Aug. 24, 1926. 1,597,318

T. H. KANE

BUILDING CONSTRUCTION

Filed June 6, 1923 3 Sheets-Sheet 1

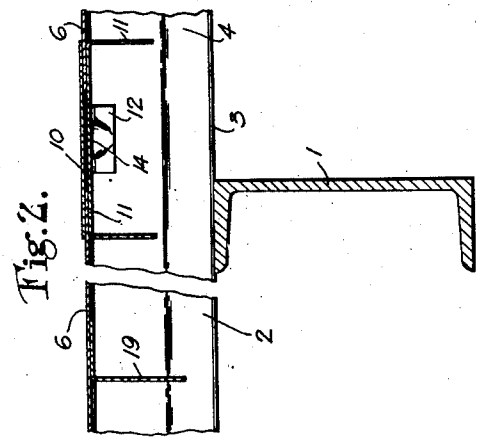


Fig. 2.

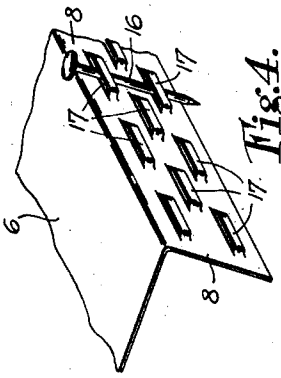


Fig. 4.

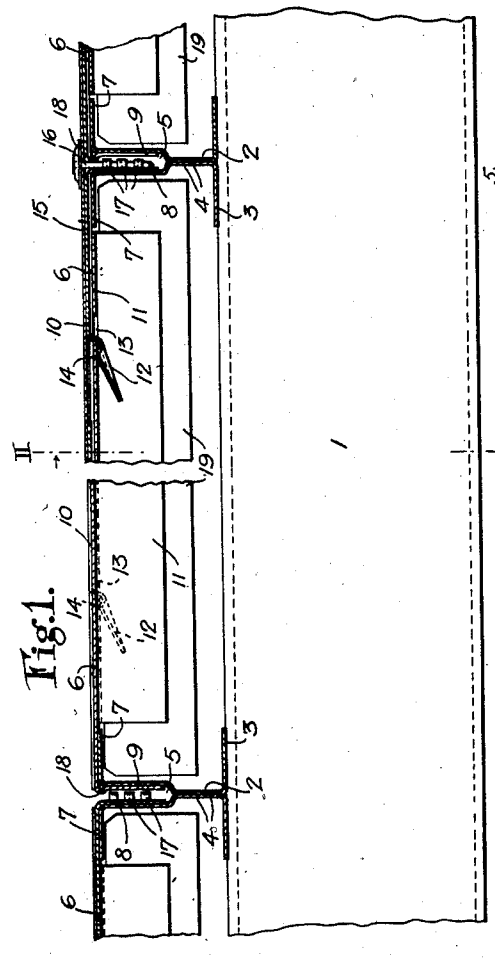


Fig. 1.

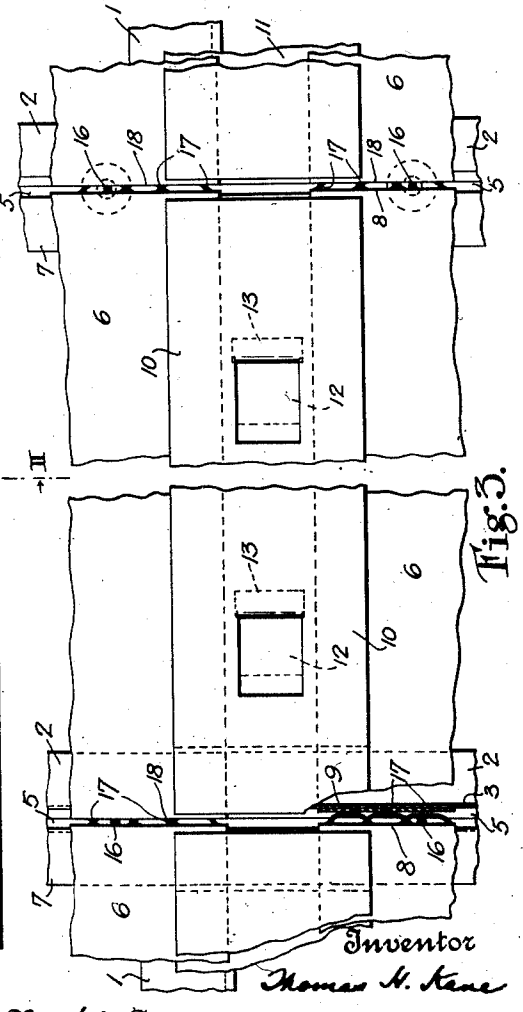


Fig. 3.

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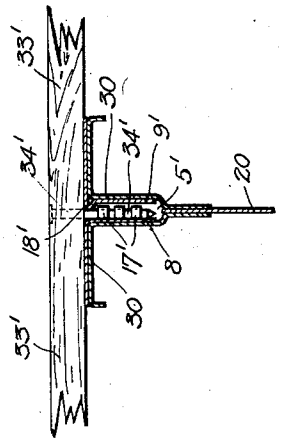


Fig. 6.

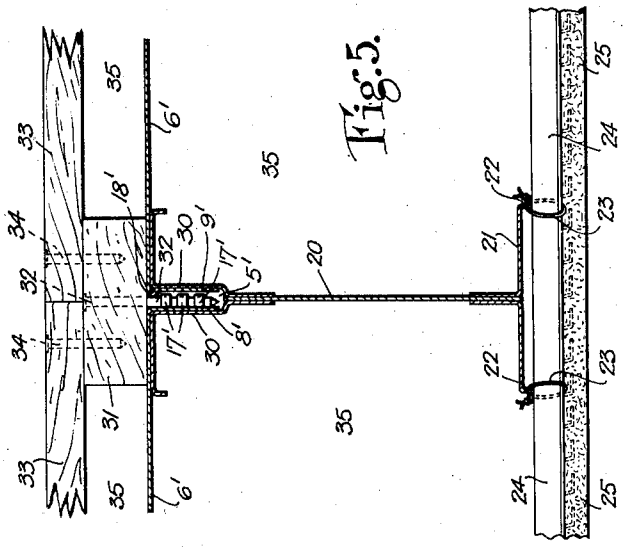


Fig. 5.

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BUILDING CONSTRUCTION

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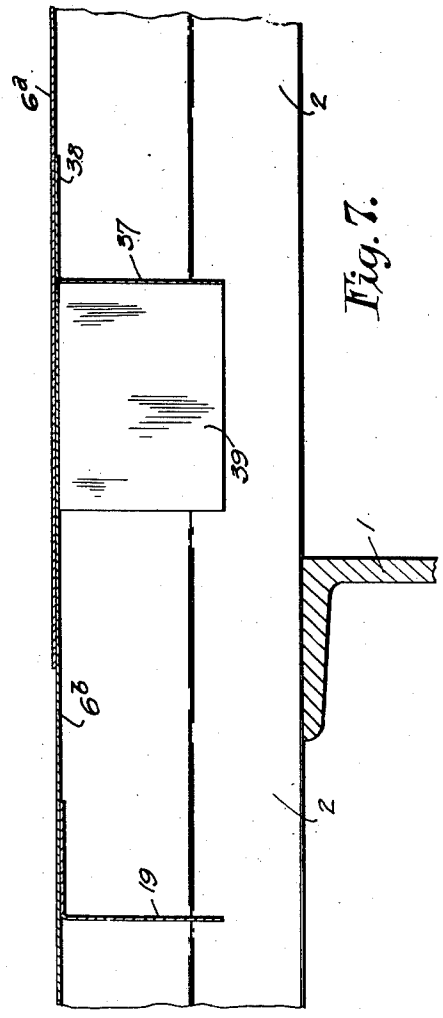
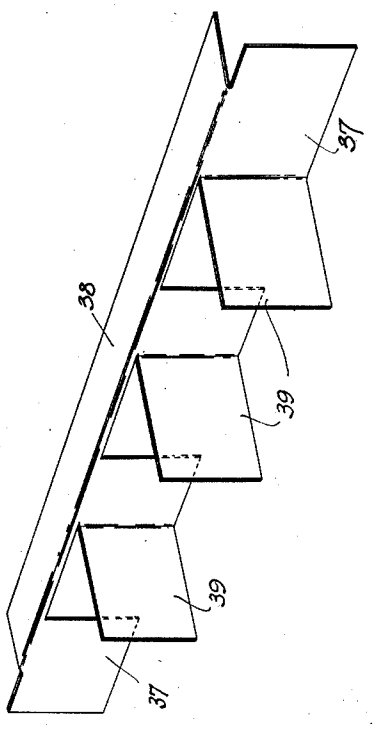


Fig. 7.

Fig. 8.



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UNITED STATES PATENT OFFICE.

THOMAS H. KANE, OF YOUNGSTOWN, OHIO, ASSIGNOR TO TRUSCON STEEL COMPANY, OF YOUNGSTOWN, OHIO, A CORPORATION OF MICHIGAN.

BUILDING CONSTRUCTION.

Application filed June 6, 1923. Serial No. 643,648.

This invention relates to an improved building structure, particularly adapted for use as a roof structure or as a floor structure.

The primary object of the invention is to provide a structure comprising a plurality of metallic plates and means for supporting the same, said metallic plates and the joints therebetween being covered by a covering, such as the ordinary asbestos or other roofing material in the case of a roof structure, or wooden floor boards in the case of a floor structure.

Another object of the invention is to provide said metallic plates with means adapted to receive and to anchor or securely hold nails or like securing devices for holding said covering in place.

Further object of the invention is to provide improved means for connecting or splicing the adjacent edges of adjacent metallic plates.

A still further object is to provide in the case of the floor structure, an air space between the metallic plates and the flooring for the purpose of providing a fireproof structure.

The invention is illustrated in the accompanying drawings, in which:

Figure 1 is a vertical section of a roof structure in accordance with the present invention.

Figure 2 is a vertical section on the line II—II of Figure 1.

Figure 3 is a plan view of the roof structure.

Figure 4 is a perspective view showing the manner in which the roofing nails engage the loop members of the roof sheets after passing through the outer roof covering.

Figure 5 is a vertical section of a floor structure in accordance with the present invention showing the air space provided,

Figure 6 is a vertical section of a similar form of floor structure without the air space.

Figure 7 is a detail view of a modified manner of connecting or splicing the adjacent edges of the roof sheets, and

Figure 8 is a perspective view of a stiffening angle used in the construction shown in Figure 7.

Similar numerals refer to similar parts throughout the several views.

The invention is shown in Figures 1 to 4 of the accompanying drawings as applied to a roof structure, which consists of a plurality of metal supports or purlins 1 preferably of channel form, these being suitably supported at the ends thereof by the opposite walls of the building, or being associated with other purlins in a rafter like construction and arrangement, depending upon the type of roof employed. A plurality of auxiliary supports or sub-purlins 2, preferably of substantially I form as shown, extend transversely of the main supports or purlins 1, the bottom flanges 3 of the sub-purlins being secured to the upper flanges of the purlins, as by welding, riveting or other convenient means. The sub-purlins 2 are preferably formed by two similar channel-shaped members having their web portions 4 secured together by welding, riveting or the like, with the upper portions of the webs separated or spaced apart to form longitudinally extending grooves or recesses 5. It is of course understood that the purlins and sub-purlins will be of suitable thickness and strength and so spaced in relation to each other as to meet the requirements of the particular structure under process of construction.

Extending across between adjacent pairs of the sub-purlins 2 are the metallic roof sheets 6 which are supported upon the upper flanges 7 of the sub-purlins, and are themselves provided at their edges with flanges 8 and 9 as hereinafter described, the roof sheets thus being supported by the sub-purlins to form a substantially flat surface, with the flanges of said roof sheets extending downwardly along the inner sides of the grooves or recesses 5 of the sub-purlins.

The joints or spaces between the adjacent edges of the adjacent roof sheets 6 are covered, and such roof sheets held firmly in desired relative positions by means of joint or splice strips 10 above the roof sheets and splice channels 11 below said sheets with their flanges extending downwardly. The said splice strips extend over and cover the joints or spaces between the edges of the roof sheets, as clearly shown in Fig. 2, and each splice strip is provided with a plurality of downwardly projecting tongues or prongs 12 preferably stamped therefrom which are adapted to pass through apertures or slots 13 in the splice channel 11 therebeneath and

to engage with the undersurface of said channel to thereby draw said splice plate and channel together and into close engagement with the opposite surfaces of said roof sheets, so that the latter at their edges are securely clamped between said plate and channel. The roof sheets 6 are spaced apart sufficiently at their edges or provided with recesses to allow the passage of the prongs 12 through the apertures 13 provided in the said splice channels 11. The prongs 12 of the splice strip 10 are upwardly distorted or bent in the manner shown in Figs. 1 and 2 of the drawing, so as to provide an upwardly extending bead or projection 14 adapted, when the splice strip is moved relatively to the splice channel by a sliding movement, to exert a camming action against the underside of the splice channel which results in drawing the plate and channel together and clamping the roof sheet securely therebetween.

An alternative way of connecting together the adjacent edges of the adjacent roof sheets is shown in Figure 7 according to which the edge of one roof sheet 6^a overlaps the adjacent edge of the adjacent roof sheet 6^b. In order to properly support the edge of the roof sheet 6^b a stiffening angle 37 has one flange 38 secured to the roof sheet 6^a by welding, riveting or the like while the other flange extends perpendicularly from the roof sheet. From the latter flange are pressed out, as shown in Figure 8, a plurality of tongues 39 which extend underneath the edge of the roof sheet 6^b to properly support the same.

The roof structure so far described is adapted to be rendered waterproof and weathertight by a covering of roofing material 15, such as asbestos roofing or the like, laid in sheets across the substantially flat surface provided by the metallic roof sheets 6.

The covering of roofing material may be secured to the roof sheets 6 in any convenient manner, as by means of a securing or cementing material such for example as hot asphalt or pitch applied between the roof sheets and the covering to cause the latter to adhere to the former. This makes a very practical, simple and effective roof construction, the plates giving the necessary strength and rigidity and the waterproofing material extending over the sheets and covering the joints therebetween rendering the structure waterproof and weatherproof. With this form of structure the grooves or recesses at the upper parts of the sub-purlins need not be so wide as shown in the drawings but may be such that the flanges of the roof sheets fit snugly and firmly within such recesses.

In the construction shown in the drawings, the roofing material is affixed to the roof sheets by means of the usual roofing nail 16, driven through said material along the line of the grooves or recesses 5 of the sub-purlins 2.

The roof sheets 6 are formed or equipped with means adapted to receive and to securely anchor or hold the roofing nails 16, and for this purpose, the flange 8 at one edge of each roof sheet 6 is provided with a multiplicity of loop members 17 extending outwardly therefrom and preferably stamped from the metal of the flange such multiplicity of loops preferably comprising a plurality of rows thereof arranged one below the other, the loops of each row preferably being offset with respect to the loops of adjacent rows. Flange 9 of the adjacent roof sheet 6 may be provided with a projection or bead 18, and the said flanges 8 and 9 of the roof sheets are arranged in separated relationship to one another within the groove 5 of the sub-purlin as shown in Figure 1.

The roofing nails 16 when driven through the roofing material 15, will be guided by the head 18 on the flange 9 of the one roof sheet into the groove 5 against the face of the adjacent flange 8 and said nails will pass through one or more of the loop members 17 of said flange. The loop members 17 will preferably be spaced from the face of the flange 8 a distance such that the nails 16 when driven into place, will tend to expand said loop members away from said flange, so that said loop or loops tend to securely grip the nail and anchor or hold the same in place.

In order to strengthen the roof sheets and to prevent the possibility of buckling thereof metal stiffening members or angles 19 of suitable thickness and strength and suitably spaced apart may be affixed to the undersurface of the roof sheets as shown in Figures 1 and 2. Further, if a ceiling should be associated directly with the purlins 1 air spaces will be provided between such ceiling and the metal sheets which will serve to make the construction fireproof.

Another application of the invention in connection with a fireproof floor construction is shown in Figure 5. This construction comprises a plurality of metallic floor supports or joints 20 of substantially I form, the lower flanges 21 of which are pierced at intervals as at 22, so as to permit the attachment of small lengths or loops of wire 23 for the purpose of supporting the lathing 24, to which lathing is attached in the usual manner the plaster 25, so as to form a ceiling. The upper portion of the joist is formed by angle members 30 secured to the web portion of the joist, and separated or spaced apart in the same manner as already described with reference to the sub-purlins 2 of the roof construction. Metallic sheets

6′, exactly similar in construction to the roof sheets hereinbefore described, are laid across between the adjacent joists 20 with their flanges 8′ and 9′ extending downwardly along the grooves 5′ thereof, the flanges 8′ being provided with the loop members 17′.

With the sheets 6′ in position, beams 31 of suitable material such as wood are laid directly over and along the lines of the grooves provided in the joists 20, and said beams are securely fixed to the joists by means of nails 32 driven through the beams into gripping engagement with the loop members 17′ on the flanges 8′ of the sheets 6′. As hereinbefore described in connection with the roof structure, the nails are guided into engagement with the loop members 17′ by the beads 18′ on the flange 9′ of the adjacent metal sheet. The floor boards 33 may now be laid across the beams 31 and secured thereto by nails 34.

This form of structure provides large air spaces 35 between the lathing 24 and the metal sheets 6′, and also between the metal sheets 6′ and the floor boards 33, which render the construction fireproof and each floor thus constructed would serve as a barrier to a fire occurring either above or below such floor.

A slightly modified form of floor structure is shown in Figure 6, this structure having the floor boards 33′ fastened directly to the metal sheets 6′ by the nails 34′ in the manner already described with reference to the fastening of the beams 31 of the construction shown in Fig. 5. This form of structure eliminates the use of the beams 21 and is adapted for use in buildings of lighter construction.

This invention has been described in connection with certain forms of building construction in order to clearly illustrate the manner of its use, and it is not of course to be limited to the particular forms of structure described since what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

What I claim is:—

1. Building structure, comprising a plurality of substantially parallel supporting members having longitudinally extending recesses therein, a plurality of flat sheet metal units extending across between adjacent supporting members and provided along parallel edges thereof with flanges extending downwardly into said recesses, means separate from said sheets for connecting and supporting the remaining edges of adjacent units, and a covering overlying said units and secured thereto.

2. Building structure comprising supporting means, a plurality of metallic sheets supported by said means, a waterproof composition covering overlying said sheets and covering the same and the joints therebetween, securing nails driven through said covering and means on said metallic sheets for anchoring said nails.

3. Building structure comprising a plurality of substantially parallel supporting members with longitudinally extending recesses therein, metallic sheets extending across between said supporting members and supported thereby, and provided with flanges along the edges thereof extending downwardly into the recesses in the supporting members, a waterproof composition covering overlying said sheets and covering same and the joints therebetween and means cooperating with said flanges of said metallic sheets for securing the covering in place.

4. Building structure comprising a plurality of substantially parallel supporting members with longitudinally extending recesses therein, metallic sheets extending across between said supporting members and supported thereby, said metallic sheets being provided with flanges along the edges thereof extending downwardly into the recesses in the supporting members, a water-proof composition covering overlying said units and covering the same and the joints therebetween, securing nails driven through said covering and means on said flanges of said metallic sheets for gripping or anchoring said nails.

5. Building structure comprising a plurality of substantially parallel supporting members with longitudinally extending recesses therein, metallic sheets extending across between said supporting members and supported thereby, said metallic sheets being provided with flanges along the edges thereof extending downwardly into the recesses in the supporting members, a waterproof composition covering overlying said units and covering the same and the joints therebetween, at least one row of loop members pressed out from said flanges and securing nails driven through said covering and through said loop members and gripped thereby.

6. Building structure, comprising substantially parallel supporting members, a plurality of flat metallic sheets each extending across the space between two of said members and supported at its edges by said members, said sheets having means thereon co-acting directly with said supporting members to hold the sheets against movement, means separate from said sheets and independent of said supporting members whereby those adjacent edges of adjacent sheets which are perpendicular to said members mutually support each other, and a waterproof composition covering laid flat upon said sheets and covering the same and the joints therebetween.

7. Building structure, comprising sub-

stantially parallel supporting members, a plurality of flat metallic sheets each extending across the space between two of said members and supported at its edges by said members, said sheets having means thereon directly co-acting with said supporting members to hold the sheets against movement, means separate from said sheets and independent of said supporting members for connecting those adjacent edges of adjacent sheets which are perpendicular to said supporting members, and a waterproof composition covering laid flat upon said sheets and covering the same and the joints therebetween.

8. Building structure, comprising substantially parallel supporting members, a plurality of flat metallic sheets each extending across the space between two of said members and supported at those edges which are parallel to said members by said members, said sheets having means thereon coacting directly with said supporting members to hold the sheets against movement, means connecting those adjacent edges of adjacent sheets which are perpendicular to said supporting members, said means including flat metallic plates overlying said adjacent edges of said sheets and metallic members underlying said edges and connected to said plates, and a waterproof composition covering laid flat upon said sheets and said plates.

9. Building structure, comprising substantially parallel supporting members having grooves or recesses extending longitudinally thereof, a plurality of metallic sheets each extending across the space between two of said supporting members and supported at its edges thereby and having at said edges flanges extending downwardly into said recesses and engaging the walls thereof to hold the plates against movement, means connecting those adjacent edges of adjacent sheets which are perpendicular to said members, said means at the upper surface thereof being flat and substantially in the plane of said sheets, and a waterproof composition covering laid flat upon said sheets and covering the same and said connecting means.

10. Building structure, comprising substantially parallel supporting members having grooves or recesses extending longitudinally thereof, a plurality of metallic sheets each extending across the space between two of said members and supported at those edges which are parallel to said members by said members and having at said edges flanges extending downwardly into the recesses of said supporting members, means connecting those adjacent edges of adjacent sheets which are perpendicular to said supporting members, said means including flat metallic plates overlying said adjacent edges of adjacent sheets and metallic members underlying said edges and interconnected with said plates, and a waterproof composition covering laid flat upon said sheets and said plates.

11. Building structure comprising a plurality of supporting members having grooves or recesses extending longitudinally thereof, a plurality of metallic sheets extending across between said supporting members and supported thereby having flanges extending downwardly into the recesses of said supporting members, means for joining adjacent edges of adjacent sheets, a waterproof composition covering overlying said sheets and covering the same and said joining means, and means cooperating with said flanges for securing said covering in place.

12. Building structure, comprising substantially parallel supporting members, a plurality of metallic sheets each extending across the space between two of said members and supported at those edges which are parallel to said members by said members, said sheets having means thereon coacting directly with said supporting members to hold the sheets against movement, and means connecting those adjacent edges of adjacent sheets which are perpendicular to said supporting members, said means including flat metallic plates overlying said adjacent edges of said sheets and metallic members underlying said edges and connected to said plates.

13. Building structure, comprising substantially parallel supporting members, a plurality of flat metallic sheets each extending across the space between two of said supporting members and supported at those edges which are parallel to said members by said members, said sheets having means thereon co-acting directly with said supporting members to hold the sheets against movement, and means connecting those adjacent edges of adjacent sheets which are perpendicular to said supporting members, said means including flat metallic plates overlying said adjacent edges of said sheets and metallic members underlying said edges, said plates and members having co-acting means for connecting the same.

14. Building structure comprising supporting means, a plurality of metallic sheets supported by said supporting means, means joining adjacent edges of adjacent sheets including metallic plates overlying said adjacent edges of said sheets, and provided with a plurality of projecting tongues, metallic members underlying said edges and provided with a plurality of apertures through which said tongues project to and connect said plates and members.

15. Building structure comprising supporting means, a plurality of metallic sheets supported by said supporting means, means joining adjacent edges of adjacent sheets

including metallic plates overlying said adjacent edges of said sheets and provided with a plurality of projecting tongues upwardly distorted or bent so as to provide an upwardly extending projection or bead, metallic members underlying said edges and provided with a plurality of apertures through which said tongues extend with said projection or bead pressing against the underside of said members.

16. Building structure comprising supporting means, a metallic sheet structure supported upon said means and built up of a plurality of units, a covering above said sheet structure, securing means driven through said covering and means provided on said structure for anchoring said securing means.

17. Building structure comprising a plurality of substantially parallel supporting members having longitudinally extending recesses therein, a plurality of metallic sheets extending across between said supporting members and supported thereby, said metallic sheets being provided with flanges along the edges thereof extending downwardly into the recesses in the supporting members, a covering overlying said metallic sheets and means co-acting with said flanges of said metallic sheets for securing the covering in place.

18. Building structure comprising a plurality of substantially parallel supporting members having longitudinally extending recesses therein, a plurality of metallic sheets extending across between said supporting members and supported thereby, said metallic sheets being provided with flanges along the edges thereof extending downwardly into the recesses in the supporting members, a covering overlying said metallic sheets, securing nails driven through said covering and means on said flanges of said metallic sheets for gripping or anchoring said nails.

19. Building structure comprising a plurality of substantially parallel supporting members having longitudinally extending recesses therein, a plurality of metallic sheets extending across between said supporting members and supported thereby, said metallic sheets being provided with flanges along the edges thereof extending downwardly into the recesses in the supporting members, a covering overlying said metallic sheets, at least one row of loop members pressed out from said flanges and securing nails driven through said covering and through said loop members and gripped thereby.

20. A structural element comprising a flat metallic sheet of such length and width as to adapt it for use as a roof or floor sheet, said sheet having a flange along an edge thereof and means provided on said flange for securing or anchoring securing nails.

21. A structural element comprising a flat metallic sheet of such length and width as to adapt it for use as a roof or floor sheet, said sheet having a flange along an edge thereof and at least one row of loop members pressed out from said flange and adapted to engage and securely hold or anchor securing nails.

22. A structural element comprising a metallic sheet having a flange along an edge thereof, a plurality of rows of loop members pressed out from said flange, and arranged one below the other, each row of loop members being offset with respect to the loop members of adjacent rows, and adapted to engage and securely hold securing nails.

23. A structural element comprising a metallic sheet having flanges along the edges thereof, one flange having loop members pressed out therefrom and adapted to engage and securely hold securing nails, and the opposite flange having a guiding bead or projection formed thereon.

24. Building structure comprising a plurality of substantially parallel supporting members having longitudinally extending recesses therein, a plurality of metallic sheets each extending across between adjacent supporting members and supported thereby, each sheet having flanges along two parallel edges thereof extending downwardly into the recesses in the supporting members, the adjacent remaining edges of adjacent sheet being arranged in spaced relation, and gripping means for closing the gap between said adjacent edges and gripping said edges to connect the same together.

25. Building structure comprising a plurality of substantially parallel supporting members having longitudinally extending recesses therein, a plurality of metallic sheets each extending across between adjacent supporting members and supported thereby, each sheet being provided along parallel edges thereof with flanges extending downwardly into the recesses in the supporting members, and means for joining together the adjacent remaining edges of adjacent sheets, comprising metallic plates overlying said adjacent edges, metallic members underlying said edges, and means connecting said plates and members.

In testimony whereof I affix my signature.

THOMAS H. KANE.