Oct. 7, 1958 R. E. STROUD 2,854,726

CONCRETE FORM STRUCTURE FOR USE IN CONSTRUCTION OF CONCRETE FLOORS AND THE LIKE

Filed May 11, 1955 3 Sheets-Sheet 1

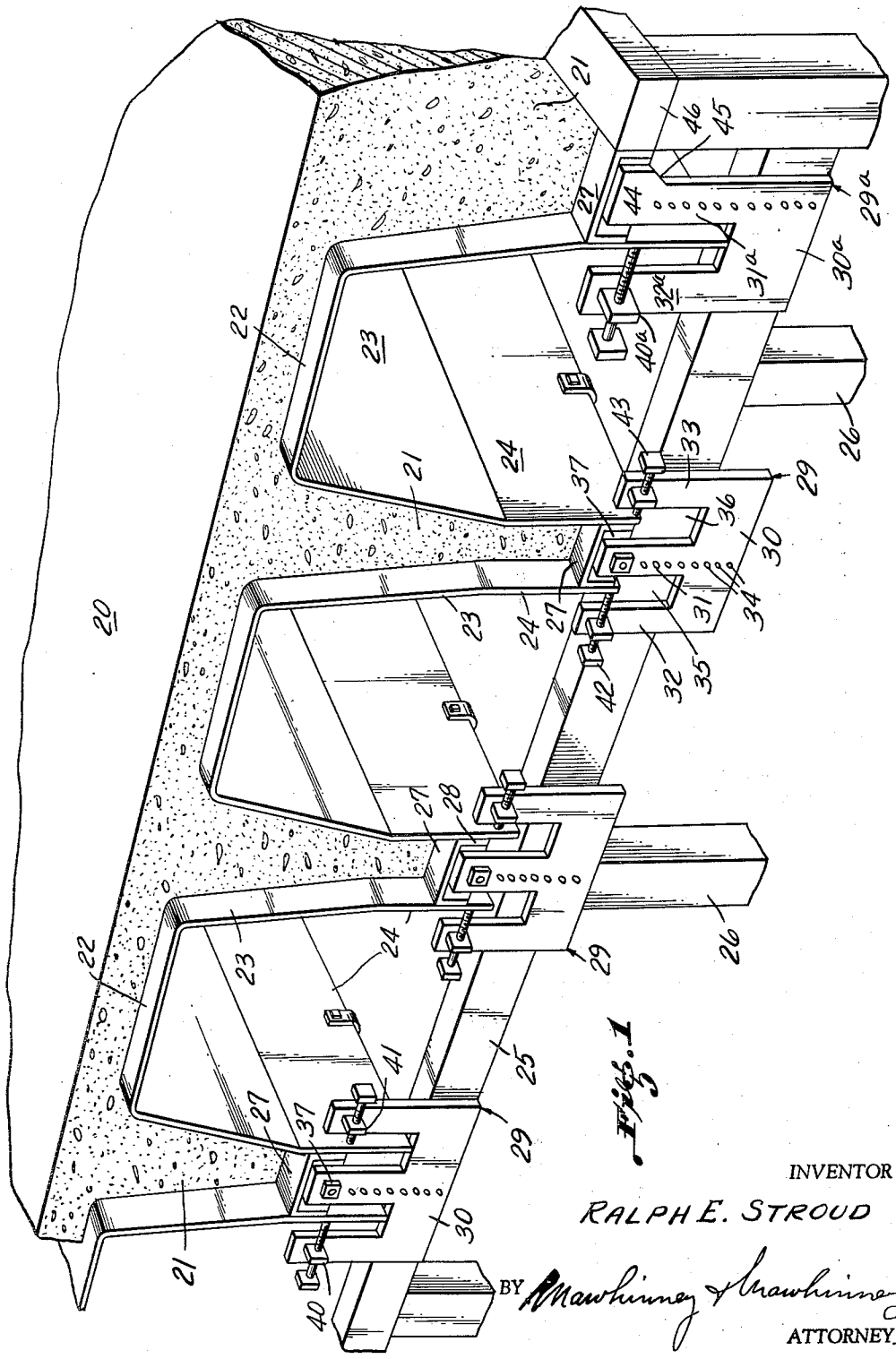


Fig. 1

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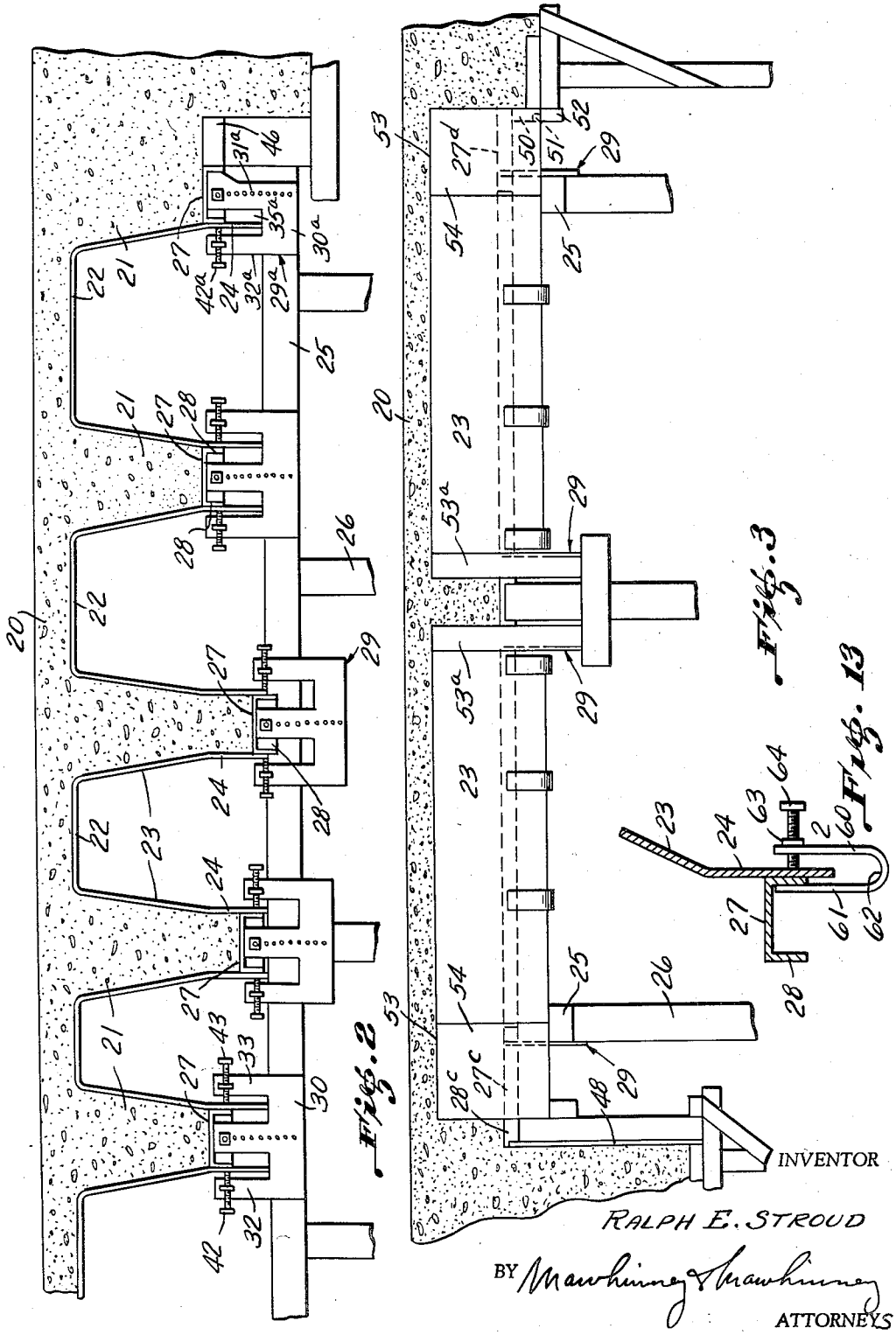


Fig. 2

Fig. 3

Fig. 13

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Fig. 4

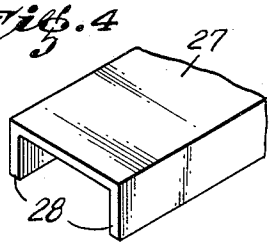


Fig. 5

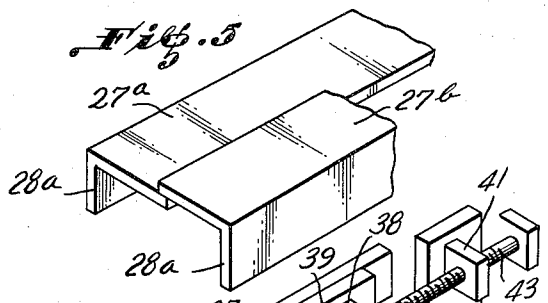


Fig. 6

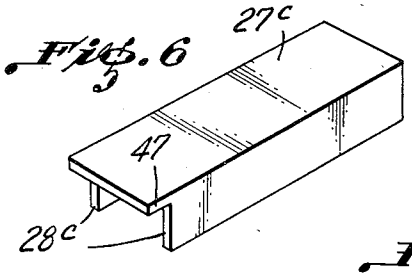


Fig. 9

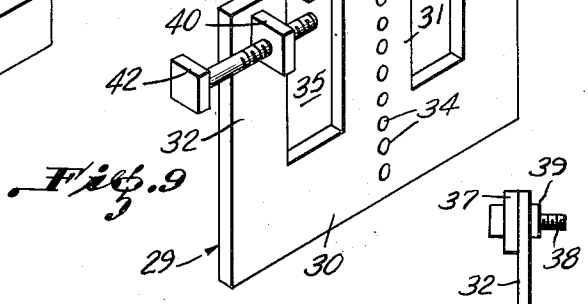


Fig. 12

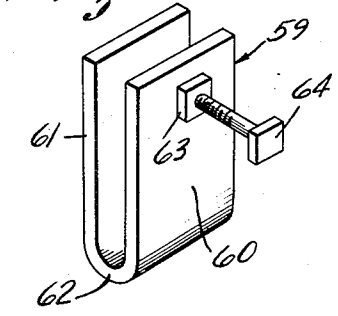


Fig. 10

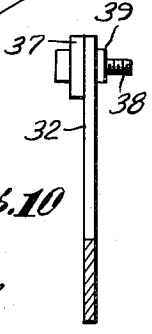


Fig. 7

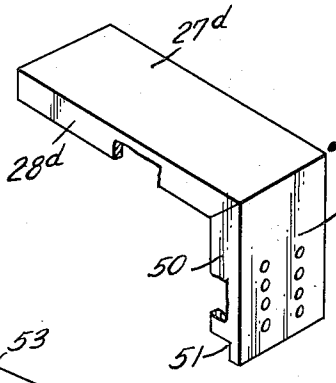


Fig. 8

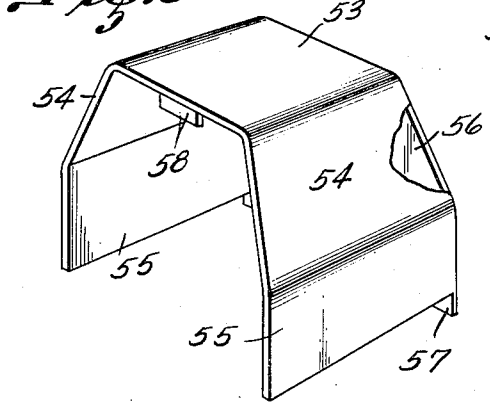
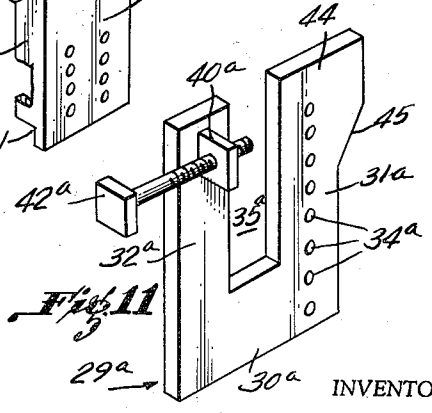


Fig. 11



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2,854,726

CONCRETE FORM STRUCTURE FOR USE IN CONSTRUCTION OF CONCRETE FLOORS AND THE LIKE

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Application May 11, 1955, Serial No. 507,529

2 Claims. (Cl. 25—131.5)

The present invention relates to concrete form structure for use in construction of concrete floors and the like and has for an object to provide forms or pans of steel or other suitable material preferably of the long span type in which certain adjustments are made possible to provide for the rib joists of the concrete in various widths and depths and to accommodate forms of different widths and heights, all to the end of materially reducing the cost of concrete constructions and to provide a type of form which can be used with any building specifications with a minimum amount of equipment.

The invention has for another object to provide an adjustable bracket adapted to be affixed at varying heights to the shoring or false work which will act to bind the filler forms for the bases of the concrete rib joists to the main arch forming pans for supporting these filler forms at desirable elevations between the main pans to control the depth of the concrete rib joists.

A still further object of the invention is to provide certain adjuncts to the pans and forms which will enable long span forms to produce better finishes in the concrete with less equipment and with less capital investment in such equipment.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views:

Figure 1 is a fragmentary perspective view of a concrete form structure for use in construction of concrete floors and the like according to the present invention and showing all of the parts assembled and concrete poured to form the floor slab and ribs joints between the form pans.

Figure 2 is a fragmentary end elevational view of the same.

Figure 3 is a longitudinal section taken through the construction.

Figure 4 is a fragmentary perspective view of a variety of filler forms to be mounted between the main arch pans in order to mold the bottom of the rib joists of concrete.

Figure 5 is a similar view showing a double or lapped type of filler form.

Figure 6 is also a fragmentary perspective view of a lap type of filler form used at the end of the main filler form to fill out the latter so as to complete the support for the concrete rib joists.

Figure 7 is a perspective view of a type of end filler form useful at the end of the main filler form to form the beam side.

Figure 8 is a perspective view of a form of end cap for fitting to the ends of the arch forming pans.

Figure 9 is a perspective view of a form of adjustable bracket for binding the filler forms to the main pans at varying elevations.

Figure 10 is an edge view of the adjustable bracket.

Figure 11 is a perspective view of a modified form of adjustable bracket to be used on the last row of forms next to beam to form T's at beams.

Figure 12 is a perspective view of a type of clamp which may be employed to hold the pans and forms together between the adjustable brackets.

Figure 13 is a vertical cross-sectional view through the filler form and adjacent wall of a pan showing a form of clamp applied thereto.

Referring more particularly to the drawings, and for the present to Figures 1, 2 and 3, **20** designates the concrete floor slab and **21** the concrete rib joists which have been shown as already poured and molded upon the arch forming pans **22** and other molding equipment hereinafter more particularly described, which is assembled together as illustrated in these figures.

The pans **22** have preferably downwardly divergent side walls **23** below which are substantially vertical lower side walls **24**, resting at their lower edges upon wooden or other joists **25** supported by the shoring or false work **26**.

As shown more particularly in Figure 2 the concrete rib joists **21** are of different widths and different depths to illustrate the adjustable features of the improved device. Also in this figure the pans **22** are shown to be of different widths.

Between the pans **22** are filler forms **27** for forming the lower portions of the concrete rib joints. These filler forms **27**, pursuant to the illustration of Figure 4 have downwardly extending flanges **28** adapted to be abutted by the straight or vertical lower side walls **24** of adjacent pans **22**, as shown more particularly in Figures 1 and 2. In these figures the filler forms **27** are shown as being carried at various elevations by the walls **24** of the pans **22**, this being accomplished by the use of adjustable supports or brackets **29** which are of the general form of the letter **E**, these adjustable brackets **29** being illustrated more particularly in Figures 9, 10 and 11. The form of bracket illustrated in these figures comprises generally a lower or horizontal bar **30**, a central upstanding bar **31** and end upstanding bars **32** and **33** which are spaced in opposite directions from the central upstanding bar **31** so as to provide therebetween slots **35** and **36** which open upwardly through the upper edge of the bracket **29**. A vertical row of perforations **34** in the central bar **31** which preferably extend down into the horizontal bar **30** provide for receiving therethrough nails or other fastenings by which the bracket may be secured to the wooden joists **25** or to some other part of the scaffolding or shoring.

The central upstanding bar **31** carries a cross bar **37** on a screw bolt **38** which is threaded into an internally threaded nut **39** welded or otherwise secured to the opposite side of the central upstanding bar **31** near its upper portion.

Other nuts, internally threaded, designated at **40** and **41** are welded, preferably to the same sides of the end upstanding bars **32**, **33** but in edgewise fashion so that the threaded openings through these nuts **40** and **41** are substantially in axial alignment. The nuts **40** and **41** receive screw bolts **42** and **43**.

It will be clear from Figures 1 and 2, that the central upstanding bar **31** is adapted to be entered upwardly in the space between the lower vertical walls **24** of adjacent pans **22** so that the cross-bar **37** may be fitted into the channel provided by a filler form and its downwardly directed flanges **28**.

Due to the fact that the series of perforations **34** enable the bracket **29** to be affixed to the wooden beam **25** at various elevations as shown in Figures 1 and 2, the cross-bar **37** will carry the involved filler form **27** at the requisite elevation in order to form a concrete rib joist of the desired depth. In fitting the brackets **29** in place, the

screw bolts 42 and 43 will be initially retracted and care will have to be exercised in order to move adjacent pans 22 sufficiently together upon the intervening filler form 27 so that the adjacent walls 24 of the pans 22 will be received in the slots 35, 36 of the brackets 29, with the inner free ends of the screw bolts 42, 43 poised to engage the inner faces of the walls 24 when these screw bolts 42, 43 are rotated in the appropriate direction to cause the bolts to close in upon the walls 24. In this way the walls 24 are clamped tightly to the flanges 28 of the filler form 27 lying between adjacent pans 22 so that the concrete or any liquid will be prevented from escaping downwardly in spaces between the filler forms and the adjacent pans 22. The lower edges of the pans 22 will rest upon the wooden beams 25 or other parts of the shoring or false work.

Referring more particularly to Figure 11, a modified form of adjustable bracket 29^a is shown comprising a bottom bar 30^a having only two upstanding bars 31^a and 32^a separated by slot 35^a for the purpose shown at the extreme right hand end of Figure 2 of receiving therein the lower portion of the adjacent wall 24 of the pan 22 at the end of the structure. The upstanding bar 31^a is provided with a vertical series of spaced perforations or holes 34^a to receive a nail, nails or other fastenings for securing the bracket 29^a to a part of the scaffolding or the like. This modified form of bracket 29^a carries a nut 40^a projecting outwardly from the upper portion of the upstanding bar 32^a to receive therethrough the threaded portion of the bolt 42^a by which pressure is applied to the inside surface of the wall or leg 24^a of the end pan 22 to thus draw the filler form 27 which might be also characterized as the rib joist form against the outside surface of this same wall 24. The upper end of the upstanding bar 31^a may if desired carry a cross-bar such as a cross-bar 37 of Figure 9. However such cross-bar will not always be required. It is preferable however to provide an enlargement 44 at the upper end of the upstanding bar 31^a. An inclined edge surface 45 may lead from the narrower lower portion of the upstanding bar 31^a to the enlarged upper end 44.

The modified form of bracket 29^a of Figure 11 is used on the last row of forms or pans 22 next to the beam 46 as shown at the extreme right hand end of Figures 1 and 2. This is for the purpose of forming T's at the beams 46.

Referring more particularly to Figure 5 a double form of filler form or rib joist form is illustrated in which two webs 27^a and 27^b are overlapped to a desired extent in order to space the flanges 28^a a desired distance apart. The overlapped portions of the webs 27^a and 27^b may be welded or otherwise secured together to provide the completed form. Such double concrete joist forms are used to form extra wide concrete joists.

Referring more particularly to Figure 6 a form of lap rid joist form 27^c is shown having depending spaced longitudinal flanges 28^c and a projecting web ledge 47 at one end thereof. This lap rib joist form is used at the end of the main filler form 27 as shown at the extreme end of Figure 3 for the purpose of filling out the form 27 for the bottom of the concrete rib joist. As shown in Figure 3 the projecting web ledge 47 may lap over the adjacent beam 48 of the shoring or other false structure, while the flanges 28^c may abut against the adjacent edge of this beam 48.

Referring more particularly to Figure 7 an end filler form 27^d is shown having flanges 28^d similar to the web 27 and flanges 23 of Figure 4. This device 27^d is used at the end of the main filler form 27 to form beam side. For this purpose the web is formed with a downturned end wall 49 and with side flanges 50 which are continuations of the flanges 28^d. However the lower portions of the flanges 50 are cut away as shown at 51. The downturned end wall 49 may be provided with two rows of perforations if desired to receive nails or other fastenings by which this end wall 49 is affixed to abutting portions of the shoring or false work. The position of this end member 27^d is shown at the extreme right hand end of Figure 3, the cut-out portion 51 being provided to fit a complemental upper portion of the beam 52.

Referring more particularly to Figure 8 a form of end cap 53 is shown having downwardly divergent side walls 54 and substantially straight vertical lower walls 55. The caps are provided with closed end walls 56 with downwardly projecting flanges 57. The pan end caps 53 are also provided with projections 58 in the top portions thereof for removing the cap from the concrete. These projections 58 may be in the form of angle irons. The caps are made of any suitable material and in any suitable dimensions. As shown in Figure 3 these pan end caps are adapted to be fitted to the ends of the pans 22 so as to complete the span of the pans 22 over to the ends of the false work with part of which the downwardly depending flange 57 may be engaged to properly locate the end caps 53.

Other similar caps 53^a, shown in the central portion of Figure 3 and generally referred to as "Dia Caps" are so called because these caps are used at the diaphragm and are generally of smaller longitudinal dimensions.

59 designates a U-shaped clamp which comprises generally the spaced side walls 60, 61 and the bottom connecting yoke 62. The clamp is open at its opposite ends and through its upper portion and carries upon one wall, for example the wall 60 an internally threaded nut 63 which may be welded against rotary movement to the external portion of the wall 60. A threaded bolt 64 engages with the internal threads of the nut 63 and passes freely through an opening in the wall 60 so that inner end of the bolt 64 projects into the clamp space between walls 60 and 61 as shown in Figure 13. The upper end of the inner wall 61 is adapted to engage within one of the flanges 28 of the filler form 27 while the upper portion of the outer clamp wall 60 fits within the lower portion of a wall of the pan 22 so that the inner end of the threaded bolt 64 will be in a position to engage the inner surface of the vertical wall 24 of the pan in order to clamp the pan 22 and the filler form 27 together. As the adjustable brackets 29 can only be affixed at points where the false work 25 is available for carrying these adjustable brackets 29, the clamps 59 are of such construction that while embracing the parts 24 and 28 they will also themselves be supported by these parts so that as many of these clamps 59 as desired may be connected between the walls 24 and flanges 28 all along the span between beams 25 of the false work. In this way tight joints may be maintained between the filler forms 27 and the near walls 24 of adjacent pans 22.

It will be understood by those in the art that all of the parts herein described may be made in any dimensions, of any length, height, width and breadth and in any sizes, of any lengths. It is also to be understood that all of the parts herein described may be made of any desired material, for instance cold-rolled steel of appropriate gage.

The pans and forms are preferably of long span type which are also adjustable, and it will be understood by those skilled in the art that the use of the present construction will materially lessen the cost of concrete structures and with a minimum amount of equipment as the form and pan herein illustrated and described can be used to any building specifications.

The forms and pans may be of any depths. For instance the pans may be of two depths. In one case the depth will be sixteen inches, the same being adjustable to three depths, ten inches, twelve inches, and fourteen inches. This size is known as the type "B" steelform. The other size is twelve inches deep and is adjustable to three depths also, six inches, eight inches and ten inches. This size is known as type "A" steelform. Both types are in four widths, ten inches, fifteen inches, twenty inches

and thirty inches. Both types are in lengths from one foot long to any desired length. However, they will very seldom be longer than twelve feet. With the twelve inch width the improved end cap and a twelve foot long form and pan the adjustment is from twelve feet to thirteen feet ten inches, which in most cases is sufficient length.

The two inch width "Dia" or diaphragm end cap **53a** (Figure 3) is designed for use where a diaphragm is specified in the building. With a diaphragm two steel forms are required; therefore with two twelve feet long pans according to the invention a span of twenty-seven feet eight inches can be covered.

Standard lengths for the improved pans may be four feet, six feet, eight feet, ten feet and twelve feet. However, odd sizes may be necessary at times, for instance in lengths of one foot to any length.

The filler forms **27** are separated from the pans **22** to enable adjustment of the filler forms **27**. The standard widths of the filler forms **27** may be four inches, five inches and six inches but the same may be available in other widths. The double filler form of Figure 5 is designed to compensate for extra wide concrete ribs **21**. This Figure 5 form of filler form may be used for odd sizes as well. The end lap filler form of Figure 6 was designed to form the beam sides of shallow beams where the pan bears. This is a feature that will provide cheaper framing of concrete structure. The lap filler form section of Figure 6 has been designed to cover the space covered also by the end caps **53** at each end of each row of pans.

It will be appreciated that the present invention provides an adjustable long span steelform which will give a better concrete finish for less cost and with less equipment.

Type "A" and type "B" forms are of two different depths, as heretofore explained. The adjustable feature, which is an important feature of the invention, is accomplished with bracket **29** as explained in column 2. In Figure 2, the longitudinal section shows the bracket **29** nailed or fastened to the wooden beam or strong back **25** at different elevations. This is the adjustable feature. In a slab where the rib joists are specified to fourteen (14) inches, the type "B" form will be used, the bracket **29** will be nailed or fastened to the wooden beam **25** at the spacing shown in the center of Figure 2. If the depth specified is ten (10) inches, the brackets **29** will be set as the drawing shows in Figure 2 to the extreme left, and so for each depth desired. In lesser depths, the type "A" form will be used in the same manner as type "B." The same adjustment is possible with the end cap **53** as shown in Figure 8, and as explained in column 4. The lower side walls **55** on the end cap, and the lower side walls **24** of the pan and form are the portions of the form where the adjustment is made. By lowering or raising the bracket **29** on the wooden beam **25**, an operator obtains different depths from the top of the concrete slab. In the type "A," there are three different depths. These six depths are to standard construction code. However, with this new form, as herein disclosed, odd depths can be obtained if an architect so desires.

Although I have disclosed herein the best form of the invention known to me at this time, I reserve the right to all such modifications and changes as may come within the scope of the following claims.

What is claimed is:

1. An adjusting device for channel shaped filler forms between arched pans supported by false work comprising a support having means adapting the same for attachment at varying elevations to parts of the false work, a crossbar carried by the upper portion of the support and adapted to enter the channel shaped forms, said support and said crossbar being in substantially parallel planes, said crossbar being carried by the support for pivotal movement in its plane substantially parallel to said plane of the support, and means for binding the crossbar in adjusted position so that it can enter the channel shaped form and support the same.

2. An adjusting device for the channel filler forms between arch pans supported by false work comprising a support having means whereby the same may be attached at varying elevations to the false work, means carried by the upper portion of the support for substantially spanning the space between the side flanges of the channel for supporting the form, said support and said means being in substantially parallel planes with said means mounted on said support for pivotal movement in its plane substantially parallel to said plane of the support, and means carried by the support and adjustable toward and from adjacent sidewalls of the pans for engaging the adjacent sidewall of the pan for acting to move said adjacent sidewall upon the adjacent flange of the included filler form.

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