

No. 757,519.

PATENTED APR. 19, 1904.

G. A. TURNBULL.
FIREPROOF BUILDING CONSTRUCTION.

APPLICATION FILED DEC. 8, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

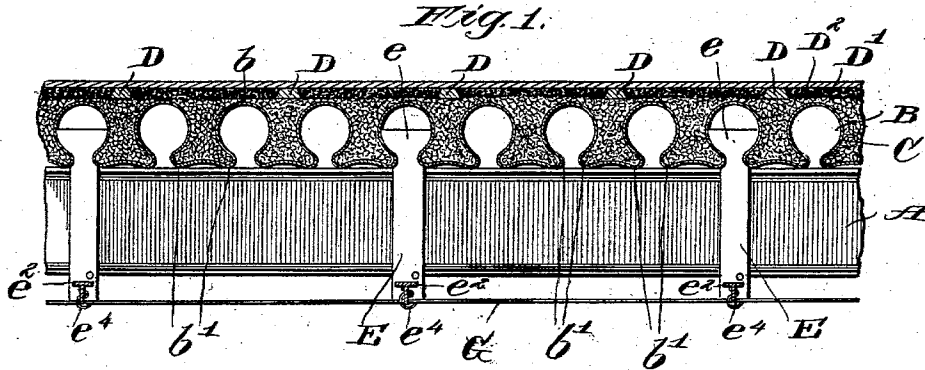
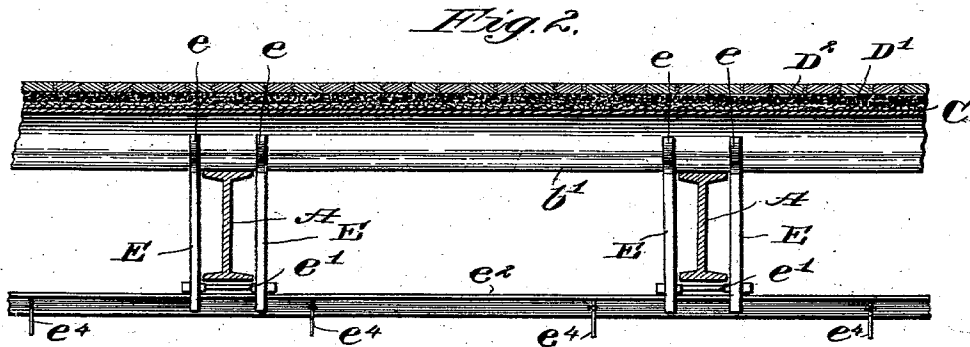
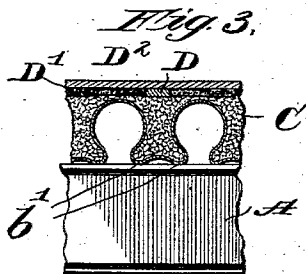
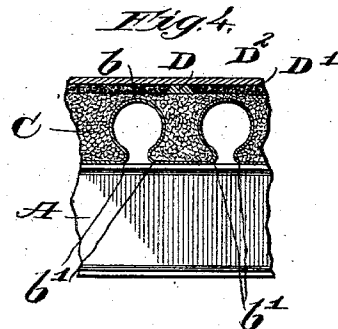


Fig. 5.

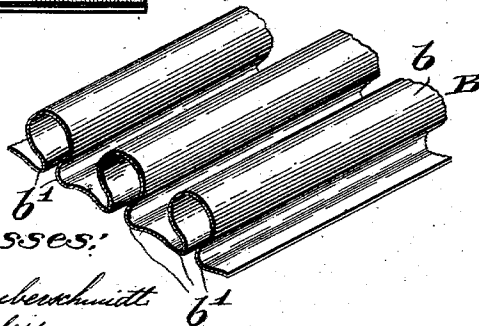


Fig. 6.



Witnesses:

J. D. Pauberschmitt
R. W. Ashley

Inventor:

George A. Turnbull
By Charles H. Hill

Atty.

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G. A. TURNBULL.
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APPLICATION FILED DEC. 9, 1901.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 7.

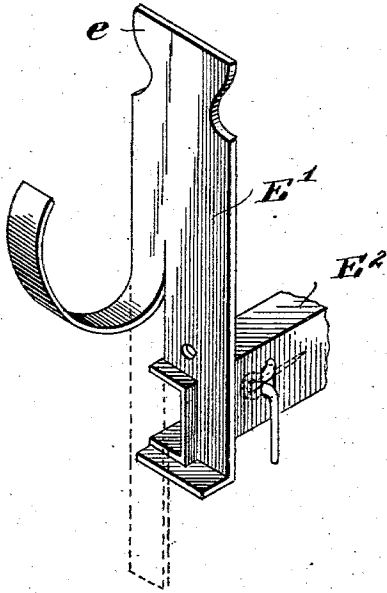


Fig. 8.

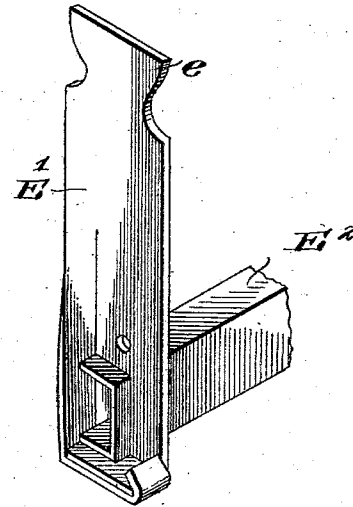


Fig. 9.

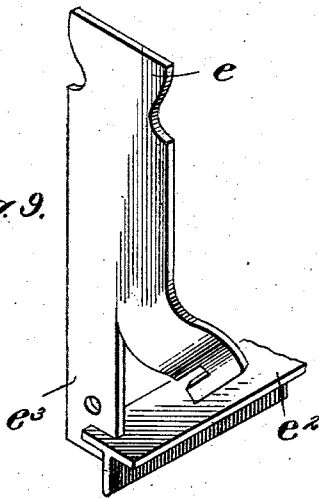
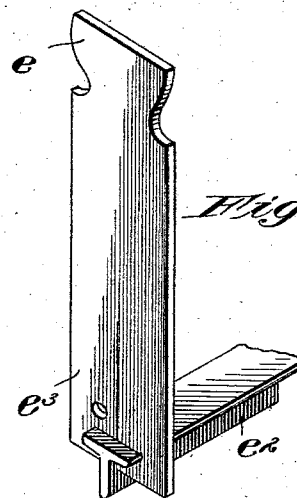


Fig. 10.



Witnesses:

*J. A. Pauberschmidt,
Rev. Ashley*

Inventor:

*George A. Turnbull
By Charles M. Niles
Atty.*

UNITED STATES PATENT OFFICE.

GEORGE A. TURNBULL, OF CHICAGO, ILLINOIS.

FIREPROOF BUILDING CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 757,519, dated April 19, 1904.

Application filed December 9, 1901. Serial No. 85,220. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. TURNBULL, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fireproof Building Constructions; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in fireproof building construction, and more particularly the construction of floors and ceilings for fireproof buildings.

Heretofore many different constructions have been devised for rendering the floors and ceilings of a building fireproof, or partly so. In such constructions tile has been largely used, and in some instances the I-beams or other girders have been connected with sheets of corrugated iron or the like laid on the lower flanges thereof and concrete or other similar material has been placed thereon, embedding the said I-beams therein and of a sufficient thickness to extend above the same. Such constructions have been objectionable owing to the fact of their great weight. Furthermore, inasmuch as the concrete lies against the beam it is evident that heat applied to the concrete heats the beam, thereby causing expansion and contraction, which tends to crack and break the concrete.

It is a well-recognized fact that dead-air spaces afford the best protection from changes in the atmosphere.

The object of my invention is to provide a floor and ceiling construction of great strength and little weight as compared with any other construction and so constructed as to provide ample air-spaces on both sides and above and below the I-beam girders of the floor, thereby protecting the girder on all sides and from above and below from the action of changes in temperature. The ceiling construction embodied in my invention is of great strength and little weight and is designed to be supported wholly from above the I-beam girders and is constructed wholly of metal.

The invention embraces many novel features of construction; and it consists in the matters hereinafter described, and more fully pointed out and defined in the appended claims.

In the drawings, Figure 1 is a section of a construction embodying my invention, taken longitudinally of the floor-girder. Fig. 2 is a similar section taken transversely thereof with the lathing omitted. Figs. 3 and 4 are fragmentary details of modified forms of the corrugated sheet. Fig. 5 is a perspective view of a corrugated metallic sheet embodied in my invention. Fig. 6 is a detail of the hanger and ceiling-strips. Figs. 7 and 8 are perspective views illustrating one form of hanger and the manner of securing a channel-iron ceiling-strip thereto. Figs. 9 and 10 are perspective views of a slightly-different form of hanger and illustrate means for securing a T-iron ceiling-strip thereto.

In carrying out my invention, A indicates the I-beam girders designed to support the floor and ceiling of the building. B indicates a corrugated sheet of metal extending transversely of said girders and forming the foundation of the floor. Said sheet, as shown in Fig. 5, is provided with a plurality of parallel cylindric corrugations or rolls *b*, rounded at the top and partly closed at the bottom and extending longitudinally of the sheet. Between said rolls *b* the metal is bent inwardly, as shown in Figs. 1, 3, 4, and 5, to form supporting-points on each side of the opening into said rolls, as indicated by *b'* *b'*. Between said supporting-points *b'* *b'* the metal may be arched upwardly or concaved, as indicated in said figures, thereby providing a very small surface of contact for the corrugated sheet with the I-beam. Said sheets are placed on said I-beams with the tops of the rolls turned uppermost, and fine concrete is spread over the same, as indicated in Figs. 1, 3, and 4, packed solidly in spaces between said rolls and laid to a desired depth above the top thereof. Furring-strips D are laid desired distances apart preferably between said rolls, as shown in Figs. 1, 3, and 4, and a layer of Portland cement or other fireproofing material adapted to serve as a thermal insulation is laid flush

with the tops thereof. Said furring-strips, if preferred, may be narrower at the top than at the bottom, thereby rigidly securing the same therein. The floor B² is laid in the usual manner and secured to said furring-strips in close contact with the cement.

In many constructions where a ceiling is not necessary the floor as thus described will be all that is necessary to form the finish. If it is desired to provide a ceiling below the I-beams, metallic hangers E, each having a head e, which fits closely in the corrugations formed by the rolls b, as indicated in Fig. 1, are provided. Said hangers may be of any desired length, but, as shown, extend somewhat below the bottom of the I-beam. The lower end of each is formed to engage the metallic ceiling-strips e', which extend transversely of the I-beam, as indicated in Figs. 1 and 2, and which form the support for the metallic lath G of any desired kind. Said ceiling-strips are similar to those shown in my former patent for metal lath or sheathing, issued July 11, 1899, and numbered 628,565, and may be either a T-iron, as indicated in Figs. 1, 2, 6, 9, and 10, or channel-iron, as indicated in Figs. 7 and 8, and are apertured through the webs thereof, and the head of a staple e', of wire, is passed through each aperture and a lath-nail or other fastening means passed into the head to secure the staple in position. One of the ends of each staple is bent downwardly, as shown in Fig. 2, and affords means for securing the lath thereto. If of T-iron, the ends of the hangers may be formed, as indicated in Figs. 1 and 6, to receive the same, in which instance said hangers may be turned sidewise and inserted upwardly into the corrugations, then turned to the position indicated in Fig. 1. The hangers being located any desired distance apart, the T-iron, extending transversely of the I-beams and cut to any desired length, may be slid through the lower ends of said hangers, as indicated in Fig. 2.

Obviously it may sometimes be inconvenient, owing to the lack of space, to slide the ceiling-strips into position in the ends of the hangers. To obviate this difficulty, the hangers may be slit upwardly, as indicated in Figs. 9 and 10, and one side thereof bent, as indicated in Fig. 9, whereupon the T-iron may be supported with one flange engaged in the cleft of the portion e'. When a sufficient length of T-iron is thus supported, the other or upturned side of the hanger is turned downwardly by means of a hammer, wrench, or other appropriate tool and the notch in the other side of the hanger engaged on the other flange of the strip, as indicated in Fig. 10. If the channel-bar E² is used, the hanger E' is slit longitudinally at one side of a median line and an angular notch cut in the broader portion thereof, near the lower end, of a size adapted to receive the channel-bar E². The lower end of said broader section below said

notch is turned upwardly to form a horizontal supporting-flange for the ceiling-strip. When said hangers are inserted in position, said narrower side portion may be turned up, as shown in Fig. 7, and any desired number of the hangers arranged in alinement and a channel-bar ceiling-strip laid in said notches. By the use of a hammer, wrench, or other tool the narrower side member may then be turned downwardly beneath the flange, forming a clench and providing a positive support of great strength for the ceiling. The lath G, preferably metallic, of any desired kind, is secured on the under side of the ceiling-strips by means of the depending ends of the staples, which pass through the lath and are then bent up into engagement with the lath, as indicated in Fig. 1. The ceiling is then plastered in the usual manner. The ceiling being suspended out of contact with said channel-beams by the hangers, which are also out of contact with the beams, provides a continuous air-space below and at each side of the beams. In other words, the only portion of the floor or ceiling construction having contact in any way with the beams are the points b' b', between which are air-spaces.

The operation is as follows: The corrugated sheet is so formed as to provide substantially a plurality of tubes open at the lower side and extending transversely of the beams, the connection between the same being also arched, thus providing a minimum contact with the beam, while insuring maximum strength when filled with concrete, as shown. Said arched and tubular construction also reduces the amount of concrete material to the minimum, thus greatly reducing weight, while providing abundant dead-air space above the beams. The ceiling-strips being rigidly engaged in the lower ends of the hangers, while the upper ends of the hangers are permanently engaged in said corrugations, the tubular portions of the same afford a lock for the hanger, effectually securing the same from displacement or movement due to any vibration the building can possibly be subjected to.

As a further improvement I have provided apertures in the lower ends of the hangers below the beams and after the hangers are secured in position secure bolts therein of a length sufficient to avoid forcing the ends of the hangers into contact with the beams. If preferred, the middle portion of the bolt may be provided with shoulders to abut against the inner side of the hangers, while the head and nut, with suitable shoulders, abut against the outer side of the same, thus firmly clamping the lower end of the hangers in position.

Obviously the construction shown may be applied to other buildings than to a floor or ceiling construction, and if preferred, the form of said corrugations or rolls and the degree of openings between the same may be varied and the form of the top of the hanger

may be modified or the filling material used upon the corrugated sheet may be varied.

Many features of construction may be modified without departing from the principle of this invention.

I claim as my invention—

1. In a fireproof construction, the combination with a support of fireproof coverings on opposite sides thereof, air-chambers between the support and one of the coverings and means engaged on the walls of said air-chambers for supporting the other covering therefrom out of contact with the support.

2. A fireproof construction comprising a metallic base consisting of corrugated sheet metal, said corrugations forming parallel cylindric loops or folds partly opened on the inner side thereof and arched bends between the folds, a filling material covering said loops or folds on the convex side thereof and filling the spaces between the same.

3. In a fireproof construction a sheet of metal having corrugations therein forming shallow concave and deep cylindrical depressions alternately disposed in one side of said sheet and deep irregular depressions in the other side thereof and a fireproofing material engaging in said irregular depressions.

4. The combination with girders, of corrugated sheets supported transversely thereon, said corrugations forming upwardly-directed tubular loops or folds partly closed at the bottom thereof, a corrugation between adjacent loops or folds, a plurality of shoulders on the inner surface of said sheet adapted to rest on said girders, a filling of concrete or the like covering the loops or folds on the convex side thereof, a plurality of hangers having heads thereon complementary with the inner side of said loops and engaging therein and a ceiling suspended therefrom out of contact with said girders.

5. The combination with girders, of sheets of metal supported transversely thereon said sheets comprising a plurality of parallel corrugations having upwardly-directed loops or folds partly closed at the bottom, said sheet curving upwardly between said corrugations or folds, fireproofing material filling the spaces between the corrugations and covering the upper surface thereof, a floor secured thereon and a plurality of hangers engaged in said corrugations and acting to support therefrom a ceiling or the like.

6. In a device of the class described, the combination with the girders of a corrugated plate or sheet extending transversely thereof, upwardly-directed loops or folds in said sheet forming downwardly-opening partly-closed corrugations, said corrugations forming regular cylindric depressions in one side of said sheet and irregular depressions in the other side thereof, fireproofing material filling said sheet on the upper side thereof to a point above said loops or folds, a hanger secured in

said corrugations and extending below the girders, a ceiling-strip engaging in the ends of said hanger and acting to lock the same in position and means for securing lath thereon.

7. The combination with metallic girders of a sheet supported thereon provided with a plurality of partly-tubular corrugations partly open on the under side, a hanger engaged at one end in said corrugations and extending downwardly on each side and out of contact with the girders, means at the lower end of each hanger for engaging ceiling-strips and permanently-attached means on the ceiling-strips adapted to secure thereto metallic lath, said girders being free from contact with the structure thus formed with the exception of the contact therewith of the corrugated sheet.

8. A floor and ceiling construction comprising the combination with metallic I-beams of a partly-metallic floor supported thereon and providing air-chambers transversely of the beams above the same and means engaging in said air-chamber of the floor adapted to support a ceiling below the beam and free from contact therewith.

9. A flooring and ceiling construction comprising transverse beams, a sheet supported thereon, partly-tubular corrugations therein and an upwardly-curved portion between the corrugations, hangers engaging in said corrugations by heads shaped to conform thereto and supports at the lower end of each hanger adapted to positively engage and support a ceiling-strip and means on the ceiling-strip for securing metallic lath thereto.

10. In a device of the class described a hanger comprising a strip of metal shaped at the upper end to provide a head and recessed at its lower end to admit therein an article to be supported.

11. The combination with a hanger provided at one end with a head and having the other end transversely and longitudinally slotted, of a ceiling-strip engaged thereby and means permanently secured thereon for engaging lath thereto.

12. A hanger of the class described comprising a metallic strap having on one end thereof a head and having the other end thereof slit longitudinally and notched horizontally to engage a ceiling-strip substantially as described.

13. A ceiling-strip for the purpose specified comprising a metallic bar provided with elongated apertures along its length, a wire clip engaged in said apertures each clip bent at one end to form a locking-key therefor and the other end adapted to be bent up and engage thereto metallic lath or the like.

14. The combination with supporting-beams of a floor supported thereon and provided with a plurality of tubular air-spaces above and extending transversely of the beam, hangers engaged in said air-spaces and depending on each side of the beam and out of contact therewith, shouldered bolts engaging the lower ends of

said hangers below and out of contact with the beams, and means carried on the lower ends of said hangers for supporting the ceiling.

15 In a floor construction, the combination
5 with supporting-beams of a sheet of metal laid transversely thereon and provided with partly-tubular corrugations extending transversely of the beam, hangers engaged in said corrugations on each side of the beam and out of
10 contact therewith having a length greater than the depth of the beam, bolts engaging the lower ends of said hangers together and means there-

on for spacing said lower ends of the hangers out of contact with the beam and means on the lower end of each hanger for supporting there- 15 from a ceiling.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

GEORGE A. TURNBULL.

In presence of—

A. B. HILLS,

LOUIS J. DELSON.