(No Model.)

W. H. BROWN.

FIREPROOF FLOOR AND CEILING.

No. 551,258. Patented Dec. 10, 1895.

Fig. 1.

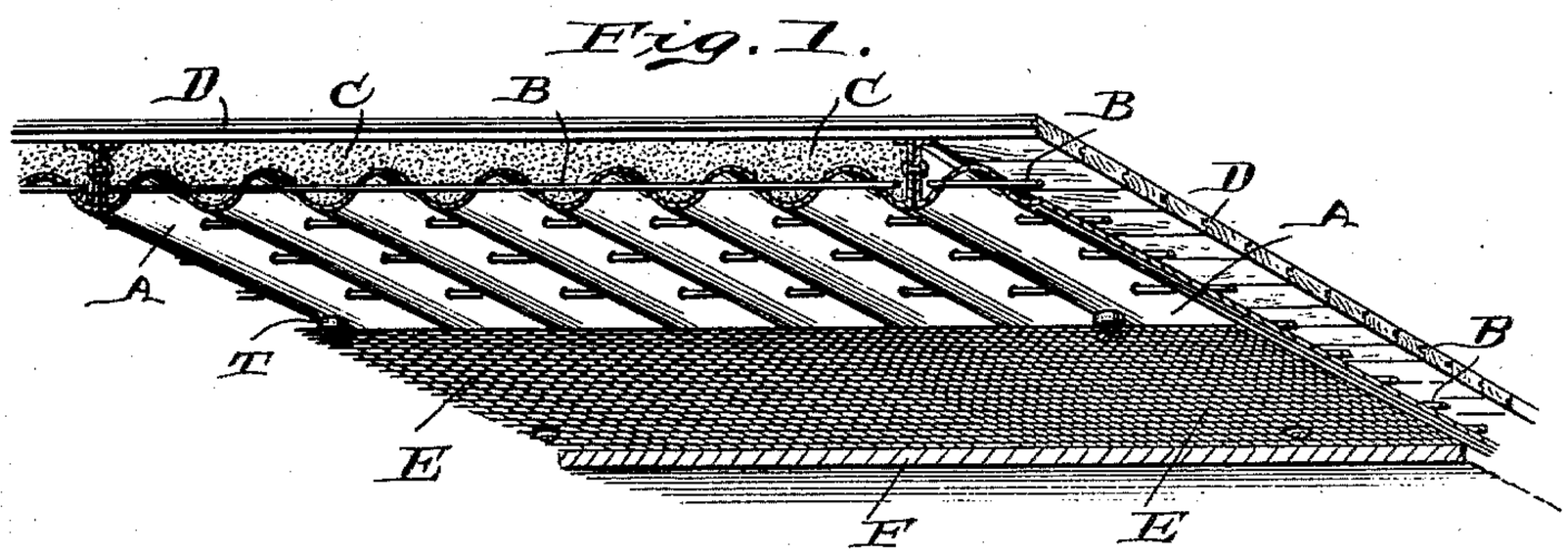


Fig. 2.

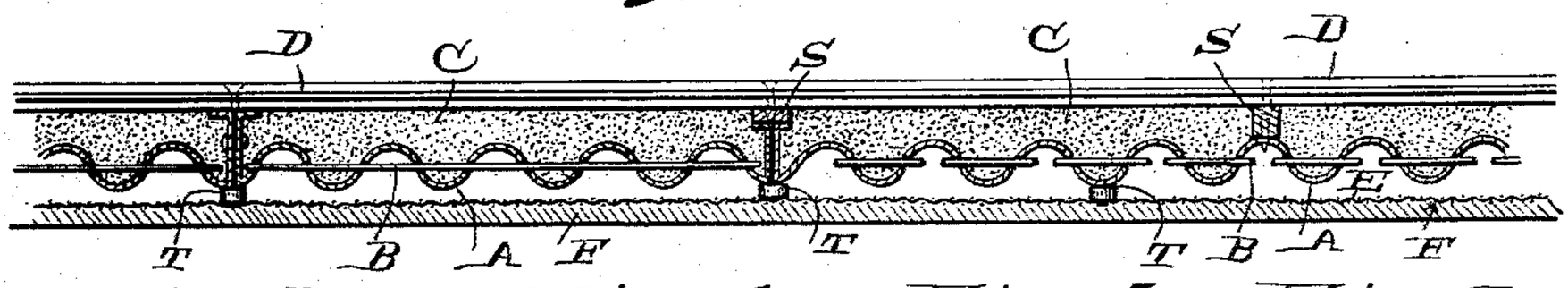


Fig. 3. Fig. 4. Fig. 5. Fig. 6.

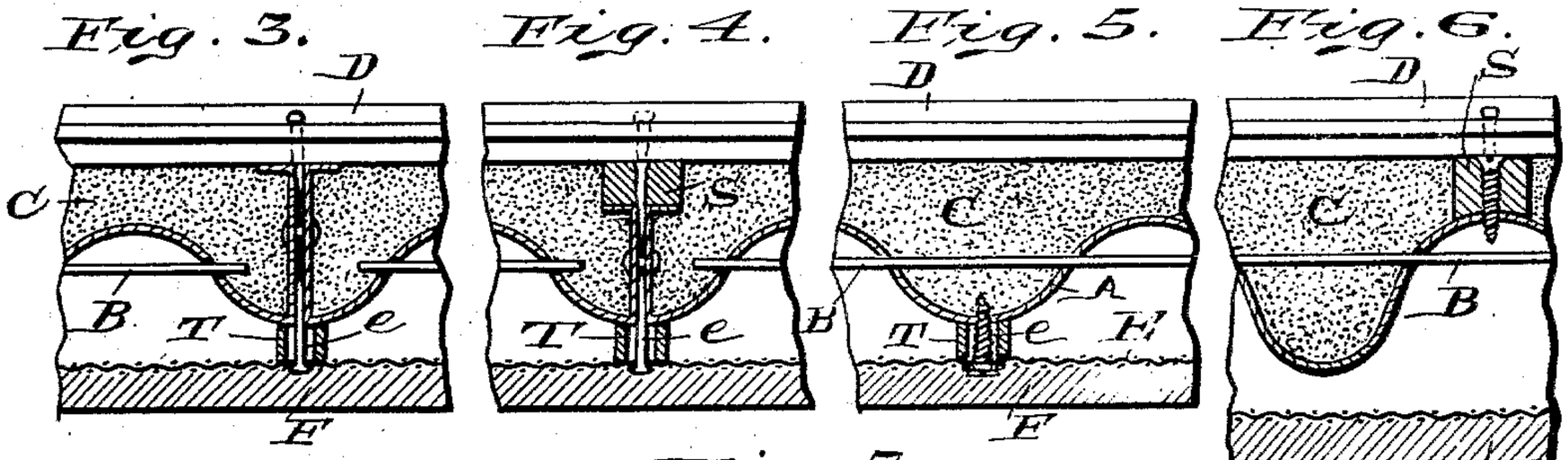


Fig. 7.

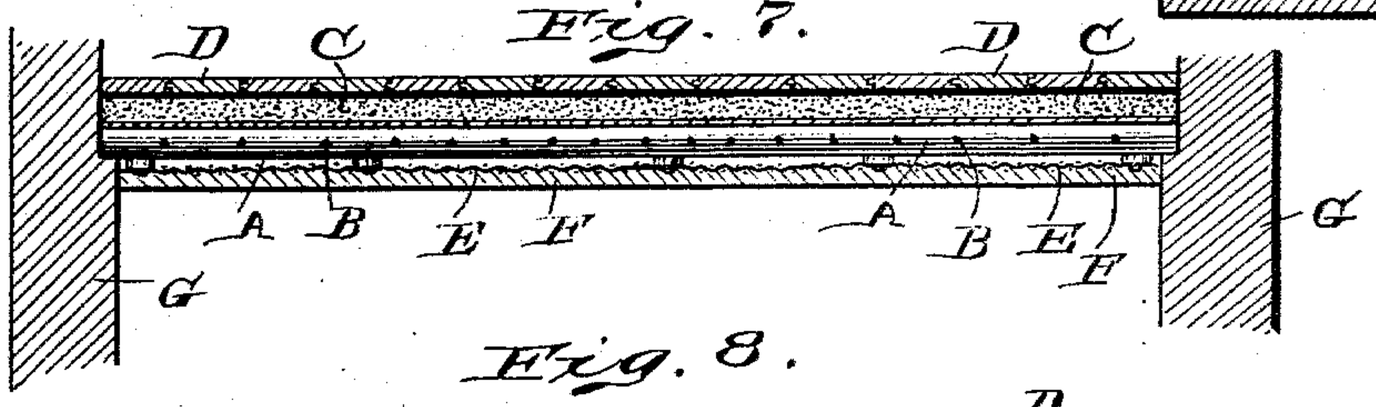
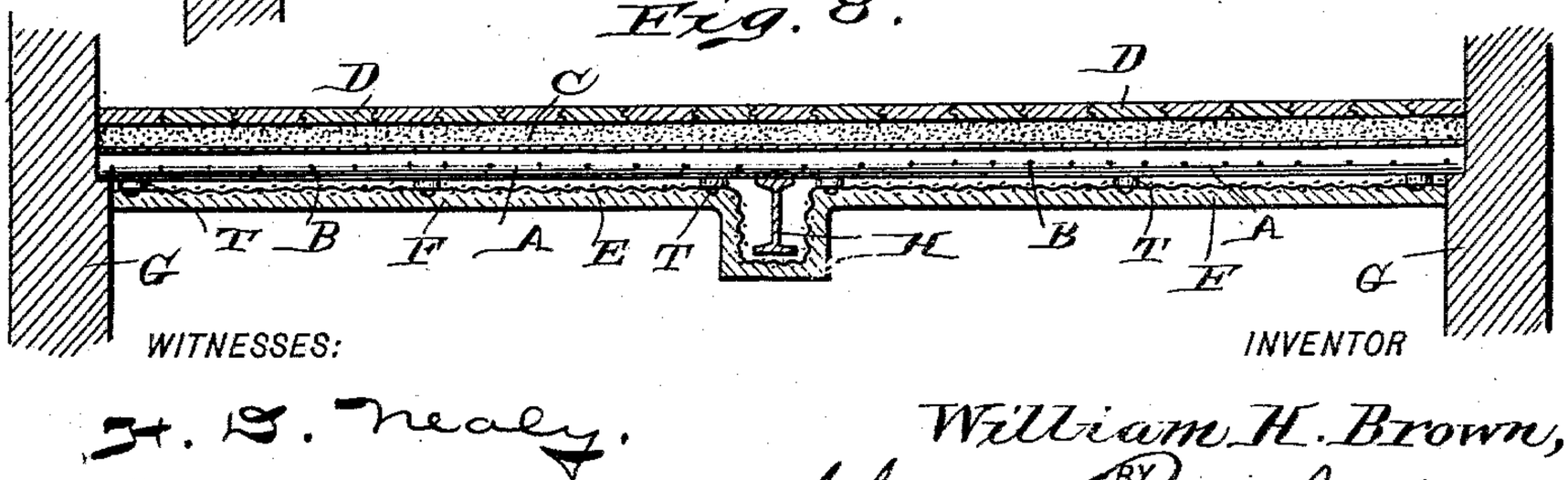


Fig. 8.



WITNESSES:

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FIREPROOF FLOOR AND CEILING.

SPECIFICATION forming part of Letters Patent No. 551,258, dated December 10, 1895.

Application filed July 31, 1895. Serial No. 557,732. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. BROWN, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Fireproof Floors and Ceilings, of which the following is a specification.

My present invention has especial reference to buildings of comparatively light construction, and its object is to provide for such buildings, and in all cases where the load to be carried is not too great, an inexpensive fireproof floor and ceiling structure in which the corrugated scaffolding for the concrete filling, together with such filling, shall in large measure take the place of floor-beams, and serve to directly support, as well as become a part of, the floor of the building. In carrying out this invention I construct my said incombustible floor of deeply-corrugated metallic sheets thrown directly across from wall to wall of an apartment within certain limits of span, such limits being, however, much greater than those commonly employed, and combine therewith a bed of concrete by a peculiar method. I may also, when the span exceeds the limit, introduce a beam or beams at intervals between said walls without departing from my invention, my principal purpose being to construct a floor containing means by which the several parts composing the same shall be so firmly united and connected together as to cause them to act together as one member in carrying such loads as may come upon it. Such a floor, with the ceiling which I design to accompany it, will be first fully described, and the novel features thereof then pointed out in the claims.

Referring to the accompanying drawings, which are made a part hereof, and on which similar letters of reference indicate similar parts, Figure 1 is a perspective view of a fragment of a fireproof floor embodying my present invention, shown at various points in various stages of completion; Fig. 2, a detail sectional view through the floor, being substantially a front edge elevation of the structure shown in Fig. 1, but illustrating different forms of various details; Fig. 3, a detail view on a large scale, illustrating more clearly the construction and means for uniting the several parts together; Fig. 4, a view similar to Fig. 3, except that the upturned edges of the metallic plates are shallower, with a wooden nailing-strip secured thereon; Fig. 5, a detail view illustrating how the lathing can be suspended directly to the metallic sheets by means of wood-screws; Fig. 6, a detail view illustrating the nailing-strips connected directly to the metallic sheets, and also a deeper floor construction; Fig. 7, a detail sectional view showing my invention as applied where the sheets forming the scaffolding extend from wall to wall of the apartment, without any interposed supporting or floor beams; and Fig. 8, a similar view illustrating the same in a wide apartment where a central floor-beam is necessary.

In said drawings the portions marked A represent the corrugated metallic scaffolding; B, uniting, strengthening and stiffening rods passing through the same; C, the concrete filling; D, the wooden flooring; E, the lathing; F, the plastering applied to the lathing; G, the walls of the building or apartment, and H the interposed supporting or floor beam employed in the apartments wider than the limit otherwise permissible with this construction.

The corrugated metallic sheets A are in their general form not widely dissimilar from corrugated metallic sheets already well known. My purpose, however, is best subserved by making the corrugations larger or deeper than they have been commonly made in sheets for similar purposes, so that a maximum of rigidity and supporting strength may be secured. These sheets in ordinary-sized apartments of buildings intended to be used for dwelling purposes, or wherever there are to be no large concentrated loads, may extend from wall to wall of the building, as shown in Fig. 7, and constitute not only the scaffolding for the concrete, but the main support for the floor structure, of which they form a part. As shown most plainly in Figs. 2 to 6, the corrugations are perforated laterally and rods B inserted in said perforations, which rods may be continuous, as shown at the left in Fig. 2, or in short pieces, as shown at the right in Fig. 2. In either case, however, they pass through the depressions formed (by the corrugating) in the upper sides of the sheets, so that the concrete when placed on said sheets will surround said rods, which are thus firmly embedded therein,

so that the sheets, rods and concrete are all firmly united together. This uniting of the concrete and the metallic sheets together, at these numerous places, secures that the floor-load shall mostly or largely be carried by the tensile strength of the metal, rather than by a mere breaking strain. It will be readily understood that the hardened concrete, when the strain comes upon the floor, acts with a thrust directly against each of these various rods, the lines of force leading from the center of gravity of the load to the several rods. Where the concrete is not so united, it easily becomes disengaged from the surface of the sheets, so that a floor structure of this character is only as strong as the separate powers of resistance of the two parts, whereas, by my construction, I get the combined strength of the parts in their most advantageous condition. Practical tests have demonstrated the high efficiency of this construction.

I prefer to use the continuous rods illustrated, but manifestly the short rods will subserve the purpose with substantially equal advantage, while not contributing quite so much to the stiffness of the structure as a whole. Greater strength can be produced by making the floor structure deeper, as shown in Fig. 6, in which cases, especially where there is a considerable addition to the depth, I make the corrugations deeper, while leaving the highest point substantially the same distance from the flooring D as in the shallower constructions. By doing this I secure a minimum thickness and consequent less bulk and weight of concrete over the higher parts of the metallic sheets, while the maximum depth of concrete varies with the structure of the floor. In all cases these proportions should be accurately calculated with a view to secure the greatest strength with the least weight of structure employed. In thus varying these corrugations, of course, a greater proportion of the metal is disposed between the highest and lowest points and in a more nearly vertical position, which increases the stiffness and strength of the structure. The concrete in any case is filled in between the scaffolding, composed of these metallic sheets, and the upper level of the floor-strips. Concrete being a substance capable of great resistance to compression, but of low strength in tension, and the corrugated metallic sheets having high tensile qualities, and the two being thus, by means of the rods, united as described, so as to constitute practically a single body, the tension-resisting member of which is at the bottom and the compression member at the top, I unite in one structure and at a low cost these valuable qualities, and by the means described make the elements practically inseparable, while the whole forms an exceedingly strong and rigid means of spanning a void.

The floor D is secured to the structure just described either, as illustrated in Fig. 3, by driving the nails between the upturned edges of the metallic sheets, as in a former invention of mine, or by providing wooden nailing-strips S, secured to said upturned edges, as in Fig. 4, or to intermediate points, as in Fig. 6, and nailing or otherwise securing the floors to such strips.

There should be a ceiling below and carried by the floor, which should be practically isolated from the floor structure to such an extent as to afford an air-space between its upper surface and the lower surface of said floor or upper structure, said air-space being practically coextensive with the apartment in which the construction is used. I have shown ordinary wire lathing E, with plastering F applied thereto, as constituting this ceiling. The lathing, however, before the plastering is applied is secured to the floor structure by means of nails or screws *e* passing through said lathing and through thimbles T, and then engaging with the corrugated metallic plates A. The novelty in this part of the structure consists in the use of thimbles, which, of course, are formed uniform in length and are of comparatively trifling heat-conducting or cross-sectional area, so that, in case of a conflagration below, the floor structure is substantially protected by the dead-air space between the plastering and said floor structure, in which only these trifling points of contact exist, while the plastering can be supported at as many points as may be desired merely by using the required number of these thimbles, and nails or screws in connection therewith in the manner described.

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

1. The combination, in a fire-proof flooring, of corrugated metallic sheets having perforations extending horizontally through the corrugations, rods in said perforations, and concrete placed upon said sheets, thus filling said corrugations and embracing said rods, whereby the great crushing strength of the concrete and the great tensile strength of the sheet metal are united in a single structure, substantially as and for the purposes set forth.

2. The combination, in a fire-proof flooring and ceiling, of the floor structure composed of the corrugated sheets or scaffolding, the rods extending through perforations in the corrugations, the nailing strips, the concrete embedded around said rods upon said scaffolding between said nailing strips, and the lath-and-plaster structure secured to the under side of said floor structure, with spacing thimbles or devices between them whereby a dead air space is produced, substantially as set forth.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 27th day of July, A. D. 1895.

WILLIAM H. BROWN. [L. S.]

Witnesses:

CHESTER BRADFORD,

JAMES A. WALSH.