Dec. 6, 1960 C. I. WILLIAMS 2,962,789

FLEXIBLE SOCKET

Filed Aug. 5, 1954

Fig. 1.

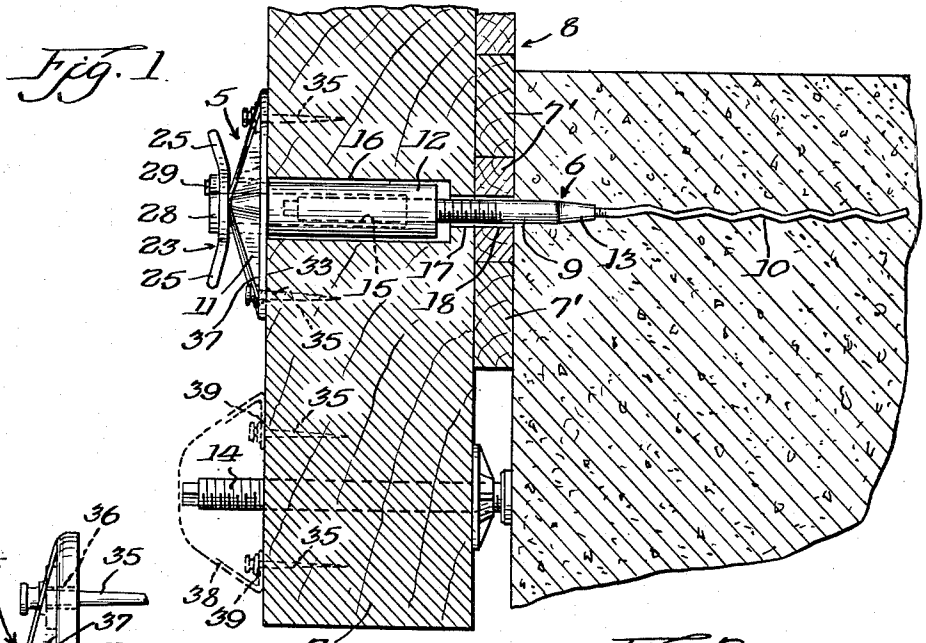


Fig. 2.

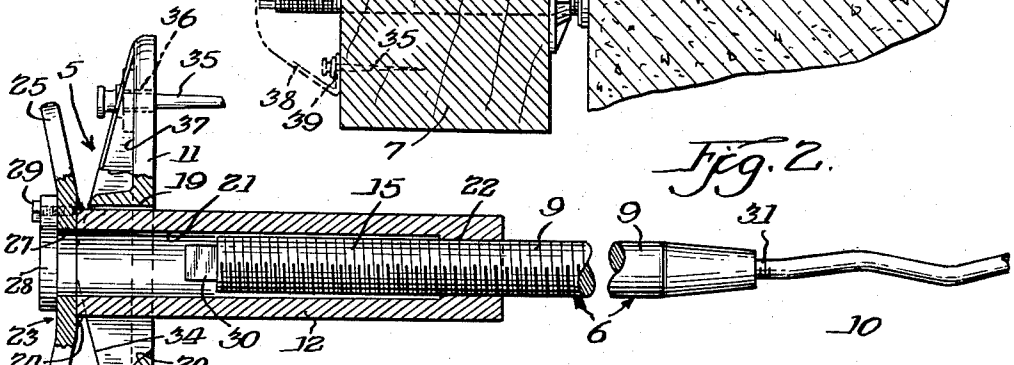
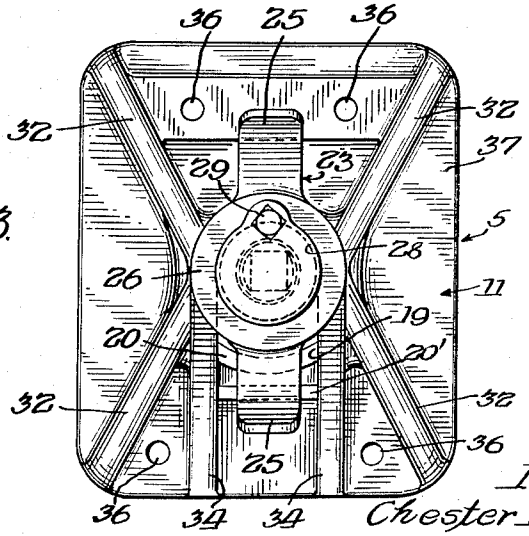


Fig. 3.



Inventor:
Chester I. Williams.
By Shee & Shee Attys.

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FLEXIBLE SOCKET

Chester I. Williams, 751 NE. Lombard St., Portland, Oreg.

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13 Claims. (Cl. 25—131)

This invention relates to concrete forms and more particularly it relates to an improved waler rod bracket construction used in the erection of concrete forms of the cantilever type as disclosed in my co-pending U.S. application, Serial No. 233,853, filed June 27, 1951, for "Method and Apparatus for Handling Forms," now United States Patent No. 2,825,115 granted March 4, 1958, and also in my U.S. application, Serial No. 323,528, filed December 2, 1952 for "Cantilever Form," and is a particular improvement over my co-pending U.S. application, Serial No. 344,271, filed March 24, 1953, for "Waler Rod Bracket" and now abandoned, and which also incorporates certain features as disclosed and claimed in my U.S. Patent No. 2,659,125 granted November 17, 1953, for "Clamp Bracket."

The invention is particularly directed to the improvement in a clamp bracket for mounting a waler rod or she-bolt construction for assembly to a cantilever-type form construction with strongbacks, such as are used on concrete forms in the forming of huge blocks of concrete that are poured in dams, and the forms therefor may be erected in a minimum of time and with a minimum amount of equipment.

Prior to my invention, waler rod brackets used in the erection of she-bolts permitted the threaded free end of the she-bolt extending outwardly beyond the form to become bent and/or further damaged because of the buckets of concrete, as they are lifted, coming in contact with the waler rod bracket members. In addition, as the buckets of concrete are raised, considerable spillage occurs on the forms and some of the concrete piles up on the waler rod clamp brackets so that at times before the forms can be disassembled, it is necessary to chip away the concrete which is set about the threads and nuts of the waler bracket and she-bolts. Also, with the waler rod bracket as disclosed and claimed in my aforementioned co-pending and now abandoned application, Serial No. 344,271, it was impossible to provide sufficient angular adjustment for adjusting the forms for angular or battered faces, such as required on dams, retaining walls, and the like.

It is, therefore, a principal object of my invention to provide an improved waler rod bracket construction to prevent bucket damage to the she-bolts where they extend through the clamp brackets and spillage of concrete upon the free ends of the she bolts.

Another object of the invention is to provide an improved clamp bracket in which the outer threaded end of the she-bolt is enclosed, and the elongated tubular portion of the clamp bracket enclosing the she-bolt is recessed within the strongback.

Another object of the invention is to provide an improved clamp bracket which may be used on any standard form of threaded she-bolt or waler rod construction irrespective of whether the clamp bracket is applied to the strongback of a cantilever type form or to the split waler construction for use in concrete forms of lighter constructions.

Still another object of the invention is to provide an improved waler rod bracket of the enclosed type and also permit adjustment of the she-bolt and its elongated tubular adjusting nut therefor exteriorly of the enclosure therefor.

Still another object of the invention is to provide a clamp bracket construction also adapted for use on waler rods or she-bolts which pull out of the concrete or disconnect back from the surface of the concrete.

Another object of the invention is to provide an improved waler rod bracket which may be readily assembled to a strongback of a cantilever form, for example, with a minimum amount of drilling the strongback for receiving the she-bolts and a contiguous portion of the clamp bracket.

Still another object of the invention is the provision of improved fastening devices which are adapted to secure either cantilever type forms to cast concrete, and also are adapted to secure oppositely disposed form members together by means operable to the exterior of the forms and which are shielded.

Another object of the invention is to provide a simple form of an elongated tubular adjusting nut as a shield for conventional she-bolts or waler rods.

Another object of the invention is the provision of improved fastening devices so that oppositely positioned concrete form members may be spaced in their opposite position by manipulation of the devices from the outside of the form.

A further object of the invention is to provide a clamping device comprising an elongated tubular adjusting nut operatively mounted on the outer end of the waler rod and a clamping bracket complementally formed thereto to detachably receive the tubular adjusting nut.

A further object of the invention is to provide an elongated tubular adjusting nut for threadably receiving a she-bolt at one end and provided with operator-operated means at the opposite ends for adjusting the tubular adjusting nut axially with respect to the she-bolt, and also to provide a closure for the open end of the tubular adjusting nut to receive a wrench for adjusting the she-bolt.

Still another object of the invention is to provide a clamp bracket having an elongated slot to complementally receive an elongated tubular adjusting nut of a clamping device, and to permit angular adjustment of the tubular adjusting nut with respect to the face of the clamping bracket.

Still another object of the invention is the use of the improved waler rod brackets in concrete form construction utilizing dummy she-bolts and pigtail anchoring means.

The invention also has among its objects the production of improved fastening devices of the kind described, which are simple in construction, reliable, durable, economical, inexpensive, easily installed, and satisfactory for its purpose.

In order to accomplish the various objects of the invention, I have provided an improved fastening device or waler rod bracket incorporating shielding means for the free threaded adjusting end of a she-bolt or waler rod, and it may also provide a shielding means for the adjustable or floating nut if the elongated tubular shielding means is fabricated with an adjustable or floating nut rather than incorporating an integrally threaded portion. The improved elongated tubular shielding means and complementally formed clamping bracket are formed as separable members though it is within the scope of the invention that an elongated tubular shield may be applied to a conventional clamping bracket or waler rod bracket, and in which the adjusting nut and the adjustable she-bolt may be adjusted exteriorly by the insertion of suitable wrenches through the shielding means. It is, there-

fore, within the scope of the invention that the elongated tubular shield may be formed with an adjusting nut construction for the she-bolt as disclosed and claimed in the aforesaid co-pending and now abandoned application, Serial No. 344,271. It is, however, preferred to form the shield for the she-bolt or tie rod as an elongated tubular member threaded at one end to complementally and adjustably receive the threaded end of the she-bolt, and in which the opposite end is formed with operator-operated means in the form of a handle for adjusting the shield in the form of an elongated tubular adjusting nut operatively mounted on the outer end of the waler rod. The clamping device also comprises a clamping bracket complementally formed to detachably receive the tubular adjusting nut in an elongated slotted opening to provide for angular adjustment of the clamping bracket with respect to the axis of the elongated tubular adjusting nut. If it is desired to form the elongated tubular adjusting nut in which a nut is flexibly mounted at the inner end of the tubular shield, it is an additional advantage since, in general use, occasionally the forms may have a slight batter or it is necessary to position the waler rods or tie rods through the forms at a slight angle.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end, my invention consists in the novel construction, arrangement, and combination of parts herein shown and described, and more particularly pointed out in the claims.

Referring now to the accompanying drawing forming part of the specification:

Fig. 1 illustrates a view in side elevation taken through a vertical concrete form of the cantilever type, partly in section, illustrating the use of the improved clamp bracket or waler rod bracket of my invention;

Fig. 2 is an enlarged view in side elevation, partly in section, of the improved clamp bracket or waler rod bracket of Fig. 1, illustrating the construction of the shielding means forming the adjusting nut and the shield for the outer end of the she-bolt together with its complementally formed clamping bracket to provide angular adjustment of the shielding means with respect to the clamping bracket; and,

Fig. 3 is a front elevational view of the improved clamping device of my invention, illustrating the clamping bracket and the handle and shield for the elongated tubular adjusting nut.

Referring now more particularly to the drawing, an improved form of waler rod bracket **5** is shown as part of an improved waler rod, she-bolt construction form tie rod, or fastening device **6**, and shown affixed to studding or strongback **7** of a conventional concrete form construction **8** of the type as illustrated in either of my co-pending applications, Serial No. 233,853, filed June 27, 1951, now United States Patent No. 2,825,115 granted March 4, 1958; and Serial No. 323,528, filed December 2, 1952. As used in the claims, "form tie rod" may be considered as a generic term to waler rod, she-bolt construction, or other form of fastening device. The concrete form construction is conventionally formed by a plurality of sheathing or planking **7'** affixed to the strongback **7**, or it may be erected as illustrated in my U.S. Patent No. 2,659,125 granted November 17, 1953 by a plurality of oppositely positioned form members, the boards of each form being connected by nails or the like with the vertically extending studs and, in this instance, the studs being connected by longitudinally extending waler members. More particularly, however, the waler rod bracket of this invention is adapted for assembly to a she-bolt **9** which, in turn, is threadably connected to a pigtail anchoring device **10** which has been precast in concrete, forming the concrete construction to which the cantilever-type form **8** is assembled.

The form to which the improved waler rod bracket of my invention may be utilized may be of any desired length and height, and the oppositely positioned form members when erected in this manner are adapted to be dismantled and used repeatedly for pouring concrete walls or mass concrete of the same or different thickness, and the forms may be used either for the construction of vertical or battered walls. The improved clamping device **5** comprising a clamping bracket **11** and an elongated tubular adjusting nut **12**, however, is more particularly adapted for use with the cantilever-type form construction in which the forms include the relatively large strongbacks, which may vary in size up to twelve inches by twelve inches, and the sheathing **7'** is made up of planking four inches in thickness.

The cantilever forms of this type are preferably erected as disclosed in my co-pending application, Serial No. 233,853, filed June 27, 1951, now United States Patent No. 2,825,115 granted March 4, 1958, by using a dummy she-bolt construction as disclosed and claimed in another of my co-pending applications, Serial No. 233,851, filed June 27, 1951, now United States Patent No. 2,823,441 granted February 18, 1958, which provides an enlarged tapered opening **13** to receive the regular she-bolt construction **9** which is assembled to the pigtail anchoring means **10** which has been precast in the concrete block. After the cantilever form construction has been mounted upon the regular she-bolts, it may be suitably adjusted and leveled with a leveling jack **14** after the elongated tubular adjusting nut **12** of the clamping device **5** has been assembled to the threaded outer end **15** of the she-bolt. To permit ease in mounting, the waler rod brackets or clamping brackets **11**, which are relatively large in size and for use with the cantilever-type construction of this size, are substantially eight inches square or larger depending upon the size of the she-bolt with which it is used. A counterbore **16** is formed in the strongback **7** to receive the elongated tubular housing **12**, and is slightly larger in diameter than the elongated tubular housing and is slightly greater in depth as illustrated in Fig. 1 to permit ease of insertion of the elongated tubular housing within its counterbore, and to provide for slight adjustment for the she-bolt **9** to extend through its complementally formed bore **17** in the strongback and a similarly formed bore **18** through the sheathing planking **7** as illustrated in Fig. 1. Although the strongbacks as used with the cantilever construction are large timbers, nevertheless, the drilling of the holes to receive the waler rods, which in constructions of this type are one and one-fourth inches or one and three-eighth inches in diameter, reduces the strength of the strongback as do the counterbores **16** which are also relatively larger in proportion than the diameter of the she-bolts since the tubular housings receive the threaded end of the she-bolt **15** to shield it. It is, therefore, equally important that any counterboring done to receive the tubular housing **12** to protect the end of the waler rod must not be too great to additionally weaken the strongback, as the pressures which these forms withstand from the fluid concrete before setting is relatively great, since the entire form is supported by the pigtail anchoring means and its associated she-bolt being held in place by the waler rod bracket and its adjusting nut affixed to the she-bolt.

Referring to Figs. 1, 2, and 3, the principal feature of my improved clamping device **5** is in the elongated tubular adjusting nut **12** which receives the threaded end **15** of the she-bolt **6** and, in turn, is complementally formed to an elongated slot **19** also angularly shaped as at **20** and to the angle of the reinforcing rib **20'** to provide for angular adjustments up to substantially 45° for the battered faces of the dams or retaining walls and the like. The shielding means **12** is so formed as to fully enclose the outer free adjusting end **15** of the she-bolt within a bore **21**, slightly larger than the outside diameter of the she-bolt. The shielding means is formed with a threaded bore **22** complementally formed to the threaded end **15** so that the shielding means is in the form of an

elongated tubular adjusting nut operatively mounted for axial adjustment on the outer threaded end of the waler rod. It is preferred to form the tubular adjusting nut as a forging or malleable iron casting and the like, which has welded or affixed thereto an operator-operated means in the form of a handle construction **23**. In the embodiment as illustrated in Figs. 1 through 3, the handle construction **23** is affixed to the tubular shield construction **12** by an annular weld **24**. The handle construction is provided with diametrically extending handle portions **25** affixed to an annular portion **26**, having a hole **27** in alignment with the bore **21** of the adjusting nut **12**. A closure **28** formed as illustrated in Figs. 2 and 3 closes the opening **27**, and the closure is pivo.ally mounted by a bolt **29** affixed to the annular portion **26**. When the handle is adjusted to the position as shown in Figs. 2 and 3, the closure is gravity actuated to overlie the opening to the tubular adjusting nut. If the handle is in any other position, it is within the scope of the invention that the bolt **29** may be secured to affix the cover in its proper position after the tubular adjusting nut has been correctly positioned with respect to the she-bolt **9** and the she-bolt, in turn, then properly affixed to the pigtail anchor construction **10**. The bore **21** and hole **27**, which are in axial alignment, are also of a diameter to permit the insertion of a socket wrench therein to be attached to the squared end **30** of the she-bolt for affixing the threaded opening (not shown) to a complementally threaded end **31** of the pigtail anchor **10** for detachably affixing and removing the she-bolt to its corresponding pigtail anchor. The clamp bracket or waler rod bracket **11** may then be affixed in place by suitably adjusting the elongated tubular adjusting nut **12** to rigidly affix the bracket **5** to the outer face of the strongback.

In order to reduce the amount which the clamping bracket **11** extends in front of the face of the strongback, the clamping bracket is constructed as shallow as possible and is reinforced with angular ribs **32**, Fig. 3. In order to provide for angular adjustment of the elongated tubular adjusting nut **12** with respect to the face **33** of the clamping bracket, spaced inclined ribs **34** are formed as illustrated in Figs. 2 and 3 along the longitudinal edges of the elongated slot **19**. The ribs **34** are complementally formed to the annular portion **26** of the handle construction to be supported on the face of the ribs **34** in the 90° position of the tubular adjusting nut, as shown in Fig. 2, or in any of its angular adjusted positions between its vertical position and its maximum adjusted position abutting the inclined portion **20** and **20'** so that approximately a maximum of 45° adjustment may be had. The handles **25** are also formed as thin as possible in cross section to maintain sufficient rigidity so that they may be used as handles for adjusting the nut and also to be tapped by a suitable instrument, such as a hammer or maul, to its final adjusted position or for loosening. Also, the handles may be so shaped that a short piece of pipe may be placed over each end for adjusting the tubular adjusting nut.

Although the waler rod bracket is preferably for use with strongbacks in erecting a concrete form, it is also within the scope of the invention that the clamping device of this invention is equally adapted for use with what is known as a split waler construction wherein the walers are preferably two-by-fours or other suitable timbers between which the she-bolt extends. In a construction of this character, the tubular adjusting nut **12** would be positioned between the waler members and, if necessary, securing means, such as screws or double-headed nails **35**, may extend through the openings **36** in the flange **37** to secure the waler rod bracket in position on the waler members or in position to the strongback, as shown in Fig. 1, so that the slotted opening **19** is in alignment with the counterbore **16** of the strongback. Likewise, although unnecessary in the cantilever-type form as illustrated in Fig. 1, as the pressure applied to the waler rod brackets is very great, there is relatively no need to affix the brackets in place on the strongbacks except if it is desired to secure them in place when the forms are dismantled or in moving the forms from one lift position to another. Although it is preferred to use a waler rod bracket of this type with a regular she-bolt in erecting the forms, it is to be understood that it is within the scope of this invention that this type of waler rod bracket or clamping device is equally adapted for use with a dummy she-bolt construction as disclosed in my aforementioned co-pending application, Serial No. 233,851, filed June 27, 1951, now United States Patent No. 2,823,441, granted February 18, 1958, and, in such case, the tubular adjusting nut and its complementally formed dummy she-bolt would be threaded to correspond to the difference in size between a dummy she-bolt and a regular she-bolt, such as illustrated in Figs. 1 and 2.

Referring to Fig. 1, the leveling jack **14** has been conventionally illustrated without the use of a protective covering. It is to be understood, however, that the waler rod construction as disclosed and claimed in the co-pending and now abandoned application, Serial No. 344,271, and which is shown in the dotted construction **38**, Fig. 1, is equally adapted for use in shielding the free end of the leveling jack as illustrated. When used in this manner, the hole for the leveling jack screw is suitably counterbored as when the tubular adjusting nut and clamping bracket is used for protecting the free end of the she-bolt, if it should be desired to apply a clamping device and she-bolt construction at the position of the leveling jack. Furthermore, it would be preferable to secure the shielding waler rod bracket **38** with suitable securing means, such as screws or double-headed nails as described, with the clamping device of Fig. 1 extending through lugs **39**. With a leveling jack of the type illustrated, it is unnecessary to use the adjusting nut such as disclosed in the aforementioned co-pending and now abandoned application, Serial No. 344,271, although it may be used, if desired, for additionally locking the adjusting screw **14** in position. Otherwise, when used as a shield for the leveling jack, the adjusting nut may be admitted and the adjusting screw of the jack extends through an opening in the boss of the bracket.

It is also to be understood that the clamping device or waler rod bracket construction of this invention may be used instead of the mounting for the dummy she-bolt as disclosed in the aforementioned application, Serial No. 233,853, filed June 27, 1951, now United States Patent No. 2,825,115, granted March 4, 1958. However, when used in this manner, the outer end of the dummy she-bolt will necessarily have to be threaded as is the regular she-bolt **9** with which this waler rod bracket construction is disclosed. When used in this manner, it is within the scope of the invention that the free end of not only the regular she-bolt is protected from bucket damage but equally protected are the outer end of the dummy she-bolt and the outer end of the adjusting screw of the leveling jack. In addition, to avoid bucket damage to the free ends of the various adjusting members of a concrete form construction, any spillage of concrete, as it is being raised in buckets to be poured, is prevented from collecting on the outer ends of the adjusting members of the she-bolts and leveling jacks so that, as it hardens, undue loss of time is not required in removing the set concrete from these members before they may be detached either in removing the forms or removing them to be raised into another adjusted position for pouring.

The outer contour of the shielding waler rod bracket **38** for the leveling jack screw **14** is preferably a modified dome or frustum of a cone to permit the edge of the bucket as it is raised alongside of the form to slide freely across the surface of the bracket so that the bucket is not tilted to any great extent to spill the concrete, and also to prevent the bucket from being caught on the bracket and cause damage to the form. Although the improved form of clamping device including the clamping

bracket **11** and its complementally formed elongated tubular adjusting nut **12** as it extends through the bracket with the attached handles **25** extend beyond the outer face of the strongback, nevertheless, the silhouette is less in height than the shielding waler rod bracket **38**. Likewise, the clamping bracket **11** is provided with the angular-shaped ribs **32** which tend to allow any bucket to pass over the surface of the bracket, and the length and shape of the handles thereof are such as to prevent catching of the bucket so that it is not tilted to any great extent to spill the concrete, and also to prevent the bucket from being caught on the bracket and handles and cause damage to the form. It is to be understood that any other suitable shape for the bracket and the handle is within the scope of the invention, which will freely allow a bucket to pass over the surface of the bracket and the handle so that the edge of the bucket does not catch the bracket, causing the form to become misaligned or any damage to the free ends of the handle and to the free end of the she-bolt to prevent their removal upon dismantling the form. It is also to be understood that the overall projection of the waler rod bracket should not be too great so that the overhang of the bracket will cause a bucket to snag. For example, in the embodiment of the shielding bracket **38** for a twelve inch strongback, the diameter of this bracket is eleven inches and the height of the bracket is substantially three and three-fourths inches. From an inspection of Fig. 1, it is noticed that the silhouette of the improved clamping device **5** of Fig. 1 is less than the shielding bracket **38**.

Although it is preferred to construct the elongated tubular adjusting nut **12** with the thread therefor tapped in the end of the housing, it is within the scope of the invention that the tubular housing **12** may be constructed to receive a nut construction as disclosed and claimed in the aforementioned co-pending and now abandoned application, Serial No. 344,271. When constructed in this manner, the tubular housing **12** will be of such a size that the diameter of the bore **21** shall be equal to that of the outside diameter of a hex nut for the she-bolt to be received within the bore with additional clearance to receive a socket wrench for the nut. However, it is preferred to construct the elongated tubular nut **12** as illustrated in order to reduce the size of the counterbore **16** required in the strongback so as not to greatly reduce the strength of the strongback. It is also to be understood that the threaded portion of the tubular nut **12** may be fabricated by a separate nut integrally cast within the inner end of the housing rather than being drilled and threaded, or any other method of securing a nut may be used so that in case of excessive wear of the threads, it is only necessary to replace the nut rather than the elongated tubular housing structure. Although the construction of the nut for the she-bolt as disclosed with respect to the aforementioned co-pending and now abandoned application, Serial No. 344,271, permits the floating of the nut and she-bolt connected thereto so that the bracket may be moved to slight angles, in the preferred construction of this invention, this angularity is accomplished by means of the slotted opening **19** together with the inclined ribs **34** and the annular portion **26** of elongated tubular housing which rides on the faces of the ribs **34**. Therefore, when the forms are constructed with a slight batter or the waler rods are inserted at a slight angle, the face of the bracket **11** still sets flush with the waler members or the face of the strongback to which it is affixed.

It is preferred that the threaded opening **22** shall be tapped to receive the conventional 8-pitch Acme thread **15** of the waler rod as shown schematically in Fig. 2. It is also preferred that if instead of the threaded opening **22**, nuts are used as disclosed in the aforementioned co-pending and now abandoned application, Serial No. 344,271, the nuts shall also be tapped to receive the conventional 8-pitch thread used for waler rods. It is also preferred that the nut should be formed hex-shaped so that they may be readily actuated with a suitable wrench inserted within the bore **21**. It is also preferred to form the nuts from steel and the elongated tubular nut **12** also from steel or malleable iron, and the castings for the brackets **11** and **38** from steel or malleable castings or from any suitable material either cast or forged to give the requisite strength for any purpose they are used. It is also preferred that the end of the rod shall be formed with a squared head **30** or other suitable head in order to provide suitable means for adjusting the she-bolt **9**.

The improved clamping device including the clamping bracket **11** and elongated tubular adjusting nut have an advantage over the conventional nut units which are shaped as washer-like casters for rotation against the waler. With the conventional construction, it is difficult to turn metal upon wood under the normal high pressure that is had in concrete form work. However, with this improved elongated tubular adjustable nut and bracket therefor, the elongated tubular nut which, when being assembled to an integrally cast pigtail anchor **10**, would normally have the she-bolt **9** assembled to the tubular nut and after the forms have been assembled, the clamping bracket **11** is generally affixed in place with the securing means **35** so that one would insert the elongated tubular nut **12** and the she-bolt in place through the elongated slot **19** and attach the threaded tapered end of the she-bolt to the complementally threaded portion **31** of the pigtail anchor. There is usually enough friction between these threads of the elongated tubular nut **12** and a thread **15** of the she-bolt so that, for a few turns, the she-bolt may be attached to the threads **31** of the pigtail anchor by rotating the she-bolt in the proper direction by the handles **25** of the tubular nut. After the she-bolt is caught, a wrench is inserted within the bore **21** after the cover **28** has been opened and attached to the squared end **30**, whereupon the she-bolt may be suitably affixed and tightened by the wrench. Upon removal of the wrench, the nut **12** may be rotated until it comes in contact with the clamping bracket **11** with the inner face of the annular portion **26** of the nut abutting the face of the ribs **34**, either as illustrated in Figs. 1 and 2 or at any regular position which the she-bolt may take. The adjusting nut **12** may be securely affixed by tapping the handles **25** with a suitable mallet or using a short length of pipe until the form is securely affixed to a face of the precast slab of concrete as illustrated in Fig. 1 in which the pigtail anchor is affixed. She-bolt constructions together with the clamping device of this invention may also be assembled to pigtail anchors at the upper part of the strongback prior to the pouring of the next lift. After the concrete has set, the lower she-bolt is detached in the reverse order as described in reference to Fig. 1, and the upper she-bolt is also detached and the forms raised for pouring the next lift. It is to be understood that the upper she-bolt construction together with the clamping device may be in the form of a dummy she-bolt construction.

The she-bolt is of larger diameter, forming an enlarged tapered opening **13** in which a regular she-bolt may be positioned with greater ease at the time of securing the cantilever form in its next raised position to the precast and set concrete.

It is preferred to form the clamping bracket **11** either as a casting or forging in the shape as shown in Fig. 3. Although it is preferred to be somewhat rectangular in shape, it may be square or any other conventional geometric form, though the shape as illustrated is preferred in view of the elongated slot **19**. The greater bearing surface of the bracket as illustrated is desirable in the use of the clamp bracket because of the extreme pressure used by the lateral thrust of the poured concrete against the cantilever form. Nail or screw holes **36** in the flange **37** permit the fastening of the clamping bracket **11** to the studding or strongback **7**, although with this type of

bracket there is no need to use the additional securing means except perhaps in the split waler structures or as, in this case, where the longitudinal slot is used to permit angular adjustment for battered surfaces. The fastening of the clamping brackets **11**, as illustrated in Fig. 1, is sometimes advantageous in that the she-bolt and its tubular adjusting nut **12** may be unscrewed or detached from the concrete and the bracket remains in place, and the nut and she-bolts are then reinserted.

In constructing a concrete form, using the improved waler rod construction including the elongated tubular adjusting nut and clamping bracket of the embodiment illustrated in Figs. 1 through 3, the studding or strongback and sheathing are drilled to receive the she-bolt construction **9**, and the strongback is counterbored to receive the tubular adjusting nut **12**. Each securing device or waler rod assembly is then erected as shown in Fig. 1 in accordance with the disclosure of my co-pending application, Serial No. 233,853, filed June 27, 1951, now United States Patent No. 2,825,115 granted March 4, 1958; and, if desired, the use of a dummy she-bolt construction as also disclosed in my co-pending application, Serial No. 233,851, filed June 27, 1951, now United States Patent No. 2,823,441 granted February 18, 1958, may also be used in conjunction with the improved waler rod bracket construction of this invention. In the construction illustrated in Fig. 1, after the form is assembled in place and supported by the pigtail anchoring means, the she-bolts **9** are suitably adjusted using the squared end **30**, and afterwards are locked in place with the elongated locking nut **12**. The elongated tubular housing **12** and its complementally formed recess **19** permit any slight angularlity necessary for the erection of the she-bolts to any associated anchoring means or tie rod, whether the tie rods or anchoring means **10** are placed in a horizontal position or at an angle.

Forms constructed with the waler rod brackets and tubular adjusting nut of this invention may be raised and relocated at will, as is well understood in the art. When it is necessary to remove the forms, the adjusting nuts **12** are loosened by suitable tapping on the handle with a mallet or using a pipe to unscrew the nut a slight amount, after which the she-bolts **9** may be detached from the pigtail anchoring means **10** or other securing device by unscrewing the she-bolt with a suitable wrench attached to the squared end **30**. The clamping device including the clamping bracket and tubular adjusting nut of this invention is, likewise, equally adaptable for use with the constructions of the aforementioned applications. The forms, when dismantled, may then be reassembled wherever desired in the reverse order.

It is thus obvious that there has been disclosed a simple and inexpensive form of an improved adjusting nut and clamping bracket therefor, for use with the conventional form of she-bolt construction as illustrated, which may be readily assembled and disassembled in the construction of concrete forms.

There has also been disclosed an improved elongated tubular adjusting nut which serves as a shield to prevent damage to the outer end of the she-bolt since the tubular adjusting nut and outer end of the she-bolt are embedded within the strongback or between the split waler construction to prevent damage by the concrete buckets, and also shielding the outer end of the she-bolt from the spillage of concrete across the face of the form, and an additional shield being provided by a cover **28** at the outer end of the bore within which the outer end of the she-bolt is axially positioned. Although it is preferred to form the clamping bracket and tubular adjusting nut as separate members to provide for angular adjustment, it is also to be understood that the clamping bracket and tubular adjusting nut may be formed as one piece, if no angular adjustment is desired or if a flexible nut is used instead of the tapped hole **22**. It is also understood that it is within the scope of the invention that the tubular adjusting nut **12** may be used without its closure or shield **28**, and also that the improved clamping device of this construction may be used separately or in conjunction with other forms of clamping devices. Furthermore, the construction may be adapted for waler rods already in use in the field which may have conventional U.S. threads, Acme 4, 5, or 8-pitch threads, or other suitable threads.

Furthermore, the improved waler rod clamping device of this invention works equally well on vertical or battered walls. The she-bolts and adjusting nuts are easily demounted and no wrecking is necessary, thus permitting greater salvage of lumber.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence, I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned.

What I claim as new and desired to secure by Letters Patent is:

1. A clamping device for a concrete form construction including sheathing and studding and including a detachable waler rod adapted to extend transverse to the concrete form construction, said clamping device comprising an elongated tubular and threaded adjusting nut operatively mounted on the outer end of the waler rod and a clamping bracket provided with a slotted opening for angular adjustment with respect to the elongated tubular and threaded adjusting nut and complementally formed to detachably receive the tubular and threaded adjusting nut, said clamping bracket being affixed to said studding, and said tubular and threaded adjusting nut providing an elongated housing for enclosing the outer end of the waler rod and extending outwardly beyond the outer end of the waler rod, whereby a shield is formed for the free end of the waler rod to which the elongated adjusting nut is affixed.

2. A clamping device for a concrete form construction including sheathing and studding for the sheathing and adapted to prevent bucket damage in pouring the concrete and including a form tie rod adapted to extend through the studding and sheathing, and said clamping device comprising an elongated tubular adjusting nut and a clamp bracket provided with a slotted opening for angular adjustment with respect to the elongated tubular adjusting nut, said elongated tubular adjusting nut adapted for axial and angular adjustment with respect to the clamp bracket whereby the clamp bracket is adapted to be affixed to the studding and to the form tie rod within the angular adjustment provided by the slotted opening of the clamp bracket, and said elongated tubular adjusting nut operatively receiving the outer end of the form tie rod, whereby bucket damage to the outer end of the form tie rod in its assembled position on a concrete form construction is prevented.

3. The combination with a concrete form construction including sheathing and studding for the sheathing, of a clamping device adapted to prevent bucket damage in pouring the concrete and including a form tie rod threaded at the outer end and adapted to extend through the studding and sheathing, and said clamping device comprising an elongated tubular adjusting nut, said elongated tubular adjusting nut including an elongated cylindrical shield and a base therefor, said base provided with a threaded opening complementally formed to the threaded outer end of the form tie rod and a clamp bracket provided with a slotted opening complementally formed to axially and detachably receive and angular adjust the tubular adjusting nut, said studding formed with an opening to complementally receive the tubular adjusting nut, said elongated tubular adjusting nut and threaded base thereof adapted for axial adjustment with respect to the clamp bracket and form tie rod, and said elongated cylindrical shield of said elongated tubular adjust-

ing nut operatively receiving the outer end of the form tie rod and extending outwardly beyond the outer end of the form tie rod, whereby the outer end of the form tie rod in its assembled position on a concrete form construction is prevented from becoming damaged by buckets for pouring the concrete within the concrete form construction as they are raised alongside the form.

4. The combination with a concrete form construction including sheathing and supporting structure therefor, of a clamping device including a detachable waler rod adapted to extend transverse to the concrete form construction, said clamping device comprising an elongated tubular adjusting nut operatively mounted on the outer end of the waler rod and including an elongated cylindrical shield and a base therefor, said base provided with a threaded opening, and a clamping bracket provided with a slotted opening through which the elongated tubular adjusting nut extends for axial and angular adjustment, said threaded opening of the base of the tubular adjusting nut adjustably receiving the outer end of the waler rod, and operator-operated means formed on the outer end of the tubular adjusting nut for adjusting the tubular adjusting nut with respect to the complementally threaded end of the waler rod.

5. A clamping device for a concrete form construction including sheathing and strongbacks to which the sheathing is affixed and including a detachable she-bolt adapted to extend through a strongback of the concrete form construction and through the sheathing for securing the concrete form construction to a precast slab of concrete, said clamping device comprising an elongated tubular housing and a clamping bracket, said clamping bracket detachably mounting the tubular housing and the clamping bracket formed with a slot permitting angular adjustment of the tubular housing with respect to the clamping bracket, said elongated tubular housing operatively receiving the outer end of the she-bolt, and said elongated tubular housing extending from the clamping bracket and the face of the strongback to which it is affixed.

6. The combination with a concrete form construction including sheathing and strongbacks, of a clamping device including a she-bolt and a tie rod to which the she-bolt is detachably connected, said clamping device comprising an elongated tubular housing and a clamping bracket formed with an elongated slot for adjustably receiving the elongated tubular housing forming a floating nut having angular and axial movement with respect to the clamping bracket whereby the elongated tubular housing is free to rotate and is flexible, so that the clamping bracket may be moved within an angular range from substantially 0° to 45° in a direction within a plane of the longitudinal axis of the aforesaid elongated slot, and the housing adapted to receive the free end of the she-bolt whereby the free end of the housing extends beyond the outer end of the she-bolt, and said housing formed with an opening of a size to permit a wrench to be assembled on the free end of the she-bolt whereby the she-bolt is adapted to be detached from the tie rod.

7. A clamping device for a concrete form construction including sheathing and strongbacks and including a she-bolt and a tie rod to which the she-bolt is detachably connected, said clamping device comprising an elongated tubular housing and a clamping bracket formed with an elongated slot for adjustably receiving the elongated tubular housing forming a floating nut having angular and axial movement with respect to the clamping bracket whereby the elongated tubular housing is free to rotate and is flexible, so that the clamping bracket may be moved within an angular range from substantially 0° to 45° in a direction within a plane of the longitudinal axis of the aforesaid elongated slot, said housing formed with an opening of a size to permit a wrench to be assembled on the free end of the she-bolt whereby the she-bolt is adapted to be detached from the tie rod, a closure for said opening operatively mounted on the outer end of said elongated tubular housing, and operator-operated means operatively formed on the outer end of the elongated tubular housing for adjusting the tubular housing and clamping bracket with respect to the she-bolt for affixing the clamping bracket to the she-bolt.

8. A clamping device for a concrete form construction including sheathing and strongbacks including a she-bolt and a tie rod to which the she-bolt is detachably connected, said clamping device comprising an elongated tubular housing threaded at its inner end for adjustably receiving a complementally formed threaded end of the she-bolt whereby the free end of the housing extends beyond the outer end of the she-bolt, a clamping bracket formed with an elongated slot for adjustably receiving the elongated tubular housing forming a floating nut having angular and axial movement with respect to the clamping bracket whereby the nut is free to rotate and is flexible so that the elongated tubular housing may be moved angularly within the elongated slot, and said elongated tubular housing formed with an opening of a size to permit a wrench to be assembled in the free end of the she-bolt whereby the she-bolt is adapted to be attached to and detached from the tie rod, and said elongated tubular housing extending outwardly from the clamping bracket and provided with handle means for adjusting the elongated tubular housing with respect to the threaded end of the she-bolt.

9. The combination with a concrete form construction including sheathing and strongbacks, of a clamping device including a detachable waler rod threaded at the outer end and adapted to extend through the sheathing and within a space between opposite faces of a strongback, of a clamping device including an elongated tubular housing adapted for mounting in a complementally formed bore in a strongback, said elongated tubular housing including an elongated cylindrical shield and a base therefor, said base provided with a threaded opening complementally formed to the threaded outer end of the detachable waler rod for axial adjustment of the tubular housing with respect to the detachable waler rod, and said tubular housing formed to receive the outer end of the waler rod within the elongated tubular housing, a clamping bracket detachably and operatively connected to the tubular housing whereby said clamping bracket and tubular housing are axially adjustable with respect to the longitudinal axis of the waler rod, and to the face of the strongback from which the bore extends and in which the tubular housing and the waler rod is positioned, said clamping bracket formed with an elongated slotted opening through which the elongated tubular housing extends, said clamping bracket having angular extending ribs contiguous to the sides of the opening permitting angular adjustment of the tubular housing with respect to the face of the clamping bracket, and said outer end of said tubular housing complementally formed for supporting the tubular housing in adjusted position on said ribs, and also formed with handle means for rotating the tubular housing to adjust it axially with respect to the waler rod.

10. A combined adjustable tubular housing and clamping bracket adapted to be adjustably mounted on a form tie rod of a concrete form construction, said tubular housing being elongated and adapted to telescopically receive the free end of a form tie rod to prevent damage thereto, said tubular housing adapted to be axially adjusted with respect to the form tie rod telescopically received therein, and said clamping bracket provided with an elongated opening and operatively mounted at the outer end of said tubular housing, and said tubular housing operatively mounted within said elongated opening and angularly adjustable with respect to the clamping bracket with the tubular housing extending inwardly from the face of the clamping bracket affixed to the concrete form construction.

11. A device for adjustably mounting a cantilever type

concrete form construction including sheathing and studding and comprising a combined adjustable tubular housing, clamping bracket, she-bolt, and form tie rod, said form tie rod comprising a threaded outer end complementally formed to the inner end of the she-bolt for attaching and detaching the she-bolt thereto, said form tie rod adapted to be cast within the concrete and including undulating portions anchoring the form tie rod within the concrete to support the concrete form construction upon being attached thereto, said tubular housing including an elongated cylindrical shield and a base therefor, said she-bolt at its outer end and said base of the adjustable tubular housing complementally threaded for adjusting the tubular housing with respect to the she-bolt and to telescopically receive the outer end of the she-bolt within the tubular housing while permitting the she-bolt to be attached and detached to the outer end of the form tie rod, said clamping bracket provided with an elongated opening, and said tubular housing operatively mounted within said elongated opening and angularly adjustable with respect to the clamping bracket and adapted to be affixed to the studding of the concrete form construction.

12. As an article of manufacture, a clamping bracket for adjusting a concrete form construction and for adjustably receiving an elongated tubular housing adapted for telescopically adjusting a she-bolt of a form tie rod of the concrete form construction and which is adapted to be angularly adjusted with respect to the clamping bracket, said clamping bracket formed with a slotted hole complementally formed to adjustably and detachably receive the elongated tubular housing, annular supporting means for abutting the clamping bracket

provided on the outer end of said tubular housing, angular ribs extending longitudinally of the aforesaid slotted hole at its longitudinal edges, said annnular supporting means of the tubular housing and the ribs of the clamping bracket complementally formed for supporting the tubular housing in any of its angularly adjusted positions, and said clamping bracket adapted to be axially and angularly adjusted with respect to the elongated tubular housing upon assembly upon the elongated tubular housing.

13. A device according to claim 11, wherein said tubular housing permitting wrench means to be applied to the outer end of the she-bolt through an opening provided at the outer end of said tubular housing to attach and detach said she-bolt to said form tie rod, a closure for the opening at the outer end of the tubular housing, and handle means formed at the periphery of the outer end of the tubular housing for adjusting the tubular housing axially with respect to the she-bolt.

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