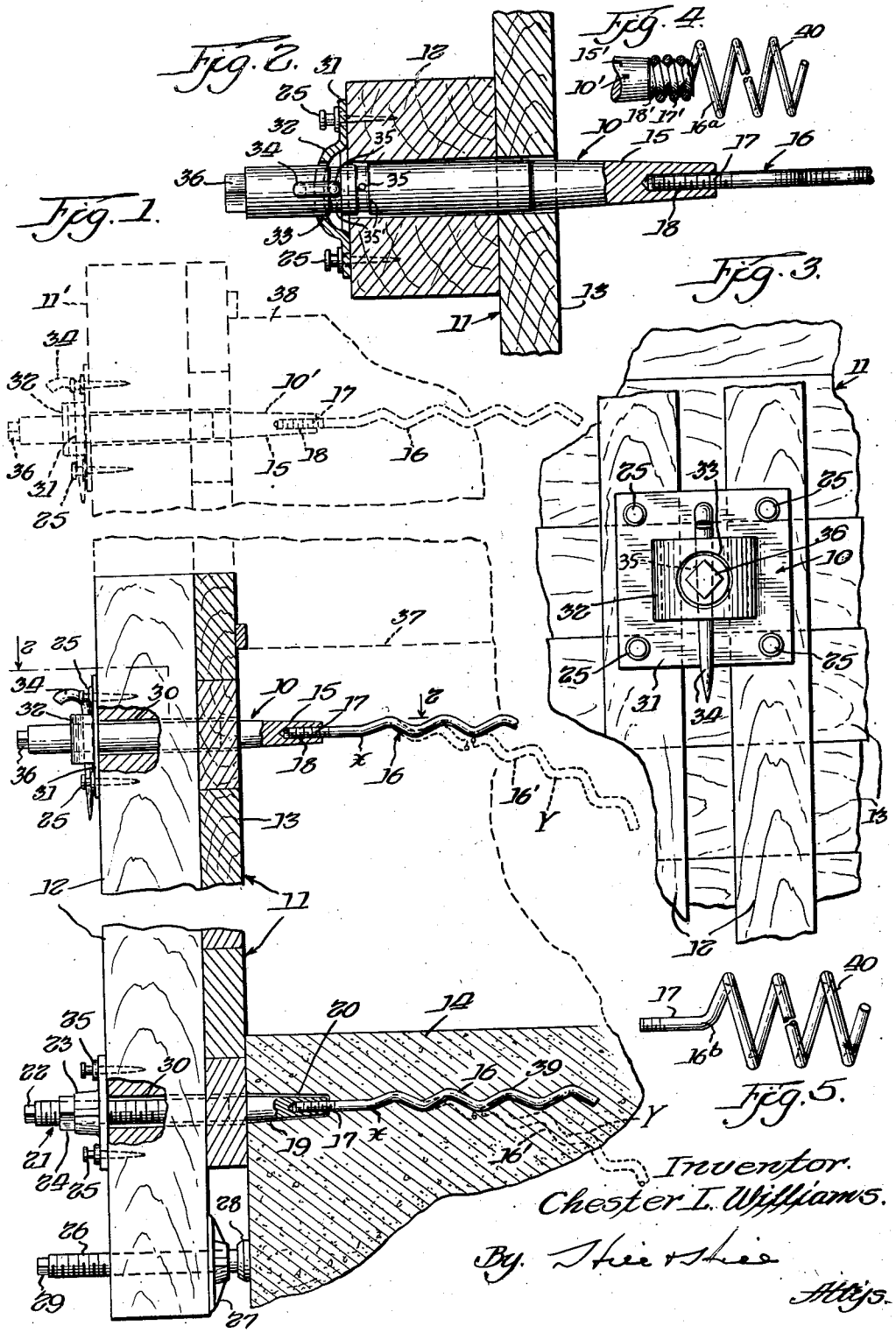
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DUMMY SHE-BOLT

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DUMMY SHE-BOLT

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8 Claims. (Cl. 25—131)

This invention relates to concrete forms, and more particularly it relates to a she-bolt construction which permits the erection of concrete forms in a minimum time.

Prior to my invention, concrete forms were erected in the usual manner by using what is known as ordinary she-bolts fastened to tie rods, and other forms of anchoring devices, and the concrete, after it had been set, anchored the tie rods in place. However, a great deal of effort was necessary to remove the she-bolts from the tie rods when the concrete form was detached and raised to the next pouring level. It is therefore a principal object of my invention to provide an improved form of dummy she-bolt in combination with an anchoring means which will permit the ready removal of the she-bolt in the raising of the forms, after which an ordinary she-bolt may be attached to the anchoring means, and the form leveled, ready for the next pouring.

It is also another object of the invention to provide an improved form of dummy she-bolt which need not be placed in the form until just ahead of the pouring so that sufficient head room is always available alongside the form while readying the form and the surface of the concrete for the next pouring.

Another object of the invention is to provide a simple form of dummy she-bolt which may be readily attached to the strong back or waler supports in a minimum of time, permitting the anchoring rods to be attached after the dummy she-bolts have been positioned on the form.

Another object of the invention is to provide a dummy she-bolt having sufficient taper that it may be readily removed from the set concrete, and to permit replacement thereof by a standard she-bolt for clamping the form in position after it has been raised.

Still another object of the invention is to provide an improved support bracket for the dummy she-bolt which is readily attached to the strong back or waler supports for the form, and permits ease in mounting of the dummy she-bolt upon the bracket after it is placed in the form.

Still another object of the invention is to provide an improved dummy she-bolt and anchor therefor which may be mounted from the exterior of the form, simplifying the erection of the form as the various lifts are poured.

In order to accomplish the above objects of my invention, I have provided a dummy she-bolt which is adapted to be detachably connected to a pigtail anchoring means or tie rods in the usual manner, and which has a taper formed thereon larger than the taper of the ordinary she-bolt to permit the insertion of the ordinary she-bolt in the tapered opening left by the dummy she-bolt after it has been removed from the set concrete, particularly, when it is necessary to lift the forms for pouring another lift. A suitable supporting bracket has been provided for detachably connecting the dummy she-bolt to the strong back or waler members of the form, and a quickly detachable pin has been provided for locking the dummy she-bolt to the bracket in its proper location in the form. Means have been provided for applying a wrench to the dummy she-bolt to detach the she-bolt from the complementally formed end on the anchoring means to which the dummy she-bolt is attached.

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.

In the drawings, wherein like reference characters represent like or corresponding parts:

Fig. 1 is a vertical, sectional view illustrating the erection of a concrete form using the dummy she-bolt construction of this invention;

Fig. 2 is a view, partially in cross-section taken substantially along line 2—2 of Fig. 1, illustrating the construction of the dummy she-bolt;

Fig. 3 is a front view of the dummy she-bolt and its supporting bracket mounted upon spaced vertical waler members of a concrete form;

Fig. 4 illustrates a modified form of she-bolt structure and anchoring means; and

Fig. 5 illustrates another embodiment of an anchoring means.

Referring now to the drawings, a dummy she-bolt construction 10 is shown mounted in a simple concrete form construction 11 comprising strong backs 12 and sheathing 13. For an ordinary concrete form construction where large lifts of concrete are being cast, the relative size of the strong back is substantially 12 inches by 12 inches, and the sheathing is made up of members substantially 4 inches in thickness. The relative length of these forms as they are erected may range up to twenty-five feet in length, and the spacing between the strong backs is usually six feet. The invention has been particularly illustrated in connection with Fig. 1 to show the method of applying the forms when pouring several lifts or layers, one upon the other, where it is necessary to raise the form. The forms may usually be set in the ordinary manner starting from bedrock, and pigtails or tie rods may be anchored in place in the rock in the ordinary manner, to which the forms are mounted and the necessary bracing applied for erecting the form for the first pouring.

In Fig. 1, for example, there is illustrated the use of the invention in which the concrete form 11 is applied for the purpose of illustration after the first pour 14 has been made and set, whereupon the concrete form 11 is raised to the position shown in the solid lines. Prior to this, the dummy she-bolt 10', as illustrated in Fig. 1, was set in the form so that its tapered end 15 is extended through the form to the position shown, and to which a pigtail anchoring means 16 having a threaded end 17 is complementally threaded into a threaded portion 18 of the dummy she-bolt. The tapered end 15 of the dummy she-bolt after it was removed from the concrete left a tapered opening 19 in the concrete slab. This tapered opening formed by the tapered end of the dummy she-bolt permits the insertion of the tapered end 20 of an ordinary she-bolt construction 21 as the relative taper of the dummy she-bolt is greater than that of the ordinary she-bolt. This provides for the easy insertion of the regular she-bolt so that it may be attached to the threaded end 17 of the pigtail anchor 16, which has been cast in place with the threaded end extending into the tapered opening 19 left by the removal of the dummy she-bolt.

Tapers 15 which have been found satisfactory for the

dummy she-bolts are from 1¼ inches in diameter to 1⅛ inches in diameter in 5¼ inches for 1¼ inch diameter dummy she-bolts **10'** and the corresponding taper **20** of the regular she-bolt **21** for the same length of taper is from 1¼ inches to 1 1/16 inches in diameter. For 1⅜ inch diameter dummy she-bolts, a suitable taper has been found to be from 1⅜ inches in diameter to 1⅛ inch diameter in 6¼ inches. The taper of the regular 1⅜ inch diameter she-bolt would also be reduced in the same relative proportions as the regular 1¼ inch she-bolt.

For the purpose of simply illustrating the invention, a simple pigtail **16** has been shown. It is within the scope of the invention that other suitable lengths and shapes may be used without departing from the scope of the invention. For example, a pigtail construction **16'**, illustrated in dotted lines in Fig. 1, found to be suitable may extend horizontally from the threaded end a predetermined distance X, after which it may be inclined at an angle of 10° for any predetermined length Y. The pigtails may be varied in length at the threaded end and at the opposite end to suit various conditions encountered and to develop the maximum holding strength of the she-bolt depending upon the forces developed in the erection of the form and the pouring of the concrete.

The concrete form **11** is then raised by suitable hoisting means to the position shown in solid lines, and while suspended in position, the regular she-bolts **21** are placed through the concrete form in the same holes provided through the strong backs for the insertion of the dummy she-bolts. The regular she-bolt **21** is affixed to the threaded end of the pigtail anchor **16** by attaching the wrench to a squared end **22** of the she-bolt, and firmly threading the she-bolt in position on the threaded end of the anchoring ends **16**. It is customary that the end of the pigtail shall be threaded into the she-bolt so that the end of the pigtail is approximately 3 inches in from the rear face of the sheathing to develop the maximum strength of the connection of the pigtail with the she-bolt. The bracket **23** and adjusting nut **24** therefor, is then threaded upon the she-bolt clamping the form against the face of the cast block, after which the double-headed nails **25** may be suitably mounted in holes provided in the bracket **23** to fix the bracket in position upon the strong back of the form.

An adjusting or alignment jack **26** is also mounted on the end of the strong back having a threaded bracket **27** abutting the rear face of the strong back, whereas a base **28** of the jack abuts the front face of the cast concrete block. This same construction of the regular she-bolt and adjusting jack is provided at frequent intervals across the width of the form, and provides the thrust support for the form when erected in place and concrete poured against the form. The forms are leveled by adjusting the jack **26** through a squared end **29** by rotating the shaft of the jack in the required direction to make the necessary adjustment. When the form is correctly leveled, the adjusting nut **24** is firmly secured to take the thrust of the concrete when poured against the form. With the usual she-bolt construction and anchoring means, the pigtail thereof will develop approximately a 35,000 pound pull in each anchor under test, whereas the actual load usually is approximately 17,000 pounds so that there is a sufficient factor of safety.

In a form construction erected in the manner described, it is possible to work along the sides of the form preparing the surface of the concrete for the next pour with a great deal of freedom, since by using this type of form construction, it is not necessary to place the anchoring means for the next pour until just ahead of the pouring operation. This has been made possible by the dummy she-bolt construction of this invention. The vertical spacing for the location of the she-bolt has been determined when the forms have been fabricated so that all that is necessary is for the dummy she-bolts **10** to be set in the form, as illustrated in Fig. 1. In some instances, there is usually provided a scaffolding built on the form (not shown) for erecting the she-bolts in position. The she-bolts **10** may have the pigtail anchor **16** attached thereto for erecting, and the she-bolt **10** and the pigtail anchor inserted through a hole **30** in the form.

A support bracket **31** for mounting the dummy she-bolt **10** is mounted contiguous to the opening **30** through the form, and nailed in position by double-headed nails **25**, as shown in Figs. 1, 2, and 3. The bracket **31** has an arcuate struck-out portion **32** from the bracket which provides an opening for the dummy she-bolt **10** as the bracket **31** abuts the face of the strong back **12** or vertical walers. The arcuate struck-out portion **32** is also provided with an opening **33** for the passage therethrough of the dummy she-bolt **10**. The dummy she-bolt is held in position with respect to the bracket **31** by a pin **34** inserted through a complementally formed hole **35** in the dummy she-bolt. The pin **34** is pointed at one end for ease in insertion through the hole in the she-bolt, and provided with a hooked portion at the opposite end for ease and removal of the pin from the she-bolt. The she-bolt is provided at its outer end with a squared end **36** for rotating the she-bolt for detachably connecting the she-bolt to the pigtail anchoring means **16** by the complementally formed threaded portion **17** and **18** of the anchoring means and the she-bolt.

Usually the bracket **31** is assembled to the she-bolt **10**, and the pin **34** mounted to latch the bracket to the she-bolt so that in the erection on the form, the assembled pin, bracket, and she-bolt may be readily mounted on the form by the insertion of the dummy she-bolt within the holes provided in the form, after which the bracket **31** is nailed in position, using the double-headed nails **25** permitting ease of removal later. If the assembled she-bolt and anchoring means are inserted and erected in place on the outside of the form, they may be suitably affixed together, but if it is desirable, because of working conditions, to assemble the dummy she-bolt from the outside of the form, and the anchor means from the inside of the form, they may be readily connected together by an erector on the outside of the form and another on the inside of the form mounting the pigtail anchors in position if it is necessary to use excessively long anchors, or if other forms of tie bolts are used. For example, if several tie rods are used which are inclined at an angle, the dummy she-bolts may be threaded to the tie rods from the outside, after which the pin is applied, securing the dummy she-bolt in relative position with respect to the form.

The form may then be poured to a predetermined level **37** and, as pointed out above, the particular form of dummy she-bolt permits the erection of the dummy she-bolts just ahead of the pouring. With this improved form of dummy she-bolt construction, it is therefore possible to pour a greater amount of concrete than has heretofore been possible, since the construction permits ease in erection of the form, and aligning thereof.

After the poured layer of concrete has been set for the required period, the dummy she-bolts are then removed by first detaching the pin **34** and unscrewing the dummy she-bolt from the threaded end of the anchoring means **16**. The brackets **31** are then detached, and the she-bolt and bracket and pin are re-assembled together to prevent displacement of the parts so that they may be readily assembled when the next layer **38** is poured after the forms have been raised and realigned. This is shown in the dotted position **11'** of the forms, and **10'** of the she-bolt of Fig. 1. Removal of the dummy she-bolt with its enlarged tapered end **15** provides the enlarged tapered opening **19** as described above so that an ordinary she-bolt **21** may then be assembled in the opening left by the dummy she-bolt, and threaded on to the threaded end **17** of the anchoring means left by the removal of the dummy she-bolt. The ordinary she-bolt

is then assembled and adjusted as described above and the forms leveled.

Although it is preferred to use a pin **34**, constructed as shown, it is also within the scope of the invention to use a hairpin type of pin (not shown) either end of which may enter the hole **35**. While the other end is adapted to engage the groove **35'**, suitably spaced holes **35** and grooves **35'** may be formed on the dummy she-bolt as shown in Fig. 2 to provide for longitudinal adjustment of the she-bolts if necessary to accommodate changes in thickness of sheathing and variations in dimensions of strong-backs, etc.

The anchoring means with which it is preferred to use the dummy she-bolt and ordinary she-bolt construction is what is known as a pigtail anchor having a series of undulating deformations **39** which serve to anchor the anchoring means within the cast concrete, and which develops sufficient strength when cast therein so as to support the form in position. It is preferred that the deformations **39** shall be laterally offset slightly greater than the diameter of the rod which usually is ¾ inch in diameter, and not more than twice the thickness or diameter of the rod. It has been found that this relationship permits the maximum development of tension in the rod when cast into the concrete preventing removal, and also permits ease of erecting the anchor into rock foundations where it is necessary to drill a hole for the anchoring rod, and cementing it in place to provide an anchor for erecting the form in place upon bed-rock. The pigtail anchors may be straight, as illustrated, or other suitable shapes as illustrated at **16'** and described above.

Referring to Fig. 4, there is illustrated a modified form of clamping device such as a dummy or ordinary she-bolt construction **10'** in which the tapered end **15'** is provided with a lag screw thread **18'** to engage a complementally formed thread **17'** on a helically formed anchoring means **16*a***. The anchoring means is formed with a plurality of helical coils **40** sufficient in number to retain the form in position when an ordinary she-bolt construction having a similar lag screw thread is threaded into the anchoring means **16*a***. The spacing of the helical coils and diameter thereof is such that the poured concrete when puddled thoroughly surrounds the anchoring means.

Fig. 5 illustrates an anchoring means **16*b*** similarly constructed with helical coils **40**, as the embodiment of Fig. 4. The anchoring means **16*b*** is however provided with a threaded end **17** as the anchoring means **16** of Fig. 1 and Fig. 2, so that it may be readily attached and detached to the dummy she-bolt construction **10** and ordinary she-bolt construction **21**. Although there has been illustrated in connection with Figs. 1, 2, 4 and 5, particular embodiments of anchoring means and clamping devices such as dummy she-bolt and ordinary she-bolt constructions, it is to be understood that it is within the scope of the invention that other similar forms of the construction may be used. In the claims, it is to be understood that clamping device and dummy she-bolt and ordinary she-bolt are synonymous.

Although there has been described a particular size of form which may be used for pouring lifts of approximately five feet, the forms may be of any desired length and height, and the forms are adapted to be dismantled and used repeatedly for pouring the concrete either for the construction of vertical or battered walls. The various members forming the concrete form are secured together by conventional fastening devices, and the bracing for the form may be suitably spaced to provide the requisite form rigidity. The form so constructed may be used with the preferred form of dummy she-bolt of this invention along with ordinary she-bolts, and may be raised and relocated, as is well understood in the art. The construction of the dummy she-bolts and the ordinary she-bolts permit ready dismantling thereof, and reuse or storing as desired.

It is thus obvious that there has been disclosed a simple and inexpensive concrete form construction and dummy she-bolt construction for the rapid erection of concrete forms as the concrete is being poured.

The improved concrete form construction utilizing the dummy she-bolts of this invention and anchoring means work equally well on vertical or battered walls, or for erection of the forms directly to a rock foundation. Furthermore, the dummy she-bolts and ordinary she-bolts, together with the levelling means, provide a simple means for erecting a concrete form in which the load on the form is carried through the levelling jack, and the ordinary she-bolt is anchored to the anchoring means, the original location of the anchoring means having been provided by the dummy she-bolt construction permitting ease of removal of the dummy she-bolt, and ease of mounting an ordinary she-bolt in place of the dummy she-bolt to the anchoring means.

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 desire to secure by Letters Patent is:

1. The combination with a concrete form, of a dummy she-bolt adapted to extend through a hole in the concrete form and an ordinary she-bolt adapted for replacing the dummy she-bolt, said dummy she-bolt having a tapered end, undulating elongated rod-like anchoring means adapted to be detachably connected to the dummy she-bolt, complementally formed means on the dummy she-bolt and the anchoring means for detachably connecting them together, and said tapered ends of the dummy she-bolt and the ordinary she-bolt differing whereby removal of the dummy she-bolt from the cast concrete forms a larger tapered opening in the concrete for detachably mounting the smaller tapered end of the ordinary she-bolt upon the anchoring means when the form is raised and the ordinary she-bolt affixed to the aforesaid undulating elongated rod-like anchoring means pre-cast in the cast concrete.

2. The combination with a concrete form, of a dummy she-bolt adapted to extend through a hole in the concrete form and an ordinary she-bolt adapted for later replacing the dummy she-bolt, said dummy she-bolt having a tapered end, a pigtail anchor adapted to be detachably connected to the dummy she-bolt, complementally formed means on the dummy she-bolt and the pigtail anchor for detachably connecting them together, and said tapered ends of the dummy she-bolt and the ordinary she-bolt differing whereby removal of the dummy she-bolt from the cast concrete forms a larger tapered opening in the concrete for detachably mounting the smaller tapered end of the ordinary she-bolt upon the pigtail anchor when the form is raised and the ordinary she-bolt affixed to the aforesaid pigtail anchor pre-cast in the cast concrete.

3. The combination with a concrete form, of a dummy she-bolt adapted to extend through a hole in the concrete form and an ordinary she-bolt adapted for later replacing the dummy she-bolt, said dumy she-bolt having a tapered end, a pigtail anchor adapted to be detachably connected to the dummy she-bolt, said pigtail anchor comprising a threaded end and longitudinally extending anchoring deformations formed thereon, complementally formed threaded means on the dummy she-bolt and the pigtail anchor for detachably connecting them together, and said tapered ends of the dummy she-bolt and the ordinary she-bolt differing whereby removal of the dummy she-bolt

from the cast concrete forms a larger tapered opening in the concrete for detachably mounting the smaller tapered end of the ordinary she-bolt upon the pigtail anchor when the form is raised and the ordinary she-bolt affixed to the aforesaid pigtail anchor pre-cast in the cast concrete.

4. The combination with a detachable anchoring means for a concrete form adapted to be detachably connected to either a dummy she-bolt or an ordinary she-bolt, each of said she-bolts having a tapered end, of a dummy she-bolt adapted to extend through the concrete form, said dummy she-bolt including an enlarged tapered end, larger than the tapered end of the ordinary she-bolt, to which the anchoring means is adapted to be detachably connected, said enlarged tapered end adapted to form an enlarged opening in the concrete cast against the form, whereby the tapered end of an ordinary she-bolt is adapted to be inserted freely for detachably connecting to the anchoring means, supporting means for the dummy she-bolt adapted for detachably mounting the she-bolt therein, means for detachably mounting the supporting means on the concrete form, said supporting means including an arcuate portion formed on the supporting means forming a vertical opening, said arcuate portion adapted to receive the dummy she-bolt, whereby the dummy she-bolt is adapted to extend through the supporting means, securing means complementally formed to means formed on the dummy she-bolt, and said securing means adapted to extend through the vertical opening in the supporting means provided by the arcuate portion, whereby the supporting means and dummy she-bolt are detachably connected together.

5. The combination with a dummy she-bolt for erecting concrete forms, said dummy she-bolt adapted to extend beyond the inner face of the concrete form for detachably mounting anchoring means thereon, supporting means for the outer end of the dummy she-bolt comprising a struck-out portion from the face of the supporting means adapted for detachably mounting the she-bolt therein, and quick detachable means adapted to be inserted through the she-bolt between the struck-out portion and the face of the supporting means for attaching and detaching the dummy she-bolt to the supporting means for locating the inner end of the dummy she-bolt with respect to the inner face of the concrete form, whereby an ordinary she-bolt may replace the dummy she-bolt as the concrete forms are relocated.

6. As an article of manufacture, a support bracket for detachably mounting a dummy she-bolt on a concrete form, said supporting means including an arcuate struck-out portion formed on the supporting bracket forming an opening in the bracket between the inner face of the

struckout portion and the outer face of the support bracket, said arcuate portion provided with an opening adapted to receive said dummy she-bolt whereby the dummy she-bolt is adapted to extend through the supporting means, said opening provided by the struck-out portion adapted to receive securing means for detachably connecting the support bracket 'and the dummy she-bolt together, and said supporting bracket adapted to be detachably affixed to the concrete form.

7. The combination with anchoring means for erecting concrete forms, having longitudinally spaced undulating deformations adapted to be cast integrally in concrete, of either a dummy she-bolt or an ordinary she-bolt adapted to be detachably connected to an end thereof, each of said she-bolts having a tapered end and said dummy she-bolt having an enlarged tapered end having the diameter of the free end larger than the diameter of the free end of the tapered end of the ordinary she-bolt and adapted to be detachably affixed to the anchoring means whereby upon removal of the dummy she-bolt, the enlarged tapered end forms a tapered opening about the end of the anchoring means, whereby the smaller tapered end of an ordinary she-bolt is readily attached to the end of the integrally cast anchoring means for erecting and securing concrete forms to the cast concrete.

8. The combination with a detachable anchoring means for a concrete form, of a clamping device adapted to extend through the concrete form, said clamping device including an enlarged tapered end to which the anchoring means is adapted to be detachably connected, and said free ends of said anchoring means and clamping device adapted to be connected complementally formed, said enlarged tapered end adapted to form an enlarged opening in the concrete cast against the form, whereby the tapered end of a smaller similarly formed clamping device is adapted to be inserted freely for detachably connecting to the anchoring means, and said anchoring means comprising a large diameter helix extending rearwardly along the length of the anchoring means for retaining the anchoring means when embedded within the concrete cast within the form.

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