(No Model.)

T. A. LEE.

FIREPROOF ROOF OR FLOOR.

No. 517,576. Patented Apr. 3, 1894.

Fig. 1.

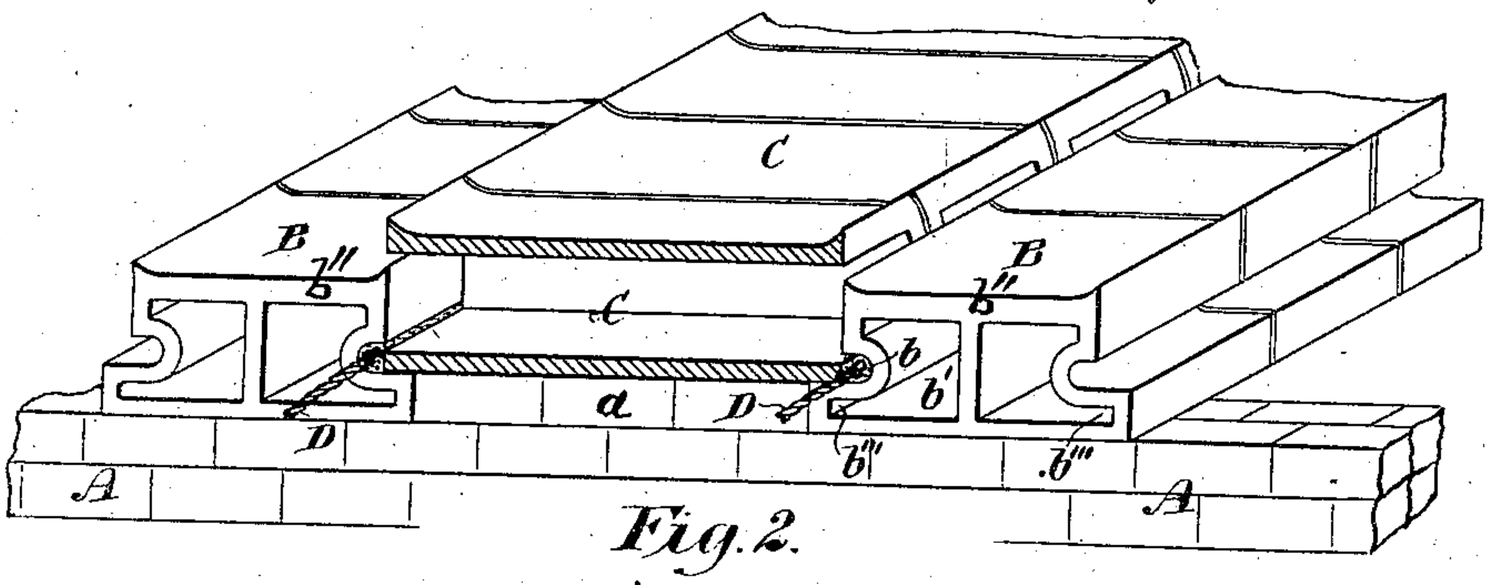


Fig. 2.

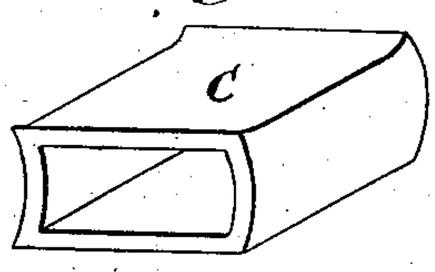


Fig. 3,

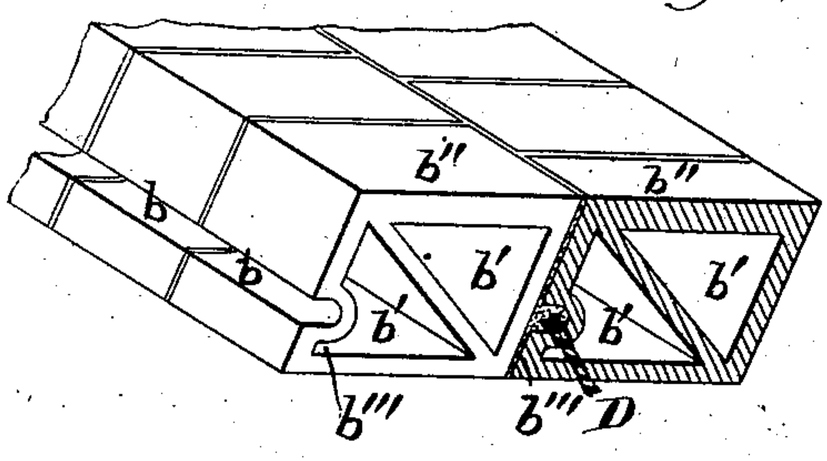
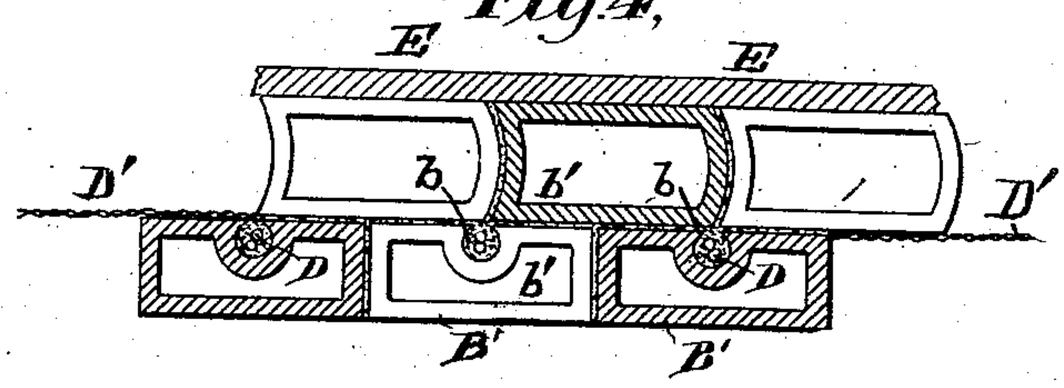


Fig. 4,



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UNITED STATES PATENT OFFICE.

THOMAS A. LEE, OF KANSAS CITY, MISSOURI.

FIREPROOF ROOF OR FLOOR.

SPECIFICATION forming part of Letters Patent No. 517,576, dated April 3, 1894.

Original application filed April 26, 1892, Serial No. 430,759. Divided and this application filed January 9, 1893. Serial No. 457,743. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. LEE, of Kansas City, Missouri, have invented certain new and useful Improvements in Fireproof Roofs and Floors, of which the following is a description, reference being taken to the accompanying drawings, which form a part of this specification.

My invention is peculiarly suited for roofing smelter flues and passages for heated gases, though in most respects it is perfectly adapted to floors, roofs, area ways, walks, stairways, and bridges, of fire proof construction. Its purpose is to form a simple, light, strong, and durable structure, fire proof and incombustible, and, as employed for smelters' flues, capable of withstanding the excessive heat and the gases present in the flues.

To these and certain other incidental ends, my invention is embodied in the construction and its various features and parts, arranged, combined, and used, in the manner hereinafter set forth.

In patents numbered 461,028 and 461,029 granted to me on the 13th day of October, 1891, I have described a joist and a floor, in which hollow tiles form an openwork webbing between a tension member consisting of iron or steel rods, embedded in mortar and cement, near the lower face of the floor, and a compression layer or member consisting of the upper walls of the tiles. The principle of the I-beam or other beam joist, or girder, is incorporated into the floor, rendering the use of other supporting beams or girders unnecessary, and causing the floor itself to act as a succession of parallel united joists, in which the tension rods support the tensile stresses due to the load, the upper tile walls support the crushing or compressive stresses, and the vertical walls of the hollow tiles form the web connecting these two members rigidly together.

In a former application filed by me on April 26, 1892, and serially numbered 430,759, (of which the present application is a division for the purpose of claiming details of construction that could not be covered in the former case) I have disclosed certain modifications of and additions to my construction making it simpler, better, and less expensive. The present application is for matter briefly described or referred to in this former case but which is therein claimed only in the general terms descriptive alike of all the forms shown.

As the invention that forms the subject of the present application is particularly adapted to smelters, I will describe it as employed for this purpose and will refer to the accompanying drawings wherein—

Figure 1 is a view of a portion of one form of smelter flue roof, constructed in accordance with my invention. Fig. 2 is a detail view of a "book" tile which I use in many forms of my invention, and Figs. 3 and 4 are views of modifications.

In the figures like letters of reference indicate like parts.

In Fig. 1 is shown one of my preferred forms of light roof, not intended to support any superposed structure or load. The supporting flue wall is indicated by A, and the roof tiles by B and C. In erecting the roofs a scaffolding is first set up and upon this the tilework is carried till the cement or mortar has hardened and dried. The tiles B are formed, as clearly seen in the drawings, with recesses or channels *b* in their sides, for receiving the tension rods D and for protecting them from the heat and the gases, by means of the air spaces within the hollows *b'* of the tiles. To increase the strength of the compression member of my roof I form the tiles with thickened upper walls or tops *b''*, and to increase the protection afforded by the air spaces *b'* I form the tiles with the hollow flanges or projections *b'''* thus extending the hollows *b'* beneath the recesses *b* and more effectually protecting the tension rods. The tiles B are laid in courses from wall to wall with their hollows *b'* and recesses *b* communicating and continuous from wall to wall. Courses of tiles C preferably of the book shape shown in Fig. 2, alternate with the crosses B and rest upon the flanges or projections *b'''*. The tiles C are placed with the hollows transverse to the course and with the upper walls or tops rising above the tiles B and permitting free circulation of the air through the hollows. In laying, the tiles B are first placed in position. The tension rods D, preferably of spiral or ribbed form, are

then laid in the recesses *b* and embedded in cement or mortar, and finally the book tiles are added, as shown, tiles or bricks *a* being employed to fill in the wall beneath the end tile C. Through the hollows *b*, open at both ends of the courses, a continuous circulation of fresh air occurs, affording the most complete protection possible to the tension rods. In addition to this there is a transverse circulation through each of the tiles C increasing the cooling effect on the rods and on the cement joints. It will be noticed that the upper lateral edges of the tiles are slightly raised forming gutters for rain water and preventing its accumulation within the hollows of the tiles C.

In Fig. 3 I show an alternate type of my invention in which only one form of tile is used. As before, the tiles which corresponds to the tiles B in Fig. 1, are provided with the thickened upper walls *b''*, and with the recesses *b;* but the recesses are only in one wall of the tiles and the hollows *b'* extend into the projections *b'''* upon only one side. On that side the tiles may be said to rest upon the tension rods, while on the other side the inclination of the lateral faces supports them; but from this statement it must not be understood that the tiles are in any sense suspended, after the manner shown in patents to others but, in combination with the rods, they form self-sustaining courses which act as I-beams or other rectilinear girders. In Fig. 3, perhaps better than in any other figure, this principle is illustrated; for it is there clearly apparent that the floor is peculiarly designed to act as a beam for transverse loads, having a compression resisting member consisting of the thickened tile walls *b''*, a tension resisting member consisting of the tension rods D in their embedding tile walls and cement, and a non-shearing web consisting of the vertical tile walls, separating and rigidly binding together the tension and compression members like lattice work in bridge girders and columns.

In Fig. 4 I show a modification in which I employ separate protection tiles B' to replace the flanges or extensions *b'''*. These have recesses for the rods as before, and of such shape that though loosened the tiles will not fall from the rods. The upper layers are preferably of book shape or other equivalent form, in order that a loosened tile may receive support from adjacent tiles. This is more needed in this form of my invention than in Fig. 1, since in the latter instance the projections or flanges *b'''* supported the tiles C. In Fig. 4, I also supplement the upper face of the structure by a compression resisting layer of cement or plaster E which may be used as a finished floor surface. This form of my invention is very strong and at the same time very light for the greatest effect is had from a given amount of material. I still further increase the rigidity and strength of the structure by embedding light rods D', laid transversely between the tiles, to bind or bond the floor against lateral rupture.

In my floor patent above referred to I have set forth wire bonds between adjacent tension rods, whereas the bonding rods in the present instance are veritable tension rods running perpendicularly to (or at an angle with) the other tension rods D. I may place rods D every ten or twelve inches if the tiles permit, but I only employ the rods D' at intervals of five or six feet.

I do not herein describe the details of my tension resisting rods because they form the subject matter of two other applications filed by me on the 30th day of April, 1892, and the 19th day of November, 1892, and serially numbered respectively 431,369 and 452,486.

I have now set forth my invention and the manner in which it may be put into use, and therefore, without obscuring its more essential features by enumerating the many variations and additions that may be made without departing from its principles, I claim as my own, and desire to secure by these Letters Patent, the following:

1. A layer of tension rods, cement, and tiles for use in smelter flues and other passages for heated gases, certain of the tiles being provided with channeled or recessed faces whereby they may form a tubular or other space between adjacent tiles for the reception of the said tension rods, and being provided with hollow projections or flanges *b'''* extending beneath the said layer to protect the tension rods and surrounding cement, substantially as, and for the purposes, set forth.

2. In combination with supporting walls, one or more courses of tiles B provided with channels or recesses *b*, for receiving tension rods, and communicating hollows *b'*, extending parallel with and under the said recesses *b*, transversely to the said walls and open to the air at the end or ends of the said course or courses, one or more tension rods D cemented within the said channels or recesses, and one or more courses of tiles C placed adjacent to the said course or courses of tiles B and closing the said recesses *b*, substantially as, and for the purposes, set forth.

3. In combination with supporting walls, one or more courses of tiles B provided with channels or recesses *b*, for receiving tension rods, and communicating hollows *b'* extending parallel with and under the said recesses *b* transversely to the said walls and open to the air at the end or ends of the said course or courses, one or more tension rods D cemented within the said channels or recesses, and one or more courses of tiles placed adjacent to the said course or courses of tiles B, having hollows transverse to the course and open at their ends above the edges of the said tiles B, substantially as, and for the purposes, set forth.

4. A roof or floor for smelter flues and like uses, consisting of hollow tilework and tension rods, the upper walls of the said tile work

forming the compression member of the said roof or floor and the tension rods forming the tension member of the said roof or floor, and hollows *b'* within the said tile work and beneath the said tension rods forming a protective air space beneath the said rods, substantially as, and for the purposes, set forth.

5. A hollow tile B for use in floors, roofs, and other structures, subjected to compression at or near one surface and tension at or near the other surface thereof, consisting of a thickened face, wall, or portion, *b''*, for forming the compression layer of the said structure and thinner or lighter walls inclosing the hollow or hollows *b'* and forming the web of the said structure, and channels or recesses *b*, for tension rods embedded in cement, substantially as, and for the purposes, set forth.

6. A hollow tile B for use in floors, roofs, and other structures subjected to compression at or near one surface and tension at or near the other surface thereof, having channels or recesses *b* for tension rods embedded in cement, and flanges or projections *b'''* forming protective air spaces for the said channels or recesses, substantially as, and for the purposes, set forth.

7. A hollow tile B for use in floors, roofs, and other structures subjected to compression at or near one surface, and tension at or near the other surface thereof, provided with hollow flanges or projections *b'''* for protecting a tension rod or other material placed above such flanges or projections, substantially as, and for the purposes, set forth.

8. A layer of tension rods, cement, and tiles, for use in smelter flues and other passages for heated gases, certain of the tiles being provided with channels or recesses *b* whereby they may form a tubular or other space between adjacent tiles for the reception of the said tension rods, and being provided with hollow flanges *b'''*, extending beneath the said chambers or recesses to protect the tension rods and surrounding cement, and supporting the adjacent tiles, substantially as, and for the purposes, set forth.

9. A layer of tension rods, cement, and tiles, for use in smelter flues and other passages for heated gases, certain of the tiles being provided with channels or recesses *b* whereby they may form a tubular or other space between adjacent tiles for the reception of the said tension rods, and being provided with hollow flanges *b'''* extending beneath the said chambers or recesses to protect the tension rods and surrounding cement, and a superposed layer of cement, plaster, or other material, E, substantially as, and for the purposes, set forth.

10. In a floor, roof, or like structure, hollow tilework, and tension rods rigidly secured thereto, the said rods forming a tension sustaining layer or member of the structure, the upper walls of the said tilework forming a compression sustaining layer or member, and cement or other strengthening material superposed upon the said tilework, whereby distinct and parallel tension and compression members or layers are produced separated but rigidly connected by a light webbing, substantially as, and for the purposes, set forth.

In testimony whereof I have hereto set my hand this 24th day of December, 1892.

THOMAS A. LEE.

Witnesses:
HAROLD BINNEY,
MAY G. RIDLEY.