

E. M. BUTZ.  
Fire-Proof Building.

No. 223,275.

Patented Jan. 6, 1880.

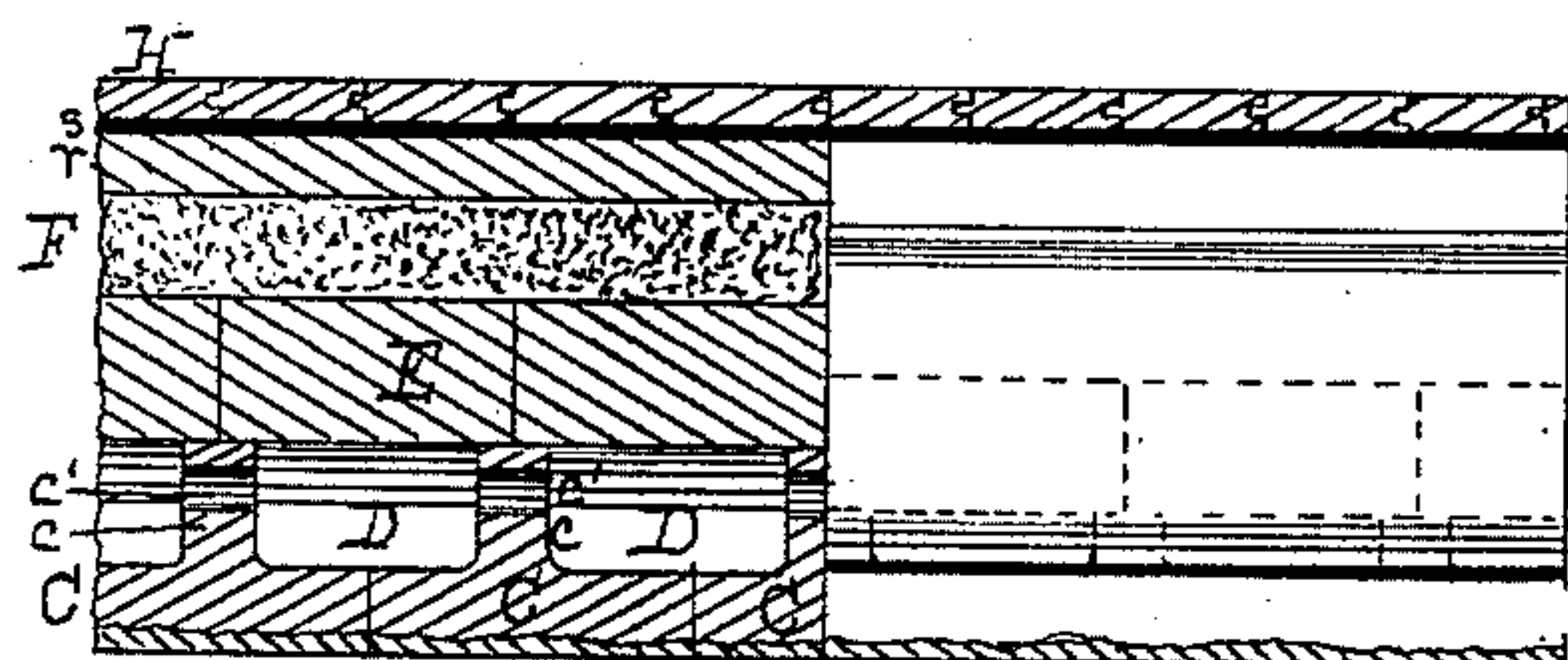
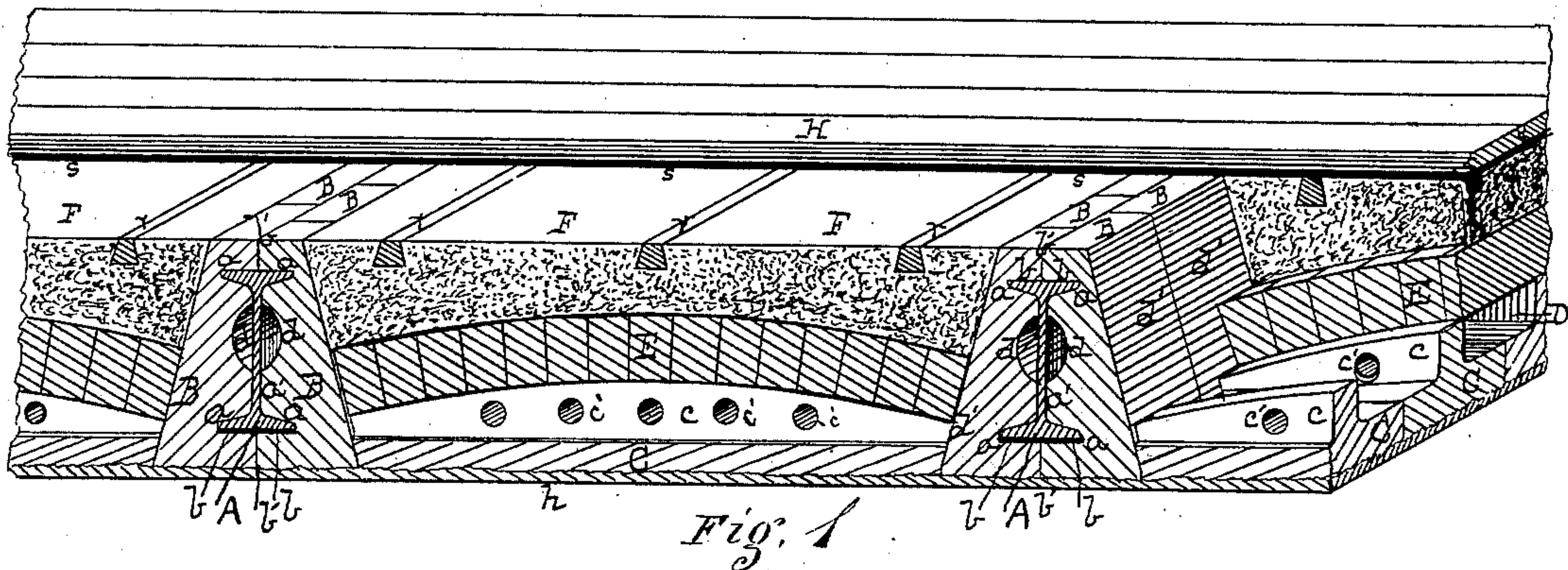


Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## FIRE-PROOF BUILDING.

SPECIFICATION forming part of Letters Patent No. 223,275, dated January 6, 1880.

Application filed October 8, 1879.

*To all whom it may concern :*

Be it known that I, EDWARD M. BUTZ, of Allegheny city, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Fire-Proof Buildings; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a sectional perspective view of the floor and ceiling of a fire-proof building illustrative of my improvement, and Fig. 2 is a view of the same, showing on the left-hand side a vertical section through the crown of the arch midway between the girders, and on the right-hand side showing a side view of the tile which incloses the girder.

In constructing the floors and ceilings of large buildings it is customary to make use of metallic beams or girders for support, and to span or bridge the intermediate spaces with arches of brick-work or sheet-metal work. Such buildings, especially when stored with inflammable materials, cannot withstand the action of the heat generated by burning their contents, as the metallic girders soon become warped and expanded, and the intermediate work is weakened to such extent as to cause the destruction of the building.

It is comparatively easy to construct fire-proof walls; but it has been found a very difficult matter to render floors, ceilings, &c., fire-proof when constructed of metal and masonry. Yet in many respects these are very desirable, if not essential, materials in large buildings.

The object of my invention is to render such materials, when used for floors and similar purposes, practically fire-proof by so incorporating them in the structure and covering or shielding them that they will be effectually protected from destruction or injury by heat in case the contents of the building should be burned.

In the drawings, A A represent metallic beams or girders, which may have the usual end support in the walls of a building. These beams may vary more or less in form, as may be desired, since the application of my invention

is not limited to any particular form of girder or beam. The form shown is, however, the one most commonly employed in building. These girders I inclose on all sides, both upper and lower flanges, *a a*, and top and bottom surfaces, with tile B, made of fire-clay or of similar material combining strength with the properties of non-conduction of and non-destruction by heat. A shape or form is given the inner faces of these tile B the counterpart of the adjacent surface of the girder, so that the two may match or fit closely together—as, for example, in the forms shown in the drawings, grooves or cuts *b* are made across the inner face of each tile, corresponding in size and depth to the upper and lower side flanges, *a a*, of the girder, and the rest of this face is so shaped that when the tile are placed upon the opposite sides of the girder, as shown, they shall meet above and below the girder, as at *b'*, the flanges *a* shall occupy the grooves *b*, while the inner faces may or may not bear against the web *a'*. By arranging these tile along the length of the girder, as shown, and luting with fire-clay or other suitable material the joints between tile, the girders will be wholly inclosed or incased on all sides, top and bottom, both upper and lower flanges. The thickness of this inclosure will, of course, depend upon the dimensions of the tile over those of the girders, which may be varied, as desired, by the builder.

I also make channels or grooves *d* along the inner face of the tile, which afford continuous air-passages along either side of the web *a'*. These passages may communicate, by means of suitable flues in the walls, with the outer air, and they serve a very important purpose in assisting to maintain the normal temperature of the girders. The lower edges of these tile B are made thicker than the upper, so as to give their outer faces, *d'*, a sloping direction, as shown. The tile thus serve not only to inclose and protect the girders, but also as skew-backs to support the work between the girders. This work consists of fire-clay or equivalent tile C, having curved or arched back ribs, *c*. The ends of these tile are fitted to rest upon and be supported by the skew-backs or sloping faces *d'*, and when arranged in place side by side the lower faces



of C form a practically continuous surface, not only with each other, but also with the bottom faces of tile B. The surface thus formed may be roughened for receiving the plaster *h*. The ceiling thus formed will afford the best possible protection against heat to the work above.

The curve on the upper edges of ribs *c* is, by preference, the same as that of the arches E, and they may serve as forms or centers for turning or shaping such arches. These arches may be built of brick or other suitable materials, and they rest upon and are supported by the skew-backs *d'*. Air-chambers D are thus formed between E, C, and *c*, which assist materially in protecting the under side of the arches E against heat; and the better to accomplish this I make passages *c'*, in any desired number, through the ribs *c*, and thus establish air-communication between the chambers. These chambers may also open into flues in the walls, which communicate with the open air. The spaces above the arches E, in line with the top of tile B, are filled with any suitable concrete F, or its equivalent, having fire-proof qualities or properties such that the arches will be protected against heat from above. A level surface will also be secured for laying a floor or a roof.

If a tile floor is desired, a thin layer of cement is first prepared on the surface of the bed formed by F and B, and the tile are laid in this cement in the usual way. In case a floor of boards, H, is desired, strips *r*, having by preference a dovetail form in cross-section, are embedded in the upper surface of F, so as to be held firmly thereby. A layer of asbestos sheets, *s*, or other equivalent sheets having similar fire-proof properties, are arranged over the entire surface to be covered by boards H, and these boards are then laid on the surface thus prepared and securely nailed to the strips *r*.

In case the contents of the building thus constructed should be burned the boards H, and, perhaps, the strips *r*, would also be burned; but owing to the complete protection of the girders A and arches E, both above and below, by means of tile B, tile C, chambers D, and concrete F, such burning could not endanger the stability of the girders and arches, and, therefore, of the building.

In case a roof is to be prepared on the upper surface of F and B, I lay the asbestos sheets *s* over such surface, and coat this with any suitable petrifying material or cement to render it water-proof; or the strips *r*, sheets *s*, and boards H may be employed, and these may be covered with slate, tin, or other material, as desired.

The main purpose of my invention is to protect the girders A and arches E both above and below, and in effecting this object it will be observed that, while the girders are the main supports, the other members of the structure have more or less of mutual action in protecting each other and securing their common support. Thus, for example, the tile B cover

and protect the girders A on all sides, top and bottom, and they form the air-passages *d* for further protection. They, in turn, are supported by the girders, to or against which they are held by the members C, E, and F. Again, these tile serve as skew-backs for such members. The tile C are supported by B. They form a surface along with B for ceiling. They afford fire-proof protection for arches E, along with the air-chambers D, and their ribs *c* serve as forms or centers for turning the arches, while these arches support, along with the skew-backs *d'*, the concrete work F, and they, in turn, are protected by such concrete. If desired, this concrete work F may be made higher, so as to cover the upper edges or top of tile B; but I do not consider this necessary, provided these tile be made sufficiently thick, as in such case they will afford ample protection. This thickness will, of course, depend upon the size of the building and the exposure to heat to which the work may be subjected.

The skilled architect can readily adapt such dimensions to the necessities of each case.

I am aware that it is not new to inclose the girders of a building on all sides with tile, and also to fill the spaces between such inclosed girders with hollow tile-work of different forms, but without separate supporting-arches of masonry between girders; also, that tile inclosing the lower part and flanges only of the girders have been combined with intermediate supporting-arches, and with hollow tile-work under such arches, which tile-work was made of short irregular-shaped blocks keyed in position by their form and mutual resistance; but none of these constructions embody my invention, as hereinafter claimed.

In my invention all the parts inclosing and between the girders, including the arches, can be put in place, after the walls of the building are up and the girders are in place, without the necessity of using temporary supports that are to be taken down when the work is finished. This cannot be done in any of the constructions of which I have heretofore had knowledge, as either the tubular girder-tile therein used must be placed upon the girders before the girders are in place, which is wholly impracticable, or, on the other hand, temporary supports must be erected for the work between girders while it is being arranged, which adds materially to the cost of such structures.

I claim herein as my invention—

1. In a fire-proof construction, the combination of girders A and fire-clay tile B, the latter being adapted to inclose the girders by arrangement of duplicate parts upon both sides thereof, and having longitudinal grooves *d* upon their inner faces, adapted to form, when the tile are in place, continuous air-passages along the web of the girders and in direct contact therewith, substantially as set forth.

2. The combination of girders A, tile B, adapted by arrangement upon both sides of the girders to wholly inclose them, both up-



per and lower flanges, arches E, and tile C, the latter being adapted in length to span the space between the inclosed girders, the whole being constructed, arranged, and supported substantially as set forth.

3. The combination of girders A, tile B, arches E, tile C, adapted to form with tile B a ceiling and protect the girders and arches on their under side, and concrete F, adapted to form with tile B a floor or roof bed, and protect the girders and arches on their upper side, substantially as set forth.

4. The combination of skew-back tile B, arches E, and tile C, the two latter resting upon the skew-back, and the tile C having curved perforated ribs *c* on their back for turning the curve of the arches and forming communicating air-chambers D between C and E, substantially as set forth.

5. A fire-clay girder-tile, B, having on its outer face a sloping surface, *d'*, adapted to form the skew-back of an arch, and on its inner face an air-channel, *d*, and recesses *b*, the latter being adapted to receive both the upper and lower flanges of an I-beam, substantially as and for the purposes set forth.

6. A fire-clay ceiling-tile having an extended surface, C, and arched perforated back rib, *c*, substantially as described.

In testimony whereof I have hereunto set my hand.

EDWARD M. BUTZ.

Witnesses:

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