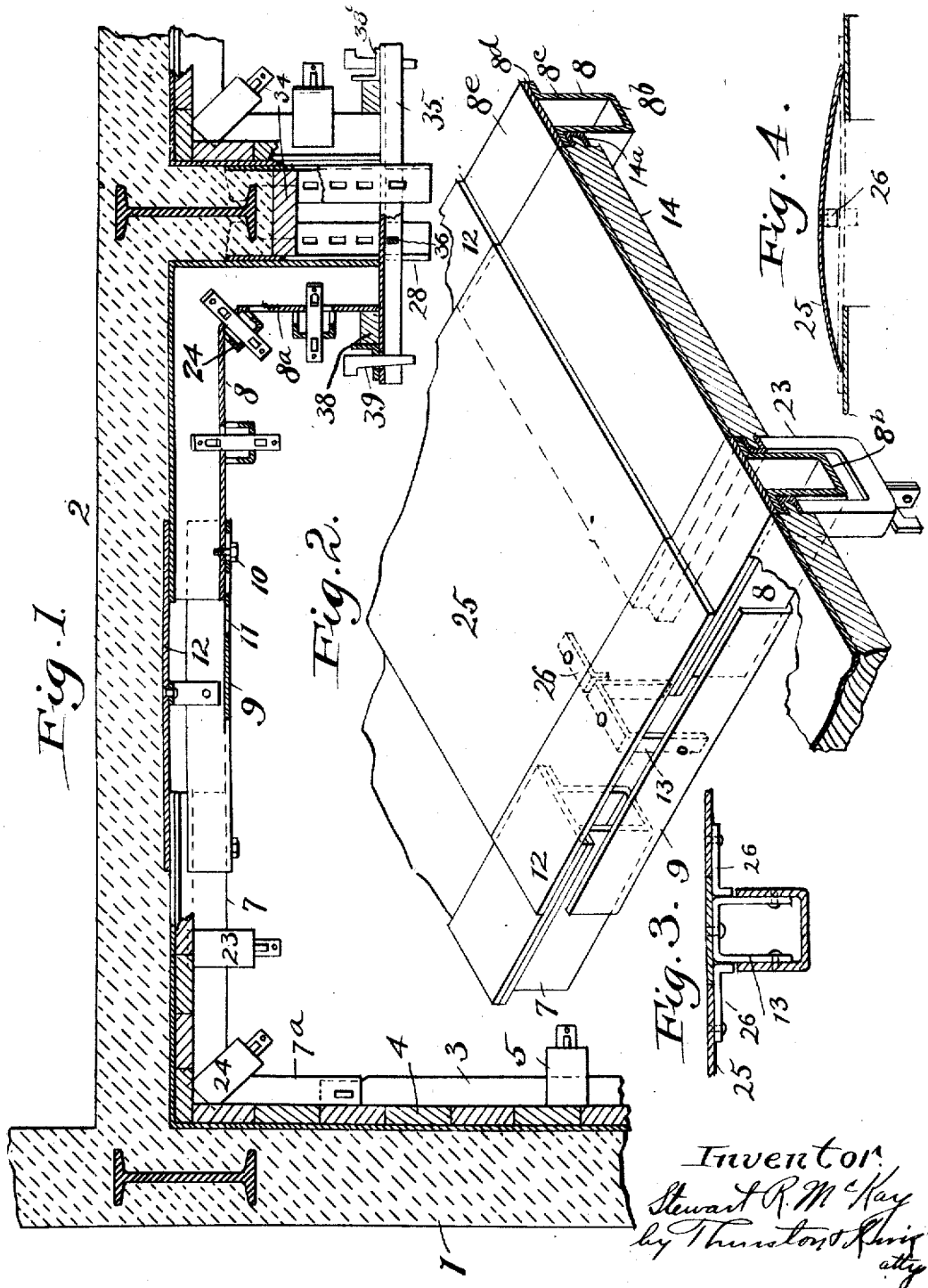


S. R. McKAY.  
 ARCH MOLD FOR CONCRETE CONSTRUCTION.  
 APPLICATION FILED DEC. 15, 1916.

1,293,838.

Patented Feb. 11, 1919.  
 2 SHEETS—SHEET 1.

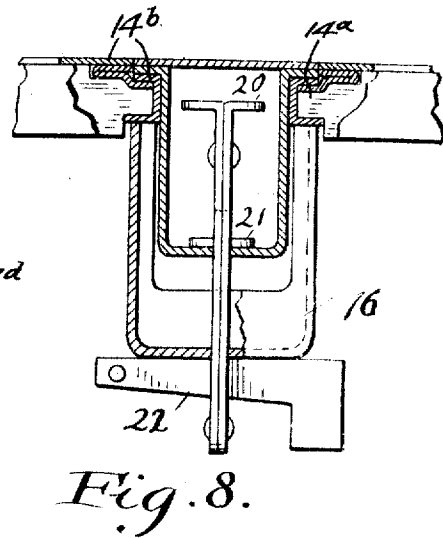
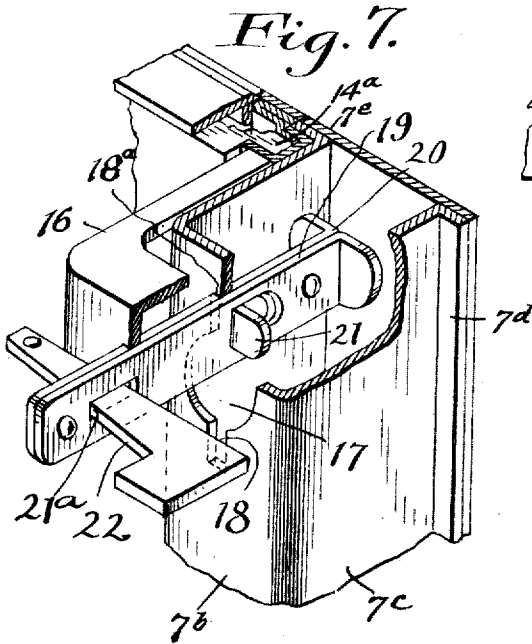
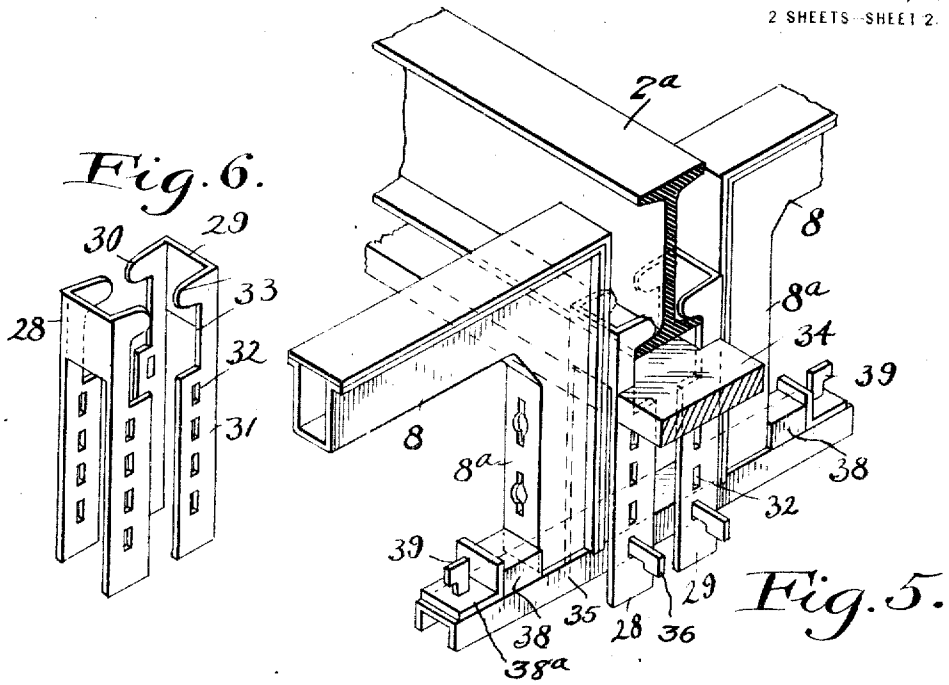


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# UNITED STATES PATENT OFFICE.

STEWART R. MCKAY, OF CLEVELAND, OHIO, ASSIGNOR TO MCKAY CONCRETE FORM COMPANY, OF SEWAREN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## ARCH-MOLD FOR CONCRETE CONSTRUCTION.

1,293,838.

Specification of Letters Patent.

Patented Feb. 11, 1919.

Application filed December 15, 1916. Serial No. 137,089.

*To all whom it may concern:*

Be it known that I, STEWART R. MCKAY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Arch-Molds for Concrete Construction, of which the following is a full, clear, and exact description.

This invention relates to forms employed for the purpose of molding ceilings, floors, or arches. While the embodiment herein disclosed is designed with particular reference to the production of a flat arch or floor construction and to the production of a concrete molding for a structural beam, it is not intended thereby to confine the invention within such limited field, as the structural features may well be capable of more extended application. The subject-matter of this application constitutes a continuation in part of my application No. 872,648, filed Nov. 17, 1914.

Among the general objects of my invention is the provision of a form having great flexibility, whereby it may be employed, with a minimum of alterations and additions, for the erection of arches varying in shape and dimensions and one which enables structural beams to be conveniently incased and protected. Further and more limited objects of the invention will appear hereinafter and will be realized in and through the combinations of elements embodied in the claims hereto annexed and illustrated in the drawings forming part hereof, wherein—

Figure 1 is a sectional view taken through a wall, ceiling, and structural beam of a building and having my invention applied thereto;

Fig. 2, a perspective view, with parts in section, of the ceiling or arch portion of my form;

Fig. 3, a sectional detail through one of the arch posts and the adjacent plates;

Fig. 4, a sectional detail through one of the arch plates and the upper portions of the adjacent mold plates;

Fig. 5, a detail in perspective of a structural beam and the cooperating portions of my mold frame;

Fig. 6, a similar view of the hangers employed in Fig. 5;

Fig. 7, a detail in perspective, with parts broken away, of a clamping device and the parts associated therewith; and

Fig. 8, a plan view of the same, with parts broken away.

In the aforesaid views, I have shown a portion of the molding form employed for the production of the side wall 1 as well as a special form for the production of the ceiling or flat arch 2 and for the molding of the I-beam 2<sup>a</sup>. The ceiling or arch mold comprises generally a series of units each comprising a pair of arched posts with mold plates secured thereto and therebetween, each post comprising a pair of adjustably connected sections, there being a bridging plate extending between pairs of posts and overlapping the ends of spaced mold plates. The vertical branches of the posts at one end of the arch form are shown as supported upon the upper ends of the wall posts 3, while the opposite branches are shown as supported upon a platform suspended from the beam 2<sup>a</sup>. It will be obvious, however, that both ends of the arch or ceiling posts may be supported in the same manner, as by wall posts 3, by platforms supported from structural beams, or in any other convenient manner, the particular arrangement shown illustrating the flexibility and adaptability of the form.

Supported between the posts 3 are the mold plates, which are shown as comprising each a suitable number of boards 3<sup>a</sup> having a sheet metal face plate, 3<sup>b</sup>, applied thereto, as described in my application No. 872,480.

Each arch or ceiling post comprises a pair of post sections each consisting of a vertical branch, a branch projecting at an angle therefrom, and a telescopic connection between such angular branches. In Fig. 1 one of the post sections is indicated at 7, 7<sup>a</sup>, the branch 7 extending horizontally from the vertical branch 7<sup>a</sup>; opposed to this section is the section 8, 8<sup>a</sup>. The posts are of hollow construction, each section comprising a channel having a web 7<sup>b</sup>, 8<sup>b</sup>, respectively, side flanges 7<sup>c</sup>, 8<sup>c</sup>, respectively, and horizontal flanges 7<sup>d</sup>, 8<sup>d</sup>, respectively, to which

plates 7<sup>a</sup> and 8<sup>a</sup>, respectively, are secured. The vertical branch 7<sup>a</sup> of the first post section is shown as telescoping upon the upper end of one of the side wall posts 3, while the vertical branch 8<sup>a</sup> of the other post section is supported upon a platform 35, to be described hereinafter. The branches 7 and 8 are opposed to each other and are shown as connected by a channel member 9 having slots 11 in the web thereof which are adapted to receive the shanks of headed bolts 10. A plate 12, of the same width as the plates 7<sup>a</sup>, 8<sup>a</sup>, is secured to the channel member 9 as by means of a U-shaped strap 13 which may be riveted to the plate and to the upwardly projecting flanges of the said member. The plate 12 overlaps the plates 7<sup>a</sup>, 8<sup>a</sup>, and provides with the channel member an adjustable connection between the post sections whereby the length of the arch or ceiling posts may be varied in accordance with the requirements of the particular installation.

Extending between adjacent arch or ceiling posts are the mold plates 14, the term "plate" being here employed in its broad sense and not for the purpose of limiting the construction of the plates or panels. Each of these plates is preferably constructed in the same manner as the mold plates 3<sup>a</sup>, 3<sup>b</sup>, and is shown as comprising a foundation of wooden boards having at opposite lateral ends thereof the tongues 14<sup>a</sup>, the work facing sides of the boards and the tongues being covered with sheet metal, as indicated at 14<sup>b</sup>. The tongues 14<sup>a</sup> are adapted to engage the flanges 7<sup>a</sup>, 8<sup>a</sup>, and the thickness of the mold plates is such that the work facing sides 14<sup>b</sup> thereof will be in the same plane as the plates 7<sup>a</sup> and 8<sup>a</sup>. The mold plates may be secured to the posts in any convenient manner, the securing means shown herein being the same as in my application 872,648, filed November 17, 1914. The adjacent ends of mold plates on opposite sides of each post are shown as secured thereto by means of a U-shaped yoke 16 which is adapted to straddle the post and with its legs bearing against the tongues 14<sup>a</sup>—see Figs. 7 and 8. Each of the posts is shown as provided with a double key-hole slot comprising a central opening 17 with narrow slots 18, 18<sup>a</sup> extending in opposite directions therefrom. Extending through the double key-hole slots is a bolt 19 which may be conveniently formed from two straps of metal fastened together, each bolt having a foot 20 which is of such size that it can not pass through the central opening 17, whereby the bolt can not be withdrawn from the post, although it may be conveniently inserted therein before securing the plates 7<sup>a</sup> or 8<sup>a</sup> thereto. Intermediate of its ends the bolt is provided with oppositely extending wings 21 which are

adapted to pass through the opening 17 but can not pass through the slots 18 or 18<sup>a</sup>. The outer end of the bolt projects through a slot in the clamping member 16 and is provided with a slot 21<sup>a</sup>, adapted to receive a wedge key 22. The parts are so proportioned that, when the wings 21 are in engagement with the inner face of the web 7<sup>b</sup> on opposite sides of the slots 18 or 18<sup>a</sup>, the legs of the clamping yoke 16 may engage the tongues 14<sup>a</sup> with a slot 21<sup>a</sup> extending beyond the outer surface of the yoke. Then, by driving the wedge key home, the yoke legs will hold the tongues 14<sup>a</sup> firmly against the flanges 7<sup>a</sup> or 8<sup>a</sup>. When the clamping members are not in use, the bolt 19 may be moved outwardly through the opening 17 until the foot 20 engages the inner face of the flange 7<sup>b</sup> or 8<sup>b</sup>. The bolt and clamping member may then be rotated at right-angles to the position shown in Figs. 7 and 8, and the clamping member may be secured to the post with its legs bearing against the web thereof, being locked in place by means of the wedge-key.

The particular clamping member shown and described herein does not of itself constitute the subject-matter of this application, the same being covered by my application No. 872,648. A suitable number of these clamping devices will be employed, those for the side-wall forms being indicated at 5, those for the ceiling or arch mold forms being indicated at 23, while still others are shown at 24, the last mentioned clamping members being shown as applied to the post sections 7, 7<sup>a</sup>, and 8, 8<sup>a</sup>, and serving to clamp both the side wall mold plates and the ceiling or arch mold plates to their respective post sections.

Extending between the plates 12 of adjacent posts and between the spaced ends of mold plates is a bridge plate 25. This plate is of such width as to abut against and form a continuation of the plates 12 and is of such length as to overlap the mold plates. To secure the plate in place, pivoted latches 26 are provided at opposite ends thereof. Each of these latches is adapted to be swung at right-angles to the position shown in Fig. 2, and, when the plate is positioned, thereafter to be moved to the position shown in said figure, whereby a portion of each latch will take beneath a plate 12, thereby to lock the plate 25 in place. The plates 25, even when used with flat arch or ceiling construction, are preferably formed so as normally to be transversely bowed, or arched, as shown in Fig. 4. When secured in place by the latches 26, the plates will press firmly upon the tops of the mold plates 14, thereby preventing the wet concrete from oozing between the said plate and the mold plates. In erecting a ceiling or arch a gap will frequently be left between mold plates. The

bridge plates 25 can be conveniently applied to and cover this gap in such manner as to prevent the leakage of the wet concrete.

As heretofore indicated, if the arch or ceiling to be formed extends between two parallel walls, the vertical branch 7<sup>a</sup> or 8<sup>a</sup> of each post section will cooperate with a vertical post 3, such as shown at the left of Fig. 1. However, it is frequently necessary in constructing an arch or ceiling to incase an I-beam or other structural beam. In the drawing, I have therefore shown a ceiling form construction adapted to cooperate both with a wall mold and with a mold construction permitting the incasing of such beam, the lower end of the post section branches 8<sup>a</sup> being supported on a platform suspended from such beam.

In this connection, I employ pairs of hangers 28, said hangers being employed with each arch or ceiling post. Each hanger preferably comprises a head 29 having inwardly extending ears 30 which are tapered, for reasons which will be explained hereinafter. Depending from each head 29 is a pair of lugs 31, the lugs of each pair being provided with alined openings 32. In the drawings, the structural member 2<sup>a</sup> is shown as an I-beam and the hangers are designed to cooperate with opposite sides of the bottom flange of such beam, the ears 30 resting upon such flange with the body of each hanger depending below the beam. Beneath the beam and extending longitudinally thereof is a plate or board 34 which is adapted to form a bottom support for the concrete within which the beam is to be incased. This plate or board 34 is supported in the notched portions 33 of each pair of hangers.

Extending between the lugs 31 of each pair of hangers and transversely of the beam 2<sup>a</sup> is a platform 35. This platform is shown as an inverted channel member and is supported from the lugs by means of pins 36 which extend through appropriate openings 32 in the hangers and through corresponding openings in the flanges of the platform member 35. The provision of the openings 32 secures a range of adjustability sufficient to meet the requirements of varying installations.

The bottom of each post section 8, 8<sup>a</sup> is shown as seated upon the platform member 35, said member also being shown as forming a seat for a similar post section upon the opposite side of the I-beam. The bottoms of the post sections 8, 8<sup>a</sup> are secured in place by means of blocks 38 (preferably of wood) each bearing at one edge against the bottom of an opposite section, and being braced thereagainst by means of an angle-plate 38<sup>b</sup> and a wedge-key 39 driven through an opening in the base of said plate and an opening in the web of the platform 35.

The spaces between the board or plate 34 and the ceiling will be inclosed by mold plates 3<sup>a</sup>, 3<sup>b</sup>, similar to the like designated mold plates at the left of Fig. 1, the said mold plates being secured to the post sections 8<sup>a</sup> in the manner hereinbefore described.

Reference has been made to the tapering of the ears 30. After the concrete has set and the forms have been removed, the head portions of the hangers will be partially embedded in the concrete. Because of the tapering of the ears, the hangers may be easily withdrawn and the openings, due to such withdrawal, may be filled with grout or concrete.

From the foregoing description, it will be seen that I have produced an arch form which possesses a considerable range of adjustment and one which permits the forms to be easily removed when the concrete shall have set. The removal of the mold plates is effected by loosening the clamps 5, 23, 24, and turning them to their right-angled position. Then, by removing the bolts 10, the post sections may be moved toward each other, enabling them to be easily taken down. The removal of the hangers 28 has been described and the removal of the platforms will be evident.

Having described my invention, I claim:—

1. In a form for molding ceilings or arches, the combination of a pair of post sections, each of said sections having branches which extend substantially at right angles with respect to each other, corresponding branches of said sections being presented toward each other and in substantial alinement with each other; an interposed post section adjustably connected to the opposite ends of the said branches; and a plate associated with the said interposed post section and cooperating with the adjacent portions of the said branches.

2. In a form for molding ceilings or arches, the combination of a pair of alined post sections; a channel-shaped member engaging with oppositely disposed portions of said sections; means for securing said channel member adjustably with respect to said sections; and a plate connected with the said channel member and associated with adjacent portions of the said post sections.

3. In a form for molding ceilings or arches, the combination of post sections, each of the post sections being composed of branches which extend at an angle to each other, corresponding branches of said sections being presented toward each other and in substantial alinement with an interposed post section adjustably connected to the opposed branches of the first mentioned sections; and clamping devices carried by the

said post sections upon the branches and at the corners thereof.

4. In a form for molding ceilings or arches, the combination of a pair of angular post sections, means for supporting said angular sections with the corresponding branches of said sections presented toward and in substantial alinement with each other, an interposed post section adjustably connected to the opposed ends of said branches, and a plate associated with and supported by such intermediate section.
5. In a form for molding ceiling and arch constructions, the combination of two pairs of angular post sections, means for supporting the angular sections of each pair in such manner that one of the branches of each section will be presented toward and in substantial alinement with the corresponding branch of the other section, mold plates adapted to be inserted between and connected to the substantially parallel branches, and an intermediate post section connected to and extending across the space between the opposed ends of the post sections and having a plate which is adapted to overlap the lateral edges of the first mentioned plates.
6. In a form for molding ceiling and arch constructions, the combination of a pair of laterally spaced posts each comprising a pair of longitudinally spaced members, mold plates adapted to be inserted between and connected to the laterally spaced members, and a pair of intermediate post sections connected to and extending across the space between the opposed ends of the post members and having a plate which is adapted to overlap the lateral edges of the first mentioned plates.
7. In a form for molding ceiling and arch constructions, the combination of two pairs of angular post sections, means for supporting the angular sections of each pair in such manner that one of the branches of each section will be presented toward and in substantial alinement with the corresponding branch of the other section, mold plates adapted to be inserted between and connected to the said branches, an intermediate post section telescopically connecting the opposed branches of each pair of angular post sections, and a plate connected to each of such intermediate post sections and adapted to overlap the opposed edges of the first mentioned plates.
8. In a form of the character described, the combination of a pair of alined post sections, each section comprising a pair of angularly disposed branches, and an interposed post section adjustably connected with proximate branches of the first mentioned post sections, each of said sections having a pair of angularly disposed branches, and an interposed channeled post section adjustably connected to the proximate branches of the first mentioned post sections.
10. In a form of the character described, the combination of a pair of alined channeled post sections, each of said sections having a pair of angularly disposed branches, an interposed channeled post section adjustably connected to the proximate branches of the first mentioned sections, and a plate opposed to the intermediate post section and also adjustably connecting the proximate branches of the first-mentioned post sections.
11. In a form of the character described, the combination of a pair of alined channeled post sections, each of said sections having angularly disposed branches, an interposed channeled post section telescopically fitted to the proximate branches of said post sections, said interposed post section having a plurality of slots therein, and bolts adapted to extend through said slots, thereby to adjustably connect the interposed post sections with said proximate branches.
12. In a form of the character described, the combination, with a pair of alined channeled post sections each having a pair of angularly disposed branches, of an intermediate channeled post section adjustably connected to the proximate branches of said post sections, and a plate opposed to the web of the intermediate post section and connected thereto and forming with such channeled section a telescoping connection for the opposed ends of the proximate branches of the first mentioned post sections.
13. In a form of the character described, the combination, with a pair of parallel posts and mold boards interposed between and secured to said posts, of a plate extending between said posts and overlapping said mold plates, and means for detachably securing the said plate to the said posts.
14. In a form of the character described, the combination, with a pair of parallel posts and a pair of spaced mold plates opposed therebetween and secured thereto, of a plate extending between said posts and overlapping said mold plates, and means for detachably securing the said plate to the said posts.
15. In a form of the character described, the combination, with a pair of parallel posts and a pair of spaced mold plates interposed therebetween and secured thereto, of a plate adapted to extend between said posts and to overlap said mold plates, and swinging catches carried by opposite ends of said plates and adapted to be brought into and out of engagement with their respective posts.
16. The combination, with a pair of oppositely disposed hangers adapted to engage

the flange of a structural beam, of means upon said hangers for supporting a plate beneath such beam, a platform supported by said hangers, a mold form post one end whereof is supported by said platform, means for supporting the other end of said post, and mold plates supported by said post.

17. In a form of the character described, the combination of a post, mold plates supported by said post, means for supporting one end of said post, a hanger, said hanger being provided with depending portions, a platform for supporting the other end of said post, and means for adjustably securing the platform between the depending portions of the hanger.

18. The combination, with two pairs of hangers adapted to be mounted on the flange of a structural beam and to depend therefrom, one pair of hangers being laterally spaced from the other, of a mold plate supported by said hangers beneath such beam, a transverse platform supported by each pair of hangers, vertically extending posts having their lower ends supported by each of said platforms, means supported by each platform for forcing the posts against the hangers cooperating therewith, mold plates adapted to be inserted between said posts, and means for clamping said plates to said posts.

19. The combination, with two pairs of hangers adapted to be mounted upon and depend from the flange of a structural beam, one pair being laterally spaced from the other, of a mold plate supported by said hangers beneath said beam, vertically extending posts supported from said hangers, mold plates adapted to be inserted between said posts, and means for securing the plates to the posts.

20. The combination, with a pair of opposed channel-shaped hangers having their flanges presented toward each other and provided with slots for enabling them to be applied to the flange of a structural beam, of a mold plate supported in said slots beneath said beam.

21. The combination, with a pair of laterally spaced hangers adapted to be connected to and depend from a structural beam, of a bottom mold board supported by said hangers beneath said beam, posts supported by said hangers, and mold plates interposed between and connected to said posts.

22. In a form for molding ceilings and arch constructions, the combination of two pairs of post sections, the sections in each pair being spaced apart and in alinement with each other; interposed post sections ad-

justably connected to the said alined sections; mold plates adapted to be inserted between and to engage the said pairs of post sections; and means for holding the said plates to the said post sections.

23. In a form for molding ceiling and arch constructions, the combination of two pairs of spaced post sections, the sections of each pair being in substantial alinement and spaced apart; an interposed post section adjustably connected with the opposed portions of each pair of post sections; a plate associated with each interposed post section and bearing upon adjacent portions of the cooperating post sections; spaced mold plates adapted to be inserted between the said pairs of post sections; means for securing the said mold plates to the post sections; and a plate extending between the pairs of post sections, said plate bearing upon the spaced mold plates and cooperating with the plates associated with the intermediate post sections.

24. In a form for molding ceiling and arch constructions, the combination of two pairs of spaced post sections, the sections of each pair being in substantial alinement and spaced apart; an interposed post section adjustably connected with the opposed portions of each pair of post sections; a plate associated with each interposed post section and bearing upon adjacent portions of the cooperating post sections; spaced mold plates adapted to be inserted between the said pairs of post sections; means for securing the said plates to the post sections; a normally curved plate extending between the said pairs of post sections and at its edges bearing upon the spaced mold plates; and securing means associated with the said plate for holding the same in straightened position.

25. The combination, with a pair of laterally spaced hangers adapted to be connected to the flange of an I-beam, each pair comprising in turn a pair of opposed channel brackets having their flanges recessed to receive the I-beam flange and to suspend the brackets thereby, the bracket flanges being recessed as far as the webs of said channels beneath the I-beam, a bottom plate supported by said hangers in the space thus formed below the I-beam, and means cooperating with said hangers for supporting mold plates on opposite sides of the I-beam and of the bottom plate whereby a mold may be formed about the depending flange of the I-beam.

In testimony whereof, I hereunto affix my signature.

STEWART R. MCKAY.