Sept. 6, 1949. C. M. DICUS 2,480,840

FORM FOR BUILDING CONCRETE STRUCTURES

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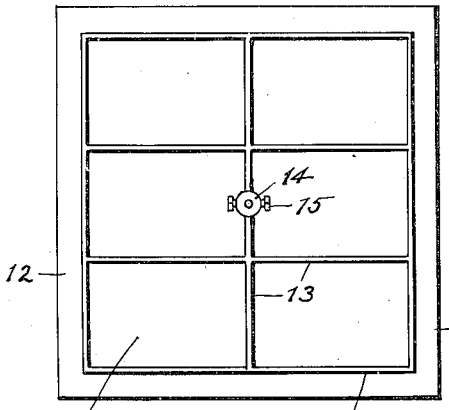


FIG 1

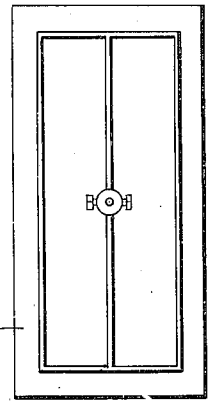


FIG 7

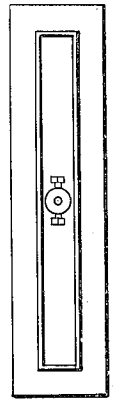


FIG 9



FIG 2

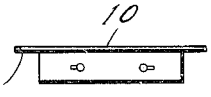


FIG 8

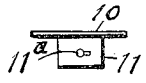


FIG 10

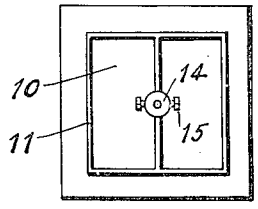


FIG 3

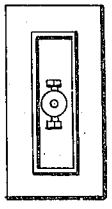


FIG 11



FIG 5

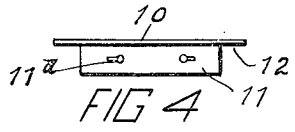


FIG 4

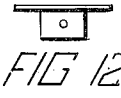


FIG 12



FIG 6

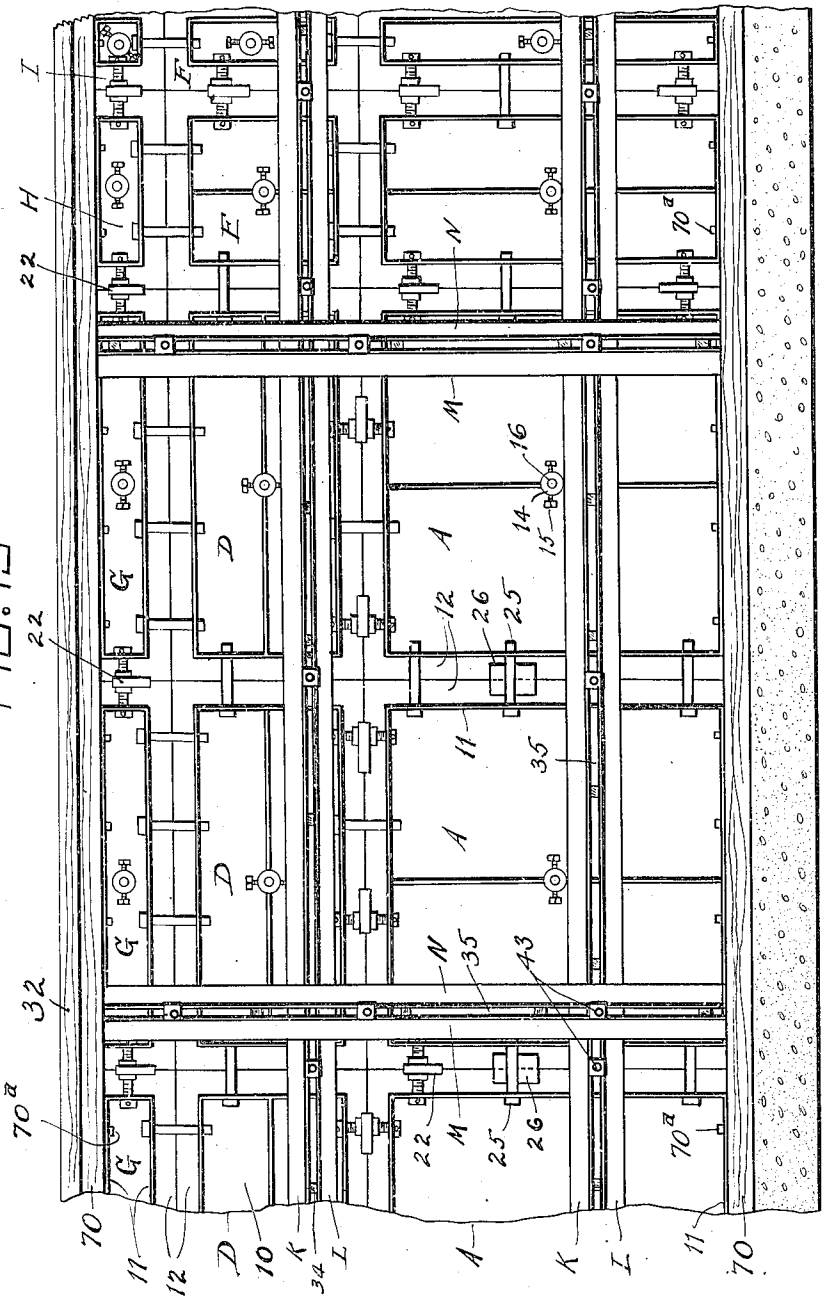
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BY
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ATTORNEYS.

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FORM FOR BUILDING CONCRETE STRUCTURES

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FIG. 13



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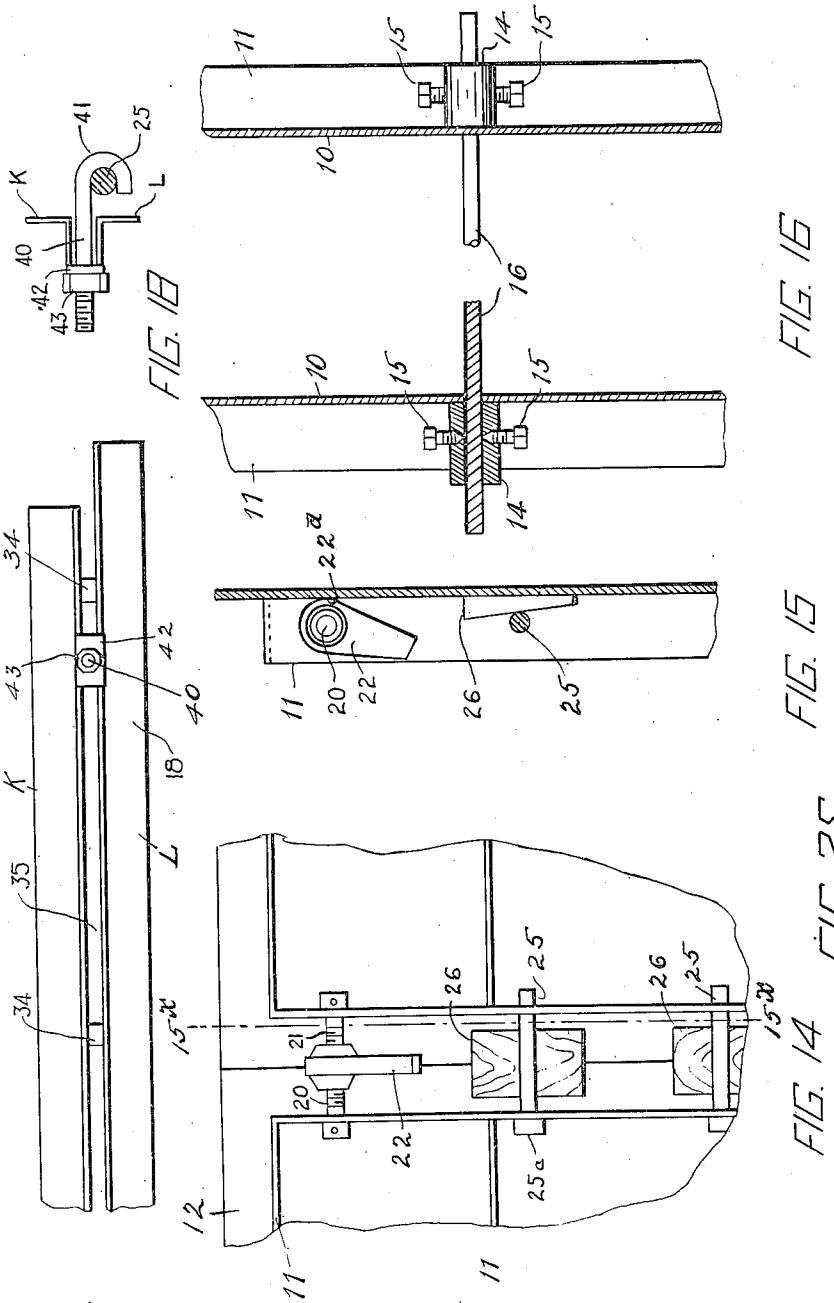
By Mason, Liddy, Glascock & Finch

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FORM FOR BUILDING CONCRETE STRUCTURES

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Sept. 6, 1949. C. M. DICUS 2,480,840

FORM FOR BUILDING CONCRETE STRUCTURES

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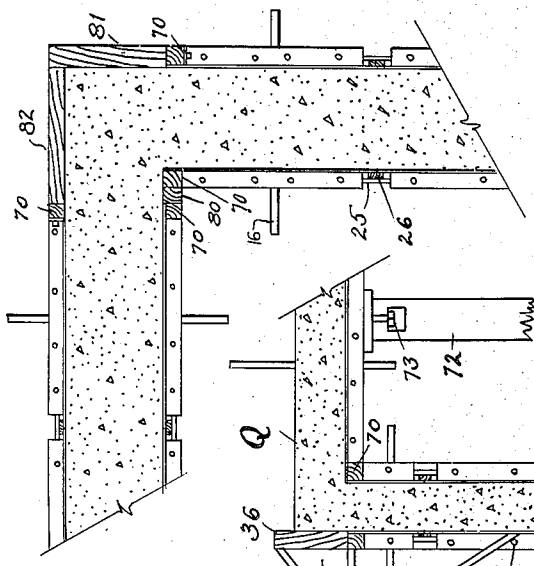


FIG 20

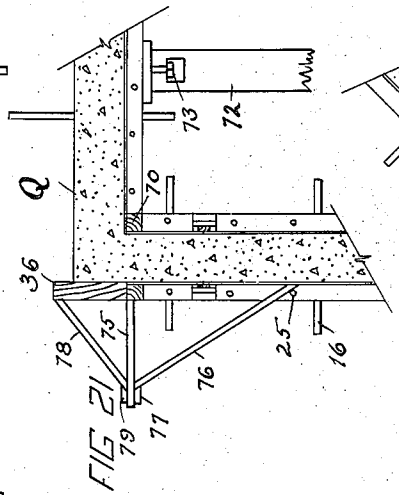


FIG 21

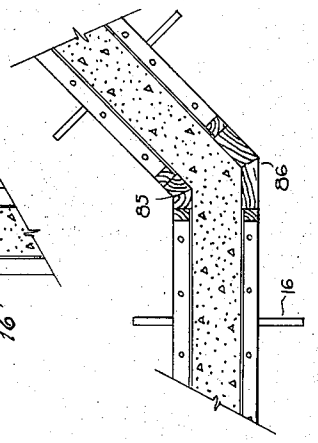


FIG 23

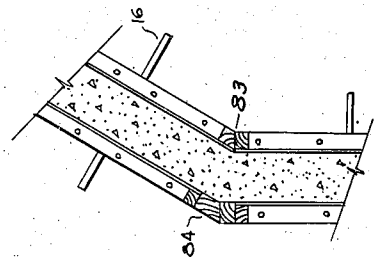


FIG 22

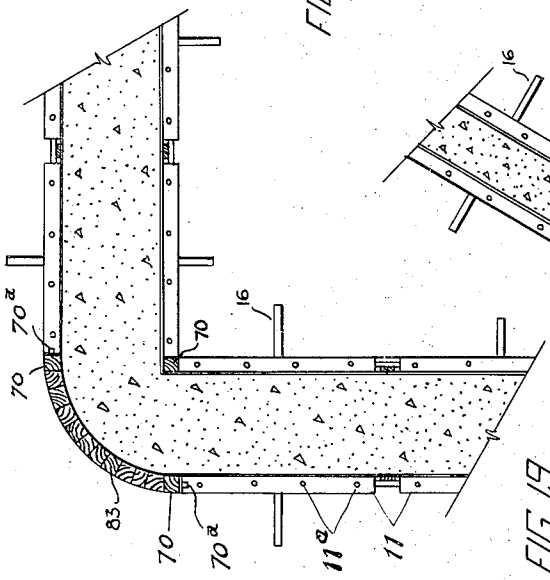


FIG 19

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FORM FOR BUILDING CONCRETE STRUCTURES

Filed March 19, 1946 5 Sheets-Sheet 5

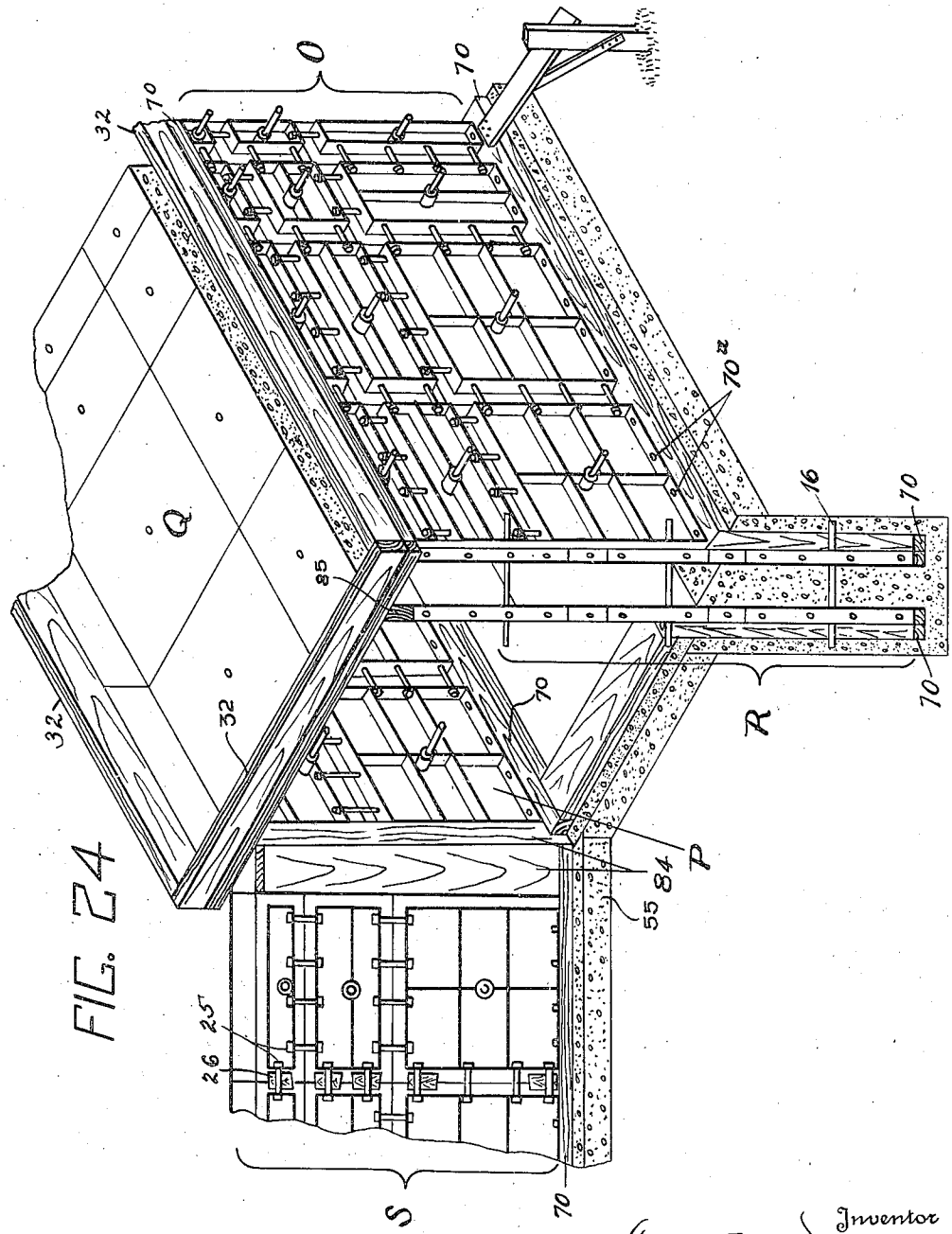


FIG. 24

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Patented Sept. 6, 1949 2,480,840

UNITED STATES PATENT OFFICE

2,480,840

FORM FOR BUILDING CONCRETE STRUCTURES

Charles M. Dicus, Waynesville, N. C.

Application March 19, 1946, Serial No. 655,578

2 Claims. (Cl. 25—131)

1

My invention has for its object to provide forms for molding various concrete constructions, generally referred to as false work for bridges, culverts and buildings which are especially designed for use in various combinations and may be quickly and easily assembled at the site of the work in the first instance and disassembled and transported to be subsequently employed elsewhere.

A primary object of my invention is to provide a general type of form which is capable of being made in various standard sizes which are capable of being united to provide molding forms for wall faces of given area which are self sustaining and will provide perfectly smooth surfaces on the molded wall.

Another object of my invention is to provide a combination standard of molding forms which will enable a builder or contractor to make turns, and angles and meet other exact engineering specifications by the supplementary addition of wood fillers and require only the use of a minimum amount of wood for such extensions.

A still further object of my invention is to provide a type of metal form which lends itself particularly for use in combination with wood for the construction of odd shapes of wall construction with particular attention to the provision of means for attaching such wooden pieces to said forms in such a manner that the waste material resulting upon the completion of a given building, or other piece of work is reduced to a minimum.

To these and other ends my invention comprehends further improvements all as will be fully described in the accompanying specification, the novel features thereof being set forth in the appended claims.

In the drawings.

Figure 1 is an outer face view of a molding form of square dimensions constructed in accordance with my invention.

Figure 2 is an edge or top plan view thereof.

Figures 3 and 4 are views similar to Figs. 1 and 2 showing a smaller rectangular form but of one fourth the area.

Figures 5 and 6 are like views of a rectangular form of one sixteenth the area of that shown in the first mentioned figures.

Figures 7 and 8, 9 and 10 and 11 and 12 are views of similarly graduated proportionally designed oblong molding forms.

Figure 13 is a view of the outer side of a completed false facing or wall molding form illustrating one method of combining the various

2

forms with auxiliary means for supporting the forms for heavy construction work.

Figure 14 is an enlarged view of the vertical meeting edges of two adjacent forms illustrating the means employed for connecting them.

Figure 15 is a sectional view taken on the line 15x—15x of Fig. 14.

Figure 16 is a detail central sectional view taken through two opposed forms illustrating the manner in which a wall thickness is determined or fixed.

Figure 17 is a side view of a portion of a reinforcement comprising members which may extend horizontally or vertically on the exterior of the false work forms and is used in so called heavy constructions.

Figure 18 is an end view of the bars shown in Fig. 17 illustrating the manner in which they are secured to the forms.

Figure 19 is a horizontal wall section illustrating the construction of a form for molding a rounded corner.

Figures 20 and 21 are similar views showing angular corner mold constructions of different sizes.

Figures 22 and 23 are horizontal sectional views showing angular corners such as occur in the wing construction of culverts and

Figure 24 is a view illustrating forms embodying my invention assembled for the construction of a culvert.

Figure 25 illustrates a section of a filler strip which may be of any desired length and is provided with bolts for attachment to the panel ribs at the bottom, top or lateral edges of the false work.

Similar reference characters in the several figures indicate similar parts.

In carrying out my invention I employ as the basis of the false work to be used in molding walls, floorings, culvert wings, etc., a rectangular panel, preferably, but not necessarily of metal, such as indicated by 10. If a steel plate is used one eighth thickness will be ample for most purposes and I have found that a square having side measurements of two feet, as shown in Fig. 1, lends itself to universal use especially as other panels constructed proportionable to these basic dimensions, such as one foot by one foot (Fig.3), or one foot by two feet (Fig. 7), or six inches by two feet form easy assembling combinations with each other.

Each of these panels 10 I stiffen by reinforcing ribs 11 secured on their rear faces and arranged parallel to their edges so as to provide margins

12 of equivalent width on all four sides of the panels irrespective of their comparative sizes.

On the larger panels I further strengthen them by means of transverse ribs 13 and in the center of each of them I place a boss or hub 14. The latter is provided with a central aperture and tapped into its opposite sides are set screws 15. When building the two sides of the false work panels of equal size are placed opposite each other. This will position their respective hubs 14 in alinement so that a bar 16 may be passed through them and the spacing of the panels thereon determined in accordance with the desired thickness of the wall, after which the panels will be firmly secured by the lock screw 15.

The meeting edges of the panels 10 are further brought into close engagement by strain bolts and held in alinement with wedges. To this end I provide the marginal ribs 11 on all the panels with bolt holes 11a identically located in each rib so that these on any two panel sides and ends will always be in alinement. In practice I have found it satisfactory in connecting the large panels to use strain bolts only at the corners, hence I make provision for the quick adaptation of these by making their heads slightly smaller than the apertures 11a and rely upon their engagement with the ribs by the shoulder of the bolt head engaging against one side of the aperture. If desired however those apertures in the ribs located nearest the panel corners may be formed as key hole slots, as will be understood. A quickly operated strain bolt may be arranged as shown in Figs. 14 and 15 by making it of two parts 20 and 21 provided with right and left hand screw threads fitted into opposite sides of a hub on a lever 22. The heads of bolts 20 and 21 are provided with transverse drill holes for the insertion of a nail or other instrument for preliminarily tightening the bolts into the lever 22. The latter is provided on its underside with a cam surface 22a which overlaps the parting line between the marginal meeting edges 12 of two panels so that when it is forced downwardly to effect the final clamping action of the two bolts it will both lock itself and aline the edges of the panels. Of course similar strain connections may be used in the intermediate apertures. Similarly ordinary bolts with end nuts may be used in any of these apertures but I have not found it necessary to use such in the intermediate apertures and at these points I insert a bar 25 preferably one having a head 25a behind which I drive a wedge 26 the effect of which is to lock the bar and aline the edges of the adjacent panels simultaneously.

In Fig. 13 I have shown these forms assembled as false work for molding a straight wall. It will be observed that the larger forms (Figs. 1, 7 and 9) are first set up and rest upon a horizontal stringer 70 by resting their lower ribs 11 thereon. This places their lower marginal edges 12 against the inner face of the stringer and permits the panels to be secured thereto by fastenings, such as lag screws 70a passing through the apertures 11a. In this Fig. 13 I have shown a second tier composed of three forms D, corresponding to those illustrated in Fig. 7 but laid horizontally, and single panels E, Figs. 3 and F, Fig. 11. The third or top tier comprises three panels G, such as those depicted in Fig. 11 and single panels H and I corresponding to those of Figs. 11 and 5 respectively. As further illustrations of the use of wood strips for filling out fractional dimensions there is shown a planking 32 extending as a top rail beyond the marginal edges of the upper tier of forms and secured by bolts 70a to the flanges 11 of these several panels.

In setting up a large number of panels for molding a heavy wall such as shown in Fig. 13 I reinforce this false work by cross beams extending both horizontally and vertically. These reinforcements I preferably make of angle irons K and L and M and N of given lengths.

The inner faces of these bars are in the same plane and when placed in position engage the outer edges of the ribs 11 on the several panels which they span. I make each of these pairs of bars into units by permanently connecting by welding spacing blocks 34 between them of a width to provide a substantially continuous channel 35 through which fasteners may be inserted for securing the reinforcing members to the several panels. A convenient means for accomplishing this connection is shown in Fig. 18 and comprises a bolt 40 passing through the channel 35 and having a hook shaped inner end 41 which will engage one of the bolts or bars 25. On the outer end of the bolts 40 are pressure plates 42 which bear against the outer edges of the angle irons when the nut 43 is tightened.

It will be observed from the foregoing that the typical forms described enables a builder to construct a lead in the forms used for one wall face over those forming the other face as may frequently occur in complying with the plans and specifications of engineers or architects and to meet exact dimensions in fractions of foot measurements by supplementing the metal work with extensions of wood. In the same manner the described forms are designed to aid in the construction of wall corners which may be either curved or at various angles, as will be further described.

In the accomplishment of the above ends I also provide as an auxiliary element the filling strips shown in Fig. 25 and designated by the reference numeral 70. These strips are rectangular in cross section and of a size to fill the niche, common to any of the forms, existing between the outer or lateral face of their marginal ribs and the edge of the panel. In this auxiliary element, which may be of indeterminate length, I provide bolts 70a spaced to register with the perforations 11a in the ribs 11 of adjacent panels. Such a strip is used in a horizontal position at the bottom of the false work in connection with the sill and along the top edge of panels where risers such as 32 are employed. They also form an important feature in corner constructions where they extend vertically, such use being shown particularly in Figs. 19 to 23.

The method employed for building corner forms is shown in Figs. 19 to 23. In cases where the specification for a given piece of work enables the panels for the false work on the inner side of a wall to butt against each other, as shown in Figs. 19 and 21 the auxiliary element 70 is used as an inner corner fillet and extends from the bottom to the top of the wall and being backed on two sides by the ribs 11 of the corner panels serves as a backing for the free marginal edges 12 of said panels. In Fig. 21 another use is shown for the auxiliary element. Here is shown a flooring section of a bridge, culvert or room the floor panel Q of which is supported on an upright post or studding 72 which may be secured to the panel by a bolt 73. The outer molding form 36 for the flooring is a board set edgewise on the auxiliary strip or fillet. It is spiked

thereon and in order to securely hold it in position an outwardly extending truss work is formed by securing to the fillet, at intervals, outwardly extending arms 75 which are held horizontally by a brace 76 extending downwardly from a foot block 77 to a point of rest against one of the panel securing bolts 25. The wood edge form 36 is stiffened and held in place by a brace 78 secured to its upper edge and bearing outboard against a foot block 79.

As shown in Fig. 20, in instances where a gap occurs between the meeting edges of inner panels the short side may be extended by using two of the auxiliary strips 70 and a filler, such as 80, of the required width.

Square wall corners are formed as shown in Fig. 20. Here the outside forms are extended by the use of two of the auxiliary members to which boards 81 and 82 may be bolted or spiked. As one of these planks will extend beyond the other they will at this point be spiked together.

A rounded corner for a wall is molded by using a form such as 83, Fig. 19, the edges of which extend to and are secured to the proximate faces of the auxiliary strips 70.

Two angular shaped corners are illustrated in Figs. 22 and 23 the former to show the use of narrow filling strips 83 and 84 with angular meeting edges extending from oppositely disposed auxiliary fillets when the mold panels come close together, the latter where a wider gap occurs which necessitates closing it with larger filling strips such as 85 and 86.

The universality of the molding form panels made in accordance with my invention will be seen from an inspection of Fig. 24 which shows their use in the construction of a culvert. In this view I show panels assembled to form the false work O for the outside of one wall, those employed on the inside of a second wall P, a deck or flooring Q and two wing walls R and S. The parallel side walls are shown supported on the lower auxiliary strips forming sills which carry on their upper ends the coping formed by the extensions 32, resting on the upper auxiliary strips 70 and extend above the deck panels Q, whatever distance is required to give the finished flooring the desired thickness. At the inner ends of the wings R and S will be seen the extensions of wood 84, comprising the outer angle forms shown in Fig. 22.

After the false work has been erected the concrete mixture is poured and allowed to set and thereafter the forms are disassembled. This may be done speedily commencing with the top forms, after first removing the reinforcements K and L and M and N by disconnecting their retaining hooks 40—41. The disconnection of the panels is accomplished by removing the bolts 70a of the several auxiliary strips, knocking out the wedges 26 and withdrawing the bars 25. The strain bolts 20—21 are quickly loosened by raising the cam levers 22 and slipping the heads of these bolts out of the apertures 11a. While certain workmen may be performing some of these operations such as disconnecting the wooden extension pieces by removing their attaching bolts others may be engaged in making the remaining disconnections. The final operation is that of loosening the set screws 15, withdrawing the panels from the tie rods 16 which in turn are driven out of the wall and the holes thus remaining plugged.

It will be seen from the foregoing that I have provided a system of mold forms so constructed that when brought into assembling position allow a clear view of the meeting edges which enables the user to determine their evenness and the resultant smoothness of the inner surface of the false work which is maintained when the panel sections are clamped or bolted together. By the provision of a series of forms of similar construction and related sizes it is possible to erect a combination of metal parts which if they do not equal given specifications in feet and inches will closely approximate the same thus requiring a minimum of extensions of wood so that there need be but little wastage upon the completion of a job. In fact I have found in practice that the provision of the ribs on the exteriors of the panels having perforations therein positioned alike in all the panels forms a ready means for bolting them together and fixing thereto the extension pieces. This construction so contributes to the easy removal of the several parts that there need be practically no loss of these extensions since they may be retained for subsequent use.

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

1. Forms for use in building false work forming molds for concrete structures composed of a plurality of thin rectangular panels each having exterior reinforcing ribs extending outwardly parallel to their edges and spaced inwardly therefrom to provide free marginal areas, said ribs being provided with alined perforations, strain bolts extending through certain of said perforations, a cam lever embracing the contiguous ends of said bolts serving to draw adjacent panels together and arranged to engage across the parting line of the meeting edges of two panels to hold said edges in parallelism.

2. False work for molding the face of a concrete structure comprising a plurality of rectangular panels assembled with their inner faces in a common plane, each having on their outer faces angular ribs spaced inwardly from their four edges to provide free margins on the panels, said ribs having key holes adjacent their meeting ends and other apertures intermediately disposed, strain bolts fitted in the key holes for uniting the corners of adjacently assembled panels, means on said bolts for engagement with the meeting edges of the adjacent panels, pins extending through the intermediate apertures and spanning the intervening panel margins and filler pieces bearing against said pins and the parting lines between the united panels for maintaining their alinement.

CHARLES M. DICUS.

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