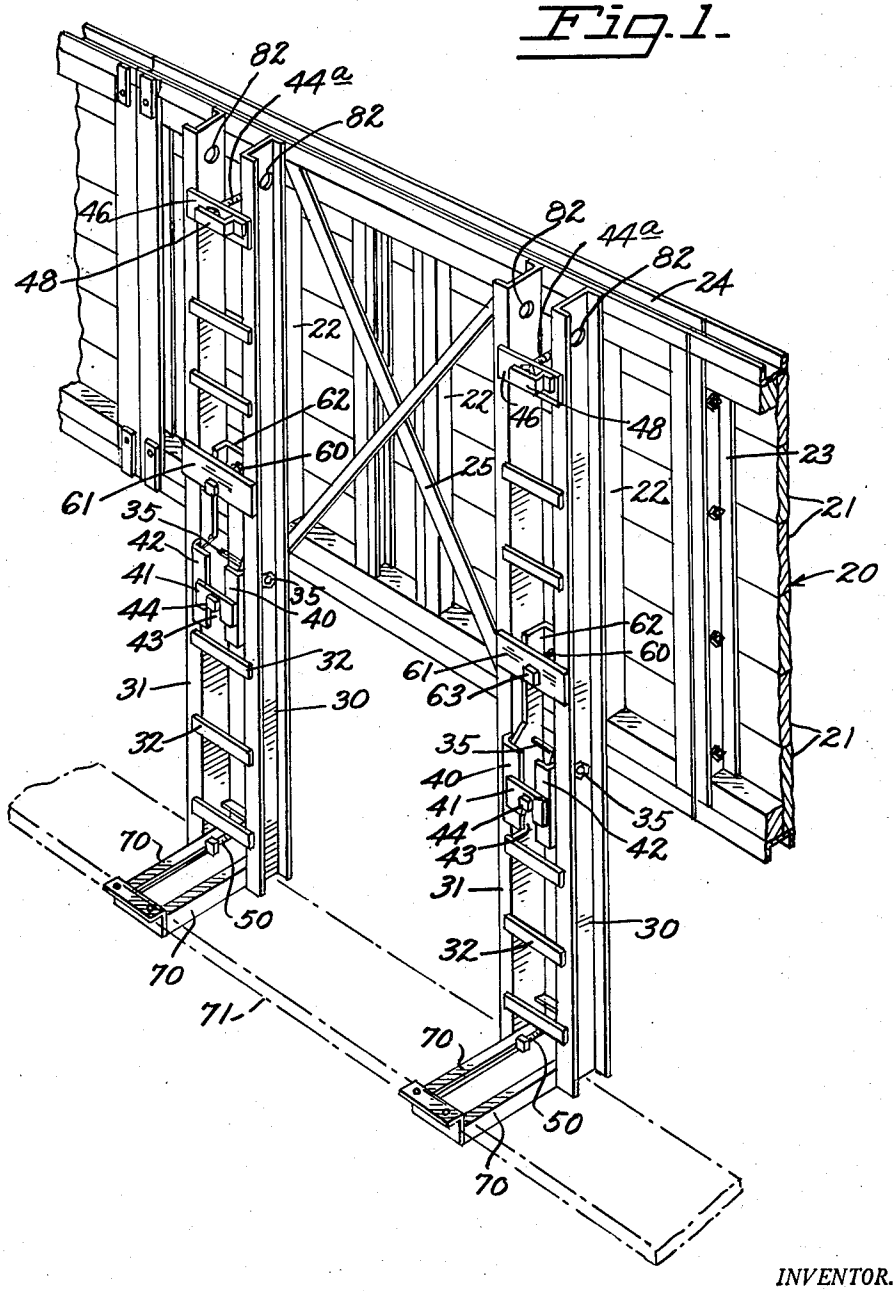
Aug. 25, 1953 W. H. SCHUTTE 2,649,643

DAM FORM

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Fig. 1.



INVENTOR.
WILLIAM H. SCHUTTE
BY
ATTORNEY

Aug. 25, 1953 W. H. SCHUTTE 2,649,643

DAM FORM

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Fig. 3.

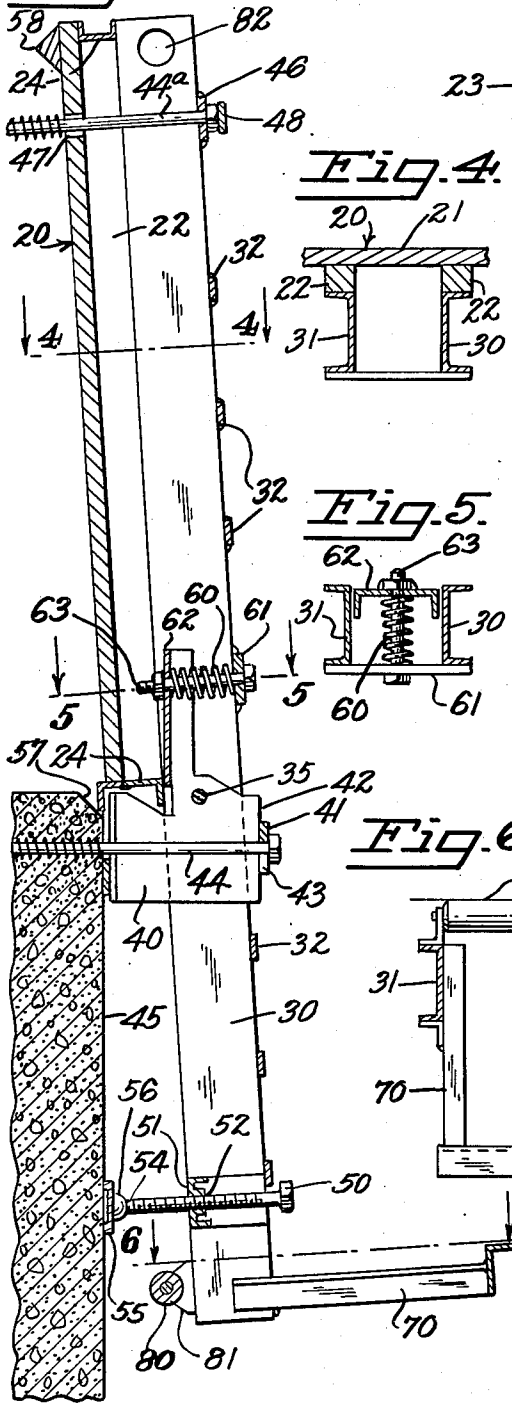


Fig. 4.

Fig. 5.

Fig. 6.

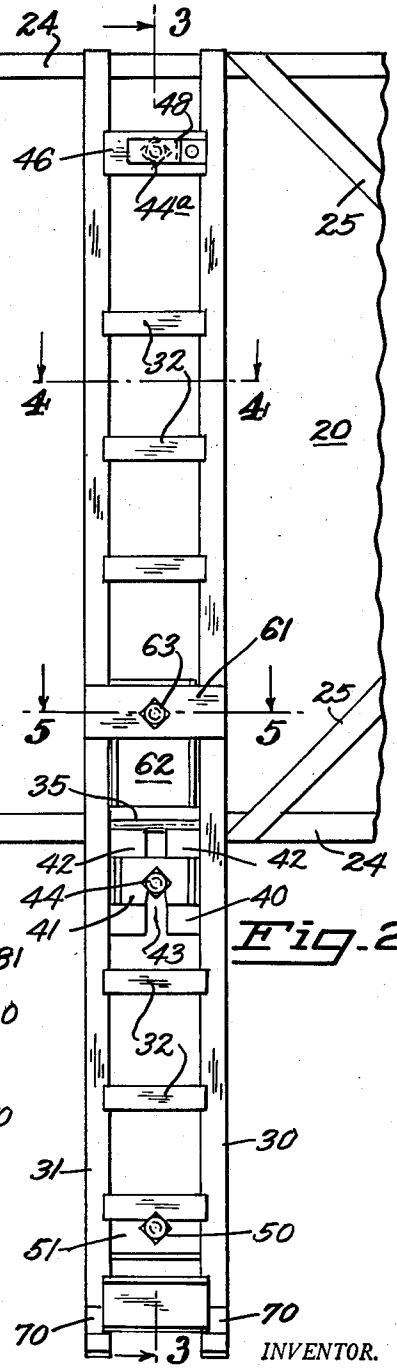


Fig. 2.

INVENTOR.
WILLIAM H. SCHUTTE
BY A. Duncan Owen
ATTORNEY

Aug. 25, 1953 W. H. SCHUTTE 2,649,643

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Fig. 8.

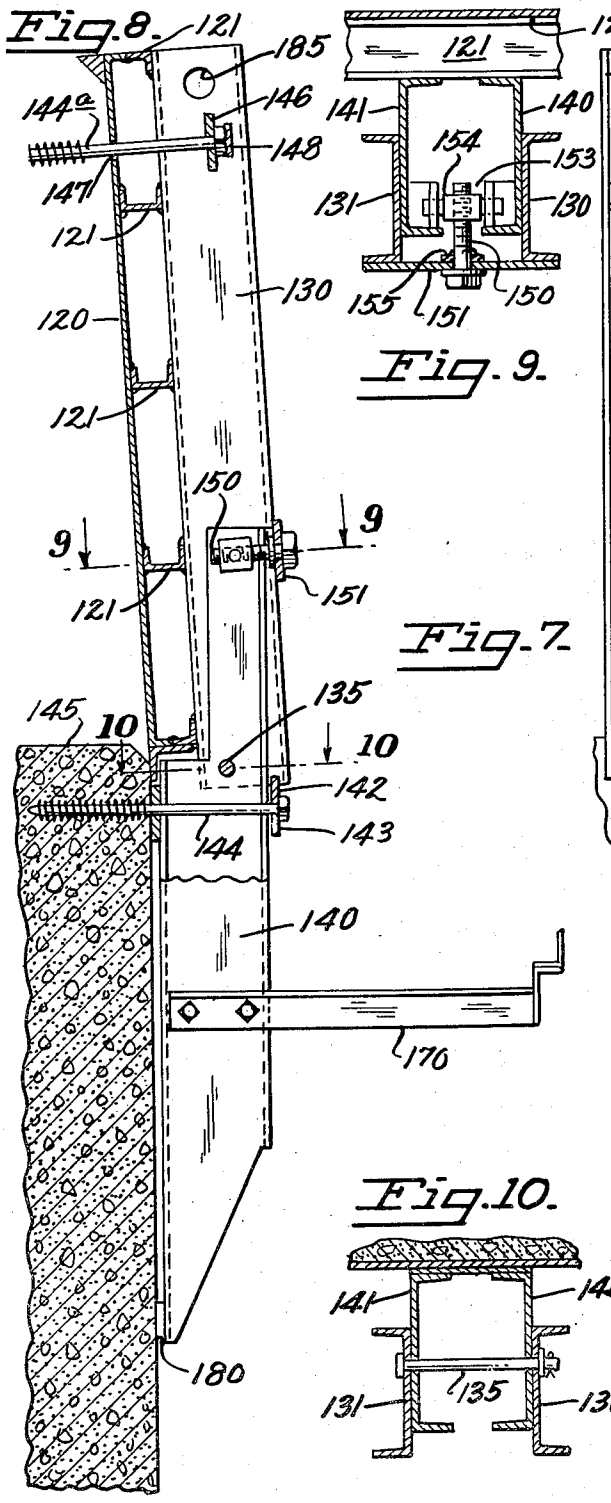


Fig. 9.

Fig. 7.

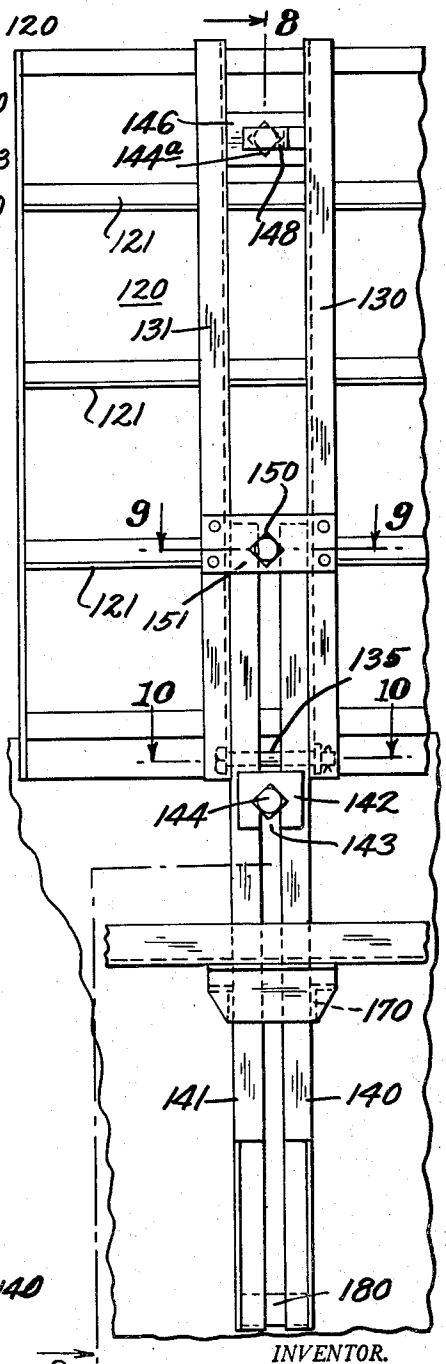


Fig. 10.

INVENTOR.
WILLIAM H. SCHUTTE
BY
A. Dunham Awe
ATTORNEY

Aug. 25, 1953 W. H. SCHUTTE 2,649,643

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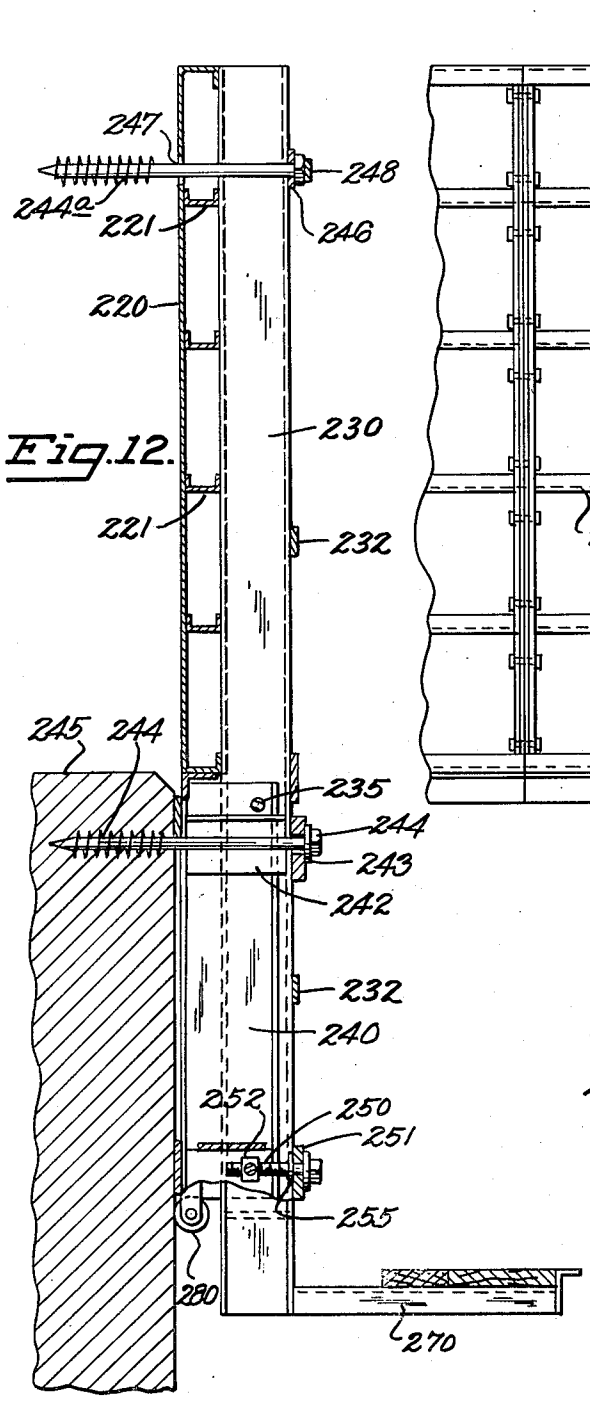


Fig. 12.

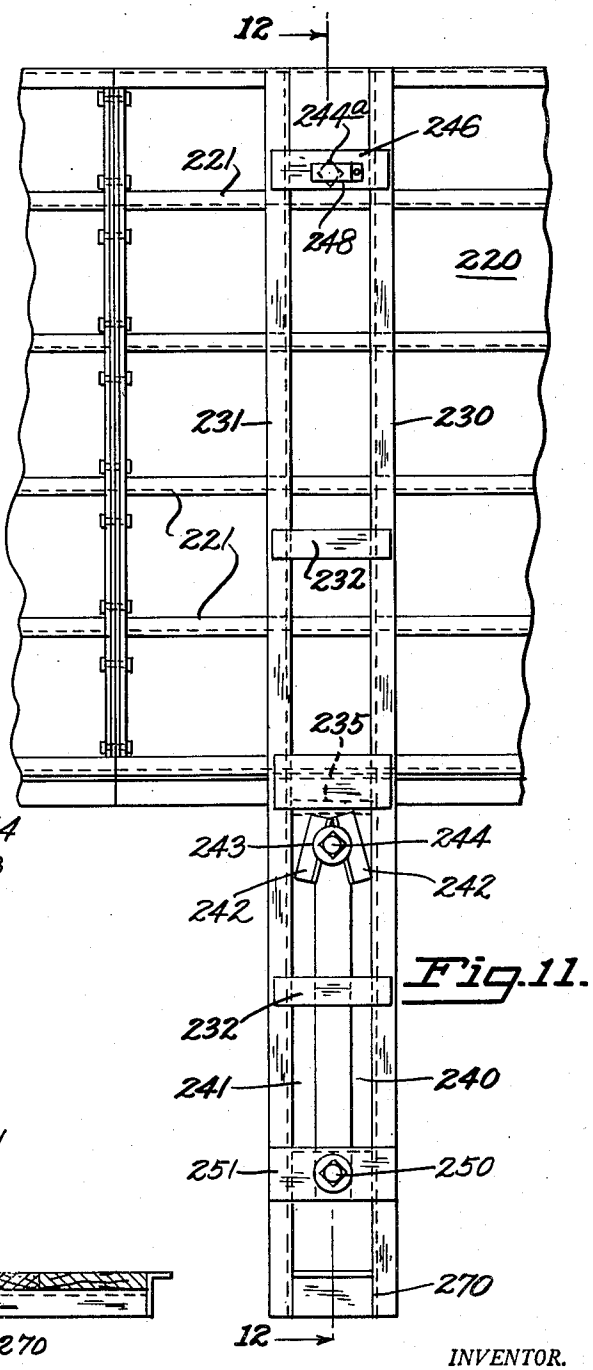


Fig. 11.

INVENTOR.
WILLIAM H. SCHUTTE
BY
A. Durham Owen
ATTORNEY

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UNITED STATES PATENT OFFICE

2,649,643

DAM FORM

William H. Schutte, San Gabriel, Calif., assignor to Noble Co., Oakland, Calif., a corporation of California

Application October 5, 1950, Serial No. 188,574

4 Claims. (Cl. 25—131)

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This invention relates to forms used to confine and shape masses of concrete.

These forms may be used, for example, in constructing dams, where large sections are poured in layers about five feet high. As each layer solidifies, the forms are moved up to a new height where they are placed in position for the next pouring.

Considerable pressure is exerted on these forms by the concrete being poured, especially when the concrete is compacted by mechanical vibrators in order to increase its density and strength. Heretofore there has been a problem of obtaining sufficient support for the forms, so that the panels are not bowed out unduly. For that reason the panels have been made rather narrow and small. The present invention provides a construction that enables the use of panels about 25 percent larger than heretofore. Not only is better support given the forms by a new construction of walers or buckstays, but fewer forms are necessary, and the time taken in moving forms and adjusting them in position is correspondingly reduced.

The weight and pressure of the concrete being poured tends to push the forms out. For that reason it is desirable that the forms be so constructed that they may be swung around a pivot point toward or away from the space to be filled. If a wall is to be vertical when the concrete has hardened, the forms should be tilted in before the pouring begins, as the weight of the concrete will push the panels out and straighten them up.

The problem in adjustable forms has been to obtain this necessary adjustment without sacrificing strength. The present invention solves this problem and makes possible the use of fewer larger forms than heretofore, because the panels are given more support. This is made possible by the use of an improved type of waler and an improved type of anchor block to which the walers are pivotally connected.

A further problem solved by this invention is that of stripping the forms from the concrete when the concrete has hardened. In the present invention the stripping may be done simply by reversing the adjustment mechanism.

The form that constitutes this invention includes a panel supported by a plurality of pairs of walers or buckstays, which are beams secured to its back surface. The use of walers in pairs gives a greatly increased rigidity and strength to the form and prevents sagging in between adjacent pairs of walers. Each pair of walers

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is pivotally secured to an anchor block, which, in turn, may be rigidly secured to an anchor bolt that threads into and projects out from the hardened concrete mass. The anchor block is preferably located mainly or entirely below the lower edge of the panel. Adjustment is obtained by swinging the walers around a pivot so as to tilt the panel with respect to the anchor block. When the adjustment means is moved to tilt the panel in the opposite direction, it acts to strip the panel from the concrete.

Other objects, features, and advantages of the invention will appear from the following detailed description of several embodiments thereof. It should be understood that it is not intended to limit the invention to these embodiments. They are described by way of illustration, and the scope of the invention is defined by the appended claims.

In the drawings:

Fig' 1 is a view in perspective of one type of form embodying this invention with parts of adjacent forms shown secured in place on both sides of the form and broken off to conserve space. A working platform is indicated by dot-dash lines.

Fig. 2 is a view in elevation of the left hand side of the form shown in Fig. 1, showing one pair of walers and the parts adjacent thereto.

Fig. 3 is a view partly in section of the form shown in Figs. 1 and 2, taken along the line 3—3 in Fig. 2, showing the form anchored to a layer of hardened concrete and the panel tilted in before the next layer of concrete is poured.

Fig. 4 is a view in section taken along the line 4—4 in Figs. 2 and 3, showing the attachment of one pair of walers to the panel.

Fig. 5 is a view in section taken along the line 5—5 in Figs. 2 and 3, showing a load compression spring which aids in stripping the panel from the concrete after pouring and hardening.

Fig. 6 is a view in section taken along the line 6—6 of Fig. 3, showing the roller and adjacent parts at the bottom of the frame.

Fig. 7 is a view similar to Fig. 2 of a modified type of form, where a different type of waler is employed together with a different type of anchor block and a different type of adjusting and stripping mechanism.

Fig. 8 is a view partly in section taken along line 8—8 of Fig. 7.

Fig. 9 is an enlarged view in section taken along the line 9—9 of Figs. 7 and 8, and showing the screw adjustment and stripping means.

Fig. 10 is an enlarged view in section taken

along the line 10—10 in Figs. 7 and 8, showing the parts adjacent the pivot point of the frame.

Fig. 11 is a view similar to Figs. 2 and 7 of another modified type of form, having a modified type waler together with a modified type of anchor block and a modified type of adjusting and stripping means. Fig. 11 also shows a portion of an adjacent form and how adjacent forms may be secured together.

Fig. 12 is a view partly in section taken along the line 12—12 of Fig. 11.

Description of the form shown in Figs. 1 to 6

This form includes a panel 20 supported by two pairs of walers 30, 31. The walers are pivotally mounted to swing relatively to an anchor block 40. Their tilt is adjusted by a jackscrew 50, and the stripping is aided by a spring means 60 that opposes the tilting-in movement of the jackscrew 50.

The panel 20 may be of wood or metal. If it is made from wood, as illustrated in Figs. 1 to 6, it usually comprises a plurality of boards 21 nailed, bolted, or otherwise secured to vertical stringers 22. The vertical edge stringers 23 and horizontal edge stringers 24 may be metal channels and there may be an X-brace 25 across the back of the panel 20. A metal panel such as the panel 120 in Figs. 7 to 12 is also suitable for this form.

Two pairs of walers 30, 31 are secured to two pairs of vertical stringers 22. (See Fig. 4.) Each waler 30, 31 is preferably a channel beam with one side secured to the stringer 22. (See Fig. 4.) The two channels 30, 31 of each pair are placed back to back and are spaced apart from each other. Cross braces 32 may be welded across the outer side of each pair of walers 30, 31 to space them apart evenly and to hold them together as a unit. (See Figs. 1 and 2.) The increased support provided by having pairs of walers secured to the back of the panel 20 is a feature of the present invention. The two channels 30, 31, spaced about a foot or more apart and acting as a unit, give much more rigidity than a single channel. This feature makes it possible for the panels to be made about 25 percent longer, with the advantages already explained.

The walers 30, 31 are pivotally secured by a pivot pin 35 to an anchor block 40 adjacent the lower edge of the panel 20. (See Fig. 3.) The anchor block 40 may comprise a steel bracket that fits inside the space between and extends out beyond the walers. It should be long enough to provide a good base that will remain firm against the concrete face when the walers are pivoted about it. A plate 41 across the block's outer face 42 has a central slot 43, open at its lower end. The slot 43 receives an anchor bolt 44, which is tightened against the plate 41 to hold the block 40 firm against the concrete face 45.

The bolt 44 is threaded into the concrete base 45, the threads being made as each block is poured, in order that there can be an anchor to support the form for the next block to be cast above. For this purpose, a template 46 is secured across the walers 30, 31 opposite an opening 47 through the upper end of the panel 20, and the bolt 44*a* to be used to support the form in its next position is inserted therethrough and retained there by a keeper 48 which is swung into place before the block is poured. Before the block dries completely, this bolt 44*a* is unscrewed so that the form can be moved, and it is screwed back into place later when the forms are raised.

By swinging the walers 30, 31 about the pivot 35, the panel 20 may be tilted in or out relative to the stationary anchor block 40 (see Fig. 3). In the form illustrated in Figs. 1 to 6, this swinging adjustment is controlled by a jackscrew 50 at the lower end of the walers 30, 31. A cross brace 51 may be provided on the inner edge of the walers having an opening 52 for the jackscrew 50. At the inner end 54 of the jackscrew 50 there may be a plate or pad 55 connected to the screw by a ball-and-socket joint 56, so that there will be a flat plate 55 bearing against the concrete at all times. As the jackscrew 50 is screwed in, the plate 55 bears against the concrete base 45, and the pair of walers 30, 31 are swung around their pivot 35 in a counter-clockwise direction. As seen in Fig. 3 the panel 20 is tilted in (to the left in Fig. 3). To facilitate tilting, the concrete blocks are preferably molded with a chamfered upper edge, shown at 57, which is formed by the projecting upper edge 58 of the panel 20.

When concrete has solidified, the panel 20 tends to stick to it. To make stripping easier, a load compression spring 60 may be mounted between a cross brace 61 that extends over the walers 30, 31 and a base member portion 62 of the anchor block 40 that extends up between the walers 30, 31 (see Figs. 3 and 5). A bolt 63 extends through the spring 60, which being between the brace 61 and the base 62 is under initial compression. The spring 60 therefore urges the walers 30, 31 around the pivot in a clockwise direction as seen in Fig. 3, or opposite to that in which it is urged by the jackscrew 50. When the screw 50 is loosened, the spring 60 helps to pull the panel 20 off the concrete and to swing the walers 30, 31 back around their pivot 35, tilting them to the right in Fig. 3.

At the lower end of the walers 30, 31 and usually below the jackscrew 50, there may be a bracket 70 where a platform 71 can be secured in place. Here the workers can stand when they work, as when they tighten the anchor bolt 44 on the anchor block 40, adjust the jackscrew 50, and secure adjacent forms together.

The side of the walers 30, 31 that is opposite from the bracket 70 is adjacent the concrete block 45. Here there may be a shock pad of metal, or there may be a face roller 80 journaled in a bracket 81. (Figs. 3 and 6.) The roller 80 is used especially where the face is a sloping one rather than a vertical one. It rolls over the face of the concrete when the form is lifted to its next higher position. The location of the roller 80 at the lower end of the walers insures its contact with the concrete face, when the spring 60 swings the walers around the pivot 35 and as the form itself tilts outwardly.

The forms are usually lifted by cables (not shown) that are hooked or otherwise secured through the holes 82 in the upper end of the walers 30, 31.

Operation of the form shown in Figs. 1 to 6

Previously, the concrete block 45 will have been provided with a threaded opening, and an anchor bolt 44 is threaded therein before or while the form is maneuvered into position. The form is usually lifted into position by hoisting cables that are secured in the holes 82. The rollers 80 at the lower ends of the walers may roll across

the face of the block **45**, or there may be pads which slide along the face.

The anchor block **40** is positioned so that the bolt **44** may engage in the slot **43**. Usually this is done by raising the form a little higher than its final position and lowering it into place, the open slot **43** being provided for this purpose in preference to a circular hole. Then the bolt **44** is tightened to hold against the plate **41**, and the block **40** is substantially stationary.

The jackscrew **50** may then be tightened against the wall of the block **45**. As it is screwed in, it moves the lower end of the walers **30, 31** outwardly and the walers swing around the pivots **35**. This swings the panel **20** into the desired position against the resistance of the compression spring **60**. When the desired position is reached, the bolt **44***a* is inserted in the template **46** through the opening **47**, and the member **48** is swung up to hold it there.

The concrete is then poured, and its weight develops a pressure which tends to straighten up the face of the panel **20**. If the concrete face is to have a slope, the panels **20** are tilted in accordingly. If the concrete face is to be vertical, the proper inward tilt is made to allow for the movement of the panel under the load of the concrete. The pairs of walers **30, 31** provide an adequate base for this swinging without sacrificing strength. For wooden panels five feet high by ten feet wide, the walers **30, 31** may be placed with their center lines about six feet apart and about two feet from the side edges.

Before the concrete is completely dry (usually after three or four hours) the upper spare bolt **44***a* is removed from the concrete and from the template. When the concrete is dry and has set (usually about 48 to 72 hours), the jackscrew **50** is unscrewed, and the spring **60** helps to strip away the panels **20** from the concrete and to swing the walers **30, 31** outwardly at their upper ends and inwardly at their lower ends. If the lifting cables are in place, the anchor bolt **44** may then be removed from the block and from the slot **43**, and the form may be raised to the next level and secured there.

Description of the concrete form shown in Figs. 7 to 10

This form includes a panel **120** supported by a pair of short walers **130, 131** which are approximately coextensive with the panel **120**. The supporting walers **130, 131** are pivotally mounted to a pair of anchor channels **140, 141** that extend down below the panel **120**. The adjustment screw **150** acts directly between the supporting walers **130, 131** and the anchor channels **140, 141** both for tilting in and out and for stripping.

A metal form **120** is shown here, although wood forms could be used. The form **120** presents a generally flat face to the concrete and has a number of horizontal bracing ribs **121** on its back side. The walers **130, 131** may be bolted or welded or otherwise secured to each of the ribs **121** or to several of them.

The supporting walers **130, 131** are shorter than the walers **30, 31** shown in Figs. 1–6. They terminate closely adjacent the lower end of the panel **120**, where each is pivotally secured by a bolt **135** to a pair of anchor channels **140, 141** that are considerably longer than the anchor block **40** of the device first described. The channels **140, 141** are spaced closer together than are the walers **130, 131** so as to fit inside the space between them, preferably facing in the opposite directions from the directions faced by their respective walers. A plate **142** secured across the anchor channels **140, 141** has a slot **143** that is open on its lower edge to receive the anchor bolt **144**, which is secured in the concrete block **145**.

A template **146**, perforated to receive another anchor bolt **144***a*, is provided near the upper ends of the walers **130, 131** opposite an opening **147** through the panel **120**. A pivoted keeper member **148** holds the bolt **144***a* in place.

A brace **151** is rigidly secured across the walers **130, 131**. An adjusting screw **150** fits loosely in an opening **152** through the brace **151** and bears against the outer face of the brace; a washer **155** is spot welded or otherwise secured to the screw **150** so as to bear against the inner face of the brace **151**. The screw **150** is threaded through an opening **153** in a bracket or swivel nut **154** that is secured across the anchor channels **140, 141**. When the screw **150** is turned in or out, it swings the walers **130, 131** around the pivot **135** supported in the channels **140, 141**. Since the connection is positive, reversal of the tilting direction serves to strip the panels from the concrete.

The platform-supporting bracket **170** is similar to the bracket **70** except that it is supported by the anchor block **140, 141** instead of on the lower end of the walers **130, 131**. A pad **180** is shown at or near the lower end of the anchor channels **140, 141**, instead of rollers **80**, but rollers may again be used. Holes **185** for the hoisting cables are provided at the upper end of the walers **130, 131**.

Operation of the form of Figs. 7 to 10

The operation is generally similar to that for the form of Figs. 1 to 6, except for the adjustment mechanism. The adjustment screw **150** is located above the pivot pin **135** instead of below it and operates positively between the walers **130, 131** and the anchor block **140, 141**, instead of indirectly against the concrete wall. Threading the adjustment screws **150** in one direction tilts the panel to the left in Fig. 8 (counterclockwise). Stripping is done positively by turning the screw **150** in the opposite direction.

The two forms so far discussed each have their own advantages and preferred uses. For some situations the first type will be preferred; for others, the second type is better and the situation will determine which one is better to use.

Description of the concrete form shown in Figs. 11 and 12

The third type of form has some similarities with each of the two types heretofore described. It includes a panel **220** supported by two pairs of walers **230** and **231**, which are pivotally mounted at **235** on a pair of anchor channels **240** and **241**. The tilt is adjusted by a screw **250**.

The panel **220** is a metal form similar to the panel **120**. It has horizontal bracing ribs **221**. Successive panels **220** are held in alignment with each other by bolts **222** that pass through the vertical edge members **223**.

Like the walers **30, 31**, the walers **230, 231** extend down a substantial distance below the lower end of the form **220**. The walers **230, 231** are preferably rigidly bolted or otherwise secured to each of the ribs **221** so that they give the maximum support to the form **220**. Bracing members **232** space and brace the walers **230, 231**.

The anchor channels **240, 241** extend down from a point just below the lower edge of the

form 220, the pivotal connection 235 between the channels 240, 241 and the walers 230, 231 being near the upper end of the channels. A pair of plates 242, secured to the channels 240, 241 to form an inverted V slot, and a washer 243 receive the anchor bolt 244, which is screwed into the concrete block 245.

A template 246 is provided adjacent the upper end of the walers 230, 231 opposite an opening 247 through the panel 220 to support the bolt 244a in place until the concrete sets.

The adjustment screw 250 is located at or near the lower end of the anchor channels 240, 241. It fits loosely in and bears against the outer face of a cross member 251 that is secured across the walers 230, 231. A washer 255 is secured to the screw 250 so as to bear against the inner face of the cross member 251, so that the connection to the member 251 is positive. The screw 250 threads into a swivel nut 252 that is secured across the anchor channels 240, 241. When the screw 250 is turned, the walers 230, 231 are swung around the pivot 235 and tilt the form 220 in or out depending on the direction of rotation. Since the connection is positive, reversal of the tilting direction also serves to strip the forms from the concrete.

There may be a platform supporting bracket 270 and a roller 280 or a pad, similar to those already described.

Operation of the form of Figs. 11 and 12

The operation is generally similar to the two devices previously described. The adjustment mechanism is located below the pivot pin 135 and operates positively in both directions between the panel supporting walers 230, 231 and the anchor channels 240, 241.

The considerable length of the anchor member's channels gives adequate support to the pivotal action of the walers. The pairs of walers 230, 231 themselves give a broadly based support to the panel 220, so that a wide panel may be used and no sagging will occur.

What is claimed is:

1. A form for use where large masses are poured in successively-built-up sections over an area, each section being poured on its solidified preceding section as a base and supported by anchoring means that are secured in said preceding section, said form including in combination: a panel; a pair of anchor blocks generally below said panel adapted to be secured to said anchoring means; a pair of parallel, spaced-apart pairs of channel members rigidly secured by one side to the outside face of said panel, being positioned so that the channeled portions face each other, and extending downwardly from said panel past said anchor block, each pair of channel members being pivotally secured to one said anchor block; a first bracket secured adjacent the lower end of each pair of channel members; a jackscrew threaded through said bracket; a pad secured on the end of said jackscrew by a ball-and-socket joint and adapted to bear against the solidified preceding section of concrete so that the screwing of said jackscrew swings each said pair of channel members about its pivot; brace members across each pair of channel members; a spring under compression between one said brace on each pair and its associated anchor block for yieldably resisting the swinging movement of said channel members and for stripping the forms from poured concrete when said jackscrews are screwed in the opposite direction from that by which the panels are swung inwardly; an upper brace member across each pair of channel members, having an opening therethrough and the panel also having an opening therethrough opposite the aforesaid opening so as to receive an additional anchoring means used to prepare a place in the concrete being poured to receive the anchoring means that will hold the anchor block when the form is raised to pour the next level; and a member pivotally secured to each said upper brace member for retaining said additional anchoring means in place.

2. A form for use where large masses are poured in successively-built-up sections over an area, each section being poured on its solidified preceding section as a base and supported by anchoring means that are embedded in said preceding section, said form including in combination: a panel; a plurality of anchor blocks generally below said panel, adapted to be secured to said anchoring means; a plurality of parallel, spaced-apart pairs of walers rigidly secured to the outside face of said panel and extending downwardly therefrom past said anchor block, each pair being pivotally secured to one said anchor block; a bracket secured adjacent the lower end of each pair of walers; a jackscrew threaded through said bracket and adapted to bear against the solidified preceding section of concrete, for swinging each said pair of walers about its pivot; and a spring under compression between each said pair of walers and its associated anchor block for opposing the swinging movement of said walers and stripping the forms from set concrete when said jackscrews are screwed in the opposite direction from that by which the panels are held against said concrete.

3. A form for use where large masses are poured in successively built-up-sections over an area, each section being poured on its solidified preceding section as a base and supported by anchoring means that are embedded in said preceding section, said form including in combination: a panel; a plurality of anchor blocks generally below said panel and adapted to be secured to said anchoring means; a plurality of walers rigidly secured to the outside face of said panel and extending downwardly therefrom past said anchor blocks, said walers being pivotally secured to said anchor blocks; brackets secured to said walers; screw means threaded through each said bracket and adapted to bear against the solidified preceding section of concrete, for swinging said walers about their pivots; and springs under compression between said walers and their associated anchor blocks for opposing the swinging movement of said walers and stripping the forms from set concrete when said screw means are screwed in the opposite direction from that by which the panels are held against said concrete.

4. A form for use where large masses are poured in successively-built-up sections over an area, each section being poured on its solidified preceding section as a base and supported by anchoring means that are secured in said preceding section, said form including in combination: a panel; a plurality of anchor blocks generally below said panel adapted to be secured to said anchoring means; a plurality of parallel, spaced-apart upright members rigidly secured to the outside face of said panel and extending downwardly from said panel past said anchor blocks, said upright members being pivotally secured to said anchor blocks; a plurality of

brackets secured adjacent the lower end of said upright members; a jackscrew threaded through each said bracket and adapted to bear against the solidified preceding section of concrete so that the screwing of said jackscrew swings said upright members about their pivots; a spring under compression between each said anchor block and at least one associated upright member for yieldably resisting the swinging movement of said members and for stripping the forms from poured concrete when said jackscrews are screwed in the opposite direction from that by which the panels are swung inwardly; said members having openings therethrough and the panel also having an opening therethrough opposite the aforesaid openings so as to receive

an additional anchoring means used to prepare a place in the concrete being poured to receive the anchoring means that will hold the anchor block when the form is raised to pour the next level; and members pivotally secured to said upright members for retaining said additional anchoring means in place.

WILLIAM H. SCHUTTE.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,368,105	Bostain	Feb. 8, 1921
2,355,376	Huddleston et al.	Aug. 8, 1944
2,493,264	Records	Jan. 3, 1950