P. M. STEWART.

BUILDING CONSTRUCTION.

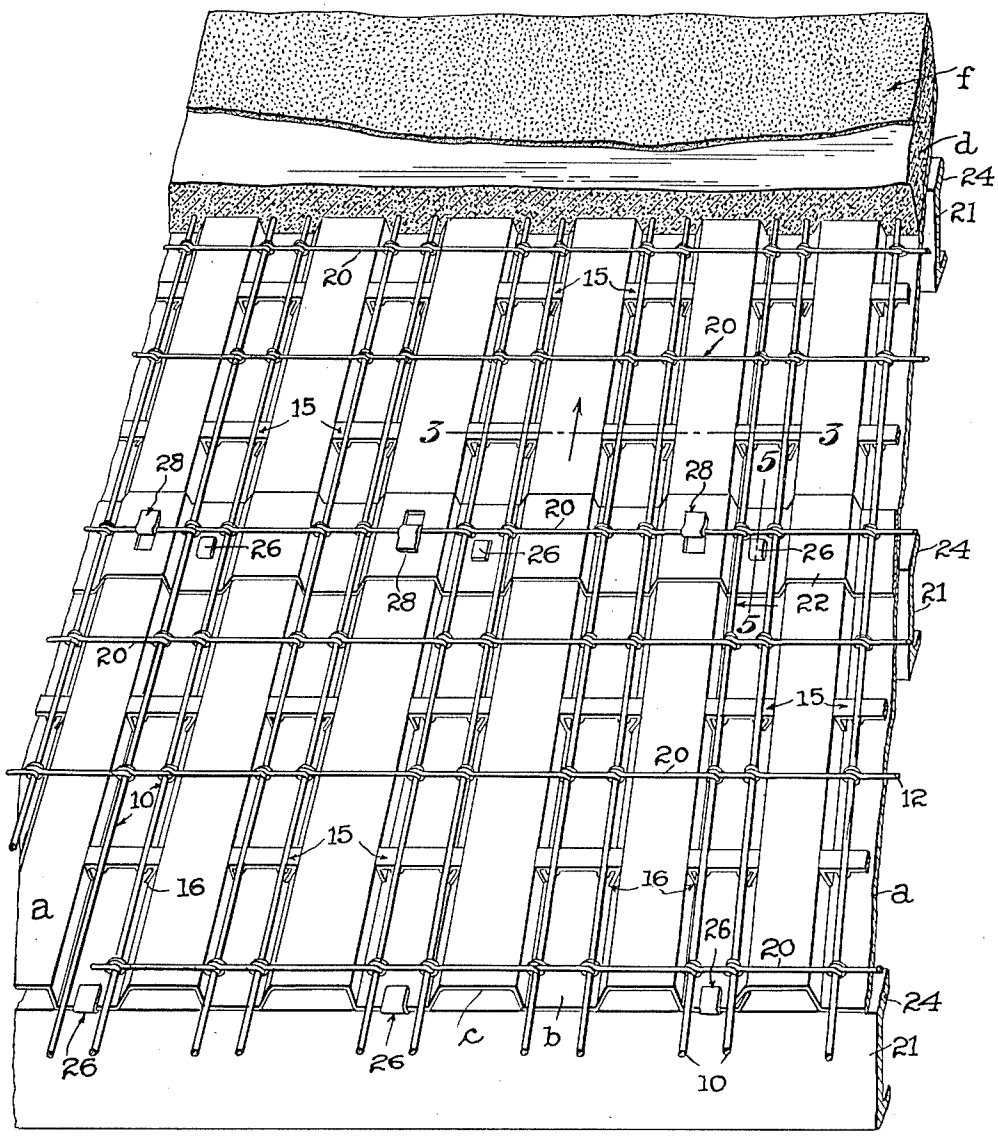
APPLICATION FILED OCT. 11, 1911.

1,073,540.

Patented Sept. 16, 1913.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

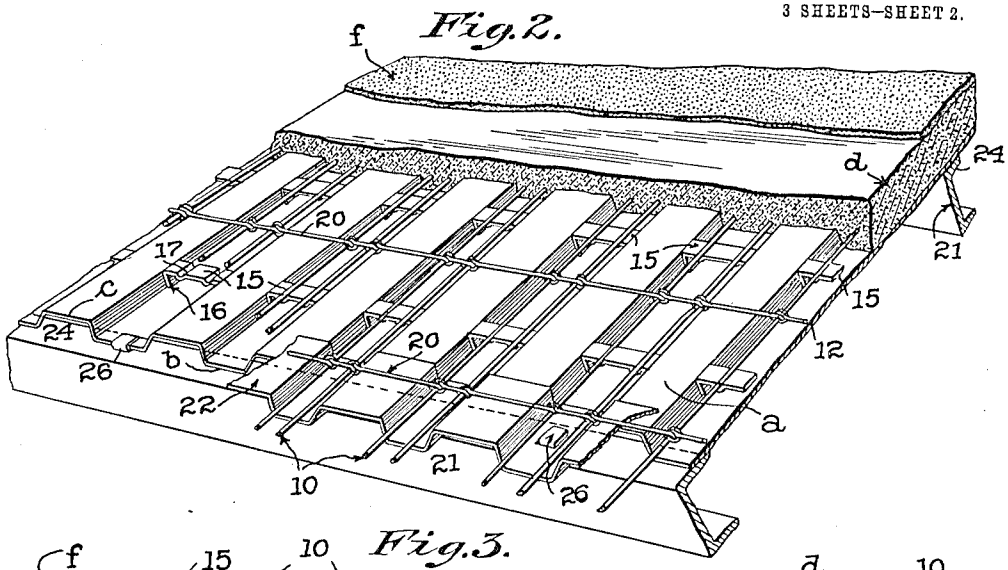


Fig. 3.

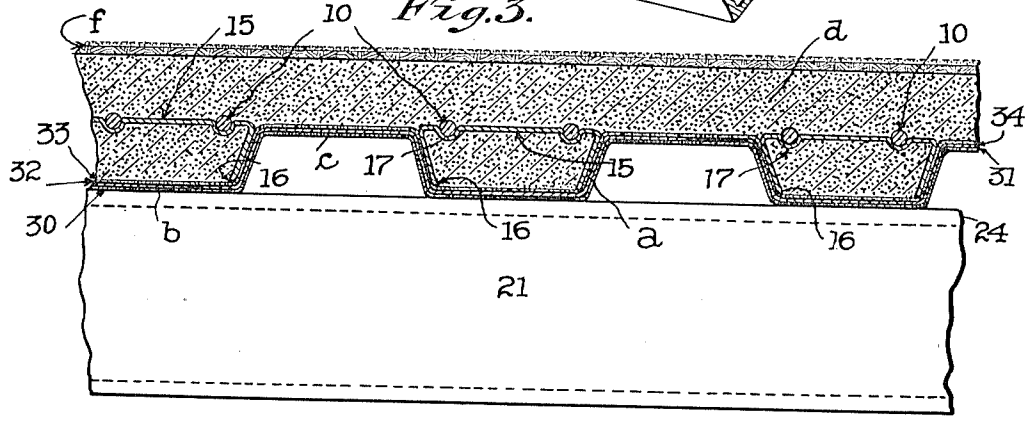
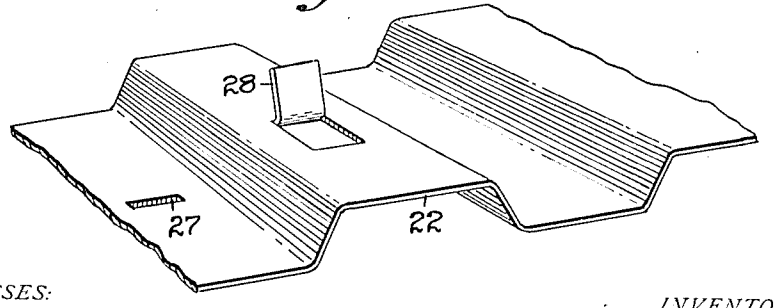


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

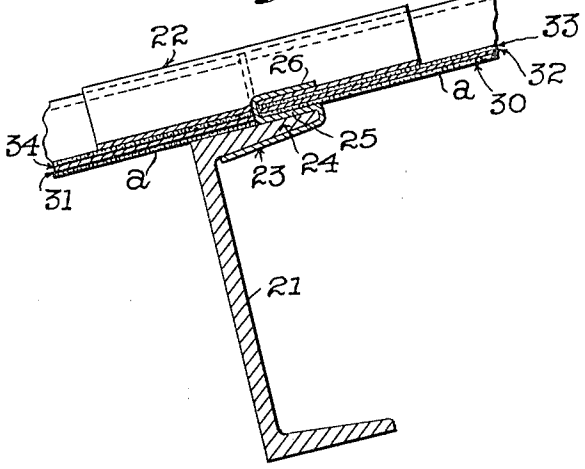


Fig. 6.

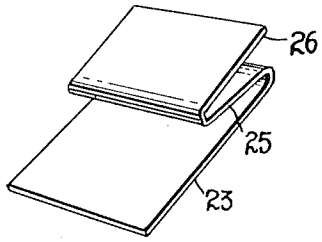


Fig. 8.

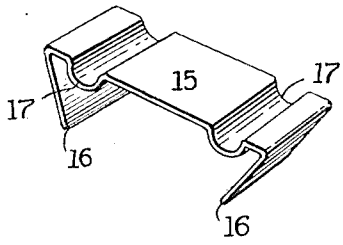


Fig. 7.

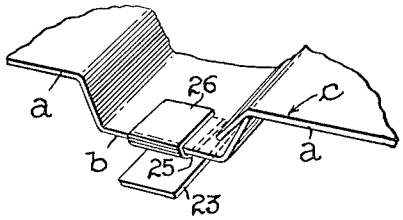
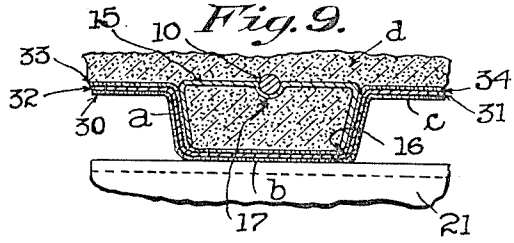


Fig. 9.



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UNITED STATES PATENT OFFICE.

PEREZ M. STEWART, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO ASBESTOS PROTECTED METAL CO., A CORPORATION OF MASSACHUSETTS.

BUILDING CONSTRUCTION.

1,073,540. Specification of Letters Patent. Patented Sept. 16, 1913.

Application filed October 11, 1911. Serial No. 654,123.

To all whom it may concern:

Be it known that I, PEREZ M. STEWART, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented an Improvement in Building Construction, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to composite building structure especially designed and adapted among other uses to be employed as the roof, walls and floors of mills and other buildings.

The invention has for its object to provide a reinforced concrete structure of minimum cost, which can be erected in the building in condition for use, and with which a light colored or white interior finish may be obtained without the use of plaster, thereby avoiding the cost from this source; and in which the concrete and metal reinforcement therein are protected against corrosion by moisture within the building, which is prevented from penetrating the concrete and setting up electrolytic action with its attendant weakening of the reinforced structure, and which moisture is also prevented from injuring the material or work being carried on in the building by dropping thereon.

To this end, the composite building structure is composed of a backing layer of reinforced concrete and a facing of corrugated asbestos protected metal, which constitutes a mold for the reinforced concrete while the latter is being formed, and a facing for the finished article.

Provision is made for mechanically bonding the reinforcing metal of the concrete with the corrugated asbestos protected metal, and provision is further made for supporting and centering the reinforcing metal with relation to the corrugated asbestos protected metal.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a view of a sufficient portion of a roof of a building embodying this invention to enable it to be understood, a portion of the concrete being omitted to expose the structure underneath the same. Fig. 2, a perspective of a portion of the roof shown in Fig. 1. Fig. 3, a cross section on an enlarged scale of the completed structure, taken on the line 3—3, Fig. 1. Fig. 4, a detail of the joint cap to be referred to. Fig. 5, a detail in section on an enlarged scale, taken on the line 5—5, Fig. 1. Figs. 6, 7 and 8, details to be referred to. Fig. 9, an enlarged sectional detail to be referred to.

Referring to the drawing, *a* represents a sheet or layer of asbestos protected metal, which is provided with substantially angular corrugations forming substantially parallel alternate valleys or troughs *b* and elevations *c*, and *d* is a layer of concrete, which is of substantial thickness and is formed on the corrugated sheet in a plastic state and allowed to set.

The concrete layer is provided with a metal reinforcement, which may be of any suitable or desired construction, but preferably that herein shown, which is composed of tension rods 10 located above the troughs *b*, and supported upon saddles or chairs located in said troughs, said saddles comprising cross bars 15 having inclined bent ends forming feet 16, which rest on the bottom of the troughs. The cross bars 15 are provided with one or more depressions or concavities 17 for the reception of the tension rods, each of which is thus held in perfect alinement and supported above the bottom of the trough a sufficient distance to allow a substantial depth of concrete to be located below them in the finished structure.

The tension rods 10 above each trough may be connected together by cross wires 20.

The upper or outer surface of the concrete layer *d* may be covered with a layer *f* of tar and gravel or other suitable material, when the composite structure is used for roofing purposes.

In the construction of the roof, the corrugated asbestos protected metal sheets are supported upon the roof purlins 21, and are arranged so that the lower end of an upper sheet and the upper end of a lower sheet rest upon the same roof purlin with their edges in close proximity to one another, after the manner shown in Figs. 1 and 5, and the joint between said edges is covered by a corrugated steel cap plate 22, which is firmly secured to the purlin by purlin clips shown in Figs. 5 and 6, said clips having a

lower member 23 to engage the under side of the flange 24 on the purlin, a second member 25 to engage the upper surface of the flange which extends under the lower end of the upper corrugated sheet, and a third member 26, which passes up between the edges of the upper and lower corrugated sheets and through a slot 27 in the joint cap 22 and is then bent over the said cap and hammered or otherwise pressed down on said cap to firmly bind the joint cap and the corrugated sheets to the purlin. The upper member 26 of some of the purlin clips may be bent over the upper corrugated sheet and some over the lower corrugated sheet.

The purlin clips employed at the lowermost or eave purlins, may have their intermediate member 25 made long enough to extend across the upper surface of the purlin and be bent over the lower edge of the corrugated sheet, as represented in Fig. 1.

The joint cap 22 may have one or more elevated sections or portions provided with fingers 28 to be bent over the cross wires 20, (see Fig. 1) and thereby mechanically bond the metal reinforcement of the concrete layer *d* to the corrugated sheet and to the roof purlins.

In constructing a roof such as represented in Fig. 1, the corrugated metal sheets may be laid upon and secured to the roof purlins, their points protected by the metal caps, the latter anchored by the purlin clips, the metal reinforcement placed in position and metallically bonded to the corrugated sheets, for a given or desired portion of the entire roof, before the concrete is applied, so that the concrete workmen can follow in close order as the metal portion of the roof is laid, which serves to expedite the building of the roof for the concrete can be rapidly laid, as the metal reinforcement is not liable to be displaced by being struck by tools in the hands of the concrete workman, owing to the mechanical bonding above described.

The sheet or layer *a* of asbestos protected metal is especially useful in combination with the reinforced concrete layer, as it comprises an outer layer 30 of asbestos, which is affixed by a layer of asphalt or like adhesive material 31 to one surface of a metal sheet or layer 32, which has affixed to its other surface a layer or sheet 33 of asbestos by a layer 34 of asphalt or like adhesive material (see Fig. 9).

The sheets or layers 30, 33, of asbestos for the best results have their exterior surfaces in their natural condition, namely, white in color and absorbent, and as a result, a firm and superior adhesion or union is obtained between the concrete backing layer *d* in a plastic state and the asbestos layer 33, while the white color of the exterior surface of the layer 30 of asbestos, enables the use of plaster as an interior finish for the underside of the roof and floors and the inner surface of the walls to be dispensed with, and the expense of plastering the roof, floors and walls to be avoided. Furthermore, the exterior surface of the asbestos layer 30 being in its natural condition, serves as an absorbent of moisture and prevents water of condensation being formed on the underside of the roof, and thereby avoids the danger of the material or work within the building being spotted and damaged by water of condensation dropping down thereon from the roof.

By reference to Fig. 9, it will be seen that the reinforced concrete layer *d* is protected from moisture from within the building, by the metal sheet 32 and the two layers 31, 34, of asphalt or like bituminous material, and as a result, the metal reinforcement of the concrete layer is protected against electrolytic action and its attendant weakening effects, and a very durable roofing, floor or wall is obtained.

In the present instance, I have shown the composite building material comprising corrugated asbestos protected metal and the layer of concrete as employed for the roof of a building but I do not desire to limit myself in this respect as it may be used for upright walls and floors. Furthermore, each corrugated sheet of the asbestos protected metal may have the reinforced concrete layer formed on it before the section or slab thus produced is placed in position.

The mechanical bonding of the metal reinforcement of the concrete layer to the roof purlins may be used to advantage with unprotected metal sheets and therefore I do not desire to limit this feature of my invention to the use of the same with the asbestos protected metal sheets although I prefer to use the latter.

Claims.

1. In a building construction, in combination, roof purlins, a plurality of corrugated sheets of asbestos protected metal supported by said purlins with abutting sheets resting on the same purlin, a corrugated joint cap covering the joint between the adjacent ends of said sheets, a purlin clip engaging the purlin supporting said abutting sheets and having a member extended up between the edges of said sheets and through said joint cap and bent over the latter, a layer of concrete laid upon the corrugated sheets, tension rods embedded in said concrete above the valleys of the corrugated sheet, cross wires joining said tension rods, and fingers on said joint cap engaging said cross wires, substantially as described.

2. In a building construction, in combination, roof purlins, a plurality of corrugated sheets of asbestos protected metal supported by said purlins with abutting sheets resting on the same purlin, a corrugated joint cap

covering the joint between the adjacent ends of said sheets, a purlin clip engaging the purlin supporting said abutting sheets and having a member extended up between the edges of said sheets and through said cap and bent over the latter, a layer of concrete laid upon the corrugated sheets, saddles in the valleys of said corrugated sheet, and tension rods embedded in said concrete layer and supported by said saddles, substantially as described.

3. In a building construction, in combination, roof purlins, a plurality of corrugated metal sheets supported by said purlins with abutting sheets resting on the same purlin, a corrugated joint cap covering the edges of said abutting sheets and provided with an opening, means extended through said opening and between said abutting sheets for mechanically securing said joint cap to said purlin, and a layer of reinforced concrete laid upon said corrugated sheets, substantially as described.

4. In a building construction, in combination, roof purlins, a plurality of corrugated metal sheets supported by said purlins with abutting sheets resting on the same purlin, a corrugated joint cap covering the edges of said abutting sheets, means for mechanically securing said joint cap to said purlin, a layer of concrete laid upon said corrugated sheets, a reinforcement embedded in said concrete and means for mechanically securing the reinforcement of said concrete layer to said joint cap, substantially as described.

5. In a building construction, in combination, corrugated metal sheets, supports upon which said metal sheets rest, a layer of concrete covering said sheets, a metal reinforcement embedded in said concrete, means for mechanically attaching the metal reinforcement to the corrugated sheets, and means for mechanically attaching the corrugated sheets with the supports for the latter, substantially as described.

6. In a building construction, a composite building structure comprising a corrugated metal sheet having on one surface a waterproofing and insulating cement, a layer of asbestos fabric affixed to said metal sheet by said cement, and a layer of reinforced concrete united to the asbestos fabric by a natural bonding of the fibers of the asbestos fabric with the concrete, said metal sheet having cemented to its opposite surface a layer of asbestos fabric which is exposed and in its natural condition, substantially as described.

7. In a building construction, a composite building structure comprising a metal sheet having on one surface a waterproofing and insulating cement, a layer of asbestos fabric affixed to said metal sheet by said cement, and a layer of reinforced concrete united to the asbestos fabric by a natural bonding of the fibers of the asbestos fabric with the concrete, said metal sheet having cemented to its opposite surface a layer of asbestos fabric which is exposed and in its natural condition, substantially as described.

8. In a building construction, a composite building structure comprising a corrugated metal sheet having on one surface a waterproofing and insulating cement, a layer of asbestos fabric affixed to said metal sheet by said cement, and a layer of reinforced concrete united to the asbestos fabric by a natural bonding of the fibers of the asbestos fabric with the concrete, substantially as described.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

PEREZ M. STEWART.

Witnesses:

JAS. H. CHURCHILL,

J. MURPHY.