

June 21, 1932.

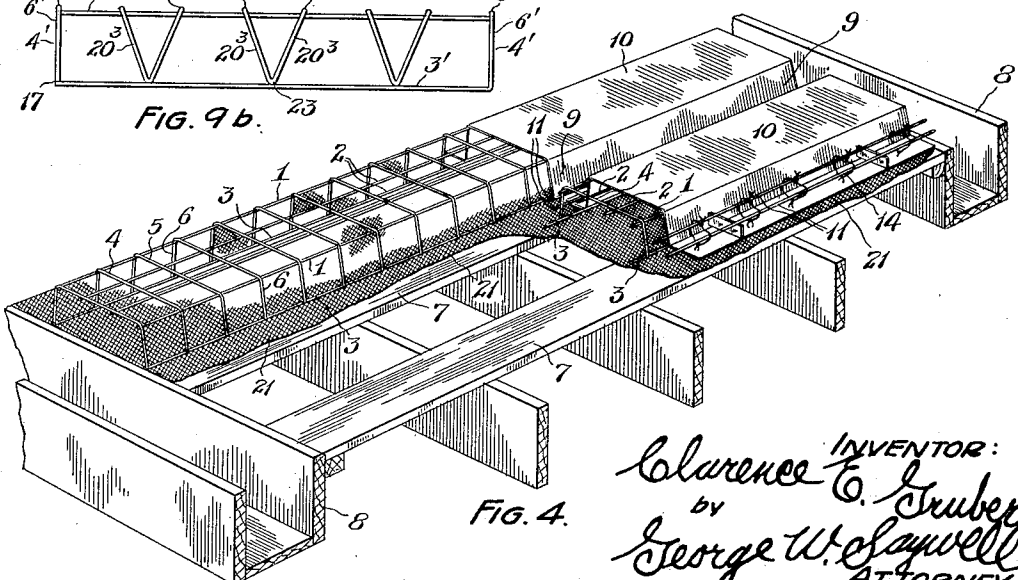
C. E. GRUBER

1,864,043

FORM FOR MAKING FIREPROOF FLOOR CONSTRUCTIONS

Filed June 27, 1928

2 Sheets-Sheet 1



INVENTOR:
Clarence E. Gruber
BY
George W. Claywell
ATTORNEY.

June 21, 1932.

C. E. GRUBER

1,864,043

FORM FOR MAKING FIREPROOF FLOOR CONSTRUCTIONS

Filed June 27, 1928

2 Sheets-Sheet 2

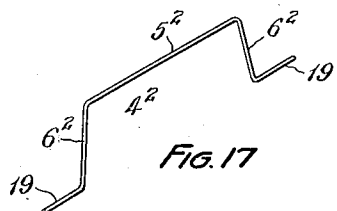


FIG. 17

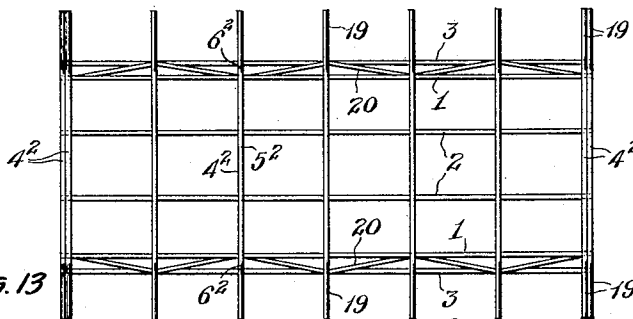


FIG. 13

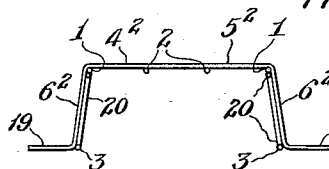


FIG. 14

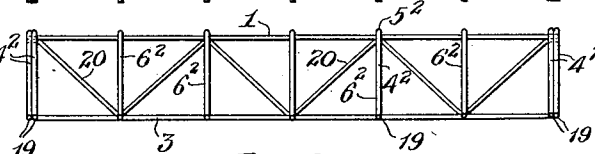


FIG. 12

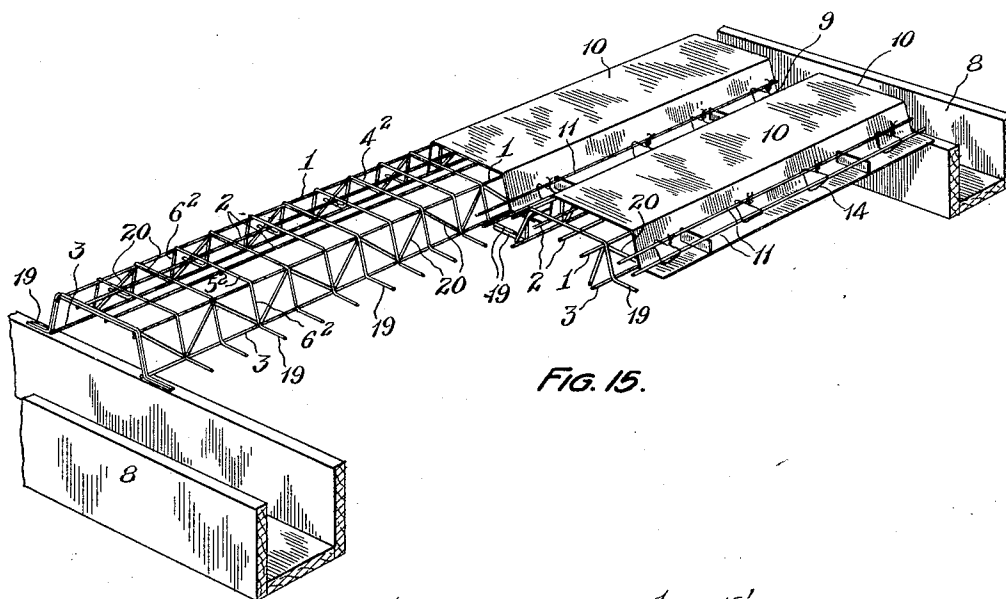


FIG. 15.

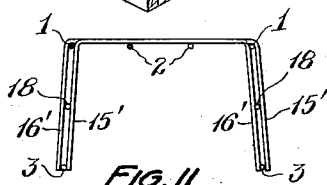


FIG. 11

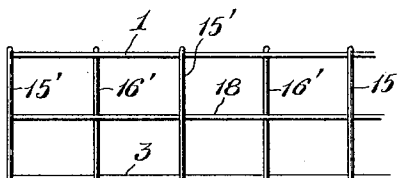


FIG. 10

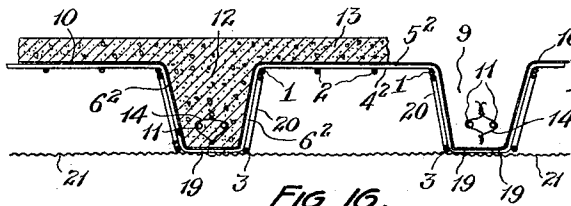


FIG. 16.

INVENTOR:
Clarence E. Gruber
BY
George W. Baywell
ATTORNEY

UNITED STATES PATENT OFFICE

CLARENCE E. GRUBER, OF CANTON, OHIO, ASSIGNOR TO THE MACOMBER STEEL COMPANY, OF CANTON, OHIO, A CORPORATION OF OHIO

FORM FOR MAKING FIREPROOF FLOOR CONSTRUCTIONS

Application filed June 27, 1928. Serial No. 288,599.

My invention relates to forms for making fireproof floor constructions. Particularly the invention relates to that type of forms which utilizes metal pans or domes. My invention contemplates the use of openwork skeleton domes comprised of rod sections. The advantages of my construction consist in light weight, economical production, easy assembly and removal, an openwork construction which is convenient for installation of water pipes, utility conduits, etc., and very convenient nesting for easy storage and transportation. Also, single domes serve for a complete span between main girders without the necessity of lapping a plurality of domes between girders; and, in some cases, without the necessity of intermediate supports.

The annexed drawings and the following description set forth in detail certain means exemplifying my invention, such disclosed means constituting, however, but one of the various forms in which the principle of my invention may be embodied.

In said annexed drawings:

Figure 1 is a side elevation of one type of my improved form;

Figures 2 and 3 are, respectively, plan and end views of the form shown in Figure 1;

Figure 4 is a perspective view illustrating the method of using the aforesaid form as a permanent part of the floor;

Figure 5 is a cross-section through a floor partially completed and for the forming of which my improved type of form is being used as a removable form;

Figures 6, 7 and 8 are respectively a side elevation, a plan view and an end elevation of a modified type of form;

Figure 9 is a modified type of outer frame of one of the form units;

Figure 9a is a perspective view of a modified type of intermediate cross frame member;

Figure 9b is a side elevation of a form provided with the outer frame shown in Figure 9 and with cross members of the type shown in Figure 9a.

Figures 10 and 11 are respectively a side elevation and an end elevation of a form

similar to that shown in Figures 6, 7 and 8, but in which the height of the frame is materially greater;

Figures 12, 13 and 14 are respectively a side elevation, a plan view and an end elevation of a further modified or truss type of form;

Figure 15 is a perspective view illustrating the method of using the truss type of form shown in Figures 12, 13 and 14;

Figure 16 is a cross-section through a partially completed floor in which the type of form shown in Figure 15 is being used; and

Figure 17 is a perspective view of an extra end frame used in the type of form shown in Figures 12, 13 and 14.

Referring to the annexed drawings in which the same parts are indicated by the same respective ordinals in the several views, the type of floor form shown in Figures 1, 2, 3, 4 and 5, is a skeleton frame comprised of upper longitudinal side rods 1, intermediate upper longitudinal rods 2 and lower longitudinal side rods 3 united by spaced cross frame members 4 consisting each of upper horizontal sections 5 and outwardly diverging and downwardly extending side sections 6, all as plainly shown in Figures 1, 2 and 3. The several rod members are suitably secured together to form the complete skeleton frame, preferably by welding. The frames thus formed in suitable lengths are mounted at their lower side edges upon planks 7, Figure 4, the latter being supported at their ends upon girder forms 8, and also suitably supported intermediate their ends, the several skeleton frames being laterally so spaced and disposed as to form between the adjacent frame members 6 a channel 9 of dimensions suitable for the concrete floor joist 12 which is desired. Reinforcing rods 11 for the joist 12 are positioned in the channels 9 in any suitable manner well known to the art. As a support for the concrete and to prevent the same being lost through the skeleton frame, waterproof paper, canvas, metal lath, thin metal sheets, or other suitable flexible material 10 which will take the form shape without any special shaping operation, is mounted upon the skeleton frames, this covering material 10

being extended over the open ends of each skeleton frame. The pouring of the concrete results in the fireproof floor 13 with concrete joist 12, shown in Figure 5. The openwork forms are then readily removable from below after the concrete is properly set. If conditions or the desired installation require, a covering material 10 is used which is pre-shaped to conform to the shape of the skeleton frame.

If it is desired to provide for a ceiling, flush with the concrete joist 12 or suspended, wire hangers 14 are suspended from the reinforcing rods 11 before the concrete is poured, from which wires 14 suitable metal mesh 21 is suspended, after the skeleton forms are removed, Figure 5. If the forms are intended for permanent location in the floor construction, the metal mesh 21 is suspended by the hangers 14 before the concrete is poured, as illustrated in Figure 4. The desired ceiling can be formed around and through the metal mesh 21 and bonded and keyed therewith.

The modification of Figures 6, 7 and 8 consists in staggering the cross frame members 4 relative to the longitudinal side rods 1 and 3 so as to provide a series of frame members 15 secured to said rods 1 and 3 upon one side and staggered with a series of frame members 16 secured to said rods upon the other side, all as plainly shown in the figures noted.

Referring particularly to Figure 9, I therein show a rod so bent as to form the entire outer frame member of one of the forms shown in Figures 1, 2 and 3. This number thus comprises the two end cross frames 4' and the two lower longitudinal rods 3' all as one integral member, each end frame 4' being comprised of the cross member 5' and the pair of diverging side members 6', the lower end of one side member 6' of one frame end 4' being welded to the other end 17 of the original rod from which this outer frame member is made.

In Figure 9a there is shown a special form of intermediate cross frame member for the type of dome shown in Figures 1, 2 and 3, which comprises two spaced cross members 5³ each having a pair of diverging downwardly extending side members 20³, these side members 20³ of the two cross members 5³ converging respectively toward each other, the whole being comprised of a single rod member bent into the shape plainly shown in Figure 9a and the ends of which are welded together at 23. A skeleton frame comprised of the outer frame member shown in Figure 9 and a plurality of cross frame members, such as shown in Figure 9a, is illustrated in Figure 9b.

In Figures 10 and 11, the openwork frames are made so deep that an additional pair of longitudinal side rods 18 is used, the same being disposed between the staggered mem-

bers 15' and 16' and midway of the distance between the upper side rod 1 and the lower side rod 3.

Referring particularly to Figures 12, 13 and 14, the form of frame therein shown is a self-sustaining truss type such that no temporary supports between girder forms, such as the timbers 7, Figure 4, are required. This truss frame is provided with diagonal side strengthening members 20 disposed between each adjacent pair of side members 6², each cross frame 4² comprised of the upper horizontal member 5² and the pair of diverging side members 6² being provided with extending foot portions 19 which are of a length so as to provide for a material lapping of adjacent feet 19 when the forms are assembled as shown in Figure 15, preparatory to pouring the concrete. These extended portions 19 support the flexible covering material 10. This truss frame of Figures 12, 13 and 14 is further braced and strengthened with additional end frame members 4², one of which is plainly shown in Figure 17, and which are duplicates of the normal cross frame members, so that each end of the frame is formed of two cross frame members.

In Figure 15 is illustrated the use of the truss type of dome as a removable form, provided a suspended ceiling is desired; and in Figure 16 is illustrated the use of this type of dome as a permanent form, the wire mesh 21 being suspended by the tie wires 14 before the concrete is poured.

Figures 1, 2, 6, 7, 9, 9b, 10, 12 and 13 show short lengths of forms or fragments of lengths, but it will be understood that these forms can be made in any reasonable lengths. The length is preferably a multiple of the distance between two cross frames. The length is also usually sufficient to span the distance between two girders. Such a spanning length is the preferred construction in the case of the forms illustrated in Figures 1, 2, 3, 6, 7, 8, 9b, 10 and 11, and would be the necessary construction in the case of the form illustrated in Figures 12, 13, 14 and 15.

What I claim is:

1. A form for making fireproof floor construction comprising an openwork skeleton metal frame having spaced upper longitudinal side and intermediate bars, spaced lower longitudinal side bars, and spaced transverse bars secured to said longitudinal bars, said transverse bars being arranged in staggered relation upon the inside and outside of said longitudinal side bars, and flexible covering material for said frame.

2. In a form for making fireproof floors, an openwork channel-shaped frame having the face of the channel unobstructed, the sides of the frame diverging toward the face of the channel whereby a plurality of frames may be nested when not in use.

3. In a form for making fireproof floors, an openwork frame having spaced longitudinal metal bars rigidly secured to spaced transverse metal bars of substantially inverted U-shape, two of said longitudinal bars connecting the ends of the transverse bars and the other longitudinal bars connecting the intermediate portions of the transverse bars, and the space between said two longitudinal bars being unobstructed whereby a plurality of frames may be nested when not in use.

4. In a form for making fireproof floors, an openwork channel-shaped frame having the face of the channel unobstructed, the sides of the frame diverging toward the face of the channel whereby a plurality of frames may be nested when not in use, and said frame comprising transverse elements having leg portions each formed of angularly related members and forming part of the sides of the frame.

5. In a form for making fireproof floors, an openwork frame comprising a member having spaced longitudinal portions connected at their ends by transverse portions of substantially inverted U-shape, longitudinal members secured to said transverse portions of said first-mentioned member, and an intermediate transverse member of substantially inverted U-shape, said intermediate transverse member being secured to the longitudinal portions of the first-mentioned member and to said longitudinal members and having each of its leg portions formed of angularly related elements, said transverse portions and said transverse member diverging downwardly, and the space between said longitudinal portions and between the leg portions of said transverse portions and of said transverse member being unobstructed.

6. In a form for making fireproof floors, an openwork channel-shaped frame having the face of the channel unobstructed, the sides of the frame diverging toward the face of the channel whereby a plurality of frames may be nested when not in use, and said frame having members extending transversely and outwardly from the frame sides near the open face of the channel.

7. In a form for making fireproof floors, an openwork frame having spaced upper and lower longitudinal bars and spaced transverse bars secured to said longitudinal bars, said transverse bars each having an intermediate portion of substantially inverted U-shape and having end portions extending outwardly from the ends of the inverted U-shaped portion, the leg portions of each intermediate portion diverging downwardly, and the space below said upper longitudinal bars and between said lower longitudinal bars being unobstructed.

8. A form for making fireproof floors com-

prising openwork frames, each of said frames having an intermediate portion substantially of inverted channel-shape and side portions extending outwardly from the lower edges of the intermediate portion, and the adjacent frames being arranged side by side with a side portion of one frame lapping the adjacent side portion of an adjacent frame, and flexible material covering the tops and sides of the intermediate portions of said frames and the lapping side portions thereof.

9. In a form for making fireproof constructions, an openwork frame comprising spaced upper longitudinal bars, spaced lower longitudinal bars, and spaced transverse bars substantially of inverted U-shape secured to said longitudinal bars, said transverse bars having their leg portions diverging downwardly toward said lower longitudinal bars and the space between said lower longitudinal bars being open whereby a plurality of frames may be nested when not in use, and said frame having members extending transversely and outwardly beyond the lower longitudinal bar at one of its lower edges.

10. A form for making fireproof floor constructions comprising an openwork skeleton frame formed of metal bars secured together, said frame having a top and two opposed divergent sides, and flexible material covering the top and sides of the frame when the form is in use, space below the top and between the divergent sides being open whereby a plurality of frames may be nested when not in use.

11. A form for making fireproof floors comprising openwork channel-shaped frames arranged side by side in spaced relation, each frame having the face of the channel unobstructed and having its sides diverging toward the face of the channel whereby a plurality of frames may be nested when not in use, and a flexible material covering the tops and sides of said frames and extending across the space between the bottoms of adjacent frames.

12. A form for making fireproof floors comprising openwork frames, each of said frames having an intermediate portion substantially of inverted channel shape and side portions extending outwardly from the lower edges of the intermediate portion, each frame having its channel sides diverging downwardly and its channel face unobstructed, and adjacent frames being arranged side by side with a side portion of one frame lapping the adjacent side portion of an adjacent frame, and flexible material covering the tops and sides of the intermediate portions of the frames and the lapping side portions thereof.

Signed by me this 22nd day of June, 1928.
CLARENCE E. GRUBER.