

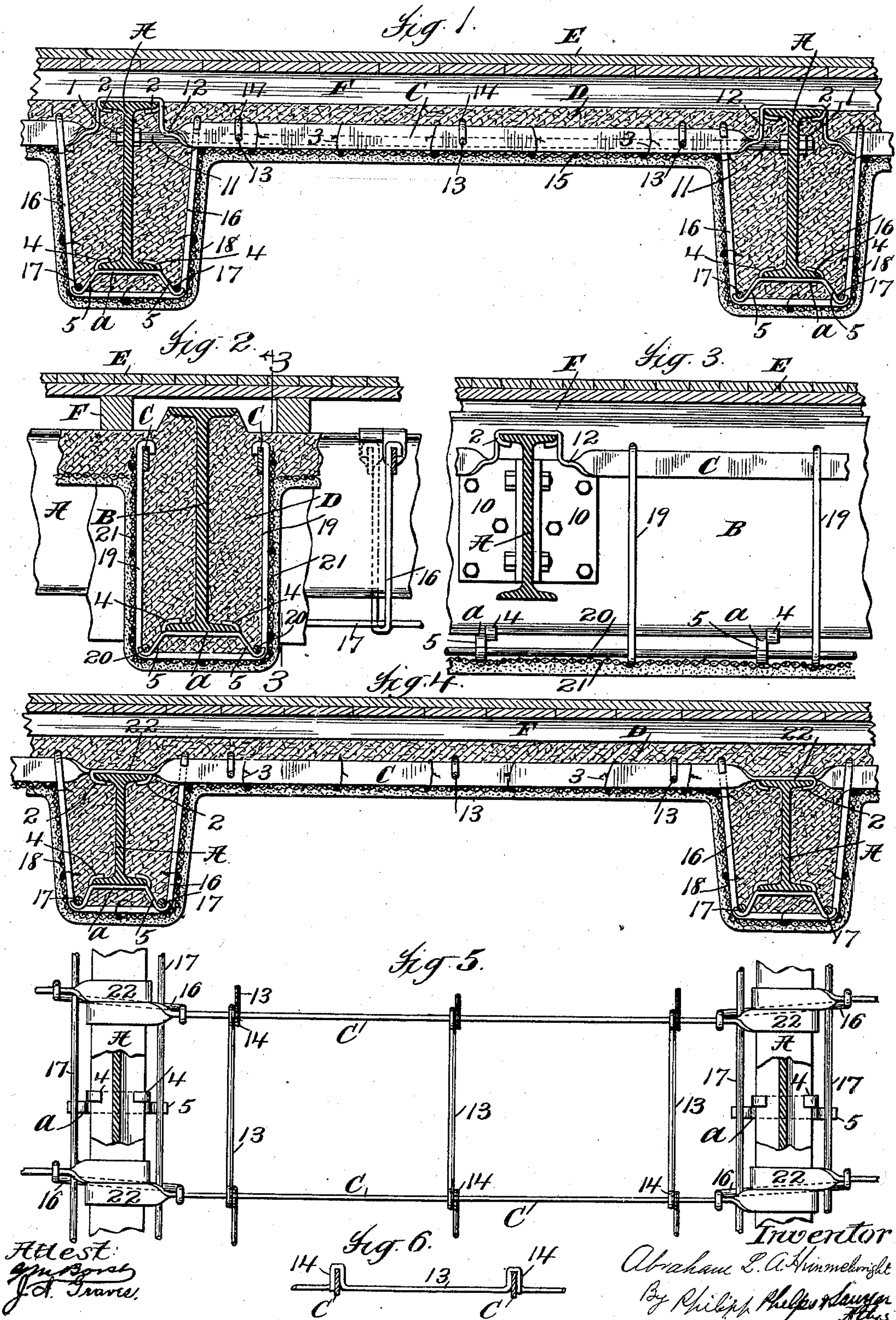
No. 644,914.

Patented Mar. 6, 1900.

A. L. A. HIMMELWRIGHT.  
FIREPROOF CONSTRUCTION.

(Application filed Aug. 31, 1898.)

(No Model.)





# UNITED STATES PATENT OFFICE.

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## FIREPROOF CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 644,914, dated March 6, 1900.

Application filed August 31, 1898. Serial No. 689,915. (No model.)

*To all whom it may concern:*

Be it known that I, ABRAHAM L. A. HIMMELWRIGHT, a citizen of the United States, residing at Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Fireproof Constructions, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to an improved fireproof floor and ceiling construction of that class in which a filling of concrete or similar plastic material is applied in connection with reticulated metal to form the floor construction, one of the especial objects of the present invention being to provide an improved floor construction of this class which shall possess the desired strength and fireproof quality, while at the same time employing light metal parts and a small body of concrete.

A further object of the invention is to provide a construction of this class with improved means for fireproofing beams or girders with a body of concrete or similar plastic material.

As a full understanding of the invention can best be given by a detailed description of a construction embodying the same, such a description will now be given in connection with the accompanying drawings, forming a part of this specification and showing floor and ceiling constructions of preferred forms embodying the invention, and the features forming the invention will then be specifically pointed out in the claims.

In the drawings, Figure 1 is a section of the construction, taken transversely to the floor-beams. Fig. 2 is a cross-section of the same, showing a girder construction, the lathing and concrete being shown partially removed from the floor for the purpose of illustration. Fig. 3 is a section on the line 3 of Fig. 2, with the floor-concrete removed. Fig. 4 is a view similar to Fig. 1, showing a modified construction. Fig. 5 is a plan view, partly in section, of the construction shown in Fig. 4, omitting the concrete and lathing. Fig. 6 is a detail view of the spanner shown in Fig. 5.

Referring especially to Figs. 1 to 3, A are the floor-beams, which are shown as of the common I form, these beams A being shown

as supported by girders B, to which they are connected at their ends by angle-plates 10, as usual, or in any other suitable manner, and these beams A are shown as tied together by tie-rods 11, passing through the webs of the beams and provided with nuts 1, so that the beams are held firmly against sidewise pressure. It will be understood, however, that these tie-rods may be omitted.

From the upper flanges of the beams A are supported metal joists C, which consist of flat metal plates of the required thickness arranged edgewise vertically and having their opposite ends formed with a quarter-twist, so that the ends 12 lie at right angles to the main portion of the joists, and these ends 12 are bent upward and extend over the tops of the beams, upon which they rest flatwise, and are provided with hooks 2, hooked over the flanges of the beams, so as to be held thereby. The joists C may thus be positioned in any desired plane below the tops of the beams, according to the length of the vertical portion of their bent ends, and the flat portions of the ends resting upon the tops of the beams hold the joists in position, with the body of the joists standing edgewise, as shown. By the hooking of the ends of the joists over the flanges of the beams also the joists act as tie-bars for the beams. With these joists C are preferably used spanners, as shown in Fig. 1 and in detail in Fig. 5, these spanners aiding in holding the joists in proper position and enabling them to be rapidly and accurately spaced in building the construction. The spanners consist of a metal rod 13 of any suitable form corresponding in length to the distance at which the joists are to be spaced, these rods 13 having at opposite ends loops 14, forming hooks adapted to embrace and rest upon the top edges of the joists C, thus holding the latter in position and securing uniform spacing of the joists. Spanners of this form are very simple and cheap, no long pieces of metal being required, so that they may be made from waste pieces of metal rods.

The joists C support the reticulated metal which forms the anchorage for the concrete or similar plastic material of the floor construction. The reticulated metal is shown as common metallic lathing 15, of wire-netting,



and this is the preferred construction, but the reticulated metal may be of any other suitable form and mesh, either of woven or netted wire or metal rods or straps or perforated or expanded metal, so that the concrete or similar plastic material applied from above will set into the openings between the parts of the reticulated metal and secure the desired anchorage of the concrete. This lathing 15 or other reticulated metal may be secured to and supported by the joists C in any suitable manner, but is shown as secured thereto by wire ties 3 at suitable intervals. The lathing 15 does not extend to the webs of the beams, but is terminated a short distance therefrom, according to the thickness of the body of concrete that is to be applied to the webs of the beams for fireproofing the latter.

In connection with fireproofing the webs and bottoms of the beams A, I preferably use the construction shown, in which the bent rods 16 are hooked over the joists C on opposite sides of the beams and extend downward and under the bottoms of the beams A, these rods 16 being arranged at suitable intervals, as shown in Fig. 3. Below the beams are supported, partly by these rods 16 and partly by hangers *a*, rods 17, extending longitudinally of and on opposite sides of the beams, and to the rods 16 17 is secured, so as to be held in position thereby, reticulated metal 18, shown as metallic lathing of the same form as lathing 13, which extends from the joists C on one side of the beams downward and around the bottom of the beams and upward to the joists on the opposite side of the beam, thus inclosing on the sides and bottom the space between the ends of the lathing 13 on opposite sides of the beams.

The hangers *a*, by which the horizontal rods 17 are partially supported and held in position, are preferably formed, as shown, of a flat piece of metal, which is slit at the opposite ends, so that the body of the hanger rests upon the under side of the beam, and a portion of each end is bent upward and over the flange of the beam to form holding clips or flanges 4, and the other portions of the ends are bent downward, so as to form depending arms 5, provided with hooks, forming seats for the rods 17.

After the metallic parts have been placed in position, as above described and as shown in Figs. 1 to 3, a filling of concrete or similar plastic material D is applied from above, filling all the space above the lathing 15 or other reticulated metal, embedding the joists C and their supporting vertical portions 12, and preferably extending level with the tops of the beams, as shown, and seating through the openings of the metal 15, so as to secure the desired anchorage thereon, this concrete also being packed down through the spaces between the rods 16, the lathing or other reticulated metal 18, and the webs of the beams, and beneath the beams and girders, so as to

fill the space within the metal 18, thus forming an integral body of concrete or similar plastic material which extends in a web of the desired thickness from beam to beam and around the webs of the beams and forms a body of fireproofing below the flanges of the beams. All the space below the bottoms of the beams is preferably filled with concrete, as shown; but the construction may be so modified as to form an air-space below the bottoms of the beams between the beams and the concrete under the beams, if desired. This floor construction of concrete or similar plastic material preferably extends level with the tops of the beams A, as above stated and as shown in Fig. 1, and upon it the flooring E may be applied directly; but the flooring is preferably supported thereon by wooden or other joists F, as shown. This floor construction is complete in itself and may be used with beams supported in this or any other suitable manner and girders and girder protection of any desired form. In girder constructions, however, I preferably protect the girders throughout by a body of concrete or similar plastic material continuous with the flooring-concrete D and extend this body of concrete or similar plastic material also below the bottoms of the girders, so as to provide a fireproof protection below the girders, and such a protected-girder construction is shown. In this construction, as shown in Figs. 2 and 3, the wire lathing or other reticulated metal 15 18 does not extend to the ends of the beams A, but terminates at a distance from the girders B according to the thickness of girder fireproofing desired, and upon the joists C, adjacent to and on opposite sides of the girder B, are hung at suitable intervals hooked rods 19, which extend downward below the flange of the girder sufficiently to provide the desired thickness of fireproofing material below the girder-flange, and in connection with these rods 19 are arranged horizontal rods 20, supported partially by rods 19 and partially by hangers *a* on the bottom flanges of the girders, which are shown as similar in construction to those previously described in connection with the beams A. To these rods 19 and the horizontal rods 20 is secured wire lathing or other reticulated metal 21, which practically forms a continuation of the metal 15 downward on opposite sides of the web of the girder B, so that the concrete or similar plastic material D may be packed within this metal 21 for fireproofing the girders, and thus a continuous body of concrete extends from the flooring about and below the girders, as shown.

In the construction shown the girder B extends above the beams A and the concrete D is extended upward immediately about the girder to the top of the latter, so as to fireproof the web and under side of the flange of the girder, the flooring E then being supported above the top of the girder by the joists F.



The construction of fireproof floor and girder protection thus far described is complete in itself and may be used without a ceiling or with a plaster ceiling applied directly to the under side of the metal 15 18 21 or with a suspended ceiling of any suitable form. As shown, the floor and ceiling construction is integral, the plaster finish being applied directly to the under side of the metal 15 18 21, the concrete D or similar plastic material projecting through the openings in this lathing or other reticulated metal, so as to form an efficient base for the plaster.

In Fig. 4 I have shown a modified construction, which is the same as that shown in Fig. 1, except that the joists C are not dropped below the tops of the beams, but the ends formed by a quarter-turn of the joists, so as to bring the joists flatwise to the tops of the beams, are extended straight across the top flanges of the beams, so that with the hooks 2 on these straight ends 22 hooked over the flanges of the beams, as in the construction shown in Fig. 1, the beams A are tied together by a straight bar extending from beam to beam. With this construction the beams are efficiently tied together, so that it will be found in practice that no other tie-rods are necessary, a very strong construction thus being formed.

It will be understood that many modifications may be made in the constructions shown by those skilled in the art without departing from the invention and that I am not to be limited to the exact form or arrangement of parts in the constructions shown.

What is claimed is—

1. The combination with flanged beams, of metal joists extending from beam to beam and supported from the tops of the beams and dropped below the flanges of the beams, reticulated metal between the beams and extending downward near the beams and about the bottoms of the beams with space between the metal and beams, and a body of concrete or similar plastic material applied from above on said reticulated metal and forming a fireproof web between the beams and fireproofing about and below the bottom flanges of the beams, substantially as described.

2. The combination with flanged beams, of joists formed of metal plates extending from beam to beam and placed edgewise vertically and twisted near the ends to form portions lying flatwise to the beam and hooked over the top flanges of the beams, reticulated metal between the beams and extending downward near the beams and about the bottoms of the beams with space between the metal and beams, and a body of concrete or similar

plastic material applied on said reticulated metal and forming a fireproof web between the beams and fireproofing about and below the bottom flanges of the beams, substantially as described.

3. The combination with flanged beams, of joists formed of metal plates extending from beam to beam and placed edgewise vertically and twisted near the ends to form portions lying flatwise to the beam and bent upward and hooked over the top flanges of the beams whereby the joists are dropped below the beam-flanges, reticulated metal between the beams and extending downward near the beams and about the bottoms of the beams with space between the metal and beams, and a body of concrete or similar plastic material applied on said reticulated metal and forming a fireproof web between the beams and fireproofing about and below the bottom flanges of the beams, substantially as described.

4. The combination with girders and transverse beams supported thereby, of joists formed of metal plates extending from beam to beam and placed edgewise vertically and twisted near the ends to form portions lying flatwise to the beam and hooked over the top flanges of the beams, reticulated metal between the beams and extending downward near the beams and about the bottoms of the beams with space between the metal and beams, reticulated metal extending from the joists downward and about the bottoms of the girders with space between the metal and girders, and a body of concrete or similar plastic material applied on the reticulated metal and forming a web between the beams and a fireproof filling about and below the bottoms of the beams and girders, substantially as described.

5. The combination with the beams A, of the flat metal bars C placed edgewise vertically and twisted at the ends to form portions lying flatwise to the beams and hooked over the tops of the beams, substantially as described.

6. The combination with the beams A, of the flat metal bars C placed edgewise vertically and twisted at the ends to form portions lying flatwise to the beams and bent upward and then over the top flanges of the beams and hooked around said flanges, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ABRAHAM L. A. HIMMELWRIGHT.

Witnesses:

C. J. SAWYER,  
A. L. KENT.