts screw-threadedly mounted on the bolts within the thimbles in abutting relation to the substantially closed ends thereof.

4. In a concrete form, the combination of an anchor pin having a corrugated portion and a male screw-threaded portion adapted for embedding in a mass of concrete, the corrugated portion lying in a plane angularly related to the screw-threaded portion; an elongated bolt having an externally endwardly tapered end portion having a longitudinal bore provided with female screw-threads releasably mounted on the screw-

threaded end portion of the pin, an opposite end providing a wrench head, and an externally screw-threaded portion adjacent to the end of the bolt providing the wrench head; a thimble having a hollow cylindrical portion in circumscribing relation to the externally screw-threaded portion of the bolt, a substantially closed end slidably mounted on the bolt, an open opposite end endwardly extended from the wrench head of the bolt, and a mounting plate radially extended from the open end of the cylindrical portion; a nut screw-threadedly mounted on the externally screw-threaded portion of the bolt within the thimble in engagement with the substantially closed end of the thimble; and a concrete form providing a bore loosely receiving the bolt and a counter-bore loosely receiving the thimble therein with the mounting plate of the thimble slidably engaged against the form.

5. In combination with a concrete form having an opening therethrough, a hollow sleeve loosely mounted in the opening having an outwardly disposed open end and an inwardly disposed end within the form provided with an inwardly directed annular shoulder defining an opening therethrough, a mounting plate radially extended from the outer end of the sleeve slidably engaged against the form, an elongated bolt extended through the opening defined by the shoulder of the sleeve having an end disposed within the sleeve and an opposite end extended loosely through the opening in the form, means engaged with the extended end of the bolt rigidly mounting the bolt in predetermined position, and means adjustably positioned longitudinally of the bolt within the sleeve in engagement with the shoulder of the sleeve to draw the sleeve, plate and form toward the mounting means for the bolt.

6. Releasable retaining means for concrete forms and the like adapted for connection to an anchor pin comprising a flat mounting plate having an opening centrally therein, a hollow sleeve rigidly connected to the mounting plate in registry with the opening and extended substantially right angularly from the plate to one side thereof, the

extended end of the sleeve having an inwardly directed annular shoulder defining a bore therethrough, a bolt extended loosely through the bore in the annular shoulder having a male screw-threaded end terminated within the sleeve and an opposite female screw-threaded end for connection to an anchor pin externally of the sleeve, and a nut screw-threadedly mounted on the male screw-threaded end of the bolt within the sleeve against the annular shoulder whereby when the sleeve is mounted in a form with the plate thereagainst the plate provides a flat outwardly disposed face into which the bolt and nut are recessed and shielded by the sleeve from inadvertent contact.

7. In combination with a concrete form having an opening therethrough and a recessed area circumjacent to the opening, a hollow sleeve loosely mounted in the opening having an outwardly disposed open end and an inwardly disposed end within the form provided with an inwardly directed annular shoulder defining a constricted opening therethrough, a mounting plate radially extended from the outer end of the sleeve slidably engaged against the form in the recessed area circumjacent to the opening, an elongated shoulder extended through the opening defined by the shoulder of the sleeve having an end disposed within the sleeve and an opposite end extended loosely through the opening in the form, means engaged within the extended end of the bolt rigidly mounting the bolt in predetermined position, and a nut screw-threadably mounted on the bolt within the sleeve in engagement with the shoulder of the sleeve to draw the sleeve, plate, and form toward the mounting means for the bolt.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,074,460	Colt	Mar. 23, 1937
2,100,614	Schenk	Nov. 30, 1937