

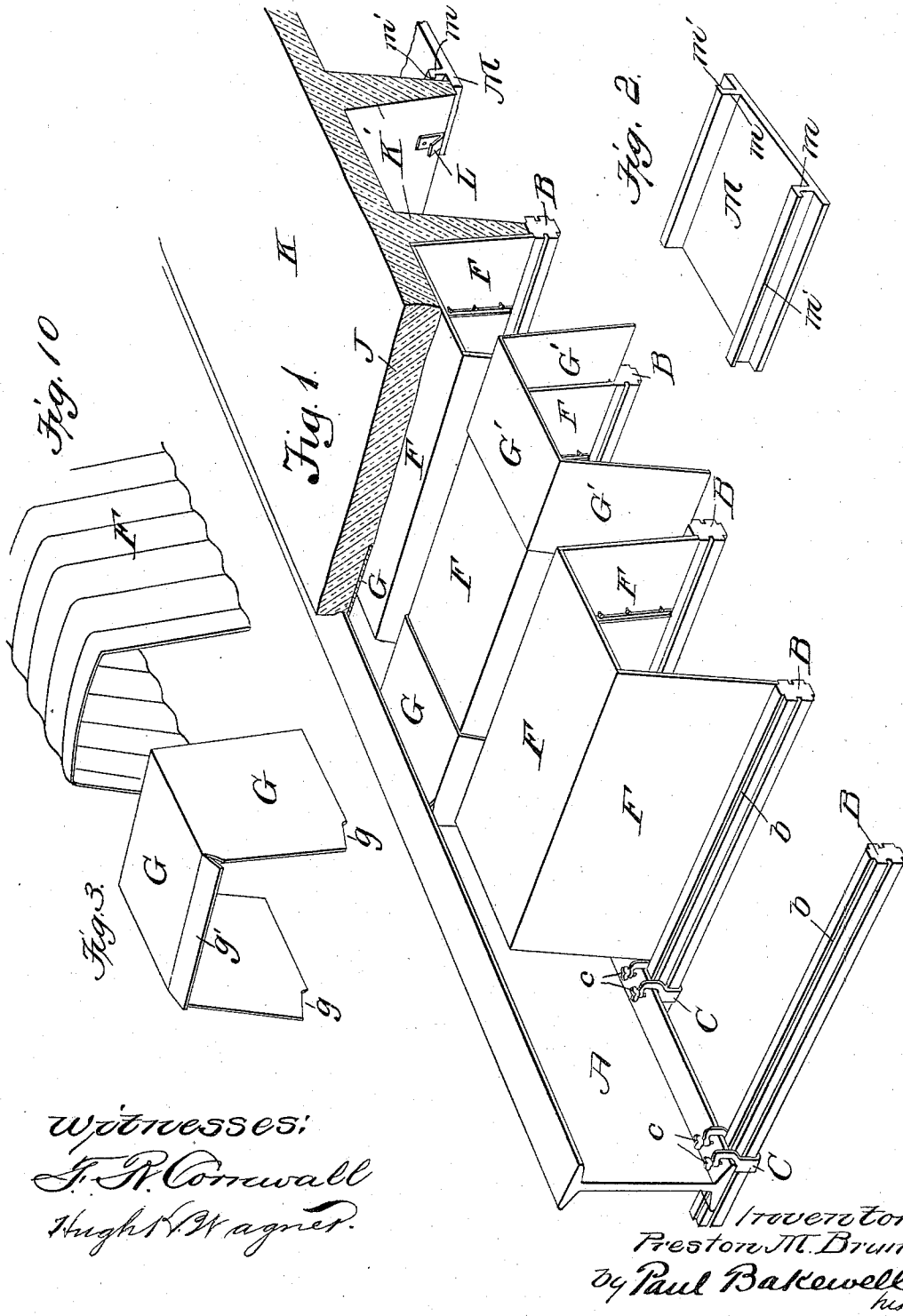
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4 Sheets—Sheet 1.

P. M. BRUNER.  
FIREPROOF FLOOR AND CEILING.

No. 534,853.

Patented Feb. 26, 1895.



Witnesses:  
J. H. Cornwall  
Hugh V. Wagner.

Inventor  
Preston M. Bruner  
by Paul Bakewell  
his atty

(No Model.)

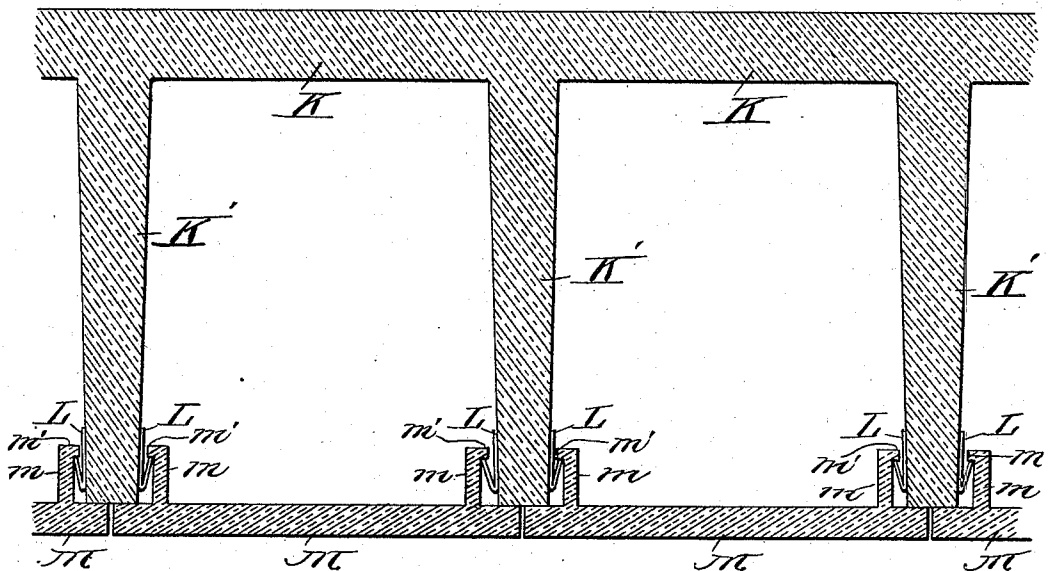
4 Sheets—Sheet 2.

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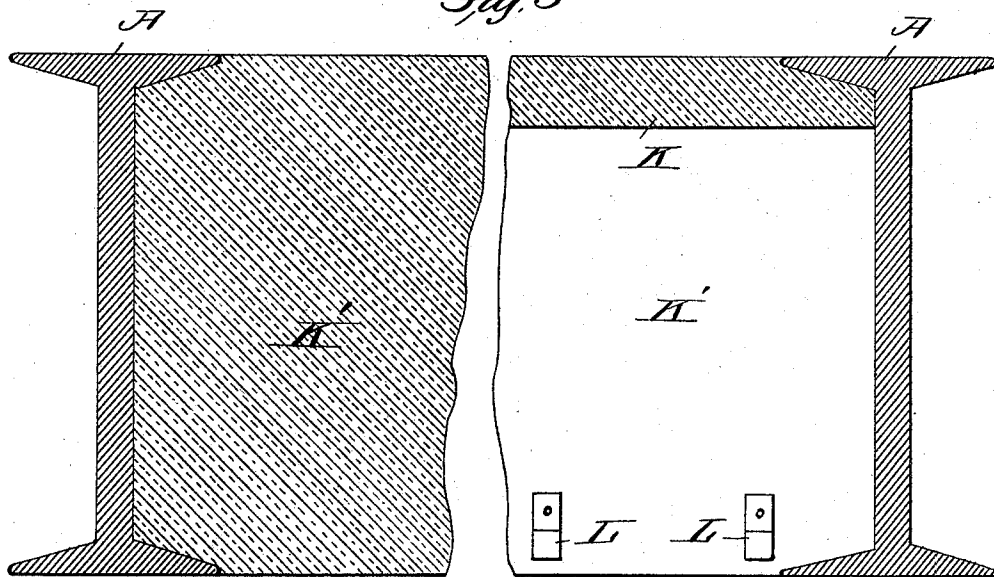
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*Fig. 4.*



*Fig. 5.*



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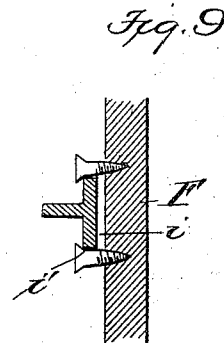
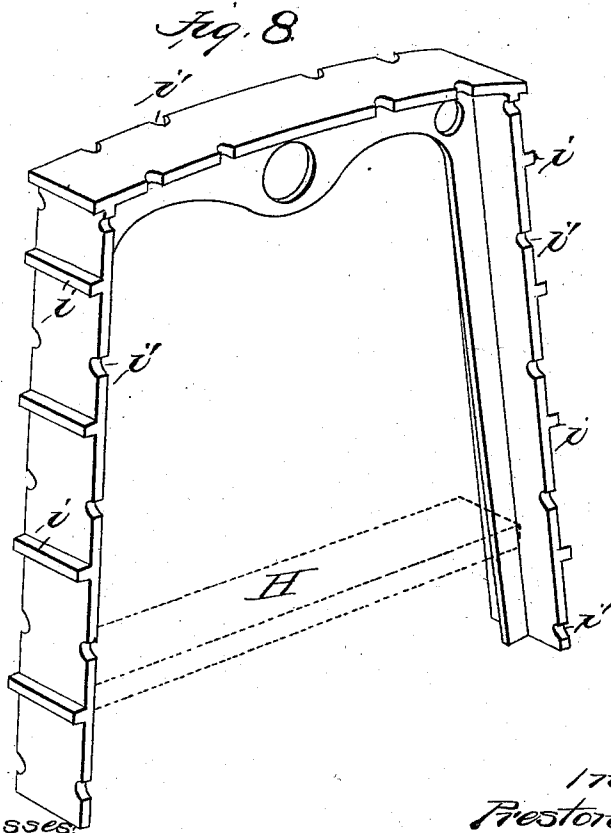
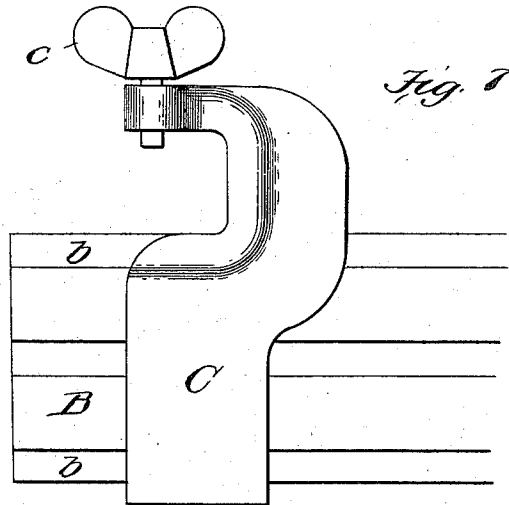
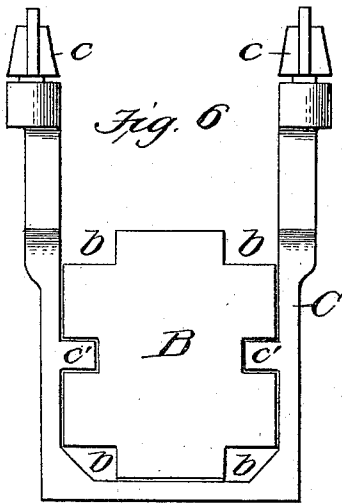
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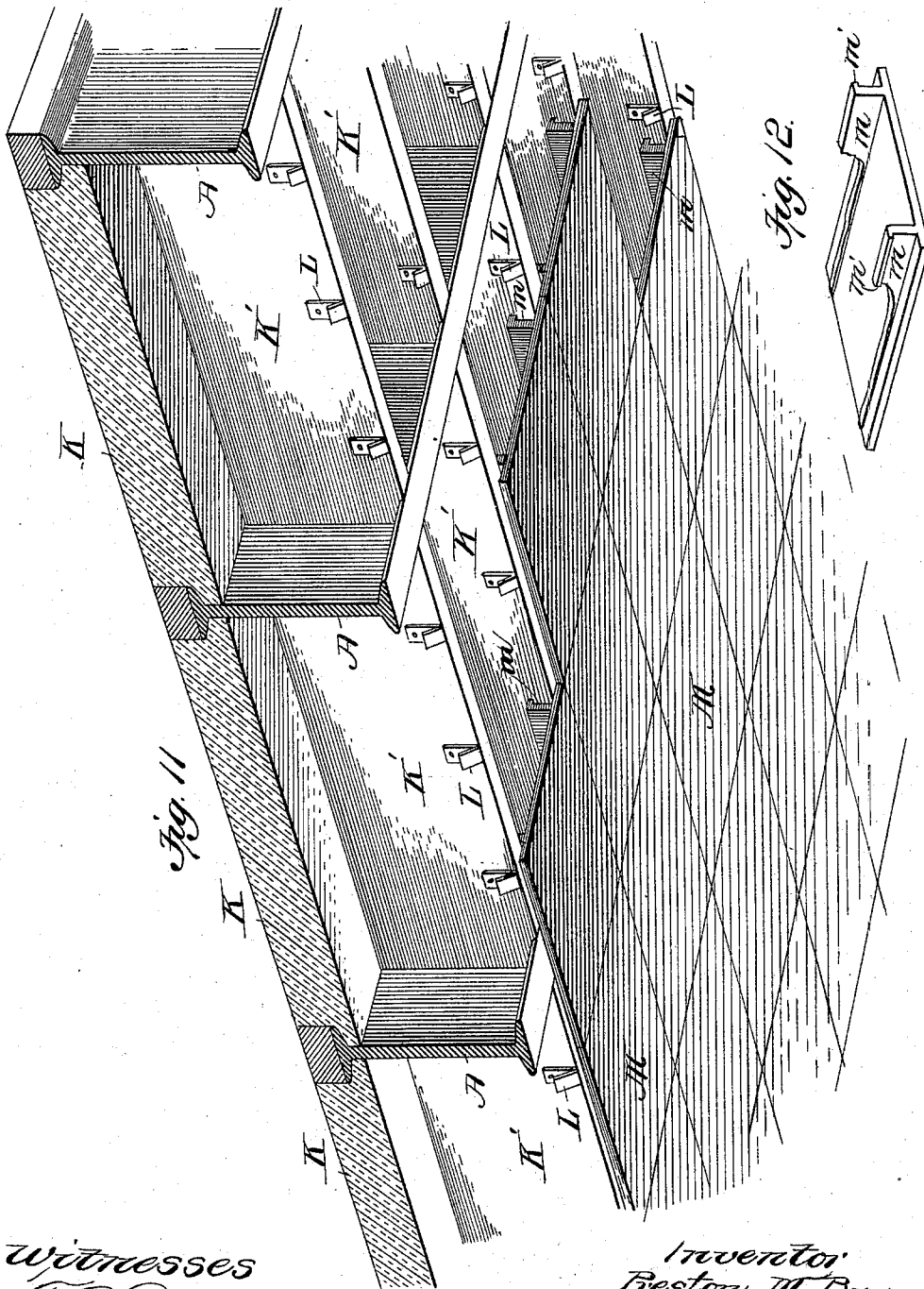
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# UNITED STATES PATENT OFFICE.

PRESTON M. BRUNER, OF ST. LOUIS, MISSOURI.

## FIREPROOF FLOOR AND CEILING.

SPECIFICATION forming part of Letters Patent No. 534,853, dated February 26, 1895.

Application filed November 14, 1894. Serial No. 528,824. (No model.)

*To all whom it may concern:*

Be it known that I, PRESTON M. BRUNER, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented  
5 a certain new and useful Improvement in Fire-proof Floors and Ceilings, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, and  
10 in which—

Figure 1 is a perspective view, illustrating the method of constructing or erecting my improved fire-proof floor and ceiling. Fig. 2 is a view of one of the ceiling blocks. Fig. 3 is  
15 a perspective view of one of the overlapping sections of a mold. Fig. 4 is a sectional view through the floor, showing the ceiling attached; and Fig. 5 is a similar view, taken at right-angles to the view shown in Fig. 4. Fig.  
20 6 is an end view of the temporary supporting beams for the mold, showing the clamp in position thereon. Fig. 7 is a similar view, in side elevation. Fig. 8 is a detail view of one of the mold braces. Fig. 9 is a detail view showing  
25 the manner of attaching a wooden mold to its brace; and Fig. 10 is a modified form of mold. Fig. 11 is a view illustrating the manner of attaching the ceiling tile in position. Fig. 12 is a detail view of one of the ceiling tiles which  
30 extends across the supporting beam A.

In the construction of fire-proofing, it is desirable that there should be the greatest amount of hollow space in the material, consistent with the required strength. In the  
35 case of floors, the burden of the load is always on top, and it is desirable that the top surface and the carrying members of the construction should be well bound together; if possible, cast in one piece. When this is done, there is no  
40 opportunity of slipping between the parts, and, consequently, transferring undue strain on the more stable members.

This present invention relates to a new and useful improvement in the construction of  
45 fire-proof floors and ceilings, in which are embodied the necessary elements tending toward perfection, as far as possible.

The invention consists, primarily, in the means of instrumentalities employed in the  
50 construction of fire-proof floors; secondly, in the construction of the floor and ceiling; and,

finally, in the manner of attaching the ceiling to the finished floor.

In the drawings, referring to Fig. 1, I have illustrated the manner and the different steps  
55 employed in building or constructing fire-proof floors, to which is afterward attached the ceiling.

A indicates a supporting I-beam, or floor-beam, of that character and shape which is  
60 in common use in the construction of buildings. The spaces between these beams are called bays, and in these bays the flooring is built.

B indicates a beam or support which temporarily forms a suspension bridge across a bay, and upon which is supported the molds or forms which temporarily occupy the space for the intended hollow spaces between the floor and ceiling. Slidably mounted on these  
70 beams, are clamps C, which extend thereabove, and are formed with a recess, into which the flange of the supporting I-beam is received, and clamped by thumb-nut c. This clamp is, preferably, U-shaped, and is provided with  
75 inwardly-projecting lugs c', which run in longitudinal grooves in the sides of beam B. This beam B is formed with recesses b on its top and bottom faces, so as to make it reversible, should it be desired, into which recesses  
80 are received the molds F.

Assuming now that the supporting beams B are in position and adjusted the proper distance apart, the mold-boxes F are then placed in position, the side edges, or vertical walls,  
85 thereof resting in the longitudinal recesses b. These mold-boxes are, preferably, made of sheet metal, and, if desired, this metal may be corrugated, as shown in Fig. 10 to add rigidity to the structure. The boxes taper slightly  
90 toward their top, so as to give them draft when they are withdrawn, and the top is, preferably, arched slightly, to increase its strength. These boxes are, in practice, preferably made in certain lengths, of—say, two or two and  
95 one-half feet, each, which I would term units of length. If, in operation, it is desired to build in a span twelve feet wide, it would be necessary to reduce the length of some of these mold-boxes, in order to make them fit that distance. Such reduction in length, where the  
100 bays constantly vary in width, would soon use

up the mold-boxes, and, in order to avoid this, I form short sections G and G', the former of which is termed the end section, and is cut away at *g*, to fit the lower flange of beam A, while the upper, or crown, portion, is formed with a lip *g'*, to conform to the shape of the upper flange of beam A. The overlapping section G' is substantially plain, and is used to bridge a space between two boxes in the middle portion of the bay.

Before placing the mold-boxes in position, I introduce between the vertical walls thereof a board or form which tends to spread said vertical walls to their required width, and, in the case a brace is used, such as shown in Fig. 8, I separate the box by spreading the legs of the brace, by a short piece of wood or other suitable material H. The brace shown in Fig. 8 consists of an inverted U-shaped frame, the outer surfaces of the legs of which are formed with projections *i*, so as to distribute the bearing-points of the mold-box throughout their length, while the side edges of these legs and the crown piece are formed with notches *i'*, at different points along their length, to receive screws by which the brace is secured to the mold-box, to prevent the mold-box warping. This brace is, also, formed with an inwardly-projecting web, which is provided with openings at the top, by means of which a hook or lever may be introduced to withdraw the boxes when removing the substructure.

Assuming now that the substructure, as above described, has been placed in position, the material, illustrated at *j*, Fig. 1, is introduced on the mold-boxes and tamped, if desired. The shape the material assumes is shown in Fig. 4, where K indicates the floor, proper, which is supported and strengthened by depending members K' extending transversely the bay, said members being supported or resting upon the lower flange of the I-beams A.

When the material composing the floor has become sufficiently set, the substructure is removed, and the expanding braces or formers knocked from between the side walls of the boxes, which they heretofore had spread. The elasticity of the boxes will cause the side walls to partly collapse, or draw away from the depending members or ribs of the floor. A hook or lever is now introduced in the hole in the web of the brace of the box, and the boxes withdrawn. I might add that the thumb-screw *c*, which clamped the beams B to the beams A, are protected from being in contact with the material by the walls of the mold-box.

To secure the ceiling to the depending members K' of the floor, I nail, or otherwise attach thereto, wedges L, which, preferably, consist of a thin strip of tin or metal bent upon itself in a V-shape, one member of which is attached to the floor-strengthening rib near its lower edge. The ceiling consists of a number of pieces of tiling M, from the upper face of

which project ribs *m*, having lips *m'* extending outwardly from the upper edges of these ribs. These tiles, comprising the ceiling, are forced up into position until the lips *m'* pass the wedges or clips L, when the tiling is temporarily supported. Liquid cement is now poured between the ribs *m* and the members K', which will permanently hold the tiling in position, the cement forming a permanent bond when set.

Other means than the clips L, here illustrated, could be employed to temporarily hold the ceiling-tiles in position. Therefore, I do not wish to limit myself to the V-shaped spring clip shown, as the cement forms the permanent bond between the floor ribs and ceiling, and the only function of the clips L is to temporarily support the ceiling tile while the cement is being poured and while it is setting.

The manner of pouring the liquid cement between the ribs *m* of the ceiling tile and the floor strengthening ribs K' is illustrated in Fig. 11. The cement is generally poured after each tile is placed in position. When the tiling extends nearly to the supporting beam A, the ribs *m* of the next tile are broken off as shown in Fig. 12, and this tile placed in position with its ribs *m* on the opposite side of the beam A, the portion from which the ribs have been removed extending under the beam and to the last laid tile in that row. Cement is now poured between the remaining portions of the ribs *m* and the floor strengthening rib, and if desirable between the beam A and the upper surface of the tiling. The tiling is thus supported at one end which is sufficient to sustain its weight. When the plastering is applied to the tiling, it forms a bond between them, and these tiles which have spanned the supporting beams A, are supported at their free ends by the plaster.

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

1. The herein described fire proof floor, which consists of a floor proper which has formed on its under side depending members integral therewith, which depending members rest at their ends upon suitable supports, ceiling tile which bridge the spaces between said depending members, means for temporarily supporting said ceiling tile in position, and cement for permanently retaining said tiling in place, substantially as described.

2. The herein described fire proof floor, consisting of a floor proper formed with depending strengthening ribs, ceiling tile formed with upwardly extending ribs which lie juxtaposition to the floor strengthening ribs when the tile is placed in position, means located between the ribs on the tile and floor strengthening ribs, for temporarily supporting said tiling in position, and cement which is placed between the floor and tile ribs, for permanently holding the tiling in place, said

cement inclosing the temporary support for the tiling, substantially as described.

3. The herein described fire proof floor, which consists of a floor proper formed with depending strengthening ribs, ceiling tile  
5 which are provided with upwardly projecting ribs near their side edges, which lie in juxtaposition to the floor strengthening ribs, the side edges of the tiling beyond its ribs extending under the floor strengthening ribs,  
10 and liquid cement which is placed between the floor ribs and tiling ribs, substantially as described.

4. The herein-described method of attaching fire-proof ceiling, said ceiling being composed of a number of ceiling tile formed with projecting ribs, which consists in introducing  
15 between said ribs and the point of support for said tiling a temporary support, and then placing between the rib and the tiling support, cement, which forms a bond between  
20 the two, substantially as described.

5. The combination with a floor having depending ribs, of a ceiling composed of tiling  
25 formed with upwardly-projecting ribs, which are of less width than the floor ribs and which fit between said floor-ribs, and means for permanently attaching the ceiling to the floor-ribs, which means is located between the ribs  
30 of the respective parts, substantially as described.

6. The herein-described supporting beam for sub-structures, which is formed with a groove or shoulder on its upper face for receiving and holding the molds in position,  
35 substantially as described.

7. The combination with a supporting beam for substructures, which is formed with grooves in its sides, of a clamp slidably  
40 mounted thereon and having tongues projecting into the grooves in the beam, said clamp being formed with a recess for attachment to a suitable support, substantially as described.

8. A removable mold-box formed of corrugated metal, substantially as described.  
45

9. A removable metallic mold-box which is substantially of an inverted U-shape in cross-section, the metal composing said mold-box being corrugated transversely, substantially  
50 as described.

10. The combination with a mold-box of a brace formed with ribs on the outer faces of its legs, the connecting piece of which is arched and which is formed with a hole in its strengthening web, substantially as described. 55

11. The combination with a mold-box, of an inverted U-shaped brace secured to the top and two side pieces of the mold box, a spreader which is introduced between the legs of the  
60 brace before the composition material is molded around the mold-box, which spreader is removed before the box is withdrawn so as to permit the legs of the brace to spring inwardly and draw the box away from a composition material, substantially as described. 65

12. The combination with a mold-box, of a brace which is secured to the top and two sides of the box, and means on said brace for the attachment of a hook or lever to remove the  
70 box, substantially as described.

13. The combination with the mold-box which is sprung out of its normal shape before the composition material is molded therearound, and means for partially collapsing  
75 said box before it is withdrawn from the composition material, substantially as described.

14. The herein described mold for floor construction, consisting of mold boxes F, adjustable beams for supporting said boxes, and sections G which span the spaces between the  
80 ends of the mold boxes, and overlap the ends thereof, substantially as described.

15. The herein-described mold for floor construction consisting of mold-boxes F and  
85 overlapping sections G and G', substantially as described.

16. The herein-described mold for floor construction, consisting of the boxes F and the overlapping sections G and G', section G being an end section and formed with cut-away  
90 portions g, and down-turned lip g', substantially as described.

In testimony whereof I hereunto affix my signature, in presence of two witnesses, this  
29th day of October, 1894. 95

PRESTON M. BRUNER.

Witnesses:

F. R. CORNWALL,  
HUGH K. WAGNER.