April 24, 1934. H. W. COLLINS 1,955,948

BUILDING CONSTRUCTION

Filed Jan. 30, 1931 3 Sheets-Sheet 1

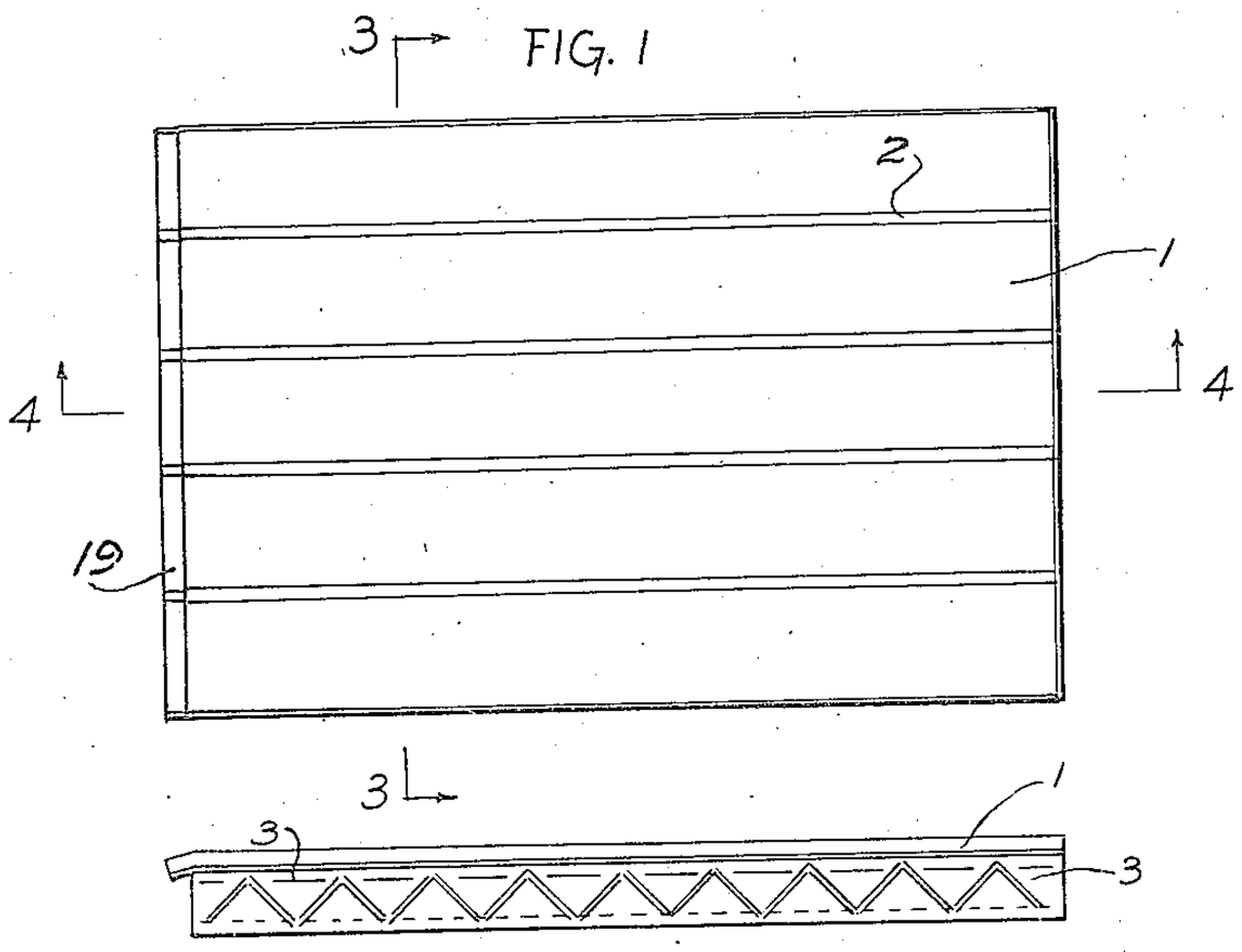

FIG. 1

FIG. 2

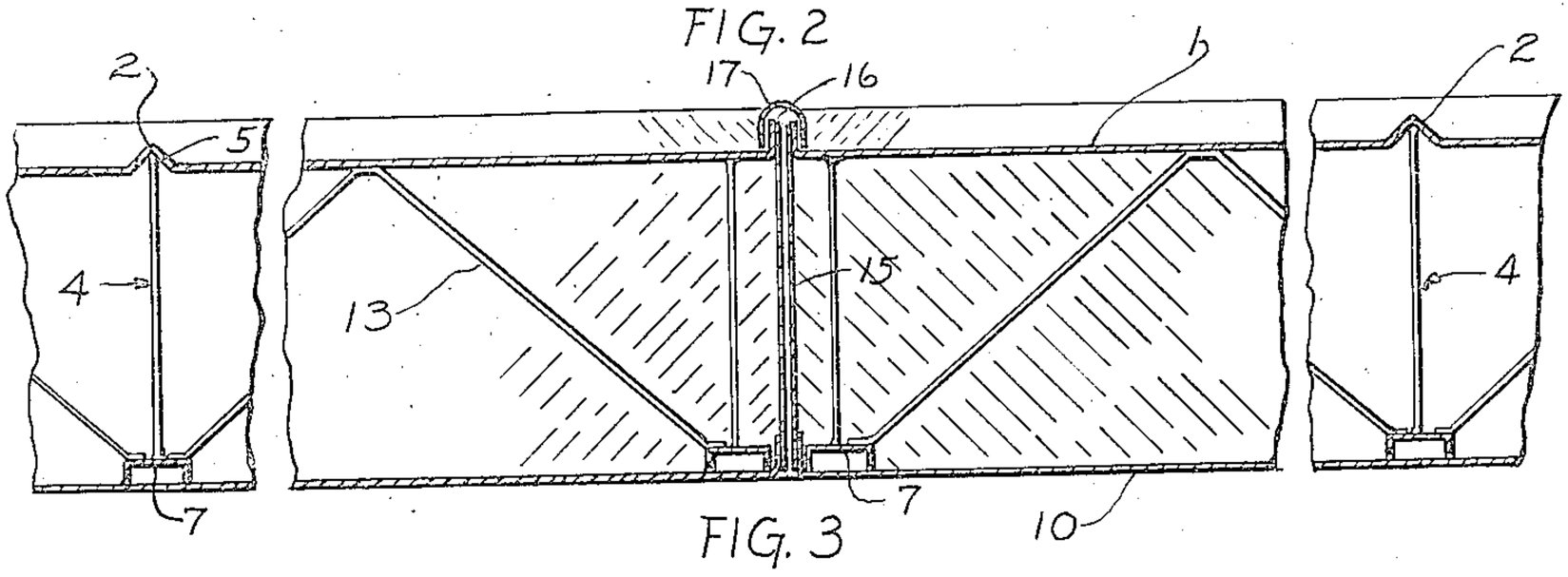

FIG. 3

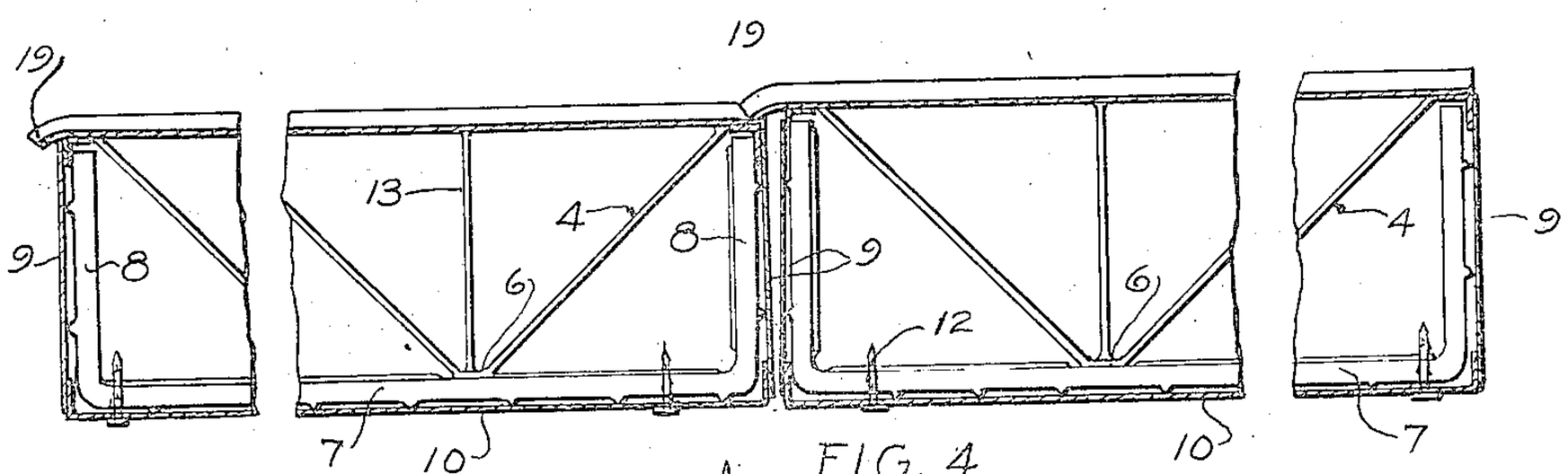

FIG. 4

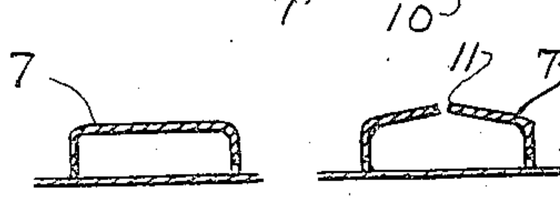

FIG. 5 FIG. 6 FIG. 7

FIG. 8

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FIG. 9

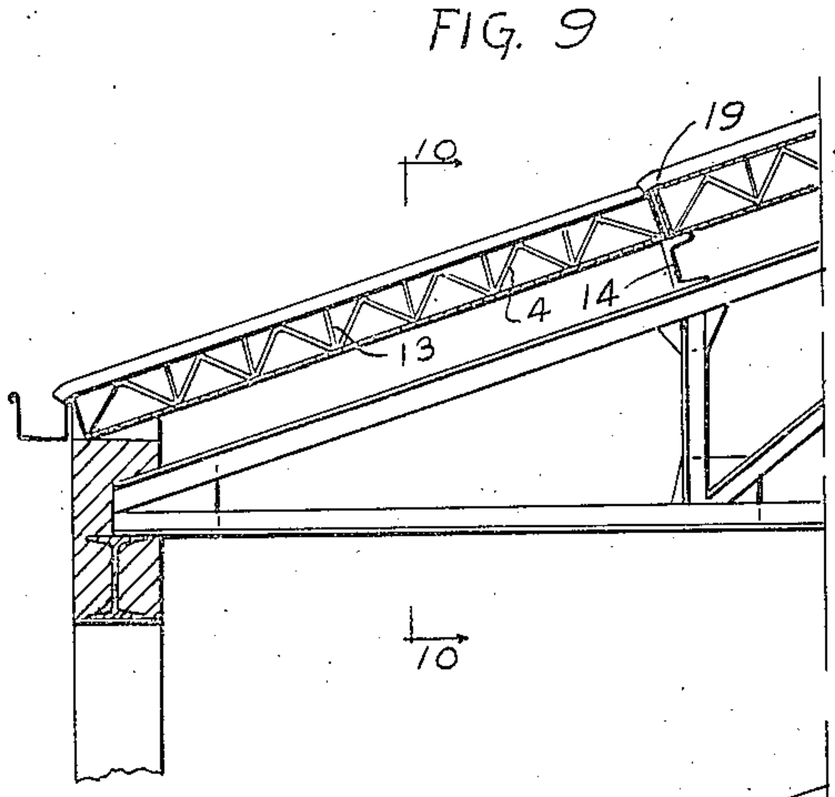


FIG. 10

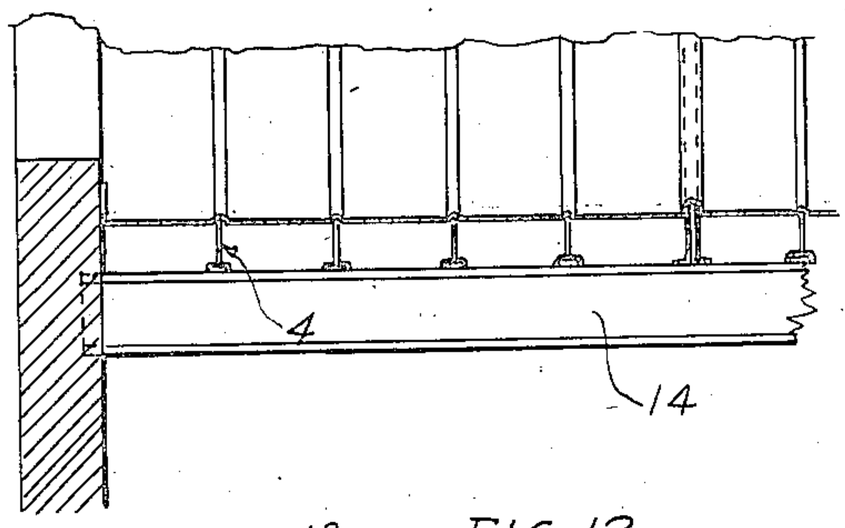


FIG. 12

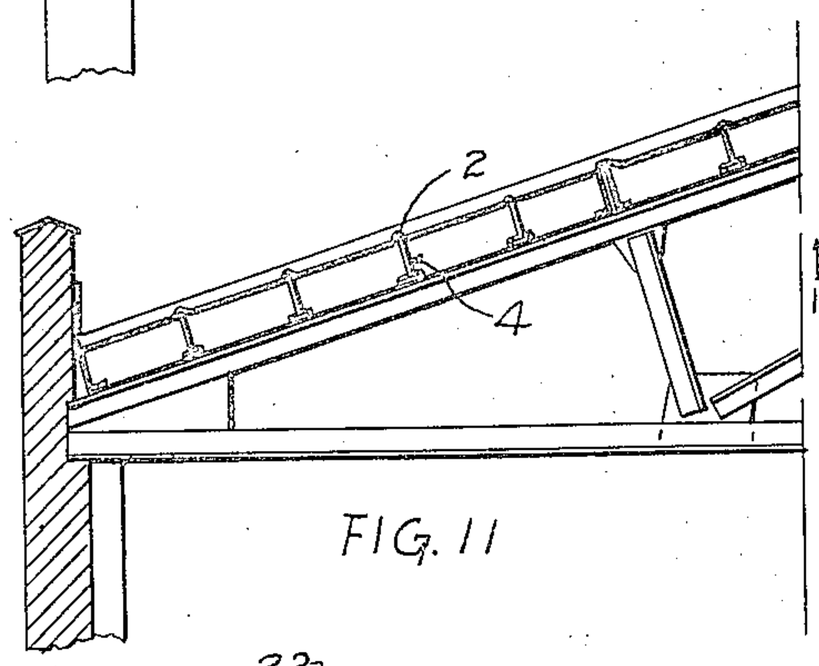
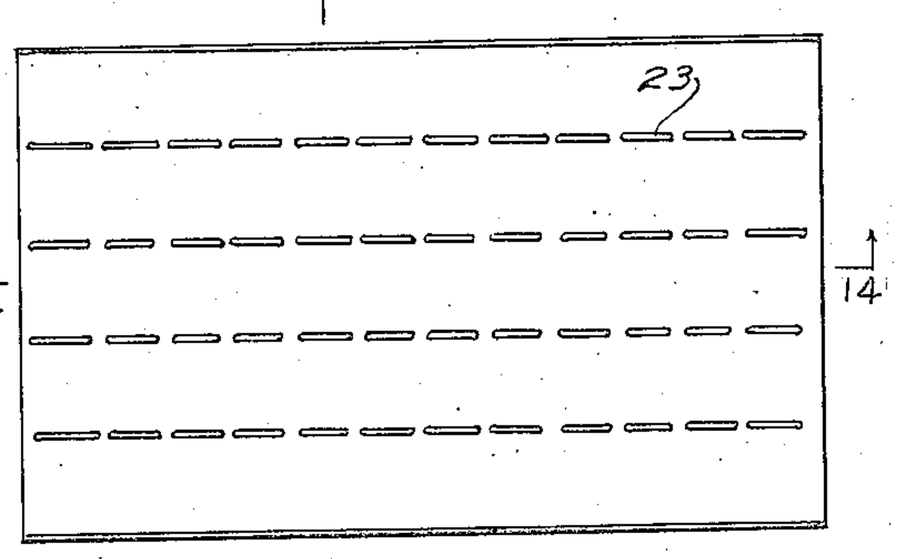


FIG. 11



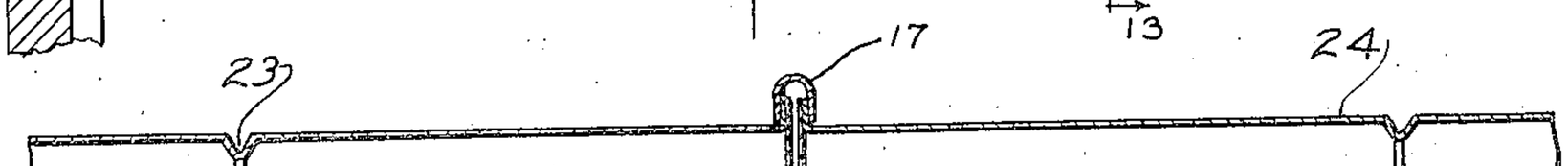


FIG. 13

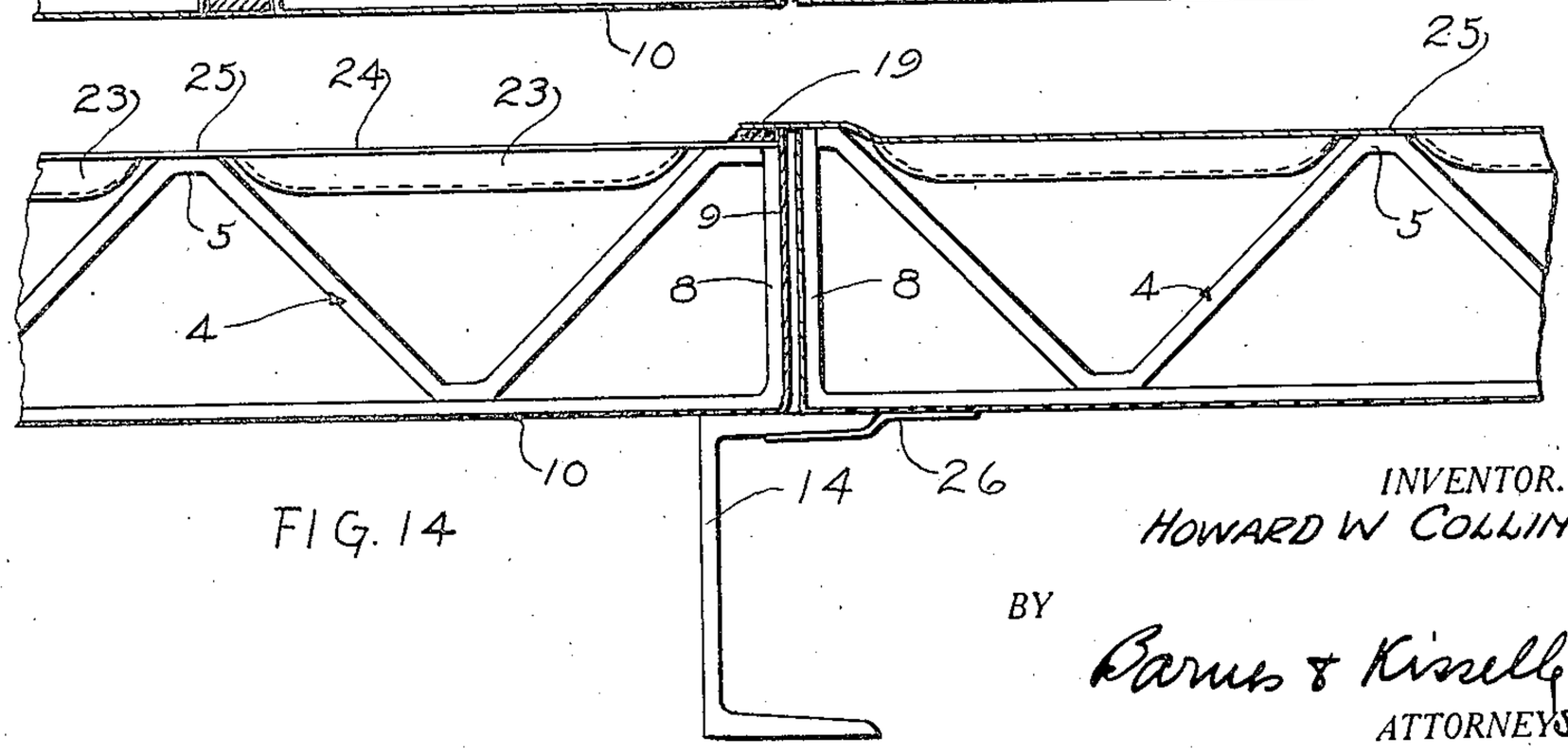


FIG. 14

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BUILDING CONSTRUCTION

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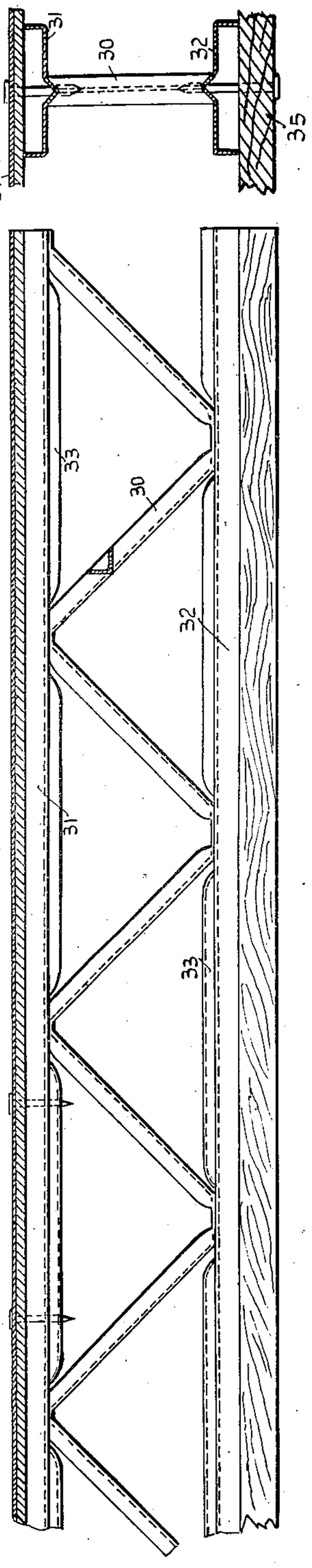

FIG. 16

FIG. 15

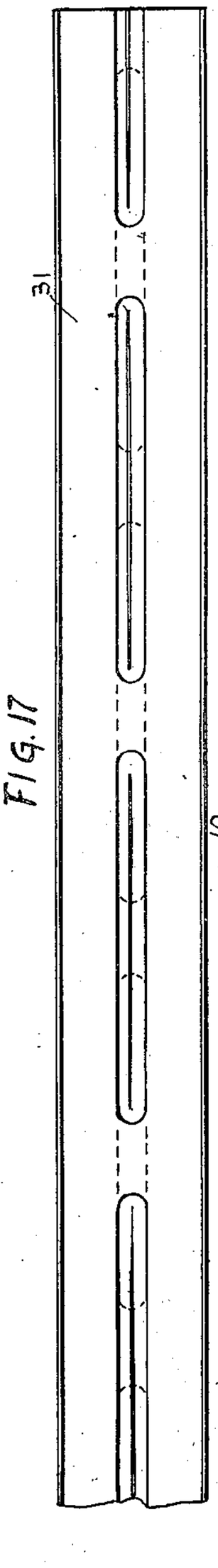

FIG. 17

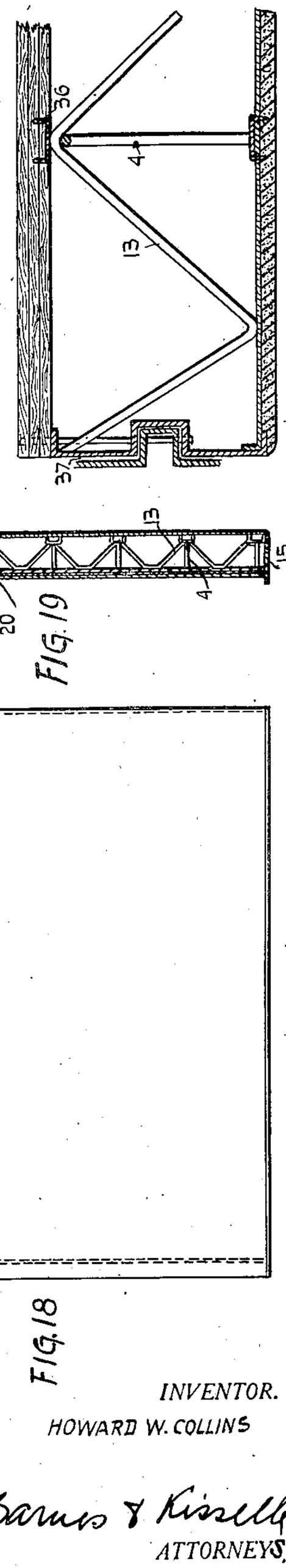

FIG. 20

FIG. 19

FIG. 18

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Patented Apr. 24, 1934 1,955,948

UNITED STATES PATENT OFFICE

1,955,948

BUILDING CONSTRUCTION

Howard W. Collins, Detroit, Mich.

Application January 30, 1931, Serial No. 512,261

11 Claims. (Cl. 189—34)

This invention relates to building construction, and more particularly to complete building units formed of sheet metal, said complete units being directly and quickly assembled to form an extremely strong but light deck or wall construction.

It is an object of the invention to provide a trussed envelope adapted to be applied to the building structure as a unit and joined together with, or in a manner to form, suitable weather-tight joints; also to so form this envelope as to provide a roof or floor deck having a wearing surface of rust resisting material, the bottom, ends and outside of the outermost trusses of the structure being covered to form a fire resisting envelope, each envelope being filled and sealed with fire-resisting heat insulating material of low conductivity.

A further feature of my invention resides in the provision of novel continuous diagonal truss members forming an integral part of the envelope; in this case the top chord of the envelope or deck is preferably corrugated to provide the proper stiffness as a compression member for a series of trusses, the trusses being secured to the top chord within such corrugations whereby to obtain a very efficient slenderness ratio.

Other features of the invention reside in the manner of reducing the conductivity of the unit between the top and bottom of the envelope; the truss members entering into this arrangement having minimum contact between the apexes of the trusses and the top and bottom chords, the sides of the envelope (when formed of metal) being also fabricated to reduce conductivity to a minimum.

Other features reside in the manner of constructing the bottom chord of the truss to facilitate easy application of the bottom envelope by nailing, the bottom of the envelope being perforated in some cases for acoustical properties; in the manner of arranging the truss structure when used in connection with ply wood for floors; and in other details of construction as will be more clearly brought out in the specification and claims.

In the drawings:

Fig. 1 is a plan view of one form of trussed insulating envelope embodying the present invention.

Fig. 2 is a side elevation illustrating in particular the side wall slotted to reduce conductivity to a minimum.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1 and also showing one manner of connecting two of the units together.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 1 and showing one manner of overlapping the ends of two adjacent units.

Fig. 5 is an enlarged detail sectional view of a bottom chord taken at a panel point.

Figs. 6 and 7 are sectional views of the bottom chord taken between panel points and before and after the securing of the bottom to the chord by suitable fastening means.

Fig. 8 is a sectional view of the manner of connecting two units together when used for floors.

Fig. 9 illustrates one form of roof construction embodying the present invention.

Fig. 10 is a sectional view taken on line 10—10 of Fig. 9.

Fig. 11 illustrates another form of roof construction embodying the present invention and showing one manner of joining the sides of adjacent units together.

Fig. 12 illustrates a slightly modified form of unit construction wherein spaced depressions are formed in a flat sheet of metal instead of using corrugations,

Fig. 13 is an enlarged sectional view taken on line 13—13 of Fig. 12.

Fig. 14 is an enlarged sectional view taken on line 14—14 of Fig. 12.

Fig. 15 is an individual truss unit fabricated in accordance with the present invention and adapted to be used for relatively heavy work.

Fig. 16 is an end view of the truss unit shown in Fig. 15.

Fig. 17 is a plan view of the truss unit shown in Fig. 15 illustrating the manner of forming the spaced depressions in the top chord.

Fig. 18 is a plan view of a modified form of envelope wherein the final wearing surface is fabricated as a part of the unit itself.

Fig. 19 is a sectional view taken on line 19—19 of Fig. 18.

Fig. 20 illustrates a further modified envelope construction for floors and embodying my novel truss arrangement.

It will be understood that my insulated envelope unit and truss structure therefor have many varying uses in connection with building construction, and while embodied mainly in deck construction for roofs and floors, it is not limited specifically thereto.

In the embodiment illustrated in Fig. 1, I have provided a sheet metal top 1 which is preferably stiffened by means of longitudinal corrugations

2. The complete unit as shown in Fig. 1, is limited in size only to the manner and ease of handling, but it does form a complete unit adapted to interfit with other units to form the complete roof or floor. The side walls of this unit are preferably of sheet metal and when formed of sheet metal are slotted as best shown at 3 in Fig. 2 whereby the conductivity between the bottom and top of the unit is reduced to a minimum. As best shown at 4 in Figs. 3 and 4, I have provided continuous diagonal truss members which extend the length of the top 1, the apex 5 of each member nestling within a corrugation 2 and preferably spot welded to the top at said point.

The top of the complete unit thus forms the top chord for the diagonal truss members. The bottom apex 6 of each longitudinal truss member is preferably secured to a U-shaped bottom chord 7, being preferably spot welded thereto. It will thus be obvious that I obtain a maximum reinforcing action combined with minimum weight and minimum conductivity.

The bottom chord 7 is preferably upturned at its ends as at 8 to complete the truss unit and provide reinforcement at the ends of each unit; the supporting purlins 14 being preferably located at such points, see Figs. 9 and 14.

A suitable insulating material, preferably loose, may be poured or packed into the envelope thus far formed and the bottom 10 then inserted in place. In order to permit attachment of the bottom wall 10 I preferably slit the chord 7 as at 11 whereby to receive a suitable nail 12, as best shown in Fig. 7, the nail slightly spreading the slit portion and thus permanently securing itself in place by frictional contact with the edges of the slit portion. If desired, one of the side walls may be inserted last after the insulating material has been inserted in place, but the main point is that the top, bottom, and four side walls of my unit form a complete envelope which is so trussed and insulated as to combine minimum weight with exceptional strength and high insulating properties.

In addition to the reinforcing obtained by the longitudinal truss members 4 I also preferably provide intermediate truss members 13 which extend laterally across the unit at right angles to the corrugations 2, such intermediate members being welded to the top and bottom chord at points directly opposite to the securing points for the main truss members 4.

End walls 9 and side walls 15 of each unit may be formed of suitable fibrous material of sheet metal, and if formed of sheet metal may be formed integrally with the bottom 10 or as individual walls. The sides of the top wall 1 may be upwardly flanged as at 16 to receive a channel locking strip 17. The preferred joint for floor construction is shown in Fig. 8 wherein the end of one top member is folded under an adjacent flange whereby a channel is formed in the first member. By pouring cement into the channel the two members are secured together and a smooth top surface is prepared.

One end of each unit may be formed with a projection 19 adapted to fit over the end of an adjacent unit to form a lap joint, as best shown in Figs. 4, 9 and 14. The bottom 10 of each envelope may be perforated (not shown) sufficiently to affect the acoustical properties of a roof installation, but still be effective to retain the insulation.

The tops of the assembled units may be covered with roofing material as shown in Figs. 2 and 3, or as shown in Figs. 18 and 19; each individual unit may have a final finished surface of thin sheet aluminum 20, or the like, secured to the top of the unit by a suitable cement.

In the modification shown in Figs. 12, 13 and 14, the continuous corrugations are replaced by spaced depressions, and the apexes 5 of the continuous truss members 4 are secured to the top at points 25 in between adjacent depressions 23. The bottom chords may be formed and secured to the bottom 10 as best shown in Fig. 13.

A clip 26 may be secured to the bottom wall 10 of each unit to assist in the assembly of the roof structure or the roof purlins.

In Figs. 15, 16 and 17 I have shown a continuous truss unit 30, angular in cross section, the top and bottom chords 31 and 32 having spaced depressions 33 as shown in Fig. 14 and the apex of such depressions being slit similar to the showing in Figs. 6 and 7 whereby any desired members 34 or 35 may be nailed directly to the truss unit.

In the modification shown in Fig. 20, adapted for floor construction, the ply-wood floor may be secured directly to and forms the top chord of the truss members, a cup member 36 may be the securing means between the apexes of the trusses and the wood floor. End and side walls may be dove-tailed as at 37 so that each unit may be secured together at each side. This structure eliminates a sub-floor; trusses extended both ways makes for lightness and cheapness; provides a better means for transmitting stress and lessens squeaks.

It will be understood that my novel envelope may be filled with fire-proofing material which may not in some cases be a relatively good insulating material. However, as the kind of insulating material does not enter into the present invention, it will be understood that where the term "insulating material" is used that it should be given a broad interpretation.

It will also be understood that the bottom 10 of my novel envelope may be formed of any suitable material, for example, fiber board or metal lath may be used in place of a single sheet of metal. It will also be obvious that the roofing material, where it is not originally embodied in the unit, may be applied to any depth desired.

What I claim is:

1. A building construction unit comprising a surface having a series of longitudinally spaced depressions formed therein, a continuous diagonal truss member having aligned apexes secured to said surface at the spaces in between said depressions, a chord secured to the opposite apexes of said truss member, said chord member being also provided with depressions in between the contact points of said truss member, and apertures formed in said depressions for receiving and clinching fastening means.

2. A building construction unit comprising a surface having a series of longitudinally spaced depressions formed therein, a continuous diagonal truss member having aligned apexes secured to said surface at the spaces in between said depressions, a chord secured to the opposite apexes of said truss member, said chord member being also provided with depressions in between the contact points of said truss member, and apertures formed in said depressions for receiving and clinching fastening means, the bottom surface secured to said chord and enclosing side walls for said spaced surfaces forming an envelope.

3. A deck unit for building construction comprising a top member embossed to form a plurality

of longitudinally extending reinforcing portions intermediate the edges thereof, a diagonal truss member having aligned apexes thereof secured to said top member at said reinforcing portions, and a bottom chord secured to the oppositely aligned apexes of said truss member, the ends of said chord being upturned to form positive supports for the ends of the unit, a bottom member secured to said chord member and enclosing side walls forming an envelope.

4. A deck unit for building construction comprising a top member embossed to form a plurality of longitudinally extending reinforcing portions intermediate the edges thereof, a diagonal truss member having aligned apexes thereof secured to said top member at said reinforcing portions, and a bottom chord secured to the oppositely aligned apexes of said truss member, the ends of said chord being upturned to form positive supports for the ends of the unit, a bottom member secured to said chord member and enclosing side walls forming an envelope, said side walls being fabricated whereby to cut down the conductivity between the top and bottom members to a minimum.

5. A deck unit for building construction comprising a top member embossed to form a plurality of longitudinally extending reinforcing portions, a diagonal truss member having aligned apexes thereof secured to said top member at said reinforcing portions, and a bottom chord secured to the oppositely aligned apexes of said truss member, the ends of said chord being upturned to form positive supports for the ends of the unit, a bottom member secured to said chord member and enclosing side walls forming an envelope, said side walls being fabricated whereby to cut down the conductivity between the top and bottom members to a minimum, two of said side walls being upturned to form flanges to permit the fastening together of two adjacent units.

6. A deck unit for building construction comprising a top member embossed to form a plurality of longitudinally extending reinforcing portions, a diagonal truss member having aligned apexes thereof secured to said top member at said reinforcing portions, and a bottom chord secured to the oppositely aligned apexes of said truss member, the ends of said chord being upturned to form positive supports for the ends of the unit.

7. A structural deck unit for floors and roofs comprising a complete trussed envelope including a series of longitudinally spaced depressions formed therein, a continuous diagonal truss member having aligned apexes secured to said surface at the spaces in between said depressions, a chord secured to the opposite apexes of said truss members, said chord member being also provided with depressions in between the contact points of said truss member, and containing insulating material, the side walls being slotted to reduce conductivity between top and bottom walls of the envelope.

8. A structural deck unit for floors and roofs comprising a complete trussed sheet metal envelope containing insulating material, the top of the envelope being embossed to form the top chord for the truss members, and a series of continuous diagonal truss members having aligned apexes secured to said surface at the spaces in between said embossed portions, and a chord secured to the opposite apexes of said truss member.

9. A plurality of interfitting envelope units for building construction, each unit being complete and comprising a longitudinal corrugated top sheet and a bottom sheet, slotted sheet metal side walls for connecting and reducing the conductivity between said top and bottom sheets, a series of continuous diagonal truss members positioned intermediate the edges of said top and bottom sheets and being formed of relatively narrow strips of metal for reducing conductivity, said apexes of said diagonal truss members being rigidly secured to the top sheet within said corrugations and other apexes being rigidly secured to a bottom chord and intermediate truss members connecting the top and bottom sheets of such constructional nature and so connected to the top sheet as to materially reduce conductivity between said top and bottom sheets.

10. A building construction unit comprising a one piece top member, a series of diagonal truss members secured at apexes to the top member, a bottom member also secured to said continuous truss members, said truss members being formed of relatively narrow strips of metal, and enclosing side walls forming an envelope, and a sheet metal chord member secured to the aligned apexes at one side of said diagonal truss member, portions of said chord member in between the points of contact of said truss member being depressed and fabricated to receive and grip a fastening means whereby any means to be supported may be nailed directly to said chord member.

11. A building construction unit comprising two spaced one piece walls joined together by spaced diagonal truss members, said diagonal members being secured at their apexes to opposite walls, intermediate truss members extending transversely to said diagonal truss members, said truss members being formed of relatively narrow strips of metal, and enclosing side walls for the unit forming an envelope, and a sheet metal chord member secured to the aligned apexes at one side of said diagonal truss member, portions of said chord member in between the points of contact of said truss member being depressed and slitted to receive and grip a fastening means whereby any means to be supported may be nailed directly to said chord member.

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