

May 22, 1928.

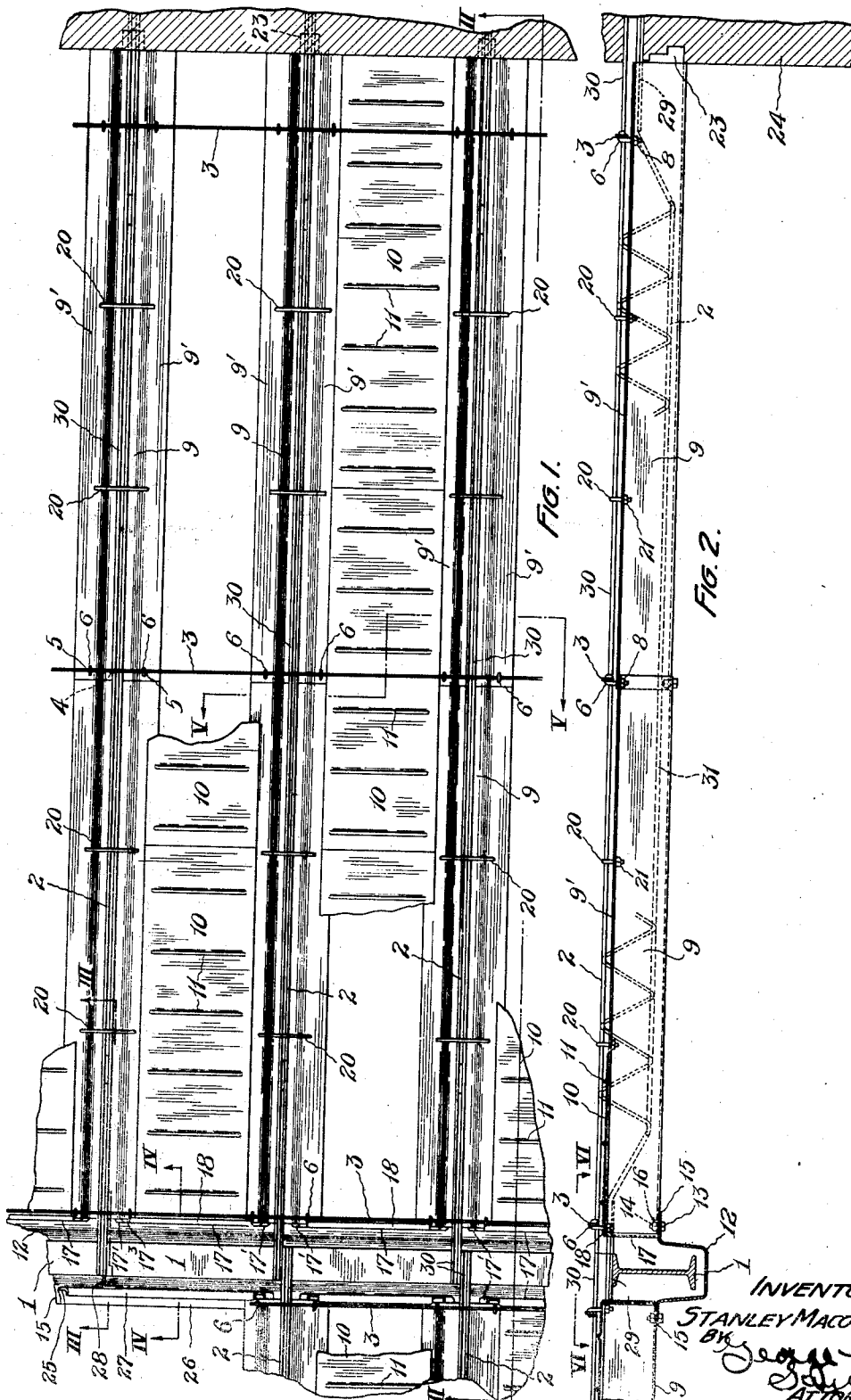
S. MACOMBER

1,670,462

MEANS FOR USE IN MAKING FIREPROOF FLOOR CONSTRUCTIONS

Filed July 8, 1926

8 Sheets-Sheet 1



INVENTOR:
STANLEY MACOMBER
BY *Samuel*
ATTORNEY

May 22, 1928.

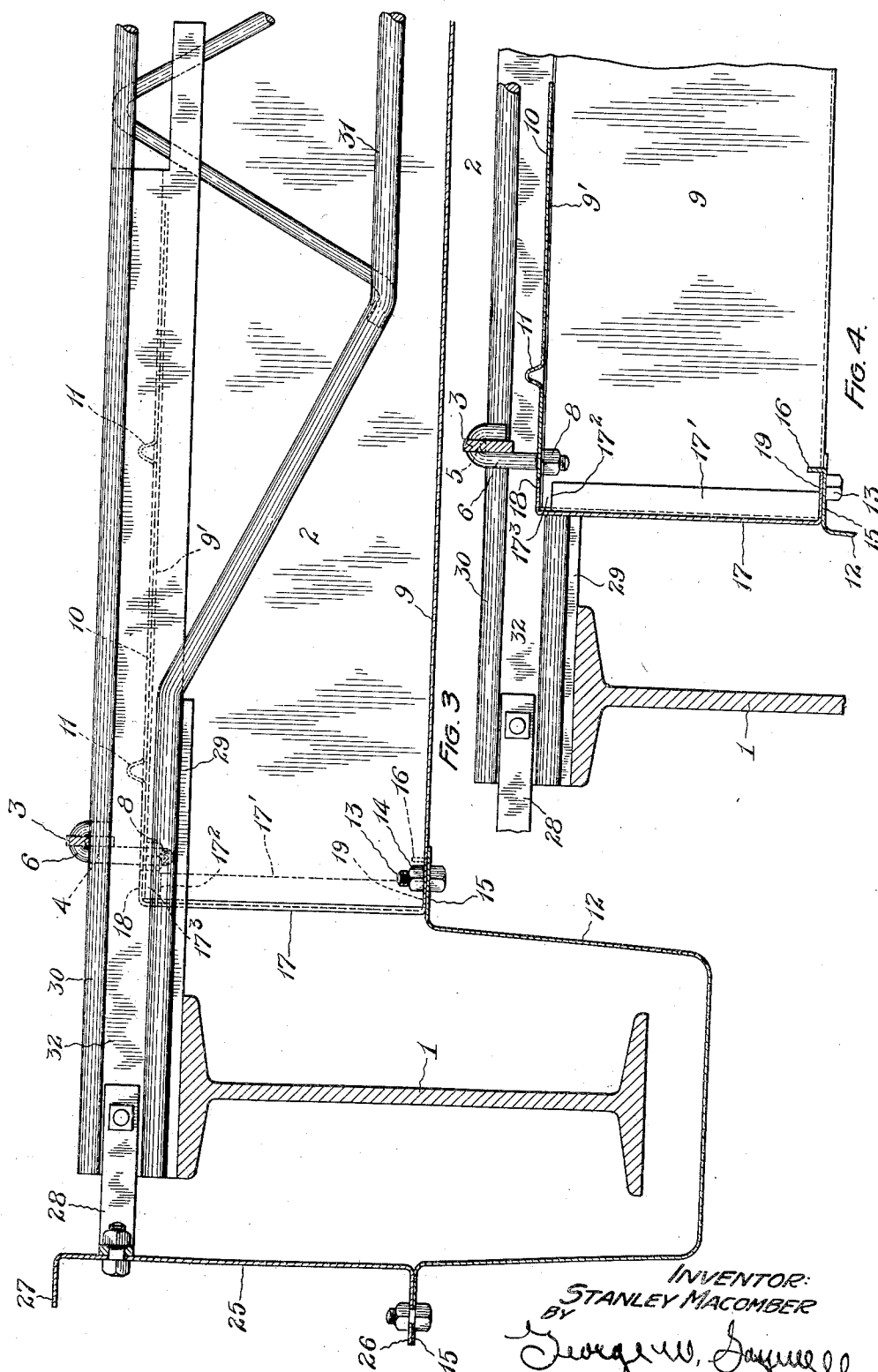
S. MACOMBER

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MEANS FOR USE IN MAKING FIREPROOF FLOOR CONSTRUCTIONS

Filed July 8, 1926

8 Sheets-Sheet 2



INVENTOR:
STANLEY MACOMBER
BY
George W. Saywell
ATTORNEY.

May 22, 1928.

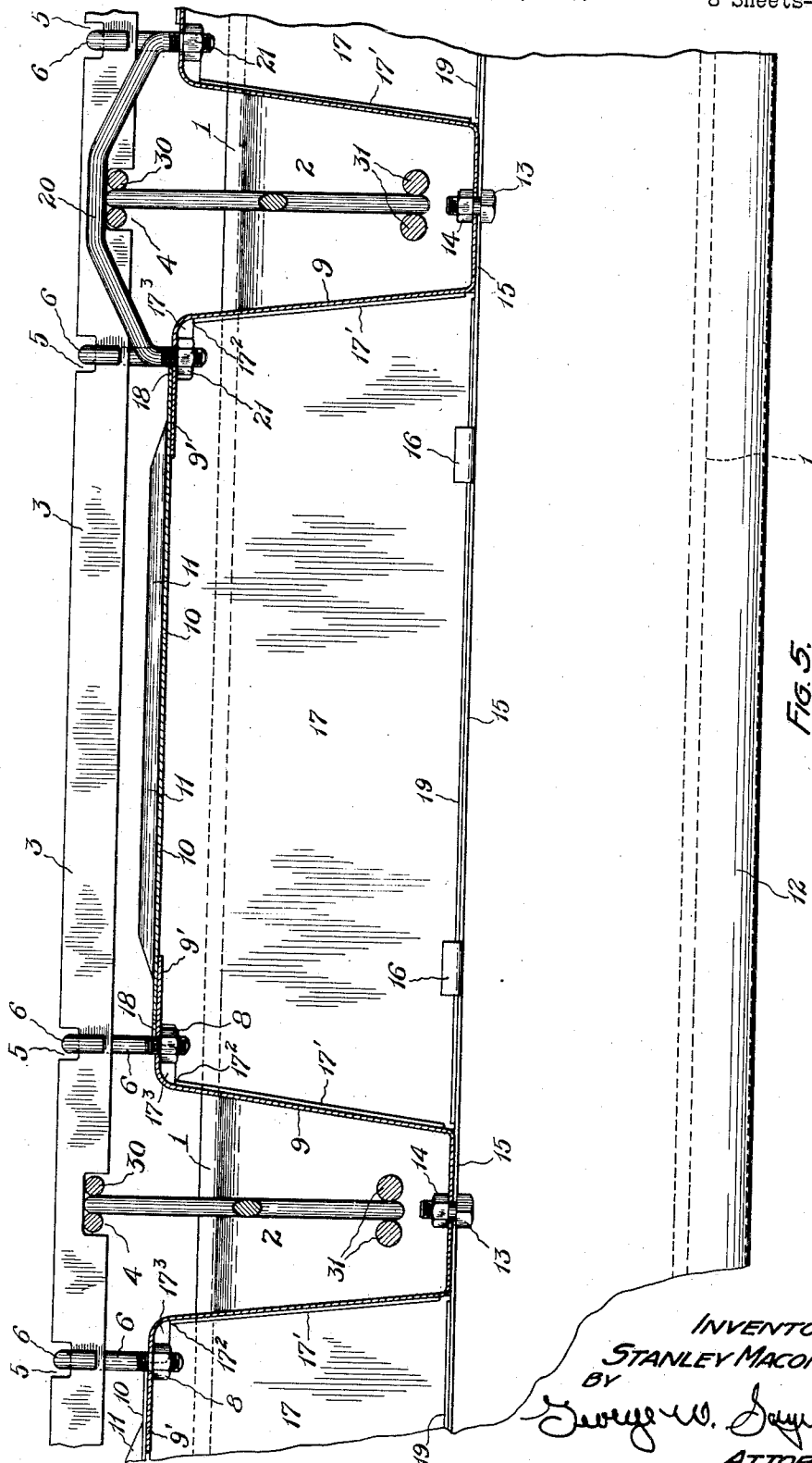
S. MACOMBER

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MEANS FOR USE IN MAKING FIREPROOF FLOOR CONSTRUCTIONS

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8 Sheets-Sheet 3



INVENTOR:
STANLEY MACOMBER
BY
George W. Saywell
ATTORNEY.

May 22, 1928.

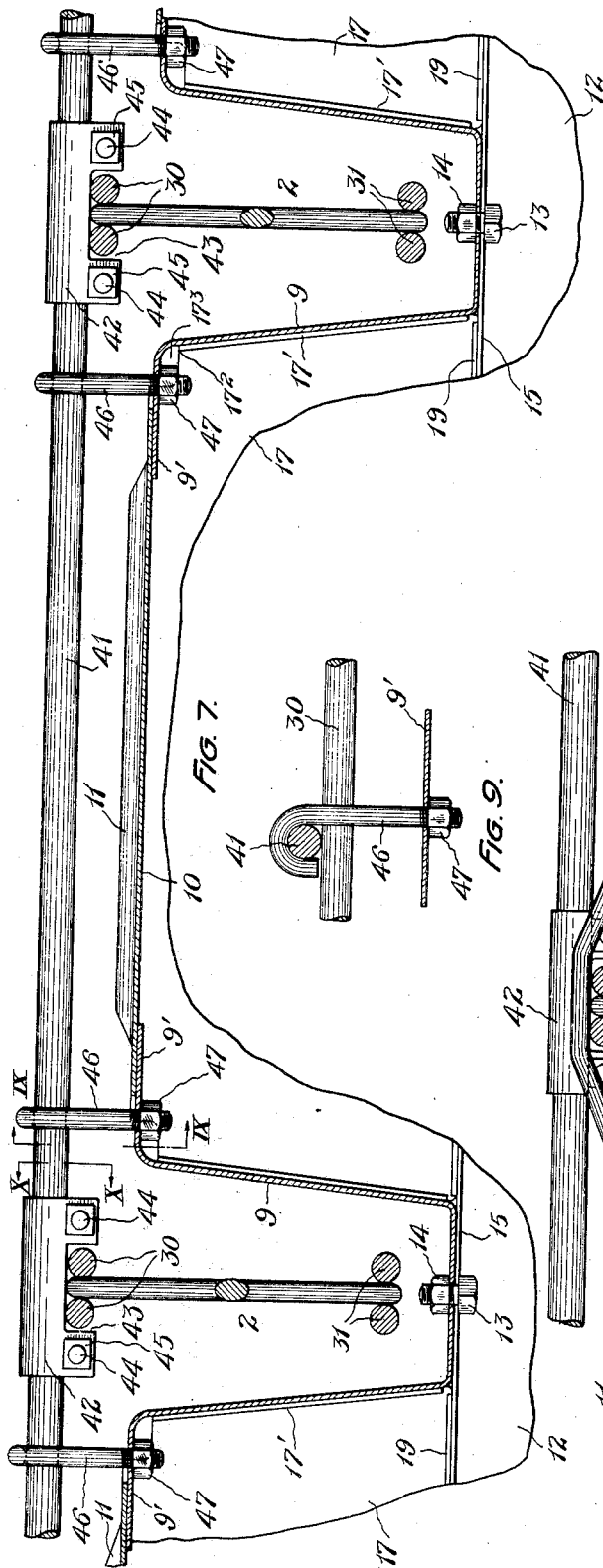
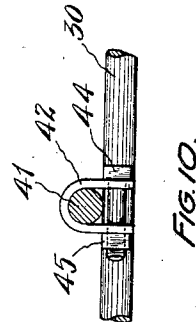
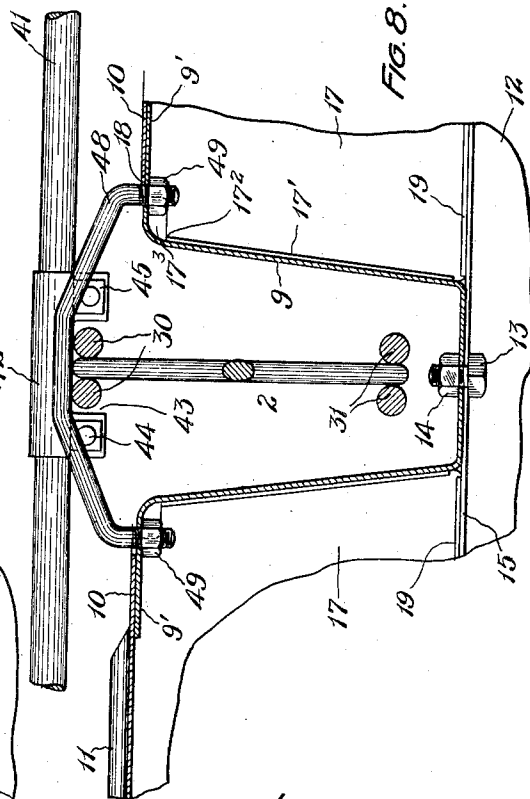
S. MACOMBER

1,670,462

MEANS FOR USE IN MAKING FIREPROOF FLOOR CONSTRUCTIONS

Filed July 8, 1926

8 Sheets-Sheet 5



INVENTOR:
STANLEY MACOMBER
BY *George W. Seymour*
ATTORNEY.

May 22, 1928.

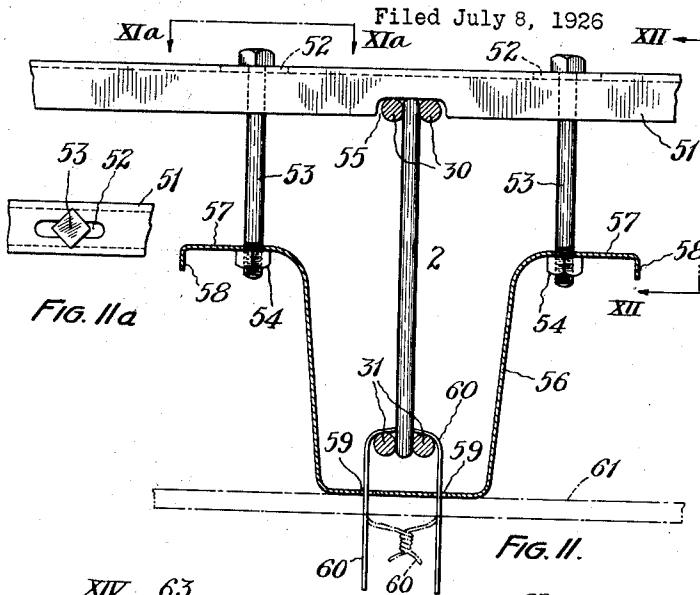
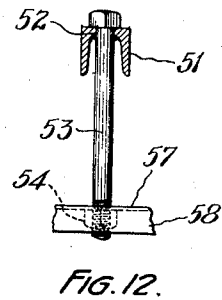
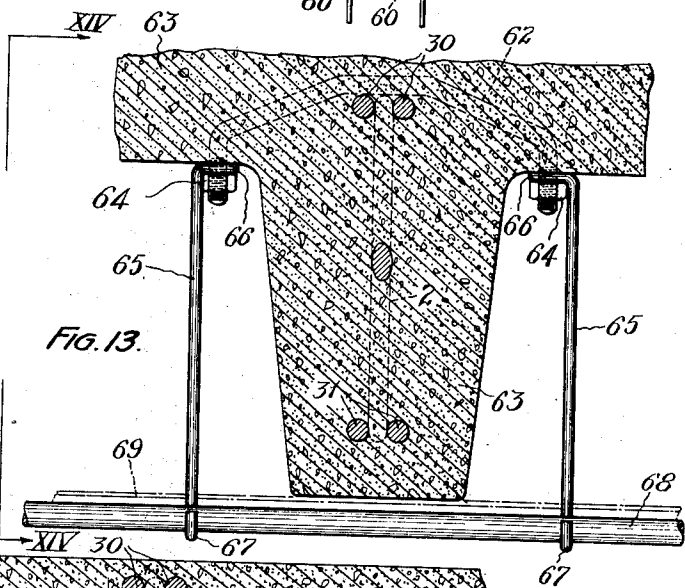
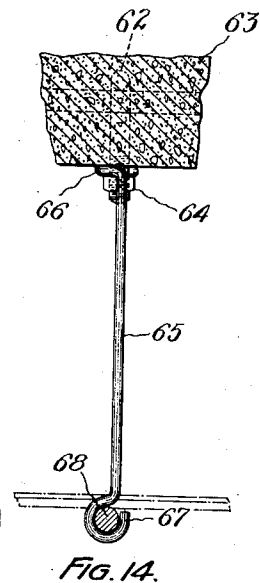
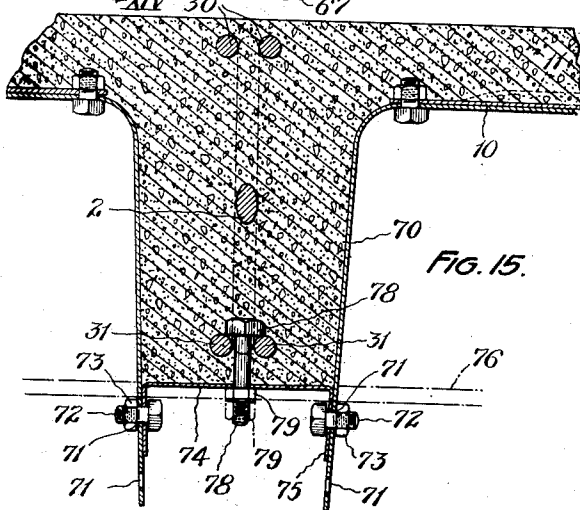
S. MACOMBER

1,670,462

MEANS FOR USE IN MAKING FIREPROOF FLOOR CONSTRUCTIONS

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8 Sheets-Sheet 6



INVENTOR:
STANLEY MACOMBER
BY
George W. Seymour
ATTORNEY.

May 22, 1928.

S. MACOMBER

1,670,462

MEANS FOR USE IN MAKING FIREPROOF FLOOR CONSTRUCTIONS

Filed July 8, 1926

8 Sheets-Sheet 7

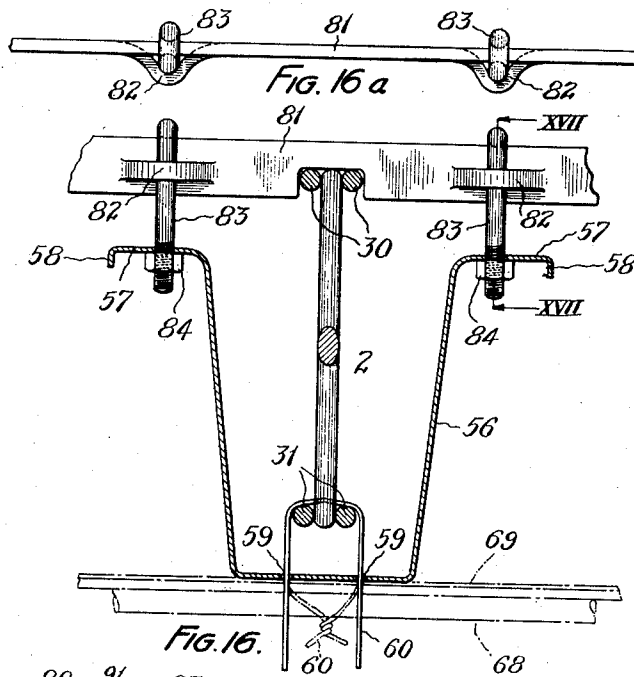


Fig. 16.

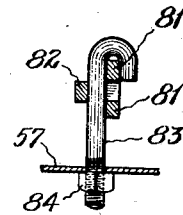


Fig. 17.

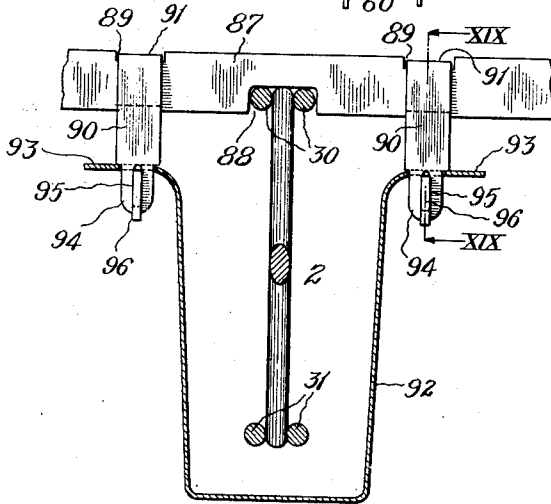


Fig. 18.

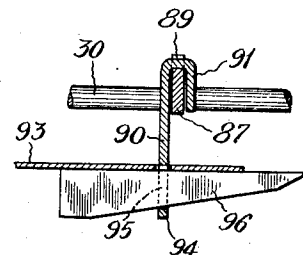


Fig. 19.

INVENTOR:
STANLEY MACOMBER
BY
George W. S. [Signature]
ATTORNEY

May 22, 1928.

S. MACOMBER

1,670,462

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8 Sheets-Sheet 8

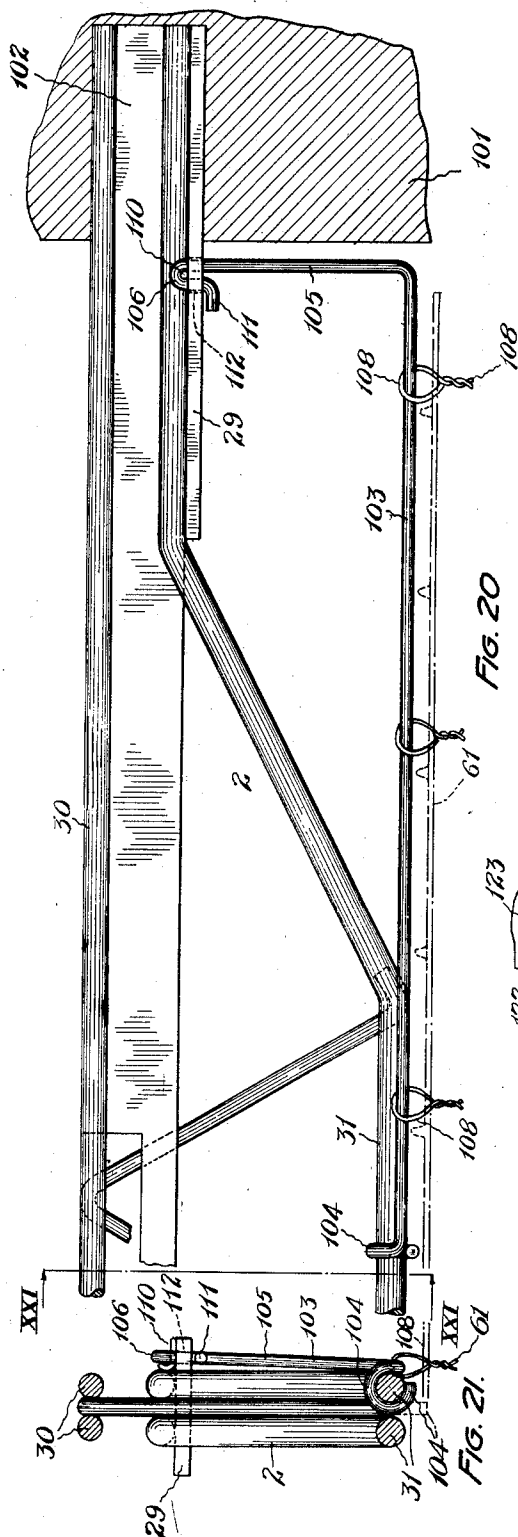


FIG. 20

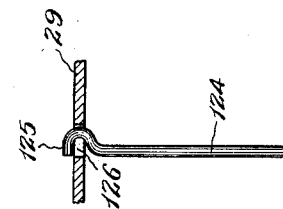
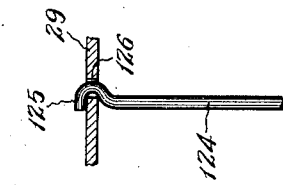
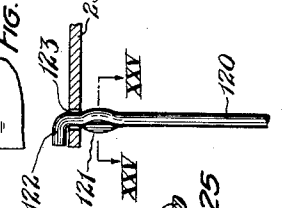
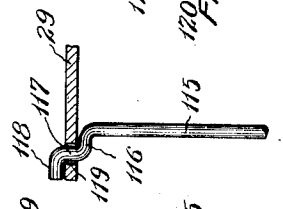
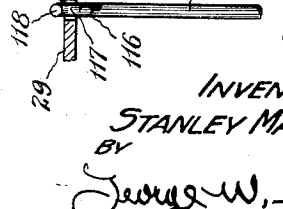
FIG. 21

FIG. 22

FIG. 23

FIG. 24

FIG. 25



INVENTOR:
STANLEY MACOMBER
BY
George W. Squell
ATTORNEY.

Patented May 22, 1928.

1,670,462

UNITED STATES PATENT OFFICE.

STANLEY MACOMBER, OF MASSILLON, OHIO, ASSIGNOR TO THE MACOMBER STEEL COMPANY, OF CANTON, OHIO, A CORPORATION OF OHIO.

MEANS FOR USE IN MAKING FIREPROOF FLOOR CONSTRUCTIONS.

Application filed July 8, 1926. Serial No. 121,114.

This invention relates to reinforced concrete floor systems. The invention particularly relates to systems of this character in which a special design of joist can be utilized for carrying the construction loads. The invention is further designed so that the concrete can act as a T-beam and can take the compression stresses as it sets. Either metal or wood forms can be used and in the event the latter are used, there is no swelling of the same occasioned whereby concrete is wasted because of the forms taking up concrete nor is there any warping of the wood forms. I particularly show and describe a special construction of removable metal form pans and certain special construction materials for making reinforced concrete floors, and the claims of this application are limited to my new and improved forms and the improved assembly of construction materials. I provide means whereby a temporary support which is utilized for carrying the forms can be left in the concrete so as to become part of the metal reinforcement of the floor. These supports are comprised of end and central spacing bars and suspension rods and intermediate suspension yokes. The design obviates the necessity of shoring, saves considerable time in construction and enables the pouring of the concrete for the top floor first, if desirable. Certain designs of suspension rods are utilized for providing a suspended ceiling, the preferred form of the latter being a metal lath suspended ceiling.

The annexed drawings and the following description set forth in detail certain means embodying my improved fire-proof floor construction, and the improved forms and form-supporting means therefor, such disclosed means constituting, however, but a few of the various forms in which the principle of the invention may be embodied.

In said annexed drawings:

Figure 1 is a plan view of a fragmentary portion of the new and improved supports and forms a reinforced floor construction, certain parts being broken away to disclose certain underlying parts, as will be herein after fully explained;

Figure 2 is a transverse vertical section, taken in the plane indicated by the line II—II, Figure 1;

Figure 3 is a fragmentary transverse vertical section, upon an enlarged scale, taken

in the plane indicated by the line III—III, Figs. 1 and 6;

Figure 4 is a fragmentary transverse vertical section, upon the same scale as that of Figure 3, taken in the plane indicated by the line IV—IV, Figures 1 and 6;

Figure 5 is a fragmentary longitudinal vertical section, upon the same scale as Figures 3 and 4, taken in the planes indicated by the line V—V, Figure 1;

Figure 6 is a fragmentary plan view, upon the same scale as that of Figures 3, 4 and 5, of a part of the elements shown at the left-hand end of Figure 1, the view being taken from the position indicated by the line VI—VI, Figure 2;

Figure 7 is a fragmentary longitudinal vertical section, showing an adjustable type of spacing bar;

Figure 8 is a fragmentary vertical longitudinal section, illustrating the use of the intermediate yoke-hangers for supporting the joist forms, when the adjustable spacer bars are used;

Figure 9 is a fragmentary transverse vertical section, taken in the plane indicated by the line IX—IX, Figure 7;

Figure 10 is a fragmentary transverse vertical section, taken in the plane indicated by the line X—X, Figure 7;

Figure 11 is a fragmentary longitudinal vertical section, showing a modified type of joist form supporting means adapted to co-operate with certain suspension rods utilized in connection with the formation of a suspended ceiling;

Figure 11^a is a fragmentary plan, taken from the plane indicated by the line XI—XI^a, Figure 11;

Figure 12 is a fragmentary section and elevation, taken from the plane indicated by the line XII—XII, Figure 11;

Figure 13 is a view of the yoke type of joist form supports and the suspension rods for the suspended ceiling, after the suspension rods have been added to the joist concrete beams formed in the joist and the latter girder forms originally set up, as shown in Figure 5, and then removed;

Figure 14 is a fragmentary section and elevation, taken from the plane indicated by the line XIV—XIV, Figure 13;

Figure 15 shows a modified form of joist form adaptable for forming concrete joists of different depths;

Figure 16 shows a modified form of spacer bar and depending supports for the joist form;

Figure 16^a is a plan of the elements shown in Figure 16;

Figure 17 is a fragmentary transverse section, taken in the plane indicated by the line XVII—XVII, Figure 16;

Figure 18 shows another modified form of the spacer bar and the depending hangers for the joist form;

Figure 19 is a fragmentary transverse vertical section, taken in the plane indicated by the line XIX—XIX, Figure 18;

Figure 20 is a fragmentary transverse vertical section of one end of a joist illustrating the means for providing a joist end extension to support the ceiling lath;

Figure 21 is a fragmentary longitudinal vertical section, taken in the plane indicated by the line XXI—XXI, Figure 20;

Figure 22 is an elevation of a modified type of ceiling lath support;

Figure 23 is a view of the elements shown in Figure 22 but taken at right angles thereto;

Figure 24 is an elevation of another type of ceiling lath support;

Figure 25 is a plan section, taken in the plane indicated by the line XXV—XXV, Figure 24;

Figure 26 is a fragmentary plan view of the elements shown in Figure 24; and

Figures 27 and 28 are elevations showing the entering and engaging positions with the bearing plate of a still further modified type of hanger for the joist end extension.

Referring to the annexed drawings in which the same parts are indicated by the same respective ordinals in the different views, a main floor girder is indicated by the ordinal 1 which is adapted to be supported by concrete or steel columns. Upon these girders 1 are supported a plurality of spaced transverse joists 2, the latter in the form of construction shown and described being a special type of bar joist described and claimed by me in my pending patent application Serial No. 642,935 filed June 2, 1923. Mounted upon these joists 2 are spacer bars 3, Figures 1 to 6, inclusive, formed along their lower edges with spaced recesses or notches 4 and along their upper edges with spaced recesses or notches 5. These spaced notches 4 furnish means for aligning the spacer bars 3 at the proper distances upon the joist 2, the bars 3 being supported upon the joist 2 by means of receiving the upper chord 30 of the joist 2 within the notches 4. The notches 5 receive the upper bent ends of hook bolts 6 which support concrete forms hereinafter fully described. The joist forms comprise pans or troughs 9 which surround the joist 2 and are formed with

upper flanges 9' which receive lower threaded ends of the hook bolts 6, nuts 8 being provided for the threaded ends of the hook bolts, by means of which the joist form pans 9 are supported at the desired height by the bolts 6. The spaces between the flanges 9' of the adjacent joist pans 9 are filled by plates 10 which are of arch construction by reason of the strengthening ribs 11.

Supported from the bottom of the joist forms 9 are girder forms 12 formed with upper edge flanges 15 which are secured to the joist pans 9 by means of bolts 13 and nuts 14. It will be noted that the extreme outer edges of the flanges 15 of the girder forms 12 are formed with upwardly-turned lips 16, Figs. 3 and 5, the purpose of which will be hereinafter fully described. In order to close the ends of the spaces between adjacent joist forms 9, and above the girder forms 12, I provide end caps 17 having upper and lower flanges 18 and 19, respectively, and side flanges 17'. The side flanges 17' do not extend quite to the upper corners of the end caps 17 but the corners are notched and the flanges shortened, as indicated by the ordinal 17², Fig. 3, indicating the top of the side flange 17', and the ordinal 17³ indicating the space between the top of this flange 17' and the adjacent end of the top flange 18, this space 17³ being considerably enlarged to provide play and to allow for the nut 8 and the slant of the mold 9. The end caps 17 are fitted between adjacent joist forms 9 on the sides and between the covers 10 and the girder forms 12 on the top and bottom, respectively, being limited in their inward movement by the stop lips 16 formed on the flanges 15 of the girder forms 12.

Three of the spacer bars 3 are ordinarily provided for each bay of the building, one at each end and one in the center, and other supports are formed for the joist forms 9 intermediate adjacent spacer bars 3. These other supports comprise yokes 20 which are supported upon the upper chord 30 of the joist 2 and are secured to the flanges 9' of the joist forms 9 by means of nuts 21. The ends of the joist 2 are framed in the masonry wall 24, Fig. 2, by means of corbelled recesses 23 for receiving concrete to effect this framing, in combination with the extension of the bearing plate 29 of the joist, as plainly shown in Fig. 20. The bottom chord of the supporting joist is indicated by the ordinal 31 and the plate 32 of the joist is shown connected at one end, Fig. 3, by means of a tie-plate 28 to a vertical member 25 which is formed with a bottom flange 26 secured to a flange 15 of the girder form 12, and with a top strengthening flange 27. The purpose of the construction illustrated by the member 25 with flanges 26

and 27 is to illustrate the closing up of a portion of the construction where no floor is to be laid, as, for instance, an elevator well. It will be noted that the plate 25 extends in height somewhat above the plane of the top chord 30 of the joist 2, or slightly above the desired height of the concrete floor.

From the description heretofore given, it will be evident that after the elements have been assembled in the manner described, the concrete can be poured and that the same will fill the joist forms 9 and flow over the covers 10 to form concrete joist and intermediate flooring and will also flow into the girder forms 12 and fill up the space between the end caps 17 to form concrete girders and complete the concrete floor, with the joist 2, the spacer bars 3, the hook bolts 6, the yokes 20 and the girders 1 forming the metal reinforcement. Now, when it is desired to remove the forms, it is necessary only to take out the bolts 13, it being noticed from an inspection of Fig. 3, for instance, that the nuts 14 are put upon the top ends of the bolts 13, and take down the forms 12, and then to remove the nuts 8 and 21, whereupon the joist forms 9 can be removed, the supporting features thereof including the spacer bars 3, hook bolts 6, yoke supports 20 and nuts 14, being left in the concrete to form part of the metallic reinforcement.

Referring particularly to Figs. 7, 8, 9 and 10, I show a modified construction of spacer bar 41 which is adjustable in effect by reason of the provision of sliding clamps 42 which are loosened or tightened by means of bolts 44 and nuts 45 intersecting the lower depending ends of the clamps 42 beneath the supporting chord 30 of the joist 2, the clamps 42 being formed in their lower edges with recesses or notches 43 adapted to receive this upper chord 30 upon which the bar 41 rests. In this type of construction, I have shown the joist pans 9 supported by hook bolts 46 which depend from the spacer rod 41 and are secured to the flanges 9' of the pans 9 by means of nuts 47. The intermediate portions of the pans 9 are supported by yokes 48 secured to the flanges 9' by means of nuts 49.

Referring particularly to Figs. 11 to 15, inclusive, I show means which are combined with my improved floor pouring apparatus to provide a suspended ceiling. I also show other types of spacer bars for supporting the joist and girder forms. One of these spacer bars 51 is formed with elongated slots 52 in its upper edge, and joist-receiving notches 55 in its lower edge, the bar 51 itself being a hot rolled member of channel construction. Within these elongated slots 52 are adjustably supported the upper ends of depending bolts 53, the lower ends of the bolts 53 being secured to joist pans 56 by

means of nuts 54 disposed beneath the pan flanges 57 which have down-turned strengthening and aligning peripheral lips 58. It will be noted that the bottom of the joist forms 56 are formed with spaced pairs of holes 59 through which extends a tie wire 60 depending from the lower chord 31 of the joist 2. When the flooring has been poured and the joist forms and girder forms have been removed, a lacing bar and suitable wire mesh can be fastened to the lower chord 31 of the joist 2 by means of the tie-wire 60 or a ribplex lath 61 may be thus secured, as indicated in Fig. 11, wherein the ribplex lath 61 is indicated in dot-and-dash lines, illustrative of where it would be positioned after the flooring has been poured and the forms have been removed. In Fig. 13, I have shown depending bars 65 provided for the purpose of supporting lacing rods 68 upon which is supported suitable wire mesh 69 for the purpose of providing a suspended ceiling. The upper and lower ends of the depending rods 65 are provided with eye-portions 66 and 67, respectively, the same being arranged in relatively right-angular positions, so that the depending rod 65 can be given a quarter turn and fitted up over the end of the yoke 62 which is buried in the concrete 63, and then the same nut 64 which was fastened over the yoke 62 when the forms were being supported can be again positioned upon the yoke 62 to hold the depending bar 65.

Referring particularly to Fig. 15, I show a type of joist form which has adjustability for different depth of joist. This is effected by making the bottom 74 of the joist form 70 in a separate piece and positioning the same within the side portions 70 at the desired depth by means of spaced pairs of holes 71 formed in the parts 70 and adapted to receive bolts 72 passed through flanges 75 of the form bottoms 74 and secured by means of nuts 73. In this type of device, a bolt 78 of the desired length is supported upon and between the two bars of the lower chord 31 of the joist 2 and fastened and retained by means of a nut 79 beneath the form part 74. When it is desired to support a suspended ceiling in this form of construction, ribplex lath 76 can be supported from the bolts 78 by means of passing the lower ends of the bolts through the lath and securing the same by nut 79, the bolts 78 being long enough and threaded for the necessary distance to allow this to be done.

Referring particularly to Figs. 16, 16^a, 17, 18 and 19, I show further modified forms of supporting bars and means for securing and holding the same. In Figs. 16, 16^a and 17, I show a bar 81 slit and bent so as to form laterally-extended spaced strap portions between which and the body of the bar 81

pass hook bolts 83 secured to the flange 57 of the joist forms 56 by means of nuts 84. Referring particularly to Figs. 18 and 19, the spacer bar 87 is formed in its upper edge with a series of spaced notches 89 and in its lower edge with a series of spaced notches 88, the latter of which are adapted to receive the upper chord 30 of the joist 2, and the former of which receive the bent ends 91 of supporting clips 90, whose lower ends are formed into depending tail portions 94 having vertical elongated slots 95 by means of which removable wedges 96 can be driven in under the flanges 93 of the joist forms 92, securely to support the joist forms by means of clips 90.

Referring particularly to Fig. 20, I show means for providing an end joist section of the suspended-ceiling supporting means to provide for the support of the ceiling adjacent the masonry wall 101. It will be noted that the bearing plate 29 of the joist 2 and the contiguous end 102 of the upper and lower chords thereof are suitably supported in the wall 101. Within this bearing plate 29 I form an enlarged slot 112 through which can be passed the bent end of an extension rod 103 secured at its other end by means of an eye 104 to one of the bars 31 of the lower chord of the joist 2. The end of the extension rod 103 which is passed through the slot 112 is of a peculiar formation, plainly shown in Fig. 20, and comprises a right-angular arm 105 formed with a looped portion 106 and a relatively right-angular end extension 111. The portion 111 forms a stop against any further upward movement of the rod 103 and the latter is supported upon the bearing plate 29 by means of a pin 110, as plainly shown in Fig. 21. Ribplex lath 61 can be supported from the extension rod 103 by means of wire ties 108.

Referring particularly to Figs. 22 and 23, I show another form of supporting means for the extension bars 103, consisting of a depending member 115 having three successively relatively right-angular extensions 116, 117 and 118, respectively. It is evident that by positioning the member 115 in a horizontal position, the portion 118 can be passed up through the slot 119 formed in the bearing plate 29, and then by dropping the portion 115 down into a vertical position, the member 117 can be passed up through said slot until the portion 116 which acts as a stop prevents any further upward movement and the portion 118 then acts as a support.

In the form of device shown in Figs. 24, 25 and 26, a hole 123 is formed in the bearing plate 29 through which may be extended the relatively right-angular end portion 122 of a supporting rod 120, by means of swinging the rod 120 into a horizontal position,

and then dropping the same into a vertical position to cause the portion 122 to act as a stop. An enlarged bulb portion 121 formed upon the rod 120 adjacently below the right-angular turn 122 by splitting the rod, as shown in Figure 25, forms a stop to prevent any undue upward movement.

Referring particularly to the form of device shown in Figs. 27 and 28, I provide a slot 126 in the bearing plate 29 of greater dimensions in one direction than in the other so as to provide for the passing upwardly therethrough of the hooked end 125 of a depending rod 124 which can then be given a quarter turn to provide for the supporting of the same by means of the hooked portion 125, the release of the rod 124 being prevented by reason of the comparatively narrow width of the slot 126, as plainly shown in Fig. 27. This last-described construction is the preferred type of supporting structure for the end extension portion 103 of the suspended-ceiling supporting means shown in Fig. 20.

What I claim is:

1. Forms for fire-proof floor construction comprising, spaced supporting bars; hangers dependingly supported therefrom; spaced open-top pan forms supported by said hangers; means forming covers for the spaces between the adjacent pans; means for closing the ends of the spaces between said pans; and other open-top pan forms supported by and below said first-mentioned forms and extending in a direction divergent to that in which said first-mentioned forms extend, the latter being removably connected to said hangers, and said two sets of forms being removably secured together, exteriorly of said forms, whereby the latter can be removed after the concrete has hardened, and the supporting bars and hangers remain as a part of the permanent metal reinforcement.

2. Forms for fire-proof floor construction comprising, spaced supporting bars; hangers dependingly supported therefrom; spaced open-top pan forms having upper-end outwardly-extended flanges secured to, and adjacent the bottom of, said hangers; cover plates for the spaces between adjacent forms, the latter and said hangers being removably secured together below said cover plates; means for closing the ends of the spaces between said forms; and other open-top pan forms having upper-end laterally-extended flanges secured to the bottom of said first-mentioned forms, said two sets of forms extending in divergent directions and being removably secured together exteriorly of said forms, whereby both sets of forms can be removed after the concrete has hardened, and the supporting bars and hangers remain as a part of the permanent metal reinforcement.

3. Forms for fire-proof floor construction comprising, spaced longitudinal supporting bars; hangers dependingly supported therefrom; spaced open-top transverse pan forms having upper-end outwardly-extending flanges secured to, and adjacent the bottom of, said hangers; cover plates for the spaces between adjacent forms, the latter and said hangers being removably secured together below said cover plates; means for closing the ends of the spaces between said forms; and spaced longitudinal open-top pan forms having upper-end laterally-extended flanges secured to the bottom of said first-mentioned forms, said two sets of forms being removably secured together exteriorly of said forms, whereby both sets of forms can be removed after the concrete has hardened, and the supporting bars and hangers remain as a part of the permanent metal reinforcement.

4. Forms for fire-proof floor construction comprising, spaced longitudinal supporting bars; hangers having hooked upper ends caught over said bars, said hangers having exteriorly-threaded lower ends; open-top transverse pan forms having upper-end outwardly-extended flanges intersected by said hangers; nuts secured to the latter below and adjacent said form flanges; cover plates for the spaces between adjacent forms; means for closing the ends of the spaces between said forms; spaced longitudinal open-top pan forms having upper-end laterally-extended flanges, the latter and the bottom of said first-mentioned forms being provided with registering holes; bolts extended upwardly through said holes and nuts for said bolts positioned within said first-mentioned forms, whereby both sets of forms can be removed after the concrete has hardened by removing said first-mentioned nuts and said bolts, and the supporting bars and hangers and second-mentioned nuts remain as part of the permanent metal reinforcement.

5. Construction materials for making reinforced concrete floors comprising, spaced tension members; spaced divergent centering and supporting bars mounted upon the latter; hangers dependingly supported from said bars; concrete girder forms supported by said hangers about the respective tension members; means forming covers for the spaces between the adjacent forms; means for closing the ends of the spaces between said forms; other concrete girder forms supported by and below said first-mentioned forms and extending in a direction divergent to that in which said first-mentioned forms extend, the latter being removably connected to said hangers, said two sets of forms being removably secured together, exteriorly of said forms, whereby the latter can be removed after the concrete has hardened, and

the supporting bars and hangers remain as a part of the permanent metal reinforcement.

6. Construction materials for making reinforced concrete floors comprising, spaced tension members; spaced divergent centering and supporting bars mounted upon, and each extending over a plurality of, the latter; spaced supporting yokes each mounted upon one of said tension members intermediate of said centering bars; hangers dependingly supported from said bars; concrete girder forms supported by said hangers and yokes about the respective tension members; means forming covers for the spaces between the adjacent forms; means for closing the ends of the spaces between said forms; other concrete girder forms supported by and below said first-mentioned forms and extending in a direction divergent to that in which said first-mentioned forms extend, the latter being removably connected to said hangers and yokes, said two sets of forms being removably secured together, exteriorly of said forms, whereby the latter can be removed after the concrete has hardened, and the supporting bars, hangers and yokes remain as a part of the permanent metal reinforcement.

7. Construction materials for making reinforced concrete floors and suspended ceilings comprising, spaced tension members; spaced divergent centering and supporting bars mounted upon the latter; hangers having hooked upper ends; concrete girder forms supported by said hangers from said bars and about the respective tension members, said forms being secured to the threaded lower ends of said hangers by means of nuts disposed exteriorly of said forms; means forming covers for the spaces between the adjacent forms; means for closing the ends of the spaces between said forms; other concrete girder forms supported by and below said first-mentioned forms and extending in a direction divergent to that in which said first-mentioned forms extend, said two sets of forms being removably secured together; depending supporting rods having upper eyelet ends adapted to register with the lower ends of said hangers; horizontal lacing rods carried by said depending rods; and ceiling metal lath supported by said lacing rods, whereby both sets of forms can be removed after the concrete has hardened, and the supporting bars and hangers remain as a part of the permanent metal reinforcement, and said depending supporting rods and ceiling skeleton can be attached to, and carried by, said hangers, after the forms are removed.

8. Construction materials for making reinforced concrete floors comprising, spaced tension members; spaced divergent center-

ing and supporting bars mounted upon the latter; hangers dependingly supported from said bars; concrete girder forms supported by said hangers about the respective tension members, said forms having separate adjustable bottoms, and means for adjustably supporting said bottoms from the form side walls; means forming covers for the spaces between the adjacent forms; means for closing the ends of the spaces between said forms; other concrete girder forms supported by and below said first-mentioned forms and extending in a direction divergent to that in which said first-mentioned forms extend, the latter being removably connected to said hangers, and said two sets of forms being removably secured together, exteriorly of said forms, whereby the latter can be removed after the concrete has hardened, and the supporting bars and hangers remain as a part of the permanent metal reinforcement, and said first-mentioned forms can be adjusted for different depths of tension members and the desired depth of concrete girders.

9. Construction materials for making reinforced concrete floors and suspended ceilings comprising, spaced tension members; spaced divergent centering and supporting bars mounted upon the latter; hangers having hooked upper ends and threaded lower ends; concrete girder forms supported by said hangers from said bars and about the respective tension members, said forms being secured to the threaded lower ends of said hangers by means of nuts disposed exteriorly of said forms; means forming covers for the spaces between the adjacent forms; means for closing the ends of the spaces between said forms; other concrete girder forms supported by and below said first-mentioned forms and extending in a direction divergent to that in which said first-mentioned forms extend, said two sets of forms being removably secured together; depending supporting rods having upper eyelet ends adapted to register with the lower ends of said hangers; horizontal lacing rods carried by said depending rods;

end bearing plates secured to said tension members; tension member extension ends dependingly supported by said bearing plates and having angular horizontal portions secured to the lower parts of said tension members; and ceiling metal lath supported upon said lacing rods and dependingly supported by the horizontal portions of said tension member ends, whereby both sets of forms can be removed after the concrete has hardened, and the supporting bars and hangers remain as a part of the permanent metal reinforcement, and said depending supporting rods and ceiling skeleton can be attached to, and carried by, said hangers, after the forms are removed.

10. Construction materials for making reinforced concrete fire-proof floor constructions comprising a concrete reinforcement support; a pan form; means for removably and dependingly supporting the form from the support; and a second pan form supported by and below said first-mentioned form and extending in a direction divergent to that in which said first-mentioned form extends, said two forms being removably secured together exteriorly of the pans, whereby the forms can be removed after the concrete has hardened, and the supporting means remain as a part of the permanent metal reinforcement.

11. Construction materials for making reinforced concrete fire-proof floor constructions comprising a concrete reinforcement support; a pan form having upper-end outwardly-extended flanges; means engaging said flanges for removably and dependingly supporting the form from the support; and a second pan form having upper-end laterally-extended flanges secured to the bottom of said first-mentioned form, said two forms extending in divergent directions, whereby the forms can be removed after the concrete has hardened, and the supporting means remain as a part of the permanent metal reinforcement.

Signed by me this 15th day of June, 1926.

STANLEY MACOMBER.