Feb. 21, 1933. E. L. SOULÉ 1,898,319

CONCRETE FORM

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Fig. 1.

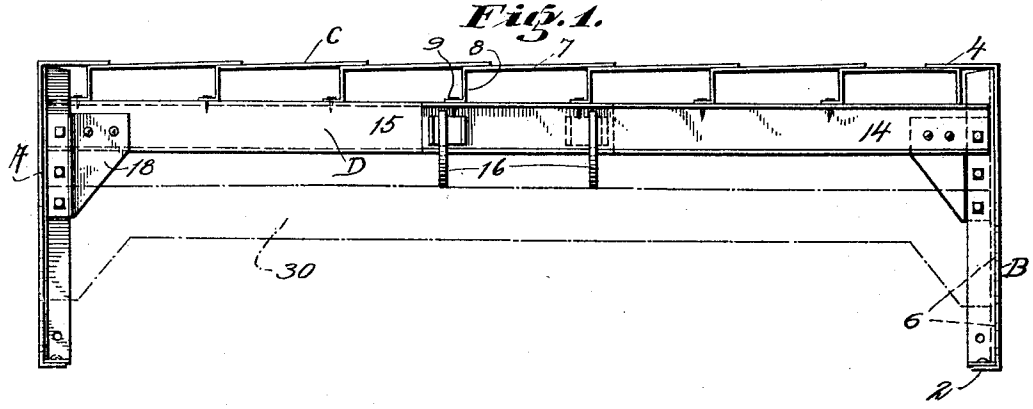



Fig. 2.

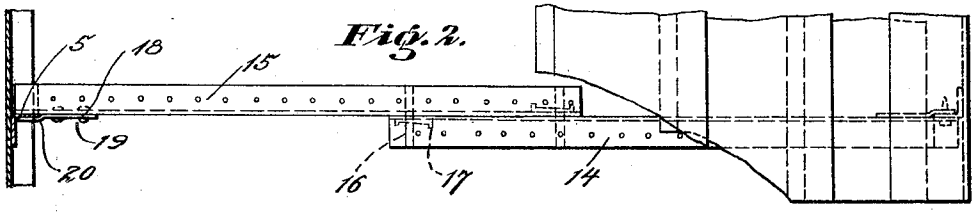
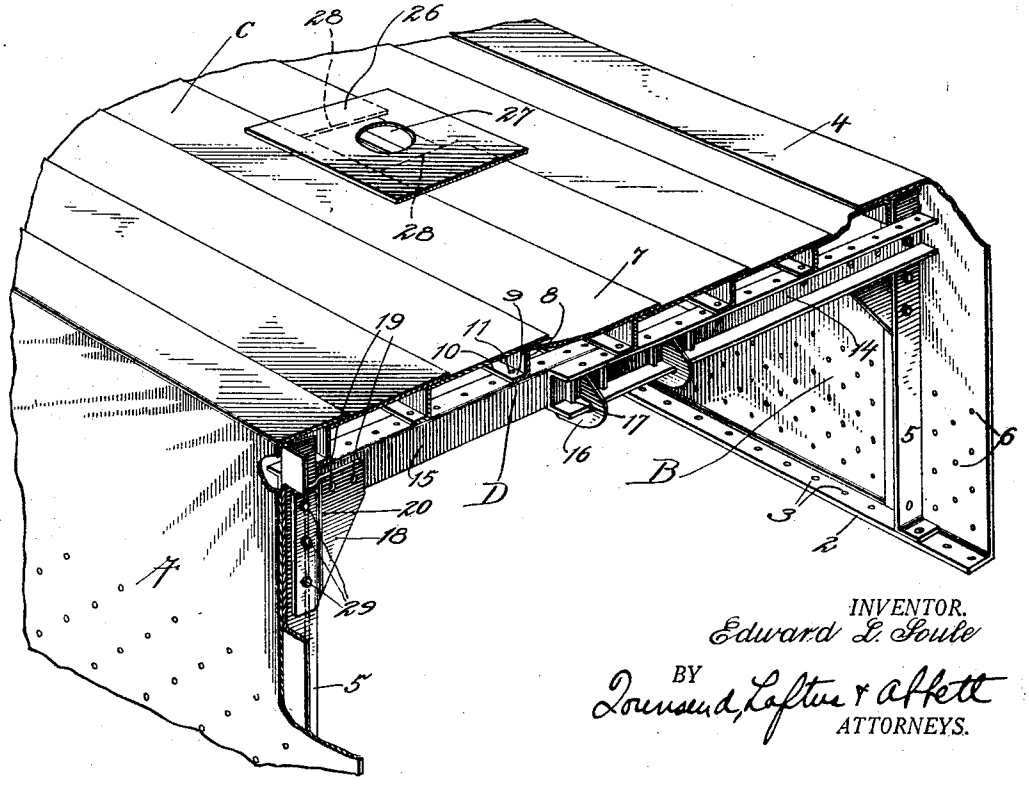



Fig. 3.




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Fig. 4.

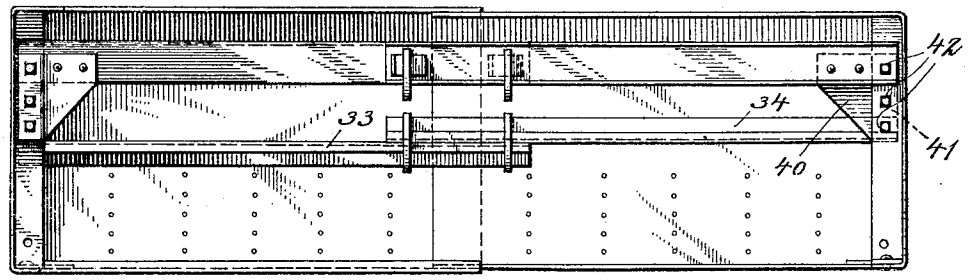



Fig. 5.

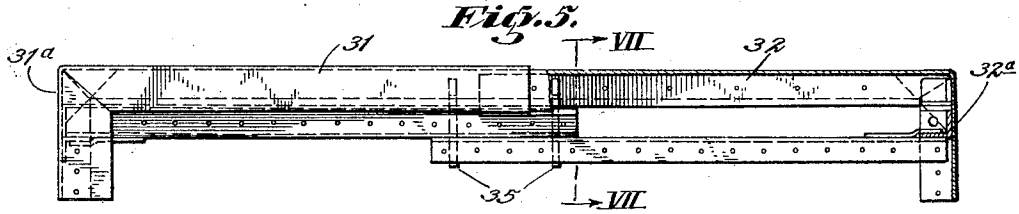



Fig. 6.

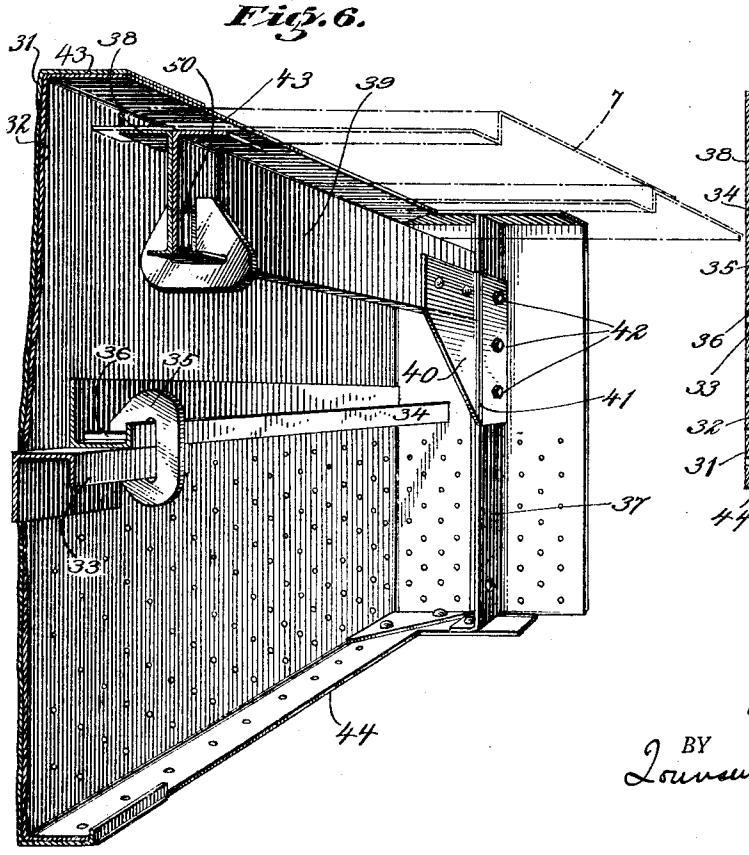
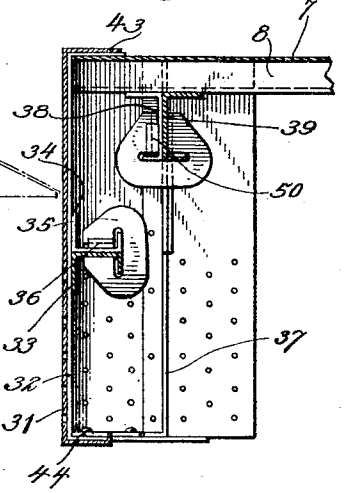



Fig. 7.




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Fig. 8.

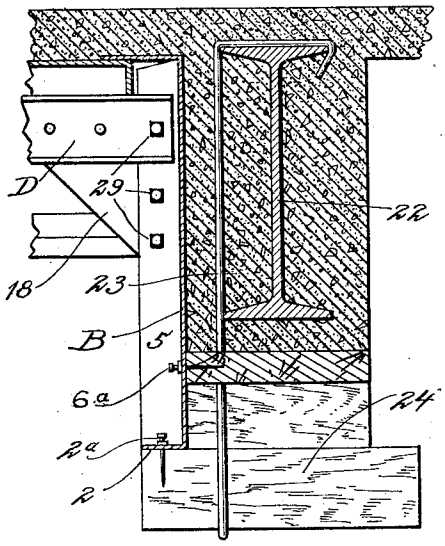



Fig. 9.

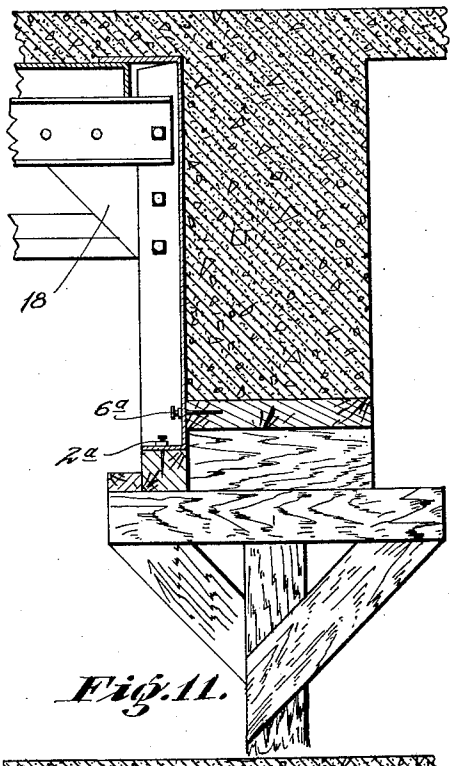



Fig. 10.

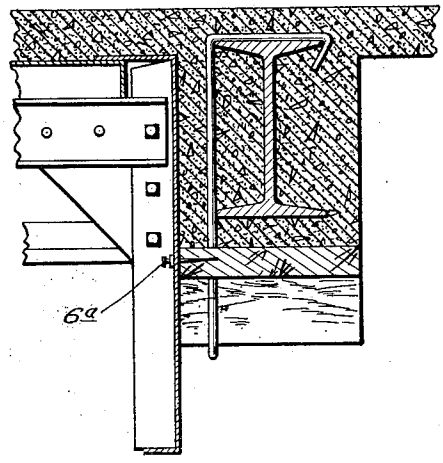



Fig. 11.

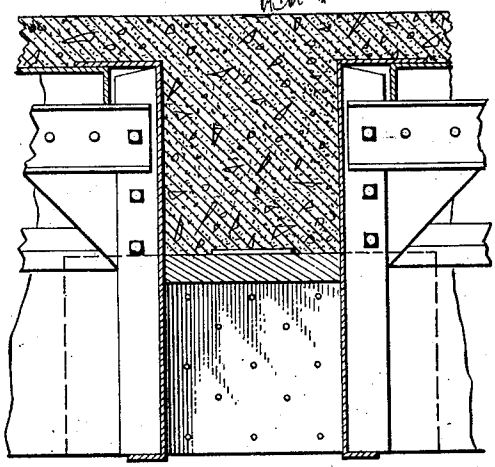


Fig. 12.

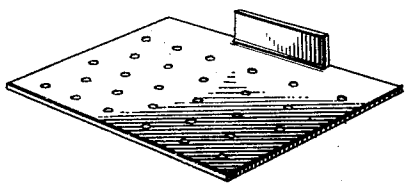
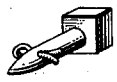


Fig. 13.



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# UNITED STATES PATENT OFFICE

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## CONCRETE FORM

Application filed August 10, 1927. Serial No. 212,013.

This invention relates to steel forms such as used in concrete floor construction and especially to improvements on the structure shown in my co-pending application entitled "Concrete form," filed May 31, 1927, Ser. No. 195,215.

In the art of concrete floor construction the floor proper is usually supported by girders which in turn are connected sidewise by a series of beams, the girders, beams and overlying floor being formed entirely of concrete and the girders, etc. commonly having metal reinforcing rods lying in and lengthwise of the lower or tension region thereof. The steel forms or molds employed are usually channel or U-shaped in cross-section and inverted when placed in position. The concrete is poured over the forms which extend from girder to girder and the forms are so positioned with relation to each other that the beams are formed between the sides of spaced rows of intermediate forms, while the girders are formed between the end walls of end forms. Steel forms of the character described when set up are supported by an underpinning or the like and when properly positioned and secured, they are ready for the pouring of the concrete. The beams, the girders and the floor finally produced are a unitary structure.

While it may be generally stated that steel forms are always more efficient and economical than wooden forms, it must also be admitted that there are a number of objections such as lack of rigidity and bracing facilities where the span between the beams exceeds certain dimensions, lack of adjustability to take care of varying sized spans between beams, girders, etc., also in taking care of girders, beams, etc. of varying width and depth. Difficulty is also encountered when placing the steel forms in position on the underpinning due to their greater weight and the same objection holds true when it comes to the stripping operation. And it may finally be stated that steel forms are generally objectionable as it is usually necessary to cut them to provide clearances for pipes and the like where they pass through the flooring and the beams.

The object of the present invention is to generally improve and simplify the construction and operation of steel forms of the character described; to provide a sectional steel form which may be rigidly braced and which is adjustable to take care of beams and girders of varying widths and depths, and also adjustable to spans of varying widths; to provide a sectional steel form which may be assembled in position on the underpinning section by section and also removed in sections when stripping, thereby eliminating the difficulty of handling heavy weights during erection or assembly, and similarly during the stripping operation; and further, to provide a sectional adjustable steel form which may be so assembled that clearances may be readily provided to take care of pipes and the like without resorting to the necessity of cutting or otherwise mutilating the forms.

The invention is shown by way of illustration in the accompanying drawings, in which:

Fig. 1 is an end view of an intermediate form,

Fig. 2 is a plan view of a portion of an intermediate form,

Fig. 3 is a perspective view of a portion of an intermediate form,

Fig. 4 is an end view of an end form,

Fig. 5 is a plan view of the same partially in section,

Fig. 6 is a perspective view of a portion of an end form,

Fig. 7 is a cross-section of an end form taken on line VII—VII, Fig. 5.

Figs. 8, 9, 10 and 11 are sectional views of a completed concrete floor and beam showing different methods of supporting the intermediate forms with relation thereto,

Fig. 12 is a perspective view of a filler plate,

Fig. 13 is a perspective view of one of the drift pins.

Referring to the drawings in detail and particularly Figs. 1, 2 and 3 which are illustrative of an intermediate form, A and B indicate the side sections of the form, C the top section, and D the bracing members. The

side sections may be made in standard lengths and heights and consist of ordinary thin steel plates such as shown in Fig. 3. These plates are provided with a base flange 2 which is perforated as at 3 and it is also provided with a top flange 4. Angle iron brace bars are riveted or otherwise secured to the side sections at spaced intervals as indicated at 5 and perforations are also provided in each side section as indicated at 6, the perforations 3 and 6 being employed for nailing or securing the side sections of the form to the soffits as illustrated at 2*a* and 6*a* in Figs. 8, 9 and 10. The top section C consists of a plurality of long, narrow plates such as indicated at 7, each plate consisting of a horizontal section 7, a vertical section 8 and a foot section 9. Each plate 7 is, in other words, provided with a Z-like flange at one end which serves two functions, first that of a support for each plate, and secondly, that of reinforcing and strengthening the same. The foot extensions are perforated as indicated at 10 and nails 11 or the like are dropped through the perforations and through the brace beams D to secure them in position when assembled as shown in Fig. 3. The brace beams or bars generally indicated at D consist of two channel-shape members such as indicated at 14 and 15. These channel beams are placed back to back as shown in Figs. 2 and 3 and they are secured with relation to each other by means of clips such as indicated at 16. These clips have T-shaped slots formed therein to straddle the beams and each clip serves as a support for a wedge 17. These wedges when driven in one direction secure the channel beams with relation to each other and when driven in the opposite direction slacken the grip of the clips 16 so that the beams 14 and 15 may be adjusted longitudinally of each other. Each beam is provided with a gusset plate such as shown at 18. These gusset plates are riveted to the respective beams shown at 19. The outer edge of each gusset plate is offset as shown at 20 so that a channel or slot is formed to receive the angle and braces 5 which are secured to the side sections of the mold indicated at A and B. The intermediate molds shown in Figs. 1, 2 and 3 may be of any length desired but preferably of a length which may be conveniently handled. They are made in four main sections, to-wit, the two side sections A and B, the top section C, and the bracing bars D. All of the sections are detachable with relation to each other and as such may be assembled piece by piece, this being of importance as it permits ready handling during erection and stripping.

In actual practice any convenient underpinning may be employed as shown in Figs. 8, 9 and 10. If the supporting formwork consists of an I beam as indicated at 22 in Fig. 8, hangers are placed thereon as indicated at 23 and the soffit formwork indicated at 24 is secured thereto, this method of supporting the soffits being more or less common practice. With the soffit formwork placed in position, the side sections A and B of the mold may be erected, that is, they are lifted up and placed in position on the soffit formwork (see Fig. 8), and they are supported by the base flange 2, nails being driven through the base flange and the side as indicated at 2*a* and 6*a*, the side sections being thus temporarily supported. These side sections as previously stated carry the angle bars 5 as they are riveted or otherwise secured thereto. The channel beams indicated at D may next be placed in position, that is, they are lifted upwardly between the side sections of the mold and they are then extended longitudinally until the offset portions of the angle plates 18 engage the angle bars 5 as shown in Figs. 1, 2 and 3. The outer edges of the angle plates 18 which are provided with three perforations and drift bolts such as shown in Fig. 13 are then inserted through the perforated angle plates and the angle bars and the channel beams 14 and 15 are thus supported. They are then further extended until the side plates or mold sections A and B assume a vertical position and the wedges are then driven tight with relation to the clips 16. Two, three or more channel beams may be placed in position, depending upon the length of each intermediate mold section. When the channel beams are all in position and adjusted and secured, it is only necessary to place the top plates C in position. This is accomplished by placing them in position one by one as shown in Fig. 3 and by securing them in position with nails or the like such as shown at 11. The whole mold is thus assembled and when all of the molds are assembled, the concrete may be poured.

During the assembly of an intermediate mold, it is possible that clearances must be provided for pipes or the like. If this is the case a piece of square tin is employed as shown at 26 (see Fig. 3). The center portion of the tin is cut away as shown at 27 to permit the pipe to extend through and the tin is placed on top of the top sections as shown, the plates 7 being pulled apart at a point below the plate 26 as indicated by the dotted lines 28 to permit the pipe to pass through. It is thus possible to provide clearances for pipes and the like without in any way cutting or mutilating the mold sections.

When the concrete has been poured and set and it is time for the stripping operation, it is accomplished as follows:

The endmost bracing beam is first released by releasing the wedges 17. The drift bolts indicated at 29 are then removed and the beam is contracted lengthwise and lowered out of the way. If three sets of brace beams

are employed for an intermediate mold section, for instance one at each end and one in the center, it is next advisable to release the center beam and the drift bolts 29, and then to lower the beam one or two holes, and then reinsert one set of drift pins. In other words, the beam is merely lowered a few inches away from the top plates 7, for instance to the dotted line position shown at 30 in Fig. 1. The same operation is resorted to as far as the next bracing beam is concerned. This leaves the top plates 7 entirely free for the stripping action and they may thus be removed one by one. Any danger of one or more top plates falling down on the workers below is entirely eliminated as the two lowered beams will support them if they should happen to drop. When all of the top plates have been removed, the two beams which have been lowered may be completely removed and the side plates A and B will then be in a position where they may be tilted away from the concrete beams and lowered.

In actual practice two sets of molds are required, the intermediate type of mold shown in Figs. 1, 2 and 3, and an end type of mold such as shown in Figs. 4, 5, 6 and 7. This mold consists of two end plates shown at 31 and 32. These plates overlap each other as shown in these figures to permit telescoping action for spans of varying widths. Each of the plates 31 and 32 are bent at right-angles to form side sections 31*a* and 32*a*. A pair of channel beams are riveted, spot welded or otherwise secured to the end plates 31 and 32 as indicated at 33 and 34. These beams are placed back to back as shown in Fig. 3 and they are secured with relation to each other when adjusted by one or more clips 35 and cooperating wedges 36. The side sections 31*a* and 32*a* have angle bars riveted or otherwise secured thereto as indicated at 37 and a pair of bracing beams 38 and 39 cooperate therewith. These beams are identical to the beams shown in connection with the intermediate molds, that is, they are provided with gusset plates 40 on each end which are offset as at 41 to straddle the angle iron bars 37, and they are provided with perforations to receive drift bolts as shown at 42. The beams 38 and 39 assist in bracing the end mold just as the beams 33 and 34. The end plates 31 and 32 are provided with top flanges 43 and with base flanges 44 and so are the side sections 31*a* and 32*a*. The upper beam consisting of the beam sections 38 and 39 assume a position slightly below the upper flanges 43 when in position as shown in Figs. 4 and 6, this base being sufficient to receive the ends of the top plates 7 which are indicated in dotted lines in Fig. 6 and in full lines in Fig. 7, i. e., the spacing between the beams 38 and 39 is equal to the vertical section 8 of the plates 7 and they may thus be slipped in under the top flange 38 when placed in position. When erecting the molds, it is first desirable to place the end molds in position on the soffit supports. The end molds in reality merely consist of the end plates 31 and 32, but they may be separated while they are being lifted in position and then telescoped and connected after they are in position. The beams 38 and 39 are, of course, a separate unit and they are finally placed in position and locked when the mold is extended to the span or width desired, the beams 38 and 39 being supported first by the drift bolts 42 and being secured by the wedges and clips as indicated at 50 (see Figs. 6 and 7). When the end molds are placed in position the intermediate molds are erected one by one in such a manner that the side plates A and B will overlap the side sections 31*a* and 32*a* of the end molds. The bracing beams D are then raised and secured between the side plates A and B and the top plates C are then placed in position one by one, care being taken that they are shoved in under the top flange 38 of the end molds so as to form a continuous cover or roofing for the molds. The end molds are, of course, the first erected when the molds are being placed in position and will be the last to be removed during the stripping operation. The concrete girders are formed by the end molds and the concrete beams are formed between the side walls A and B, this being common practice.

1. The molds here illustrated are telescopic in units to provide adjustment, both for length and width.

2. They are adjustable as to width and depth of beam or girder as shown in Figs. 8, 9, 10 and 11.

3. After the molds are erected and adjusted, they can be locked to form one connected solid unit.

4. By the use of overlapping plates, adjustment is secured for length and width of panels.

5. The use of top plates as illustrated provides a side range of adjustability for a pipe such as used in plumbing, heating, ventilating, etc.

6. Molds constructed of separable sections as here illustrated, provides easier handling when shipping and storing.

7. The sectional molds provide greater ease in assembling and stripping as heavy weights are eliminated.

8. Sectional molds such as here illustrated can be readily handled or passed through window openings and the like where larger solid units could not be handled.

9. While the top plates are here shown as Z-shaped, it is obvious that they may be angle-shaped or otherwise constructed, Z-shape being desired as it permits overlapping and at the same time provides great rigidity and strength.

While certain features of the present invention are more or less specifically described, I wish it understood that various changes may be resorted to within the scope of the appended claims. Similarly, that the materials and finishes of the several parts employed may be such as the manufacturer may decide or varying conditions or uses may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. In a mold of the character described the combination with the side plates and the angle bars secured to the inner faces thereof, of a longitudinally adjustable beam adapted to be positioned between the side plates, means for securing the beam against longitudinal adjustment when disposed between the side plates, a pair of plates secured to the beam, one at each end thereof, said plates being offset at their ends to permit the opposite ends of the beam to engage one side of the angle bars, and the plates the opposite sides of the angle bars, said plates and bars being perforated, bolts inserted through the perforations to detachably support the beam with relation to the angle bars, and a plurality of top plates adapted to be supported by the beam, said top plates being substantially Z-shaped in cross-section.

2. A concrete mold comprising a pair of overlapping end plates, each plate being bent at right angles at its outer end to form a side plate, a longitudinally adjustable beam connecting the side plates, a top flange on the side and end plates, and a plurality of top plates insertable between the beam and said flanges and supported by the beam.

3. A concrete mold comprising a pair of overlapping end plates, each plate being bent at right angles at its outer end to form a side plate, a longitudinally adjustable beam connecting the side plates, a top flange on the side and end plates, a plurality of top plates insertable between the beam and said flanges and supported by the beam, and a longitudinally adjustable beam consisting of two sections, one section of the beam being secured to one end plate and the other section to the other end plate, and means for locking said beams with relation to each other.

4. A concrete mold comprising a pair of interspaced side plates; an inturned top flange on each side plate; a beam connecting the side plates and disposed a predetermined distance below the inturned flanges on the side plates; and a plurality of overlapping top plates supported by the beam and parallel to the side plates; the inturned top flanges on the side plates telescoping with relation to the adjacent top plates supported by the beam to form a tight joint.

5. A concrete mold comprising a pair of interspaced side plates and a pair of end plates; an inturned top flange on the side and end plates; cross beams connecting the side plates and disposed below the top flanges on the side and end plates; and a plurality of top plates supported by the cross beams and parallel to the side plates, the ends of the top plates telescoping with relation to the inturned top flanges on the end plates and the outermost top plates telescoping with relation to the top flanges on the side plates.

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