

March 4, 1958

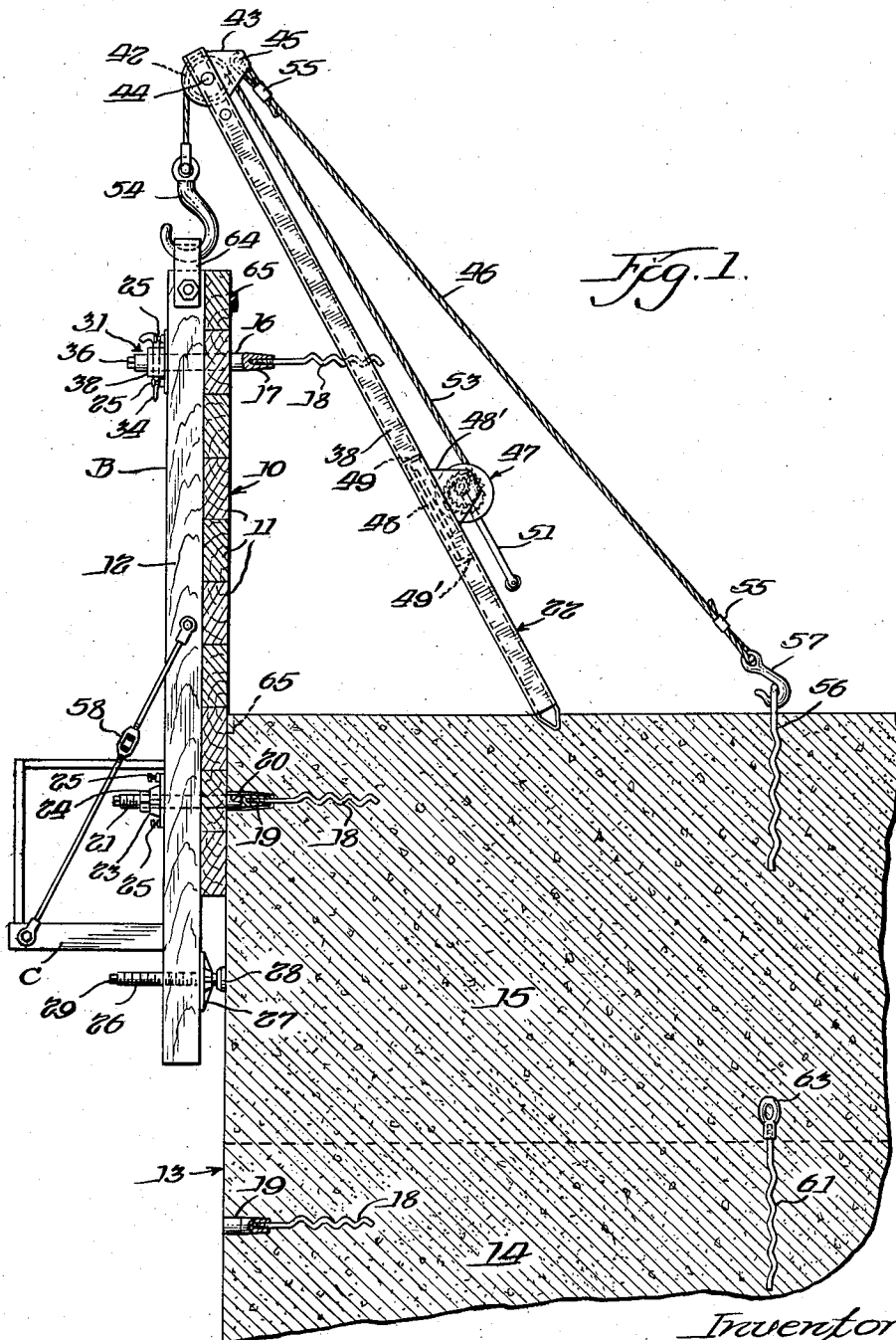
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2,825,115

APPARATUS FOR HANDLING FORMS

Filed June 27, 1951

3 Sheets-Sheet 1



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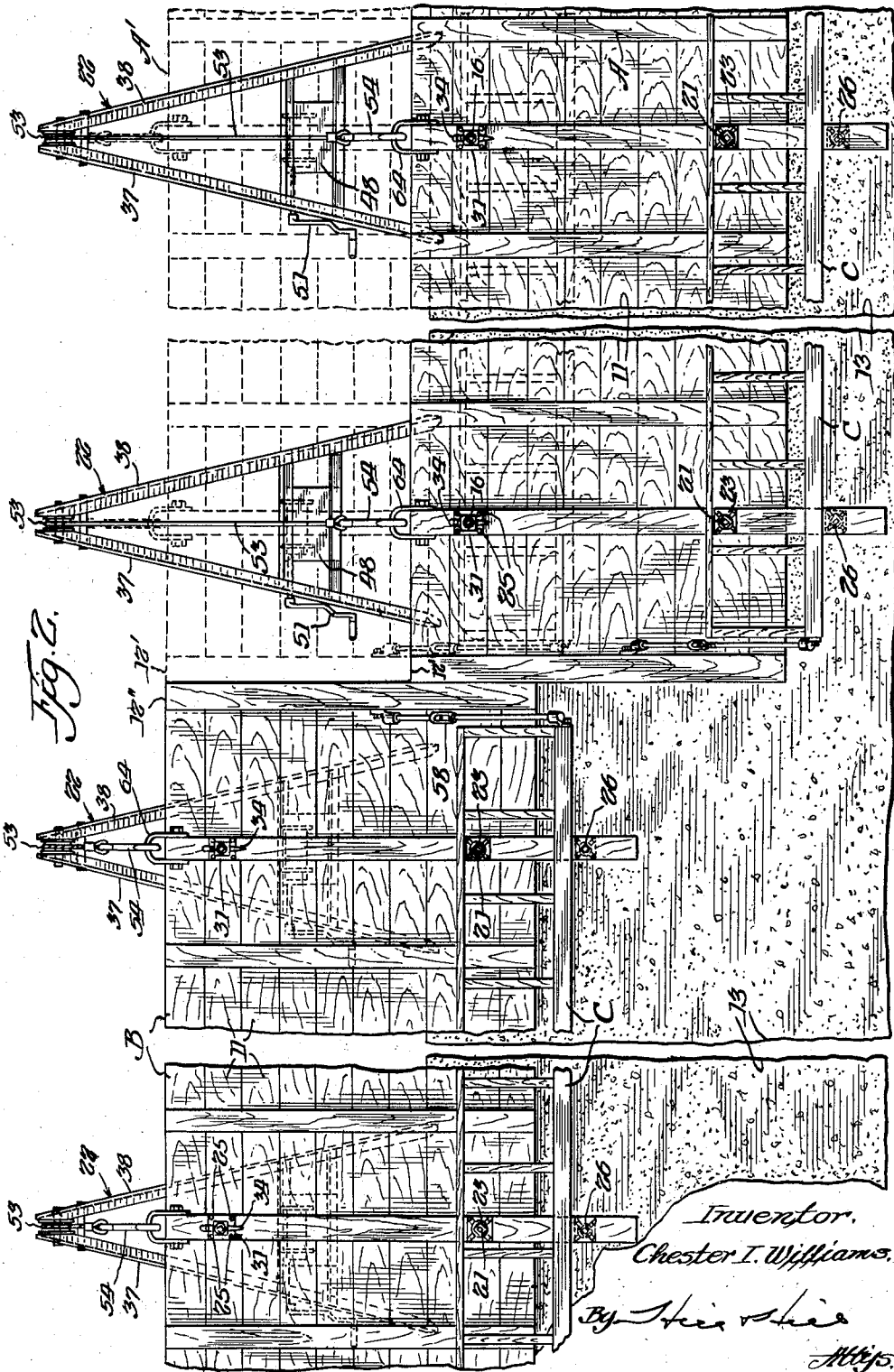
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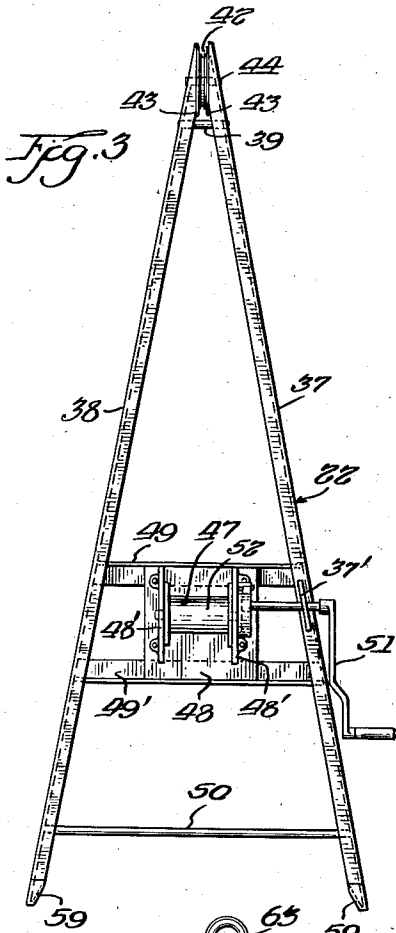
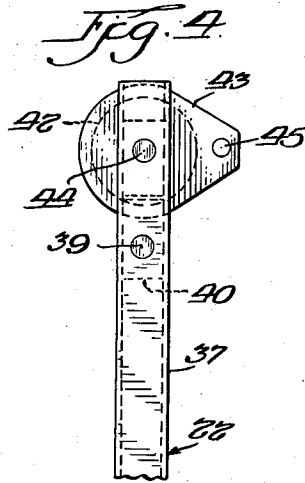
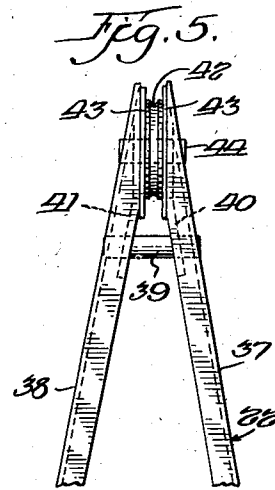
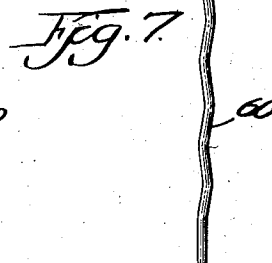
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APPARATUS FOR HANDLING FORMS

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3 Sheets-Sheet 3



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2,825,115

APPARATUS FOR HANDLING FORMS

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Application June 27, 1951, Serial No. 233,853

1 Claim. (Cl. 25—131)

This invention relates to concrete forms, and more particularly, relates to an apparatus for handling concrete forms which permits the erection of concrete forms in a minimum of time. This invention is a continuation-in-part of the invention disclosed and claimed in my co-pending application Serial No. 233,851, filed June 27, 1951 for Dummy She-Bolts.

Prior to my invention, concrete forms after each pour were usually raised with a derrick crane, or other forms of mobile cranes having very long booms, and then held in place until the forms were relocated and affixed in position for pouring the next lift of concrete. Another method of erecting forms was to place an auxiliary construction adjacent to the large blocks of concrete to be poured and the forms lifted, using the auxiliary support for maintaining the forms in position, after which the raised forms were located in position using the auxiliary forms as reinforcing.

It is therefore a principal object of my invention to provide an improved and simplified form construction and apparatus for lifting the forms in place so that in forming huge blocks of concrete, such as are poured in dams, the forms may be erected in a minimum of time, and with a minimum amount of equipment which is very portable and may be manually carried about, and may be relocated easily and erected in position for lifting the forms after the concrete has been poured and set.

Another object of the invention is to provide an improved form of dummy she-bolt construction in combination with anchoring means which will permit the ready removal of the she-bolt, and the raising of the forms, after which an ordinary she-bolt may be attached to the anchoring means, and the forms levelled ready for the next pouring, in combination with a simple portable lifting or hoisting mechanism which may be positioned adjacent the face of the concrete being poured for lifting the form while the dummy she-bolts are being removed and replaced by ordinary she-bolts.

Another object of the invention is to provide an improved portable lifting means in combination with anchoring means which may be precast in the concrete to provide an anchor for the lifting means.

A still further object of the invention is to provide simple anchoring means, which may be inserted within the concrete at the top of the lift before the concrete has entirely set, to extend above the upper face of the poured lift to provide an anchor for any supporting means which may be attached thereto in the erection of forms, or in the pouring of concrete, and which may, after use, be left in position, with the next lift being poured thereover.

Another object of the invention is to provide a simple lift construction which may be readily attached to, and detached from, the forms, and readily connected to anchoring means placed in predetermined relationship to the studding on the concrete form for successive erection of the forms as the different lifts of concrete have been poured and set.

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Another object of the invention is to provide a portable form of lifting means which may be arranged with respect to the concrete form so that the form handling devices may be operated simultaneously either by hand, or other forms of power supplied to the hoist of the devices, so that the entire form may be uniformly lifted, after which it may be retained in position until relocated and affixed to the concrete block being poured.

In order to accomplish the above objects of my invention, I have provided a simple form construction which utilizes dummy she-bolts and ordinary she-bolts, together with levelling jacks, for affixing and adjusting the form with respect to the face of the block being poured. As the forms are relocated for pouring successive lifts together with simple form handling devices or lifting means which are portable, and may be readily carried from one position to another by the erectors on the job for raising the forms and holding them in position while the forms are secured in erected position and affixed to the face of the block being poured. This simple form of lifting means is particularly adapted for lifting cantilever type of concrete forms, although it is equally adaptable for other types of forms, and particularly where the weight of the form may be distributed through several of the simple lifting means erected contiguous to the form for raising it to its next higher position. I have also provided a simple form of anchoring means for anchoring the portable lifting means in position for raising or lowering the forms, after which the anchoring means may be left within concrete as the next successive layer or lift is poured.

In order to erect the cantilever type of form to the face of the block being poured, I prefer to use the dummy she-bolt construction, together with the ordinary she-bolt which replaces the dummy she-bolt for affixing the form to the face of the block being poured, and which is particularly adaptable for the erection of cantilever type of forms. This particular form of construction is disclosed and claimed in the above-mentioned co-pending application.

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 in side elevation illustrating the erection of a concrete form using a portable form handling device in combination with a cantilever type form and improved anchoring means for anchoring the form handling device;

Fig. 2 is a view in front elevation illustrating the use of the form handling device at the beginning of the raising of the form, and also showing the form supported in raised position for affixing the form in its next successive position prior to the removal of the form handling device;

Fig. 3 is a view in elevation of a simple A-frame type form handling device with the hoisting cable removed;

Fig. 4 is a side view of the upper end of the hoist illustrating the pulley of the hoist and the anchoring means for the tension member for holding the hoist in erected position;

Fig. 5 is an enlarged, plan view of the upper end of the form handling device, illustrating the pulley construction and bracing for the frame;

Fig. 6 illustrates an embodiment of an anchoring means for the form handling device shaped in the form of a hairpin;

Fig. 7 is a view in side elevation of Fig. 6 showing

the undulating, longitudinally extending anchoring deformations of the anchoring means; and

Fig. 8 is a modified form of anchoring means in the form of a pigtail anchor having longitudinally extending, laterally displaced undulations, and provided with means for affixing supporting members thereto.

Referring now to the drawings, particularly Figs. 1, 2, and 3, there will be described the method of erecting cantilever type forms, and the apparatus used in conjunction therewith. A cantilever type concrete form construction 10, including sheathing 11 and strong back 12, is shown as being erected on the peripheral faces of a concrete block construction 13 such as is used in dam construction. For an ordinary concrete form construction where large lifts of concrete are being cast, the relative size of the strong back is substantially 12" by 12", and the sheathing is made up of members 4" in thickness. The relative lengths of these cantilever type forms as they are erected may range up to 25 or even to 50 feet in length, and the spacing between the strong backs is usually six feet. The particular method of erecting the forms as illustrated in Figs. 1 and 2 has been particularly illustrated to show the form handling devices for raising the forms when pouring successive lifts, or layers, one upon the other. The forms may be usually erected in the ordinary manner, starting from bedrock, and pig-tails or tie rods may be anchored in place in the bedrock, in the ordinary manner, to which the forms are mounted, and the necessary bracing applied for erecting the form for the first pouring.

Fig. 1, for example, illustrates the method of this invention in which the concrete form 10 is illustrated after the first lift 14 has been poured and allowed to set, and after which a second lift 15 has also been poured and set and the form has been lifted, for example, from the position A, as shown in the lower right hand portion of Fig. 2, to the position B shown in the top left of Fig. 2. Prior to this, the dummy she-bolt 16, as illustrated in Fig. 1, was set in the form so that its tapered end 17 extends through the form to the position shown, and to which a pigtail anchoring means 18 is complementally threaded into the corresponding threaded portion of the dummy she-bolt. The tapered end of the dummy she-bolt, after it was removed from the concrete, left a tapered opening 19 in the concrete slab which was later recemented. This tapered opening 19 permits the insertion of the tapered end 20 of an ordinary tapered 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 of the pigtail anchor 18, which has been cast in place with the threaded end extending into the enlarged tapered opening 19 left by the removal of the dummy she-bolt. The particular form of the dummy she-bolt construction is disclosed and claimed in the aforementioned co-pending application, and need not be further described in connection with the method of erection of this application.

The concrete form 10 is then raised by hoisting means 22 from the position A to that of position B as illustrated in Fig. 2, and while suspended in position B, the regular she-bolts 21 are placed through the concrete form into the enlarged tapered openings 19 provided by the dummy she-bolts 16 in the poured and set concrete. The regular she-bolt 21 is affixed to the threaded end of the pigtail anchor 18 by attaching a wrench to the squared end of the she-bolt, and firmly threading the she-bolt in position on the threaded end of the anchoring means 18. The bracket 23 and adjusting nut 24 are then threaded upon the she-bolt, clamping the form against the face of the cast block 13, after which the double-headed nails 25 may be driven through holes provided in the bracket 23 to affix the bracket in position upon the strong back of the form.

An adjusting or lifting 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, as shown in Fig. 2, and provides the support for the form when erected in place and concrete is poured against the form. The forms are leveled by adjusting the jack 26 through a squared end 29 and by rotating the shaft of the jack in the required direction. After making the necessary adjustments so that the form is correctly aligned, 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 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 the aforementioned invention of my co-pending application, and utilized in connection with the disclosure of the method of erecting forms of this invention. As the vertical spacing for the location of the she-bolt has been predetermined when the forms have been fabricated, all that is necessary is for the dummy she-bolts 16 to be set in the form, as illustrated in Fig. 1 and as illustrated in positions A and B of Fig. 2. The she-bolt 16 may have the pigtail anchor 18 attached thereto for erecting, and the she-bolt and pigtail anchor inserted through holes previously drilled in the form, or the dummy she-bolt may be erected from the outside of the form and the pigtail anchors mounted therein from the inside of the form.

A support bracket 31 for mounting the dummy she-bolt 16 is shown mounted contiguous to the opening through the form, and is nailed in position by double-headed nails 25, as shown in Figs. 1 and 2. The bracket 31 has an arcuate, struck-out portion from the bracket which provides an opening for the dummy she-bolt 16 as the bracket 31 abuts the face of the strong back 12. The arcuate, struck-out portion 32 is also provided with an opening for the passage therethrough of the dummy she-bolt 16. The dummy she-bolt is held in position with respect to the bracket 31 by a pin 34 inserted through a complementally formed hole in the dummy she-bolt. The pin 34 is pointed at one end for inserting the pin through a hole in 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 it to the pigtail anchoring means 18 by the complementally formed, threaded portions thereof. The particular construction of the dummy she-bolt is disclosed and claimed in the aforesaid co-pending application, and has been disclosed herein in connection with the method of erecting concrete forms using a simple A-frame type of form handling device 22. There is illustrated a scaffolding C for erecting and removing the she-bolts. A simple scaffolding has been shown suitably protected with a guard, and supported from the strong backs of the form. Any other simple form of scaffolding may be used if it is found necessary to provide a support for the workers in erecting the forms, especially for positioning the she-bolts, and in aligning the form.

Usually the bracket 31 is assembled to the dummy she-bolt 16, 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 is nailed in position, using the double-headed nails 25, permitting ease of removal later. As 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 standing on the scaffolding C, and another on the inside of the form mounting the pigtail anchor 16 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 (not shown) which are inclined at an angle, the dummy she-bolts may be threaded to the tie rods from the outside, after which the pin 34 is applied securing the dummy she-bolt in relative position with respect to the form.

Referring to Figs. 1, 2, and 3, a simple form of A-frame form handling device adapted for raising cantilever forms or other types of forms will be described. The form handling device 22 is shaped in the form of an A-frame having channel-shaped frame members or legs 37 and 38 adjoined at the upper end by a pin 39 extending through plate members 40 and 41 and base of the channel-shaped members forming the legs 37 and 38, shown in Figs. 4 and 5. The legs 37 and 38 may be formed from pipe-shaped members or angle iron members. The upper ends of the A-frame 22 is spaced apart to provide an opening for mounting a sheave 42. Plates 43 are also welded or otherwise secured to the angle channel-shaped or iron legs 37 and 38, and to the plate members 40 and 41, to provide a support for a pin 44 upon which the sheave 42 is journaled. The plate members 43, formed as shown in Fig. 4, provide a support for a pin 45 to which is attached a cable or tension member 46, Fig. 1. The hoisting mechanism 47 is mounted upon a plate member 48 which is welded, or otherwise suitably affixed, to upper and lower cross angles 49 and 49' affixed to the legs 37 and 38. An additional pipe brace 50 is affixed between the legs 37 and 38 to provide an additional bracing for the A-frame. The hoisting mechanism 47 may be any suitable windlass-type of mechanism, or other form of hoist mounted on brackets 48' affixed to the plate member 48, and it may be hand-operated or power-operated, depending upon the availability of power where the form handling device is used. For the purpose of disclosure of this invention, there has been disclosed a hand-operated hoist driven through a crank handle 51, which is connected to a suitable reducing gear mechanism for actuating a reel 52 of the winch to which a lifting cable 53 is affixed at one end, wound upon the reel, and extends over the sheave 42, and is connected to a lifting hook 54. A suitable ratchet and pawl mechanism allows the hoist to be secured in any adjusted position.

The cable or tension member 46, which is affixed at its upper end to the pin 45, and secured by a suitable clamp 55, is of such a length, as illustrated in Fig. 1, that it extends a sufficient distance behind the form handling device 22 to position it in such manner that the hook 54 will extend over the form to be raised, and may be affixed at its rear end to an anchoring means 56 in the form of a hair-pin, as illustrated in Figs. 6 and 7. The anchoring means 56 is positioned in the concrete so that the mid-portion thereof extends above the top of the lift to enable a hook 57 to engage the mid-portion thereof, and the hook is suitably affixed at the lower end of the cable 46 by a suitable securing means 55.

Although there has been disclosed a flexible cable 46 as the tensioning member, it is within the scope of the invention that a suitable rod construction may be used to withstand the tension in the lifting of the forms, and

this tension rod may have therein a turnbuckle adjustment such as illustrated at 58 in the connection for the tension member supporting the scaffolding C. It is also to be understood that it is within the scope of the invention that an adjusting cable 46 may be used in connection with the form handling device, and operated by adjusting mechanism similar to the hoisting mechanism 47 for adjusting and securing the A-frame handling device 22 in its adjusted position. When used in this manner, a suitable sheave would be mounted on the pin 45, over which the cable 46 would extend to be attached to a separate adjusting hoist similar to that described in connection with the hoist 47, but the size thereof depending upon the stress within the cable 46 in view of the load of the concrete forms.

Referring to Figs. 1 and 3, the lower ends of the channel-shaped legs 37 and 38 are provided with pointed members 59 which may be hardened for penetrating the upper surface of the lift to sufficiently indentate the surface of the concrete to prevent slippage of the hoist during the lifting operation.

Referring to Figs. 6 and 7, the legs 60 of the hairpin-shaped anchoring means 56 are provided with longitudinally extending undulations, as illustrated in Fig. 7. The undulations are laterally deformed with respect to the axes of leg portions substantially within the range of from greater than the thickness or diameter of the rod forming the hairpin, but less than twice the diameter thereof. This permits concrete to flow readily about the hairpin when embedded within the concrete, so that no voids are formed to reduce the holding power of the hairpin within the concrete. The shape of the hairpin legs permits ease in insertion of the hairpin within the poured concrete before it has finally set, so that the anchoring means may be readily located with respect to the strong backs of the form construction, and at the preferred distance back of the form, to correctly locate the form handling device. Although the hairpin 56 is illustrated as being vertically forced into the concrete, it is to be understood that it may be inclined at an angle substantially the same as that taken by the tensioning member 46.

Referring to Figs. 1 and 8, there is also illustrated another form of anchoring means 61 in the shape of a pigtail anchor, the upper end of which is threaded at 62, to which a forged or cast eye 63 may be readily affixed for attaching the hook 57 of the tension member 46. The undulations formed on the pigtail anchor 61 are shaped similarly as those on the legs of the hairpin anchoring means. This type of pigtail anchoring means also permits ready insertion within the poured concrete prior to its final setting, after which the concrete may be suitably puddled in place about the pigtail anchor. The anchoring means 56 and 61 constructed in this manner obviously permits of developing the maximum strength of the anchoring means within the concrete to provide a point of connection of the tension member 46. Either form of anchoring means may be used without departing from the scope of this invention, and after they have been used for elevating the forms, the concrete is poured thereover, embedding the anchoring means in the manner illustrated in connection with the anchoring means 61, Fig. 1. In the embodiment shown in Fig. 8, the eye 63 may be salvaged. It is also within the scope of the invention that an eye may be integrally forged on the pigtail anchor.

Referring to Figs. 1, 2, and 3, when it is desired to lift the concrete forms from the position A to that of position B, shown in Fig. 2, the form handling devices 22 are located over their respective strong backs 12, as illustrated in the lowermost position A of the form, and a suitable number of form handling devices are used, depending upon the size of the concrete form. Since the average form may vary up to twenty-five feet in length, and even to fifty feet in length, the number of form handling de-

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vices chosen, and size thereof, would depend upon the relative weight of the form. The length of the form handling device would depend upon the height of the form required for pouring, for example, a five foot lift. Such a form is approximately nine feet high to provide overlapping of the previously poured lift, and to provide space for the mounting of the lifting jacks 26 as shown. Form handling devices constructed as described above have substantially two ton capacity, are approximately ten feet in overall height, and the spacing of the legs is substantially four feet to provide suitable bracing. The bottom end of the A-frame is placed preferably not more than half the height of the A-frame to the rear of the form to provide a suitable mount, and the cable 46 is attached to the anchoring means 56 or 61 substantially as shown in Fig. 1. The hook 54 is attached to a suitable hanger 64 affixed to the upper end of a strong back 12 to which the hoist is to be attached.

The hoist 22, when suitably located, has its lifting cable 53 lowered, for example, to the position A shown in Fig. 2 for connecting the hoist to the form which is to be raised. After the cable has been connected to the form for each of the hoists used in lifting and suitably secured, and the regular she-bolt 21 and the dummy she-bolt are detached from the anchoring means 18, and the form is raised to the height shown by the position B of Fig. 2 by operating the hoist 47 of the several form handling devices 22 through their crank handles 51. A suitable ratchet mechanism of the form handling device permits each hoist 47 to be latched, securing the form in its final, erected position, as shown in Fig. 1, whereupon the ordinary she-bolts 21 which have been removed from their position, shown in position A of Fig. 2, and shall be inserted in the tapered holes 19 left by the dummy she-bolts 16, as shown in solid lines of position B, Fig. 2. This is illustrated in Fig. 1. The form is leveled and secured in adjusted position as previously described above, and as also particularly disclosed and claimed in the aforementioned co-pending application.

With the form 10 raised to the position shown in Fig. 1, and to the dotted position A' shown in Fig. 2, the concrete form is then in alignment with a similar concrete form which has been raised to the position B shown in Fig. 2. Contiguous upper ends of strong backs 12' and 12" are then suitably affixed together by bolting or clamping, and the forms aligned. In the raised position shown in Fig. 1 and position B of Fig. 2, the cable 53 is then released, and the hook 54 of each of the hoists is removed from its corresponding hangers 64. The hoist 22 may then be rotated rearwardly from the position shown in Fig. 1, permitting the detachment of the hook 57 from its corresponding anchoring means 56 or 61. The form handling devices 22 may then be stored to one side or carried to the next location where the form is to be raised in order to use a minimum number of form handling devices to raise the forms, for example, in casting a large concrete block as used in dam work. Also, a sufficient number for all of the forms, since they are relatively cheap, may be used without the need of transporting them from one position to another, but positioned or stored adjacent the forms which are to be raised by this simple type of form handling device.

Although the form handling devices 22 have been described as being hand-operated, using the crank handle 51 for actuating the lifting winch 47, it is possible to have each of the hoists power-driven, such as by a portable air motor, if such a source of power is available, or to suitable electric motors connected to the shaft for actuating the hoist so that, if desired, each of the hoists connected to a particular form may be simultaneously actuated to evenly lift the form from the lowermost position A shown in Fig. 2, to its next erected position B, Fig. 2.

After the forms have been raised for pouring, the next lift is adjusted and aligned in position. For example, in pouring a huge block for concrete dam work, the

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surface of the lift is suitably cleaned, and the form handling device moved to one side, after which the dummy she-bolts 16 and the pigtail anchors 18, or other suitable anchoring means, may be mounted at the upper end of the form, as shown in Figs. 1 and 2. The concrete is then poured to a predetermined level, as indicated by the pouring line 65. With this particular cantilever form construction, the dummy she-bolt construction permits the erection of the pigtail type of anchoring means just ahead of the pouring. With this improved form of she-bolt construction, it is therefore possible to pour a greater amount of concrete than has heretofore been possible, since with this improved method of lifting, using a simple, portable form handling device allows the forms to be easily erected and leveled.

After the poured layer of concrete has 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. The brackets 31 are then detached, and the she-bolt and bracket and pin are re-assembled together to prevent misplacement of the parts so that they may be readily assembled when the next layer is poured after the forms have been raised and leveled. This has been particularly described with respect to the raising of the form from the position A to the position B shown in Fig. 2. Removal of the dummy she-bolt with its enlarged, tapered end 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 of the anchor means 18 left by the removal of the dummy she-bolt, as illustrated in Fig. 1. The ordinary she-bolt is then assembled and affixed as described above, and the forms aligned. However, prior to the setting of the concrete, the anchoring means 56 and 61 have been set in place in the concrete and arranged for the later erection of the form handling devices 22.

Although there has been described a particular size of concrete form, and a particular form handling device for lifting the forms, the forms may be of any desired length and height, and likewise, the form handling device may be so constructed as to manipulate the particular form to which it is used. The forms are adapted to be dismantled and used repeatedly for pouring the concrete, or for the construction of vertical or battered walls, and likewise, the form handling devices are equally adapted for any type of wall.

It is thus obvious that there has been disclosed a simple and inexpensive concrete form construction and dummy she-bolt construction, together with a simple form handling device and anchoring means therefor, for the rapid erection of concrete forms as the concrete is being poured.

The improved concrete form construction and lifting means therefor work equally well on vertical or battered walls, or for erection of the forms directly to a rock foundation. The anchoring means 56 and 61, when used in this manner, are positioned in drilled holes in which has been placed concrete to develop the ultimate strength of the anchoring means for securing a form handling device thereto.

In addition, there has been disclosed a simple form handling device for the operation of the method of this invention which is inexpensive to make, and simple to operate, and very portable. It is also to be understood that other modifications thereof may be used without departing from the scope of my invention.

It is also obvious that there has been disclosed an improved method of forming huge blocks of concrete such as are poured on dam constructions today, where a slow setting, low compression concrete has been heretofore very difficult to use.

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 arrangement and method herein shown and described, or uses mentioned.

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

The combination with a concrete form construction including studding and sheathing therefor and detachable means comprising she-bolts and pigtail anchoring means for affixing the concrete form construction to embedded pigtail anchoring means for mounting and positioning the concrete form construction, of hoisting means for raising and lowering the concrete form construction including a form handling device having lifting means, complementally formed means on the concrete form construction and lifting means for detachably connecting the concrete form construction to the lifting means, said hoisting means for raising and lowering the concrete form construction adapted to be supported contiguous to the concrete form construction as it is being raised or lowered, and means for anchoring the hoisting means for raising and lowering in said position contiguous to the concrete form construction, said means for anchoring including a tension member and a pigtail shaped anchoring device adapted to be integrally cast in place, said free ends of said tension member and said anchor-

ing device adapted to be detachably connected, and said lifting means adapted for moving the concrete form construction to its successive position, whereby the concrete form construction is affixed in its elevated position by the aforesaid detachable means, after which the means for raising and lowering may be removed, and the concrete which may be poured later embedding said anchoring device after it has been detached from said tension member.

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