Nov. 3, 1964 E. L. WEIDNER 3,154,832

CANTILEVER FORM FOR CASTING CONCRETE

Filed July 9, 1962 3 Sheets-Sheet 1

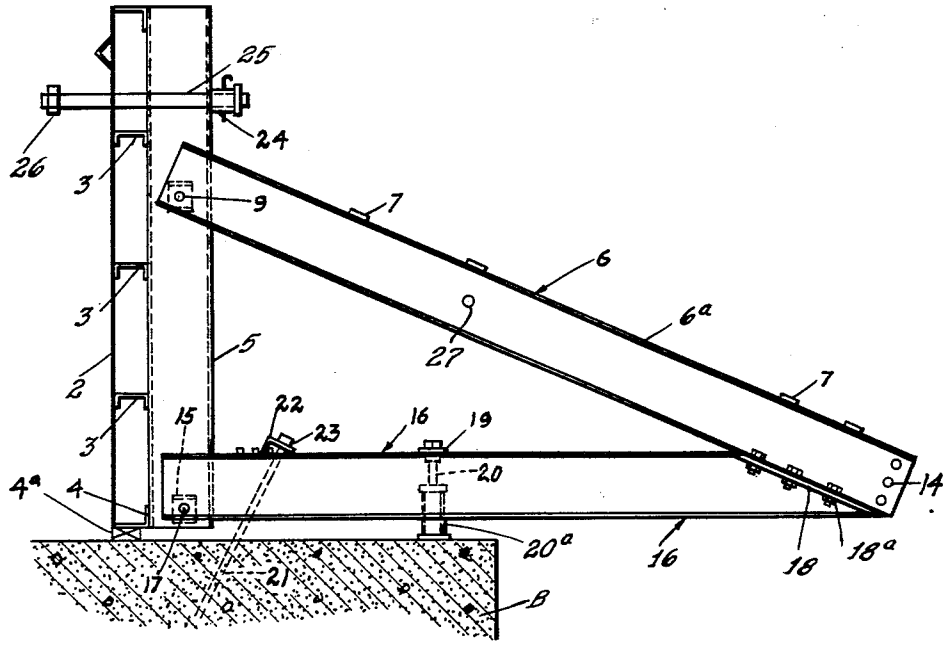


Fig. 1.

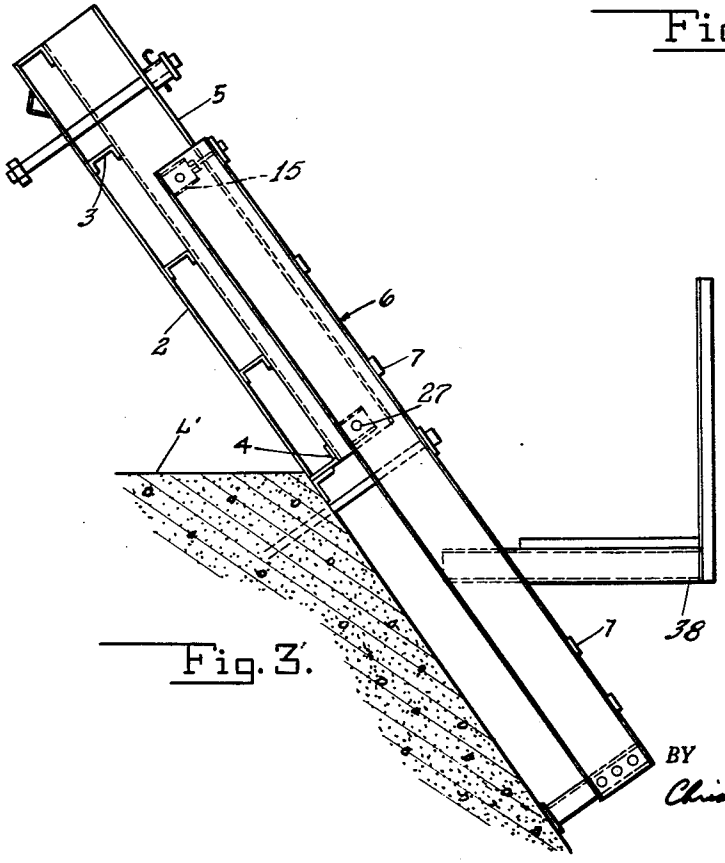


Fig. 3.

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CANTILEVER FORM FOR CASTING CONCRETE

Filed July 9, 1962 3 Sheets-Sheet 2

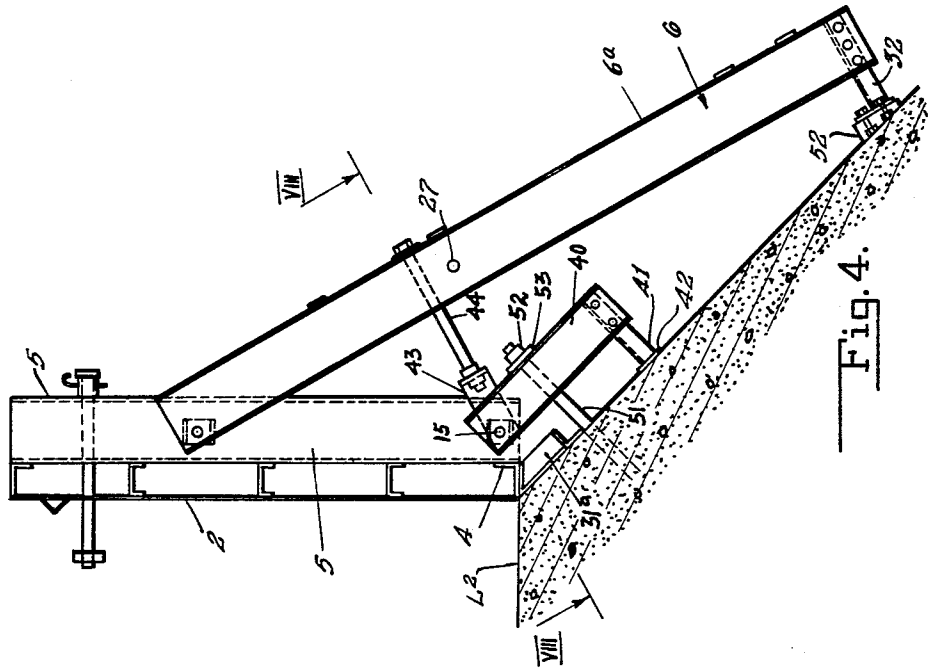


Fig. 4.

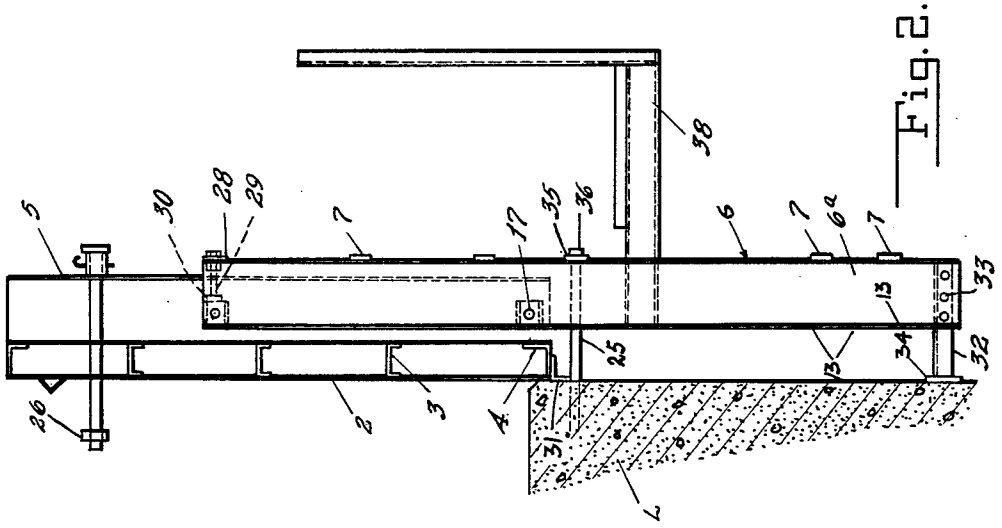


Fig. 2.

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CANTILEVER FORM FOR CASTING CONCRETE

Filed July 9, 1962 3 Sheets-Sheet 3

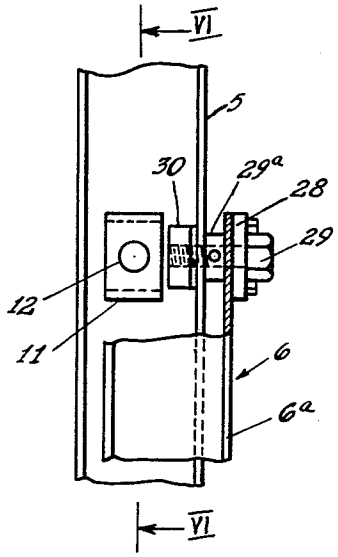


Fig. 5.

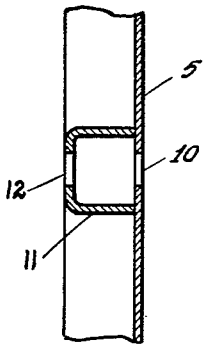


Fig. 6.

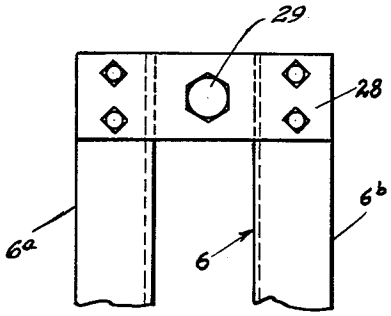


Fig. 7.

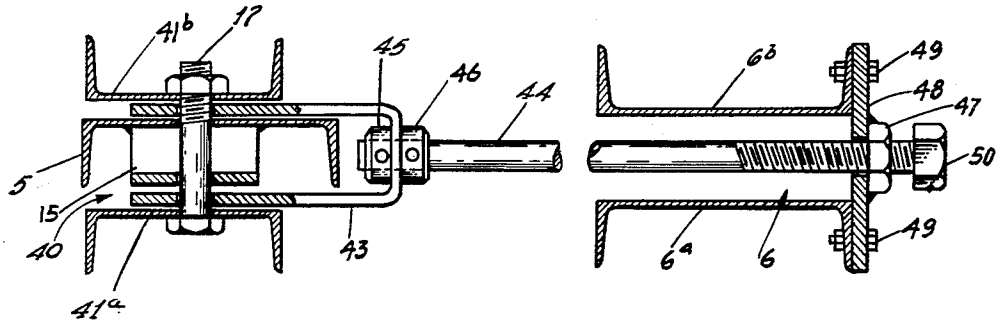


Fig. 8.

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3,154,832

CANTILEVER FORM FOR CASTING CONCRETE

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Filed July 9, 1962, Ser. No. 208,369
5 Claims. (Cl. 25—131)

This invention relates to metal forms used in the pouring of concrete wall structures and is for a form of the general type known in the art as a cantilever form.

Concrete walls of any considerable height are generally poured in horizontal courses and the concrete of one course sets before the next course is poured. This same procedure is often used in making walls which slope from the bottom toward the top. To confine the wet concrete when it is poured and until it is set, reusable metal forms, known as cantilever forms, are employed. These comprise a reinforced metal panel, the lower edge of which is confined against the previously poured course and to the outside of which there is secured depending structural sections that extend below the top of the previously formed course. These sections are secured by anchor bolts set in the previously formed course and are cantilevered or braced against the previously formed course to hold the form vertical. Similar procedures may be followed in making sloped walls.

Such forms have utility only after the first course has been poured, and they cannot be used where a sloped wall is topped by a vertical wall. Consequently separate forms must be used for making the bottom or first course of wall or where a sloping wall changes to a vertical wall.

According to the present invention there is provided a form having structural members attached to the exterior thereof adapted to be interchangeably used in making a starting course, or as a cantilevered form in pouring a subsequent or succeeding course, and for a condition where the angularity of the wall from one course to another changes, as where the wall surface changes from a slope to a vertical plane. Thus the contractor may use one set of forms where two or three were formerly required. This not only reduces the contractor's investment in forms, but eliminates hauling to and from the area of labor, handling and storage costs.

An object of the invention is to provide a form which may be interchangeably used as a braced starting form or as a cantilever form.

A further object of the invention is to provide a form which may be used also for sloped walls, or where the slope or angularity of the wall changes from one course to another.

A further object of the invention is to increase the versatility of a cantilever form.

These and other objects and advantages are secured by my invention which may be more fully understood by reference to the accompanying drawings, in which:

FIG. 1 is a side elevation showing a form embodying my invention arranged for use in pouring above a flat surface, that is, pouring the first course of a wall to extend above a given surface or foundation;

FIG. 2 shows the form used as a cantilever form in pouring a succeeding course;

FIG. 3 shows the same form as used in making a sloping wall;

FIG. 4 shows the use of the form where a vertical wall extends upwardly from a sloping base;

FIG. 5 is a fragmentary view on a larger scale, partly in section and partly in elevation, with parts broken away of the connection between the rear brace or stiff back in the position shown in FIG. 2, the view showing the adjusting bolt;

FIG. 6 is a fragmentary vertical section through the rear bracing member of the form, the view being in the plane of line VI—VI of FIG. 5;

FIG. 7 is a plan view of the upper end of the stiff-back with its adjusting bolt; and

FIG. 8 is a fragmentary view on a larger scale showing a transverse section in substantially the plane of line VIII—VIII of FIG. 4.

Referring first to FIGS. 1 to 4, the form, as in present practice, comprises a panel 2, preferably of metal with a flat forward or concrete-confining face, having spaced horizontally-extending reinforcing sections, such as channels 3 welded to the back thereof, and at the bottom of the panel there is an angle section 4 instead of a channel. Extending crosswise of sections 3 and 4 from the top of the panel toward the bottom are one or more stiffening sections hereinafter referred to as a vertical back section (although as shown in FIG. 3 it is not always in a vertical position), one of which is shown and which comprises a channel 5 having its web normal to the back of the panel and one of its flanges welded or otherwise secured to the sections 3 and 4. While the section is here shown as a channel, it could be an I-section or a box section or otherwise formed, and will be herein referred to as a vertical back section. Its height is coextensive with the height of the panel 2.

According to the present invention there is provided a bracing member 6, termed a stiff-back, which is conveniently formed of two parallel spaced channel sections with their webs in confronting relation and their flanges faced away from each other, as best shown in FIG. 7, where 6*a* and 6*b* designate the two channel sections. These channels may be handled as separate parts, or preferably they are permanently integrated by rigid cross straps such as 7 welded or bolted to the outer flanges of the channels.

At the one end of the stiff-back, where it attaches to the vertical back section 5, there are registering bolt holes. The two sections 6*a* and 6*b* as shown in FIGS. 1 to 4 are placed to straddle the vertical back section and a bolt 9 passes through these bolt holes and a registering hole 10 in the vertical back section. In order to provide a good bearing about which the stiff-back may pivot, I have here shown a filler piece 11 (see FIG. 6) in the form of a flat arch having the legs thereof welded to the webs of the section 5, this preferably being about as high as the channels on which it is carried is deep, and it has a hole 12 therethrough registering with the hole 10 so as to provide a good bearing for the bolt 9 and flat surface for the inner face of one of the confronting channels 6*a* and 6*b* to bear against, the web of the other of said two channels bearing against the web of the vertical back section. The bolt 9 constitutes a pivot pin releasably attaching one end of the stiff-back to the panel at a level slightly more than half way above its lower edge, somewhere between its vertical center and the upper edge of the panel.

The outwardly-turned flanges of the members 6*a* and 6*b* have spaced bolt holes 13 therethrough at the opposite end (see FIG. 2) and the web of each has registering bolt holes 14 therethrough near the lower or outer end thereof.

At the lower end of each vertical back section close to the bottom there is a second filler or bearing element 15 similar to the piece 11. There is a registering pivot pin or bolt hole through the filler and web of the vertical back section.

When the form is used in the manner shown in FIG. 1 to form a vertical wall extending upwardly from a horizontal base B, a horizontal strut 16 formed of two parallel channel sections has one end attached to the lower end

of the vertical back section 5 by a removable pivot pin or bolt 17 that passes through the webs of the parallel horizontal channels, similar to and spaced similarly to channels 6*a* and 6*b*, this bolt passing also through the filler 15 and the lower end of the web of the vertical back section. The outer end of the horizontal struts are cut off at an angle, and a plate 18 is welded thereto through which bolts 18*a* inserted through holes 13 pass for releasably connecting the outer end of the stiff-back to the outer end of the horizontal strut.

In using the form for this operation the parts are joined in the manner described with the stiff-back sloping on a diagonal from the panel form to the outer end of the horizontal strut. A filling strip 4*a* is inserted under the strip 4 of the panel on the foundation. A cross strip 19 is bolted or welded to the top of the strut. A thrust screw 20 carried against end-wise movement in this strip and threaded into a vertically-elongated nut 20*a* provides an adjusting jack that bears against foundation B so as to tilt the panel one way or the other on the filling strip 4*a* to set the panel in a vertical or plumb position. It is of course to be understood that this form is placed in confronting relation to an opposing form and concrete is poured into the space between these forms in the usual manner to nearly or about the full height of the form where the wall is to extend higher than the level of the form.

To use the form in the manner shown in FIG. 1 a diagonal anchor bolt 21 is set in the previously-formed base B. The form of this invention is set so that this anchor bolt extends up between the elements forming the horizontal strut 16. Its upper end passes through an angle cleat 22 so that the nut 23 on this anchor bolt clamps the cleat against the top of the strut and holds the form against movement after it has been adjusted to the right position.

There is a sleeve 24 welded to the flanges of the vertical back section 5 between the upper end of the stiff-back and the top of the panel. This is aligned with holes in the panel and flanges of the vertical section 5 so that, before the concrete is poured, an anchor bolt 25 may be passed through this sleeve and through the form. This bolt usually has a nut 26 on its inner end and its outer end is threaded so that when the concrete has set, the anchor bolt will be embedded in the wall and may subsequently be screwed out, leaving the nut 26 permanently in the wall.

After the first course of concrete has set, the pivot pin 17 is removed as are also the bolts 18*a* so that the strut 16 is removed entirely from the form. The stiff-back 6 is then swung on the pivot 9 to the vertical position shown in FIG. 2. In this position a hole 27 in the stiff-back registers with the hole in the lower end of the vertical back section 5 from which pin 17 was removed, and the pin 17 is replaced. Pin or bolt 9 is then removed and a cross piece 28 is bolted to the outside of the stiff-back (see FIG. 7). This cross piece carries a rotatable thrust pin or aligning bolt 29 that is rotatable in the cross strip, but which is confined against longitudinal movement. The threaded inner end of this bolt is engaged in a nut 30 fixed to the web of the vertical back section 5 (see FIG. 5) so that by turning bolt 29 the panel may be adjusted in or out about the pivot pin 17 to bring the panel into proper vertical alignment. The form is then ready for use in the manner shown in FIG. 2. An angle section 31 is bolted to the bottom angle section 4 of the panel with a vertical leg flush with the surface of the panel 2.

In use, this flange is butted against the top edge of the previously-poured wall section L, the stiff-back extending vertically down the face of the wall but spaced outwardly therefrom. At the lower end of the stiff-back a short length of channel 32 is bolted between members 6*a* and 6*b* by bolts 33 entered through holes 14 into the channel, this channel having a pad or foot 34 that bears against the surface of the previously-poured section to provide a cantilever bracing where outward pressure on the panel is transmitted against the lower wall surface because of the pivoting action at 17.

The previously placed anchor bolt 25 in the lower course of concrete is passed through a cross strip 35 welded or bolted across the sections 6*a* and 6*b*, and a nut 36 is applied thereto to support the form at the required level for the face of the depending leg of the angle 31 to bear against the face of the previously set course of concrete. In pouring a second course, a similar bolt 25 can be set in the concrete as it is poured to hold the form when it is raised to the level for the next pour. It will of course be understood that depending on the length of the panel there will generally be two or more vertical back sections 5 at spaced intervals, and two or more stiff-backs, and other parts will be duplicated.

The form is thus easily and quickly converted for use either on a horizontal foundation in pouring a first course or to a cantilever form for pouring succeeding courses. To reconvert to the form shown in FIG. 1 it is necessary to remove the aligning bolt 29, and it is for this reason that the ends of the cross strap 28 are bolted in place, as shown in FIG. 7, to facilitate the removal and replacement of this bolt 29. The fixed thrust collar 29*a* below the strap prevents the removal of the bolt 29 independently of the strap on which it is carried.

A scaffold structure 38 may be bolted to the stiff-back in the customary manner, the bolts, for clarity of illustration, not being shown.

As shown in FIG. 3, the form of FIG. 2 may be used without change when pouring a concrete wall having a uniform flat slope, the only difference being that the scaffold 38 is bolted to the stiff-backs at an angle such that the floor of the scaffold will be level and horizontal. In this view L^1 indicates the previously poured and hardened concrete course.

When the form is to be used with the upper course to be either at an angle to the lower course or vertically aligned therewith, as where the lower course L^2 has either a sloping surface or a vertical surface and the next course is to be vertical, the arrangement shown in FIGS. 4 and 8 is used. The pivot pin 9 is employed, as in FIG. 1, and it is unnecessary to use the aligning bolt 29 as in FIG. 2. In place of a right angle section 31 of FIG. 2, there is used instead an angle strip 31*a*, the depending flange or leg of which rests on the top area of the lower course L^2 and which is flat against said surface when the face of the panel is vertical.

In place of the horizontal strut 16 of FIG. 1, there is a special short strut 40 having its upper end pivotally connected by pin 17 to the lower end of the vertical bracing section 5. This short strut has a leg 41 at right angles thereto extending toward the sloping wall and having a pad or foot 42 that bears against the sloping face of the wall. This strut, like the strut 16 and the stiff-back, is formed of two spaced channels 41*a* and 41*b*, as best seen in FIG. 8.

In addition to the strut 40, the pin 17 also passes through two arms of a yoke 43 that straddles the vertical bracing section 5. This yoke is secured to the inner end of a rod 44 which passes through the stiff-back, as shown in FIG. 8. The rod 44 connects to the yoke through a swivel connection provided by collars 45 and 46. The outer end of the rod is threaded through a nut 47 welded to a cross strap 48 bolted at 49 to the outer flanges of the channels 6*a* and 6*b* comprising the stiff-back. There is a head 50 on the rod to which a wrench may be applied for tightening the rod.

In this case the anchor bolt 51 in the base course is normal to the slope of the base and passes through the short strut 40 and has a nut 52 bearing against a cross strap 53. The stiff-back has an angular pad 54 on the inner end of the leg 32 to set flat on the slope of the base.

The form is set with the lower edge of the inner face of the panel exactly located and the angle strip 31*a* is at the top of the base and the anchor bolt nut 52 is tightened down. The panel is then pivoted about pin 17 to bring it to a vertical plane (or different slope). The yoke rod 44 is then turned to pull the free end of the stiff-back with its shoe or pad 54 into tight frictional contact with the base and hold the panel against any pivoting movement about pin 17.

The scaffold 38 of FIG. 3 may be used in FIG. 4. It would not be needed in FIG. 1.

I have described in detail one specific embodiment of my invention and such embodiment shall be deemed to be illustrative of a structure made in accordance with the invention and shall not be construed in a limiting sense. Basically the invention utilizes a form having a rigid panel, a stiff-back pivoted to the back of the panel at a level above the vertical center by a removable pivot and movable from a horizontal or angular position to a vertical position with means at the bottom of the panel having a removable pin either for locking the stiff-back 6 in a vertical position, or to which a strut, either a long one as 16 in FIG. 1, or a short one as 40 in FIG. 4, may be pivotally and interchangeably attached. Further, the invention provides adjusting means provided by the aligning bolt 29 in FIG. 2 or the yoke 43 and rod 44 arrangement of FIG. 1 for holding the panel in a vertical position or other angular position relative to the previously formed foundation on which the added wall section utilizing the form is to be poured.

I claim:

1. A cantilever form for use in the pouring of concrete wall structures comprising

a panel having a concrete confining face and a rear face;

a vertical structural section on the rear face with a first pivot pin opening above the vertical center of the panel and having a second pivot pin opening below the vertical center of the panel near the lowermost edge thereof;

a stiff-back having a length greater than the vertical height of the panel having first and second pin openings therethrough spaced equally to the spacing of the pivot pin openings in said vertical structural sections whereby the first openings in both members or the second openings in both members may be selectively brought into alignment, the second pivot pin opening being remote from either end of the stiff-back;

a pivot pin removably passed through one of and near the middle thereof, the first opening being close to the upper end of the stiff-back the two aligned sets of openings connecting the stiff-back and panel for relative arcuate movement, the removable pin enabling the pivot to be in either of the first or second pin openings whereby the pivotal connection of the stiff-back with the panel may be selectively shifted from above the vertical center of the panel to a point below the vertical center of the panel and close to its lower edge, the second pivot pin opening in the structural member on the panel being so positioned that approximately half the length of the stiff-back projects below the panel when the pivot pin is engaged in the second opening of the structural member on the panel and the opening near the middle of the stiff-back while the upper end of the stiff-back is above the center of the panel, and a removable transverse adjusting screw in the upper end of the stiff-back, the structural member on the back of the panel having a nut secured thereto above the center of the panel with which said screw may be engaged.

2. A cantilever form for use in the pouring of concrete wall structures in stages upwardly from a previously-formed concrete mass comprising a panel having a concrete confining face and a rear face, a vertical structural section on the rear face, a strip fixed to the section and having a leg in abutting contact with the top area of the wall surface of a previously-poured block, a stiff-back pivotally attached at one end to said structural section, means for spacing the other end of the stiff-back from a surface of a previously-poured concrete mass, a strut pivotally attached at one end to the structural section, means connected to the other end of the strut for spacing the other end of the strut from the surface of a previously-poured concrete mass, means intermediate the ends of the strut anchored in said previously-poured concrete mass for fixing the strut in location thereon, and tensioning means pivotally attached both to the one end of the strut and to the structural section and adjustably connected to the stiff-back intermediate its ends whereby the space between the stiff-back and the pivotal connection of the strut, section, and tensioning means is varied to adjust the angle between the stiff-back and the concrete confining face.

3. A cantilever form as in claim 2 wherein the means for tensioning the strut with respect to the stiff-back is a rod secured at one end for axial adjustment to the stiff-back and to a yoke at its other end, the yoke being pivotally attached to the one end of the strut and to the vertical section.

4. A cantilever form as in claim 2 wherein the means for spacing the other end of the stiff-back from the previously-poured concrete mass is a leg removably attached to the stiff-back and a foot connected to the leg to contact with the surface, the means for spacing the other end of the strut from the previously-poured concrete mass being a leg connected to the strut and which includes a pad for contact with the concrete surface, and the means for fixing the strut in location is an anchor member secured to the block and removably fastened to the strut.

5. A cantilever form as in claim 2 wherein the pivotal connection of the stiff-back to the structural section is above the mid point of the concrete confining face and the stiff-back is of a length greater than the height of the panel and the strut is shorter than the height of the panel.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,154,832 November 3, 1964

Everett L. Weidner

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 5, line 48, after "end" insert -- and near the middle thereof, the first opening being close to the upper end --; same column 5, lines 50 to 52, strike out "near the middle thereof, the first opening being close to the upper end of the stiff-back".

Signed and sealed this 6th day of April 1965.

(SEAL)
Attest:

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Attesting Officer

EDWARD J. BRENNER
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