

T. A. LEE.  
FIREPROOF FLOOR CONSTRUCTION.

No. 522,426.

Patented July 3, 1894.

Fig. 1.

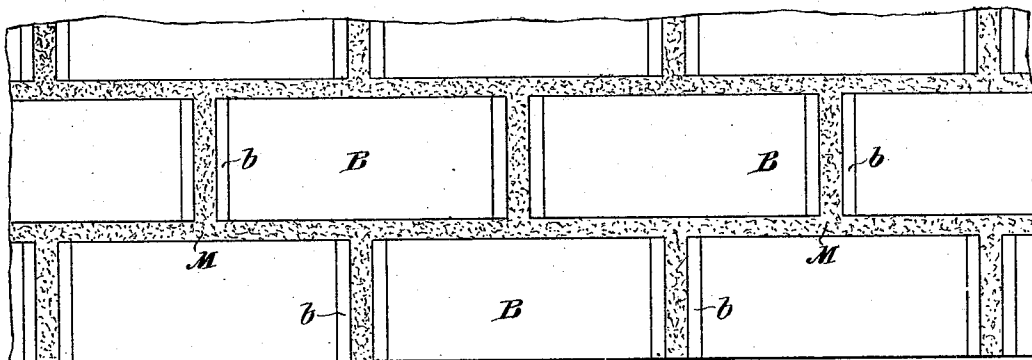


Fig. 2.

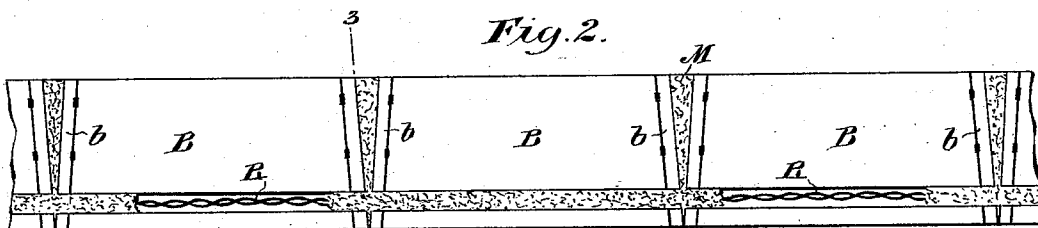


Fig. 3.

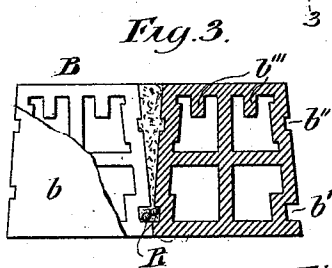


Fig. 4.



Fig. 5.

Fig. 6.

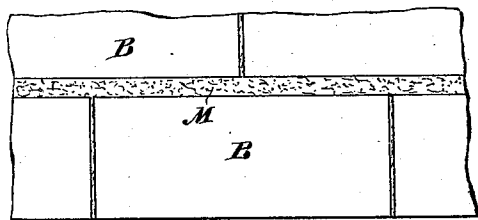


Fig. 7.

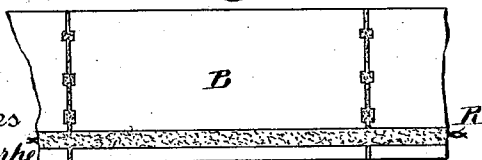
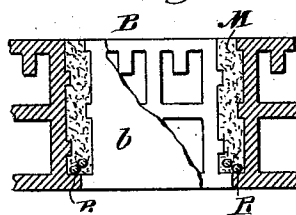


Fig. 8.



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May C. Cuddey

By his Attorney

Inventor  
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Fig. 9.

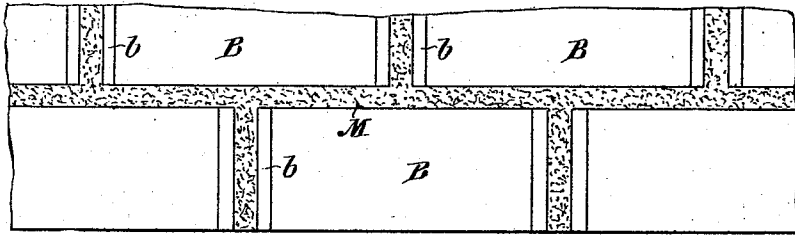


Fig. 10.

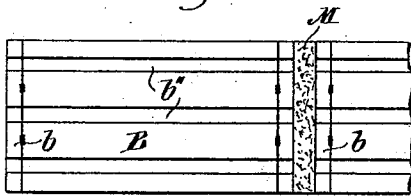


Fig. 12.

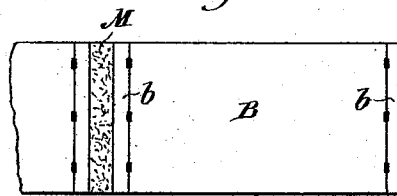


Fig. 11.

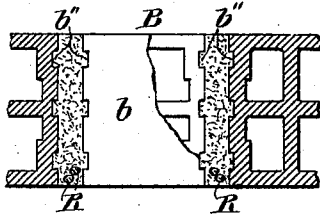


Fig. 13.

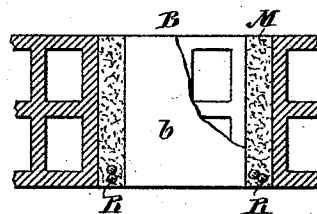


Fig. 14.

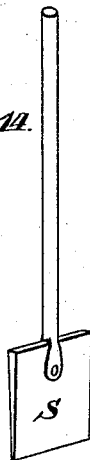
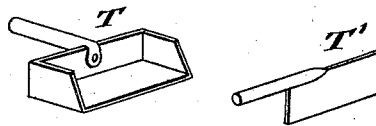


Fig. 15.



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# UNITED STATES PATENT OFFICE.

THOMAS A. LEE, OF NEW YORK, N. Y.

## FIREPROOF-FLOOR CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 522,426, dated July 3, 1894.

Application filed April 27, 1893. Serial No. 472,116. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS A. LEE, of the city, county, and State of New York, have invented certain new and useful Improvements in Fireproof-Floor Construction, of which the following is a description, reference being had to the accompanying drawings, which form part of this specification.

My invention relates particularly to fireproof floors formed as set forth in the patent granted to me October 13, 1891, and numbered 461,029 and reissued August 8, 1893, and numbered 11,356. The floors are formed of tile blocks cemented together and tension rods cemented in the base of the floor. The tile and cement in the upper portions are strong enough to bear the compression due to loads, while the tension rods and surrounding cement sustain the tension strains in the base of the floor. The intermediate tile-work forms virtually an openwork web separating but rigidly uniting the tension and compression portions, somewhat in the manner of a lattice work girder or row of girders. Under the present invention I lay the floor blocks with channels or spaces between them. They are first laid with the tension rods and the cement is filled in afterward.

My invention includes both the method of construction and the combination formed. Its purpose is to enable me to employ less expert workmen than in other constructions and at the same time to produce a thoroughly light, strong, durable, and inexpensive, floor, roof, bridge, area way, or like structure.

To such ends and purposes my invention is embodied in the floor blocks, tension rods, and cement work, constructed, arranged, combined, and used, substantially in the manner hereinafter described, illustrated, and claimed.

In an application filed herewith and serially numbered 472,115, entitled floors and floor blocks, I have described and claimed floor blocks formed with projecting bases in order that they may be merely laid in place in regular courses, base-to-base, and that the cement or mortar may afterward be poured or tamped into the channels or spaces left between the walls of the blocks. In the present case, therefore, I do not include the broad claims for such blocks, because the present case relates to tension-rod floors as above described. The

blocks are however somewhat modified to make them peculiarly applicable to my construction, and in the preferred form have channels for the tension rods in their bases, and internal ribs at the top to increase the cross section of the compression portion of the floor. The blocks are preferably, as the application referred to, about two feet long, provided with end slabs closing the hollows, and are shipped from the factory ready to be laid. The workmen have merely to lay the blocks with channels between them, cement the tension rods in the rod channels, or merely lay them at the bottom of the channels between the courses, when no rod channels are used, and afterward pour or press and pack the mortar or other cement in between the blocks flush with the face of the floor, thereby rigidly uniting rods and blocks together. The cement, when thoroughly hardened, forms strong ribs running parallel with and between the courses of tiles and greatly increasing the compression strength of the floor. The tension rods, embedded at the bottom of these cement ribs, are preferably formed of peculiar cross section to give great cement engaging power and prevent their drawing through the cement, or shearing; for clearly the rigidity of the bond between the tension rod and the tile work depends upon the mass or cross section of cement which the rod must necessarily draw with it in breaking loose from the surrounding material. I therefore construct a rod possessing what I may term a large "cylinder of shearing." A flat bar or band, twisted, would make an admirable tension rod, if it were possible to give it sufficient twist without unduly straining, stretching, or tearing, the spiral edges of the bar. I have however effected all the advantages without the attendant defects and difficulties, by employing two small rods or wires, separated by a spacing piece having grooves or channels in which the rods lie. When the rods or wires are twisted or laid with, and spirally about, the spacing piece, somewhat greater length of the rods is of course required than of the axial spacing piece. Therefore, when completed, my tension rod is able to present all the advantages of a twisted band or bar of very steep pitch with no initial strains in the edges, and with therefore a maximum strength.

I have now briefly described some of the

main features of my invention. The accompanying drawings illustrate several embodiments of it.

Figure 1 is a plan view of one form of my floor. Fig. 2 is a side view showing a course of tiles and tension rods. Fig. 3 is a cross section of the same form. Figs. 4 and 5 are side view and section of my preferred form of tension rod. Figs. 6 and 7 are plan and side view of a modified form of floor. Fig. 8 is a cross section showing still another form. Fig. 9 is a plan view of a floor made as in Fig. 8 or as in either Figs. 10 and 11, or 12 and 13. Figs. 10 and 11 are side view and section of another modification. Figs. 12 and 13 show in side view and section the employment of a simple rectangular block. Fig. 14 shows a form of tool used to tamp the mortar or cement down between the tiles, and Fig. 15 shows a hand tray and blade for cementing the tension rods within the rod channels.

Throughout the drawings like letters of reference indicate like parts and features.

The first five figures show my floor constructed of blocks with slanting sides, and my peculiar form of tension rod.

B indicates the main portions of the blocks, preferably about two feet long, and *b* the end slabs fitted and cemented to the blocks at the factory. The blocks are therefore to all intents and purposes, so far as the workmen are concerned, light solid building blocks. The blocks are provided with channels *b'* at the base for receiving the tension rods R. They are also provided with shallow grooves, or recesses, *b''*, to form dowel joints between blocks. The upper wall or top is preferably ribbed to increase its compressive strength, the ribs *b'''* projecting downward and materially increasing the stiffness and compression area of the tile.

The tension rod R is shown in Figs. 4 and 5 about half the size actually used in light floors. The small rods or wires *r* twist spirally around the grooved spacing piece *r'* which is twisted axially between them in the process of formation giving the cross section shown in Fig. 5. The flat form of the rod gives it great cement engaging power or "cylinder of shearing," with a minimum of material.

In constructing my floor, I first erect a scaffolding or temporary support, and then, beginning at one side of the floor, I lay one course of these tiles with bases touching but without cement. I then take a tension rod of length equal to the course and embed it in cement within the rod channel *b'*. For a convenience in filling the cement about the rod I have designed the tools shown in Fig. 15. The hand tray or scoop T contains enough mortar or cement for the whole length of the tension rod, as used for short spans in narrow floors. The blade T is formed to fit conveniently both the hand tray or scoop and the channel to be cemented; so that a workman with these tools can very quickly cement a

tension rod within its channel. This being done the next course of tiles is set in place, breaking joints with the other, and a second tension rod cemented within its rod channel. In this manner successive courses are laid until the whole floor is laid. After all the blocks are laid, or, if haste is desired, after several courses have been laid, the V-shaped channels or spaces between the tile blocks are filled with cement, thereby rigidly cementing the blocks and tension rods together with stiff dowel joints between the tile blocks. This final cementing may be accomplished by pouring cement of the proper consistency into the channels, till it fills them flush with the upper face of the floor; but I very much prefer, on account of superior strength, to employ mortar or cement of somewhat dryer composition and to pack or tamp it in between the blocks by some suitable instrument till every crack and crevice is filled. For this purpose I have designed the tool shown in Fig. 14. The blade S is slightly wedge-shaped to more surely force the mortar or cement against the walls and into the recesses of the floor blocks. When thoroughly hardened the cement joints or ribs, running through the floor between the courses, greatly increase the compression strength of the floor and at the same time firmly unite the tension rods and the upper portions of the floor.

In Figs. 6 and 7 I show a simpler but less preferred form of block, tapering or inclined only at the sides, without end slabs, and presenting the same cross section as in Fig. 3. They are cemented closely together, end-to-end, as they are laid in place in each course; and the channel between the courses is filled in as before.

Fig. 8 is a cross section showing a further modification. In this form the inclined sides are replaced by perpendicular sides with projecting flanges at the bottom. When the blocks are in place, base-to-base, the space or channel formed has vertical sides. The recesses or grooves *b''*, of Fig. 3, are replaced by slight projections or ribs and the rod channel is omitted. In this form the blocks are laid throughout before placing the rods, and the rods afterward laid upon chips of tile or other small supports at the bottom of the channels ready to receive the final filling of cement. This is perhaps the preferred form of my construction, since it simplifies the method of formation. The plan view of the completed floor will be the same as Fig. 9 or Fig. 1.

Figs. 10 and 11 show a further modification of Fig. 8, the projecting bases or flanges being omitted and recesses *b''* employed as before, in Fig. 3. In laying this form I use wooden guides or spacing pieces by which the workmen regulate the proper space or channel between blocks. The tension rods are laid as before, in the channels between the courses and finally the cement is filled in binding the whole floor together.

I may also use simple plane faced rectangular blocks with end slabs *b*. Such construction is shown in Figs. 12 and 13. It differs from Figs. 10 and 11 merely in the omission of the grooves or recesses *b''*, which form the dowel joints.

It must not be understood from the foregoing description that all four sides of each block need necessarily be inclined, flanged, or spaced, according to my invention; because clearly the precise form of the cement joint running parallel with the courses and the rods has little or nothing to do with the form selected for the joints used between the ends of the blocks of each course. Indeed Figs. 6 and 7 clearly illustrate this point, and show that the end plates also may be omitted without in any way preventing the full carrying out of my invention as regards the channels between adjacent courses.

I have now explained the essential features of my way of building a floor and of the floor when so constructed, and therefore, desiring to secure to myself by these Letters Patent all modifications which may be made without departing from the essential features of my invention, I claim the following:

1. A floor or like block consisting of a hollow portion B with a tension rod, channel near the base of the block, ribs *b'''* in the upper portion of the block, and end slabs *b* closing the ends of the hollows, substantially as, and for the purposes, set forth.

2. A floor or like block consisting of a hollow portion B provided with strengthening ribs *b'''* near its upper face, substantially as, and for the purposes, set forth.

3. A floor or like block for the purposes described provided with a projecting base, whereby spaces or channels for cement may be formed between adjacent blocks when placed base-to-base, and provided with tension rod channels *b'* near the base of the block, substantially as set forth.

4. A floor or like block consisting of a hollow portion B provided with a tension rod channel *b'* near the base and end slabs *b* closing the ends of the hollows, the walls of the said block projecting at the base, whereby spaces or channels for the cement may be formed between adjacent blocks when placed base-to-base, substantially as, and for the purposes, set forth.

5. In combination in a floor, roof, or like structure, blocks provided with hollows, slabs *b* closing the said hollows, and projecting bases leaving spaces or channels between adjacent blocks, tension rods laid in the said channels, and mortar or other cement filling the said spaces or channels, substantially as, and for the purposes, set forth.

6. In combination in a floor, roof, or like structure, blocks provided with projecting bases and laid base-to-base leaving spaces or channels between them, tension rods laid in the said spaces or channels, and mortar or

other cement filling the said spaces or channels, substantially as, and for the purposes, set forth.

7. In combination in a floor, roof, or like structure, blocks provided with hollows and slabs *b* closing the said hollows, and laid with spaces or channels between adjacent blocks, tension rods laid in the said spaces or channels, and ribs of mortar or other cement filling the said spaces or channels, substantially as, and for the purposes, set forth.

8. In combination in a floor, roof, or like structure, hollow blocks provided with strengthening ribs *b'''* in their upper portions and laid with spaces or channels between adjacent blocks, tension rods in the said spaces or channels, and mortar or other cement filling the said spaces or channels, uniting the whole floor, and forming strengthening ribs parallel with the said tension rods, substantially as, and for the purposes, set forth.

9. In combination in a floor, roof, or like structure, floor blocks laid with spaces or channels between the adjacent blocks, tension rods in the said spaces or channels, and mortar or other cement filling in the said spaces and uniting the said tension rods and structure and forming compression resisting ribs (as distinguished from mere cement joints) parallel with the said tension rods and extending downward from the upper surface of the said blocks, substantially as and for the purposes set forth.

10. In combination in a floor or like structure, blocks laid with spaces or channels between courses, and tension rods consisting of an axial spacing piece *r'* and two spiral wires or small rods *r* twisted or laid in grooves in the said spacing piece, the said tension rods being laid in cement or mortar between the said blocks, substantially as, and for the purposes, set forth.

11. A tension rod for the purposes described consisting of an axial spacing piece *r'* and two small rods or wires *r* laid or twisted spirally about the said spacing piece in grooves or channels therein, substantially as set forth.

12. A tension rod for the purposes described in the form of a flat twisted band or bar consisting of two small rods or wires *r* and an intermediate axial spacing piece *r'* provided with grooves upon opposite sides within which the said small rods or wires rest, substantially as set forth.

13. A tension rod for the purposes described in the form of a flat twisted band or bar consisting of two small rods or wires *r* and an intermediate axial spacing piece *r'*, substantially as set forth.

In testimony whereof I have hereto set my hand this 21st day of April, 1893.

THOMAS A. LEE.

Witnesses:

HAROLD BINNEY,  
MAY G. RIDLEY.