Feb. 17, 1970 D. J. FISHER 3,495,800

FORM AND BRACKET FOR CASTING A STACK OF UNIFORM CONCRETE SLABS

Original Filed March 16, 1966

FIG. 1.

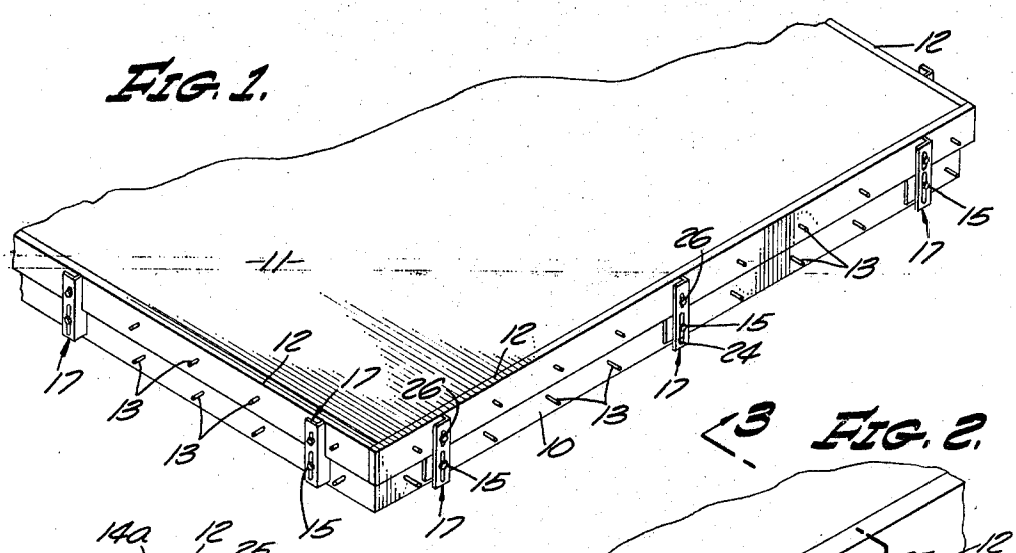


FIG. 2.

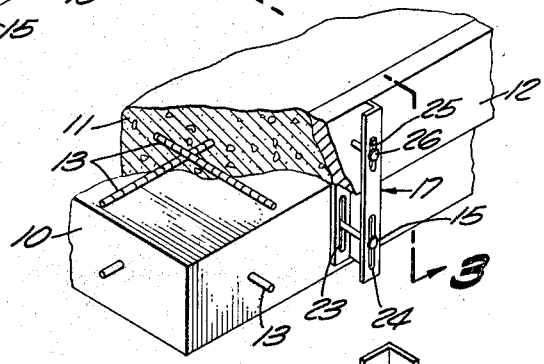


FIG. 3.

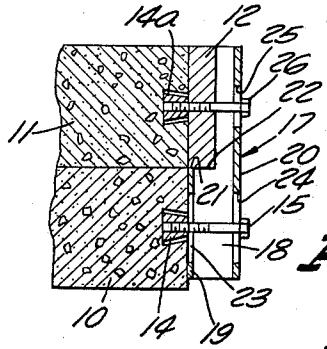


FIG. 4.

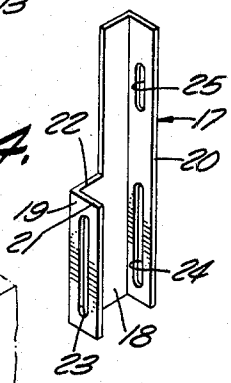


FIG. 5.

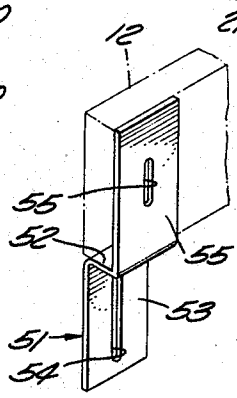


FIG. 6.

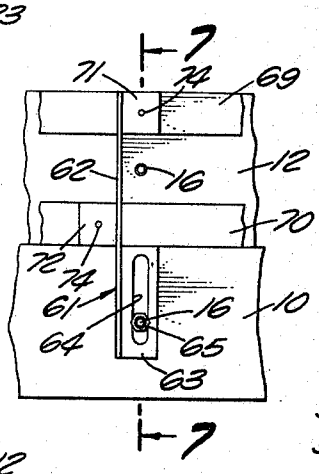
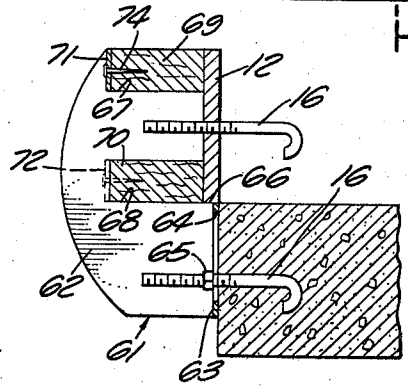


FIG. 7.



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FORM AND BRACKET FOR CASTING A STACK OF UNIFORM CONCRETE SLABS

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U.S. Cl. 249—20 3 Claims

ABSTRACT OF THE DISCLOSURE

A bracket for use in the on-site casting of tilt-up wall panels or jack-up floor sections. The bracket is secured to a single set of wooden forms and is also secured to the next lower precast slab so that each slab in a stack will be the same size and thickness but eliminating a great deal of carpentry work otherwise required if separate forms must be made for each slab. The invention involves the method of using the bracket in casting a succession of uniform size slabs in a stack.

The present invention relates to a device to facilitate building construction procedures, particularly those employing the application of precast concrete, tilt-up wall construction and lift slabs. The present invention also relates to an improved method for the casting of a plurality of concrete slabs employing the devices of the present invention. Specifically, the present invention relates to a new bracket for retaining the concrete forms in which the slabs are cast.

The method of constructing buildings by the use of precast concrete slabs is well known in the art and has become increasingly popular as a quick and inexpensive method of construction. It is the practice to cast such concrete slabs at the building site rather than attempting to transport them from another location. These concrete slabs are used to form either the floors or the walls of a building. Where the floors of a multiple story building are to be precast, it is frequently the practice to install vertical bearing members and then to cast all of the slabs at ground level in layers, one on top of another, separated by suitable means for preventing their adherence to each other. Employing suitable jacks secured to the vertical bearing members, the slabs are thereafter raised to their desired positions.

Where precast slabs are to be used as walls, it is frequently the practice to cast them as large panels of sufficient length to establish the desired height of the finished building, whereupon the slabs are tilted upward and installed in place using a suitable crane. It is not uncommon that such tilt-up wall panels will be used to form a building of several stories in height. A great savings in cost and ease of construction can be obtained by casting the majority of such panels for a particular building of the same outer dimensions, inserting suitable forms in some of said panels for windows, doors or other apertures. Thus, all of the panels having the same outer dimensions are cast in a stack, one on top of the other.

For each of the above-mentioned types of construction, it is extremely desirable to maintain the dimensions of each of the slabs within acceptable tolerances as they are cast one on top of the other. To do this, a number of carpenters are employed to construct the first forms directly on the ground to the desired dimensions. When the carpenters have completed their job, the concrete is poured into the form and finished as desired and permitted to set. A chemical substance or a layer of material is then applied to the upper surface of the first slab to prevent

the second slab from adhering to it when it is poured. The carpenters are then called in to construct the second form directly over the first one, duplicating the dimensions as well as possible. When this is done, the second slab is poured and permitted to set as before. Each of the additional slabs is prepared in the same manner. For tilt-up walls as well as for flooring, these slabs are ordinarily about six inches in thickness, and it will be obvious that the stack of precast slabs will quickly rise to a considerable height. Where the slabs are of considerable dimension, lateral support of the forms will obviously be required in order that all the sides of the slabs will be straight and true. This is not particularly a problem where the slabs close to the ground are being cast, but becomes an ever increasingly complex problem as the height of the stack grows. It is presently the practice to provide this lateral support by means of inclined supporting members forced against the sides of the forms and extending downwardly to the ground where their ends are secured against movement. As the stack of slabs grows, more and more of such supports are needed of ever increasing length, and working around the construction site becomes increasingly hazardous and cumbersome.

The lumber employed for such forms is essentially unusable for any other purposes after having been used in connection with the concrete since it ordinarily undergoes severe mishandling when it is removed from the hardened slabs and furthermore, the concrete in contact with the lumber severely dried it out. Accordingly, although a low grade of lumber is selected for this purpose, it represents a substantial cost which is not recoverable.

Briefly described, the present invention obviates a great number of the difficulties mentioned above and results in a saving of both materials and labor by using only one form for all of the casting operations. This eliminates the cost of a large quantity of lumber and further eliminates the time and expense of carpenters to construct each of the forms for each of the successive slabs. By utilizing the unique brackets disclosed by the present invention, the form is securely mounted upon the first precast slab and supported in such a manner that the dimensions are precisely duplicated. By constructing a form using lumber of slightly higher grade than now customary, the form can withstand the casting of a large number of slabs before it is rendered unusable by the deteriorating effects of the concrete. The forms can be easily attached and removed by the masonry workers thereby eliminating the need for specialized carpentry skills.

It is an object therefore of the present invention to provide a bracket which can be used in conjunction with appropriate forms to facilitate the construction of concrete slabs in multiple layers.

More specifically, it is an object of the present invention to provide a new bracket which securely retains the forms in position to permit the pouring of each successive slab of concrete in a multiple layer operation.

It is a further object of the present invention to provide a construction bracket substantially eliminating excessive quantities of lumber presently used in the construction of multiple layers of slabs.

It is another specific object of the present invention to provide a construction bracket which eliminates the necessity for specialized skills in carpentry during the construction of multiple layers of concrete slabs.

It is another object of the present invention to provide an improved method for the construction of concrete slabs.

More specifically, it is an object of this invention to provide an improved method of constructing concrete slabs in multiple layers by employing a single form in conjunction with a number of brackets.

Further objects and advantages of the present invention will become apparent upon reading the ensuing description in conjunction with the attached drawings in which:

FIGURE 1 is a partial perspective view illustrating the use of the brackets of the present invention in constructing concrete slabs in multiple layers.

FIGURE 2 is an enlarged, partial, sectional perspective further showing the employment of the bracket of the present invention and the method of construction.

FIGURE 3 is a sectional side elevation taken along line 3—3 of FIGURE 2.

FIGURE 4 is a perspective view of a preferred embodiment of the bracket.

FIGURE 5 is a perspective view of another form of the bracket.

FIGURE 6 is a partial elevation of another form of bracket shown mounted in a form.

FIGURE 7 is a sectional side elevation taken along line 7—7 of FIGURE 6, further illustrating the details of the form of bracket shown therein.

Turning now to the details of the drawings, a first slab of concrete is indicated **10** and the second slab is indicated by the numeral **11**. The steps taken to construct the first slab **10** are not shown in the drawings since such steps are those customarily employed with but a few exceptions. The forms **12** are first cut and fitted to the exact inner dimensions required for the slabs and are mounted upon the ground in a usual manner to form a large flat slab **10**. Apertures may be provided in the forms **12** to permit the insertion therethrough of a plurality of reinforcing bars **13**, if it is desired that the ends of the reinforcing bars extend past the outer edges of the slabs. The exception to these usual construction steps is the provision of additional apertures in the forms **12** and the positioning of bolts or threaded sleeves on the inner side of the forms **12** so that the concrete poured to form slab **10** will securely embed such sleeves or bolts in the concrete itself. For example, FIGURE 3 shows a threaded sleeve **14** embedded in the edge of first slab **10** adapted to receive a cap screw **15** therein during subsequent casting operations. During the casting of slab **10**, however, the sleeve **14** may be held in place by any suitable means, such as a shorter cap screw. FIGURE 7 shows the alternative use of anchor bolts **16** initially embedded in slab **10**. It will be obvious to persons skilled in the art that there are a number of alternative devices which could be employed to provide either a male or female threaded connection means. It is likewise contemplated that suitable threadable means could be employed utilizing the presence of the reinforcing bars **13**.

After the slab **10** has been poured, and finished plumb and square, the forms **12** are removed. The brackets **17** are then secured to the threaded means anchored in the slab **10** such as the sleeve **14** or the anchor bolts **16** as shown in FIGURES 3 and 7. Bracket **17**, best shown in FIGURE 4, consists of a generally U-shaped channel member including a web portion **18**, a concrete-abutting flange **19** and a rear flange **20**. The abutting flange **19** extends only partially the length of bracket **17** and is cut off to form a shoulder **21** extending into the web **18** a desired distance, whereupon the exposed edge of web **18** provides a form-abutting portion **22**. The depth of shoulder **21** from the outer surface of abutting flange **19** to the surface of portion **22** will be determined by the thickness of the forms **12**. Customarily, the forms used in similar operations are three-quarter inch or one and one-half inch lumber, the thicknesses of which are standard. The abutting flange **19** is provided with a longitudinal slot **23** and immediately opposite it, is a second longitudinal slot **24** in the rear flange **20**. Near the upper end of bracket **17** there is provided a third longitudinal slot **25** in rear flange **20**.

The bracket **17** is secured in place to the lower slab **10** by the cap screw **15** which extends through slots **23** and **24** and is threaded directly into the sleeve **14**. Before the screw **15** is tightened, the shoulder **21** is aligned as closely as possible with the upper surface of slab **10** as shown in FIGURE 3. The cap screws **15** are then tightened. When all of the desired brackets are secured in place in this manner, the forms **12** are moved into place resting upon the shoulders **21** of each of the brackets **17**. A second cap screw **26** is then extended through the slot **25**, through the form **12** and threaded into additional threaded sleeves **14***a* and tightened to force the forms **12** into secure abutment with the portions **22** of the bracket **17**.

By this procedure, the forms are aligned perfectly with the outer edges of the first slab **10** so that the second slab may be poured directly over the first slab, resulting in slabs of uniform dimensions. A sheet of material or a suitable chemical substance may be placed over the surface of slab **10** prior to the pouring of the concrete to cast slab **11** so that they do not adhere to one another. When slab **11** has been poured and finished so that its surface is true, the lower cap screws **15** are detached from the lower slab **10**, the upper screws **26** are detached from the sleeves **14***a* and the form **12** and the bracket **17** are moved upward and the cap screws **15** inserted into the sleeves **14***a* of slab **11** above. The screws **26** are then attached to a new set of sleeves in a similar manner. Each successive slab is then formed in the same manner, the longitudinal slots **23**, **24** and **25** permit adjustment for the correct thickness of the next slab and give greater flexibility for mounting the bracket. It should be noted that the overall length of the brackets **17**, particularly the length of the abutting surface **22** above the shoulder **21**, should preferably not be such as would extend the end thereof above the top edge of the forms **12**, as this may hinder scraping and finishing operations.

The number and location of the brackets shown in FIGURE 1 is not intended to limit in any way the number and location of brackets to be used in accordance with this invention. Normally, panels having an approximate dimension of ten feet by twelve feet are constructed and it is found that sufficient support is obtained by using brackets every four feet and at each corner. This of course may vary depending upon the thickness of the forms **12** and the thickness of the slab themselves.

FIGURE 5 illustrates another form of bracket which may be used and which is of simpler construction. This bracket, designated by the numeral **51**, consists of an essentially flat piece of stock which is bent to form the shoulder **52** of sufficient width to receive a form **12**. The lower half **53** of the bracket is provided with a longitudinal slot **54** and is the portion which abuts the lower, precast slab. The slot **54** provides for the insertion of a bolt or screw to secure the bracket in place. The upper half **55** of bracket **51** has a slot **56** so that the form **12** can be secured thereto, similar to the manner described with respect to the bracket shown in FIGURE 3.

The form of bracket shown in FIGURES 6 and 7 differs from those described heretofore in that this bracket employs additional reinforcing members abutting the forms themselves. The bracket **61** consists of an enlarged body portion **62** which is provided with a plurality of lateral flanges. The lower-most flange **63** is provided with a longitudinal slot **64** and is adapted to abut the outer edge of the lower slab **10** as shown in FIGURE 7. The slot **64** receives the threaded end of the anchor bolt **16** and the nut **65** secures bracket **61** in position against precast slab **10**. A shoulder **66** is provided as in the other brackets, and is adapted to receive thereon the edge of the forms **12**. Thus, the depth of shoulder **66** is provided to accommodate the thickness of the forms **12** as accurately as possible. The body **62** is further provided with a pair of substantially rectangular cutouts **67** and **68** having dimensions sufficient to receive standard two-by-fours therein. As shown in the drawings, these two-by-fours **69** and **70** are adapted to extend laterally along the length of the forms **12** to add to the lateral

rigidity of the overall form itself. It is not necessary to have the forms **12** connnected directly to the two-by-fours **69** and **70** but it may be preferable to have the bracket **61** secured to said two-by-fours. In any event, flanges **71** and **72** are formed from the body **62** of bracket **61** and may have the apertures **73** shown so that the bracket can be secured to the two-by-fours as by the nails **74** shown or other suitable means. Prior to pouring the second, and subsequent slabs, the second anchor bolt **16***a* will be inserted in an aperture through form **12** to provide means for anchoring the bracket **62** for the next subsequent casting operation.

The modified form of bracket shown in FIGURE 6 and 7 will be particularly advantageous where the thickness of the slabs **10** and **11** is such that more lateral support is required than the other types of brackets are able to provide. In addition, the lateral supports provided by the two-by-fours **69** and **70** will permit the placement of brackets **61** at greater intervals along the length of the slab so that a lesser number of such brackets need be employed in a given operation, thereby decreasing the number of attachments and removals which must be made to move the form upward for each successive casting step.

It will be seen at once, that the present invention provides an improved method of constructing the forms thereby significantly decreasing the difficulty of such construction techniques and substantially lowering the costs thereof. The brackets shown in this invention can be easily and inexpensively manufactured and will provide a long service life before replacement will be necessary. While several embodiments of the bracket have been shown and described, it will be obvious to persons skilled in the art that other similar configurations of brackets could be formed in accordance with the teachings of this invention. Changes and modifications of these brackets and of the steps of construction outlined herein will be obvious and it is the aim of the appended claims to cover all such changes and modifications as fall within the true scope and spirit of this invention.

I claim:

1. A construction device for the casting of uniformly sized concrete slabs in multiple layers, the combination comprising:

a form;

a bracket, said bracket comprising a first portion adapted to abut the edge of a first precast slab, means affixing said first portion to said first slab, said first portion including a flange, said flange having an aperture adapted to receive said affixing means therein;

a second portion of said bracket having an edge adapted to abut said form, said second portion including one

or more cutouts adapted to receive lateral reinforcing means in abutting relationship to said form;

a shoulder situated intermediate said first and second portions, said shoulder adapted to receive said form thereon, whereby the inner surface of said form is aligned with the abutting surface of said first portion;

said affixing means operative to position said shoulder in alignment with the upper surface of said first precast slab.

2. A bracket of the type described in claim **1** wherein said second portion further includes a flange adjacent each of said cutouts and means for securing said flange to said lateral reinforcing means.

3. A construction device for the casting of uniformly sized concrete slabs in multiple layers, the combination comprising:

a form;

a bracket, said bracket comprising a U-shaped channel member having first and second flanges separated by a web portion;

said first flange extending a portion of the length of said bracket, a shoulder formed at the end of said flange situated near the approximate center of the greatest dimension of said bracket, said shoulder extending into said web portion, an abutting edge formed along the length of said web above said shoulder, said first flange having an aperture therein adapted to permit the attachment thereof to a precast slab and operative to position said shoulder in alignment with the upper surface of said precast slab;

said second flange extending the entire length of said bracket along its greatest dimension, at least one aperture in said flange situated intermediate the length of the abutting edge of said web, said aperture adapted to receive affixing means for securing said form to said bracket;

said shoulder having a dimension corresponding to the thickness of said form.

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U.S. Cl. X.R.

25—131; 249—219