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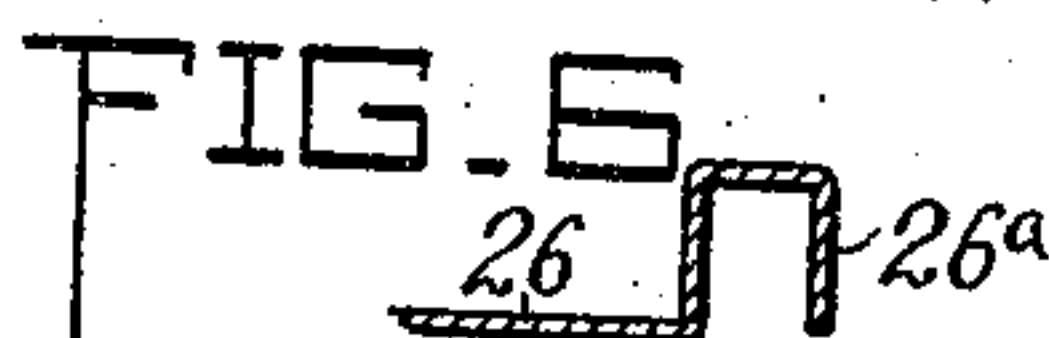
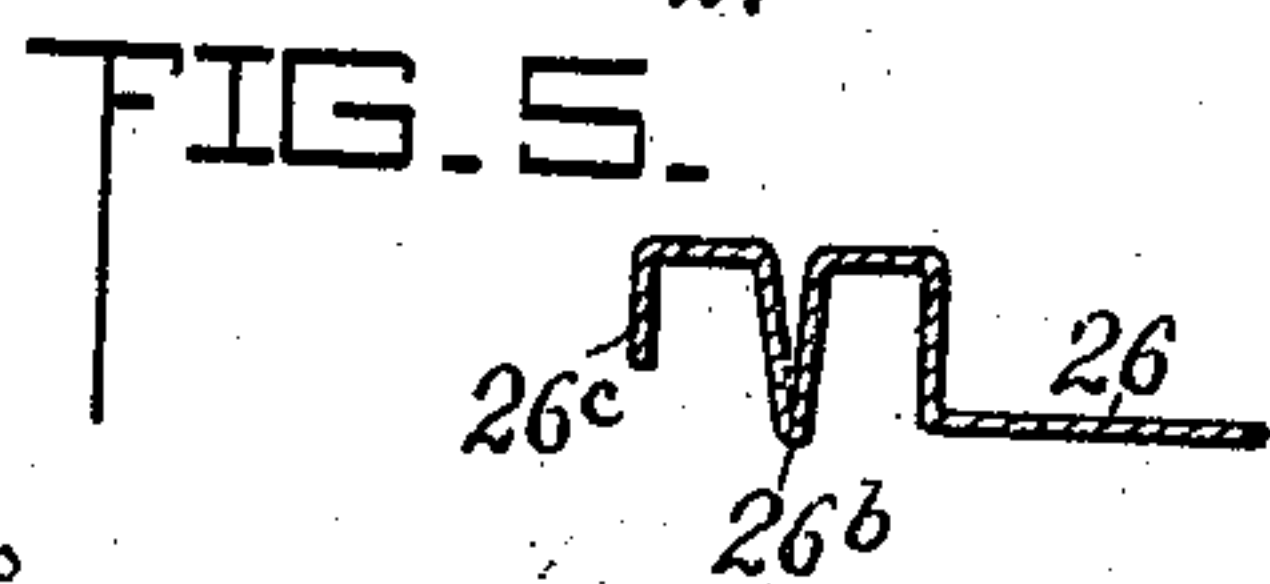
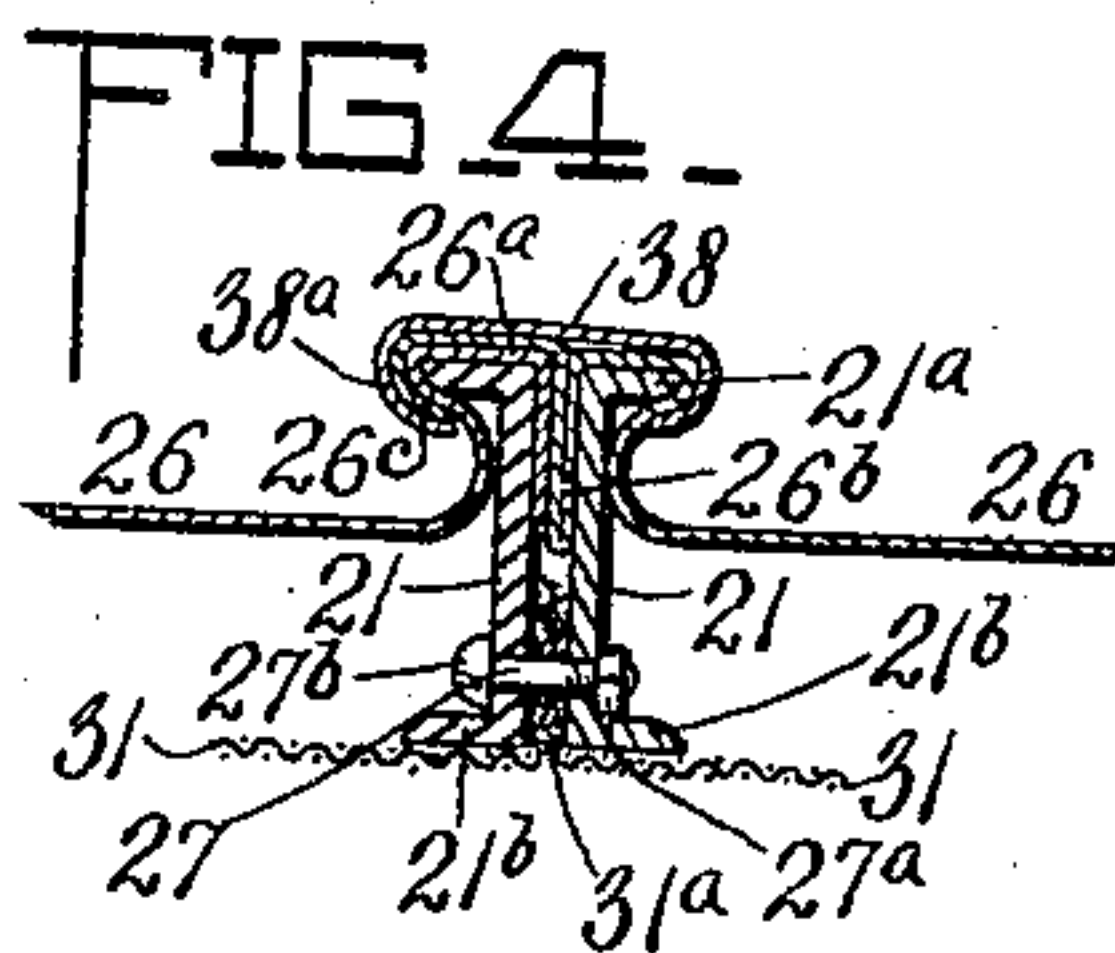
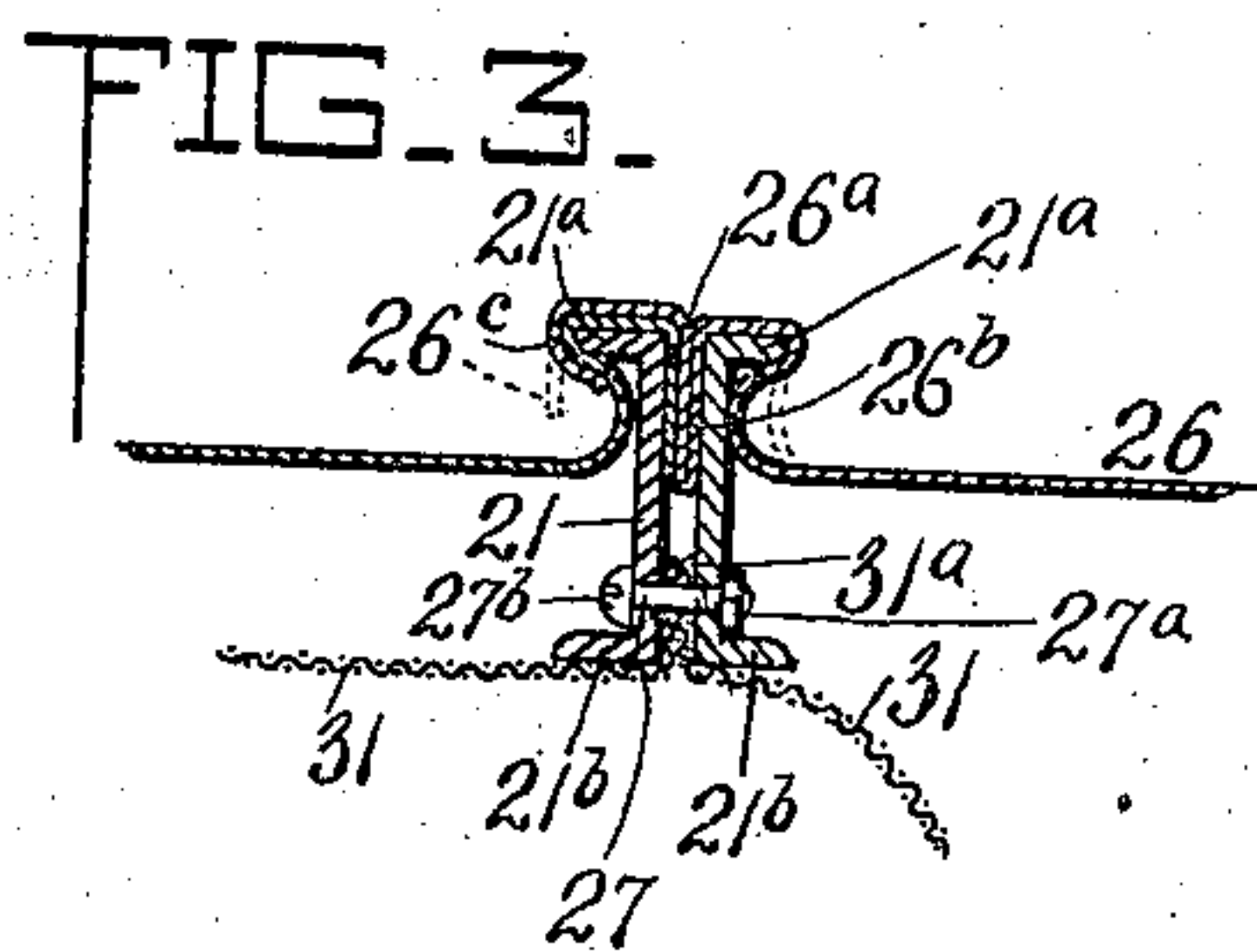
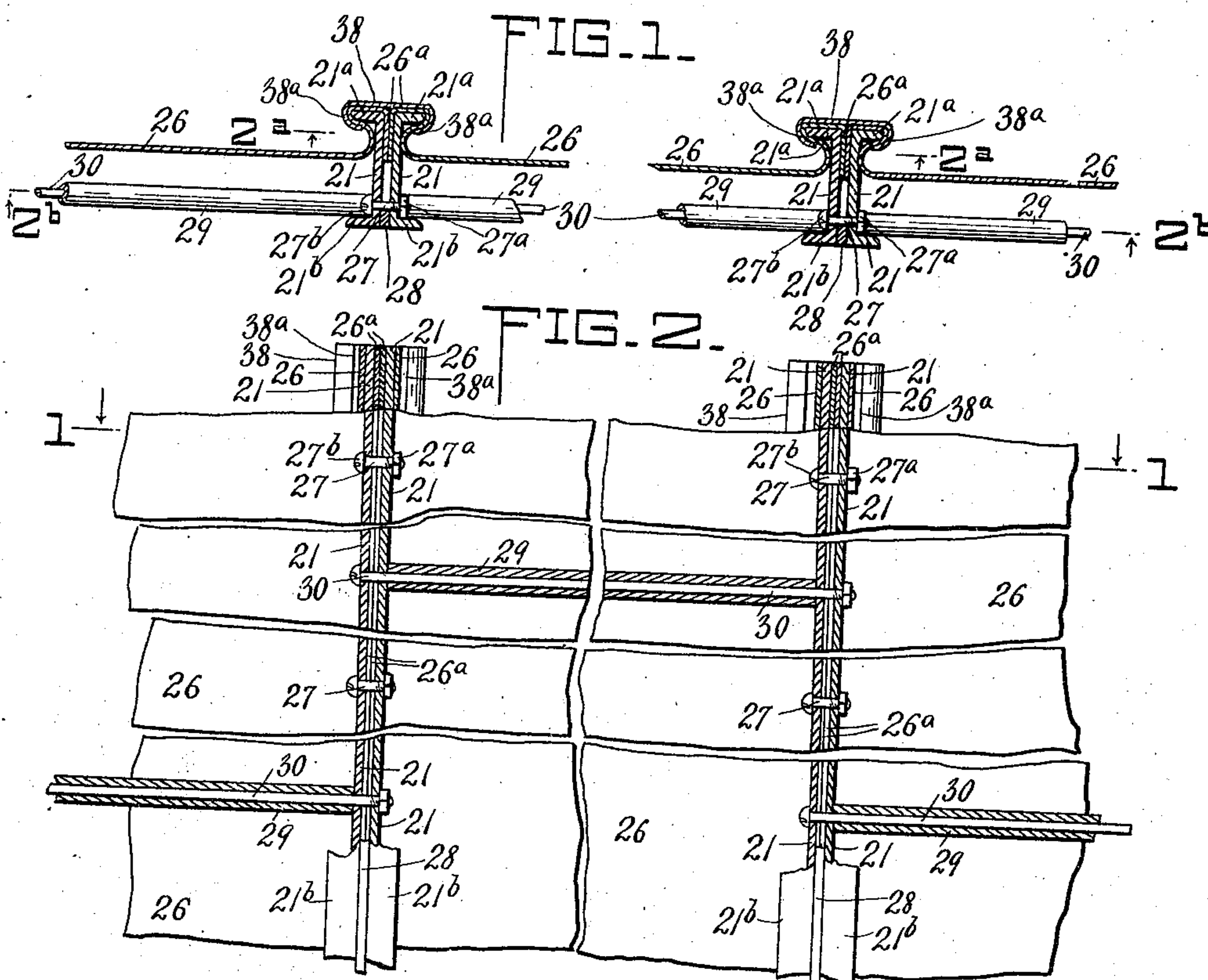
PATENTED AUG. 27, 1907.

E. B. REPP.

IRON STRUCTURE.

APPLICATION FILED FEB. 12, 1907.

2 SHEETS—SHEET 1.



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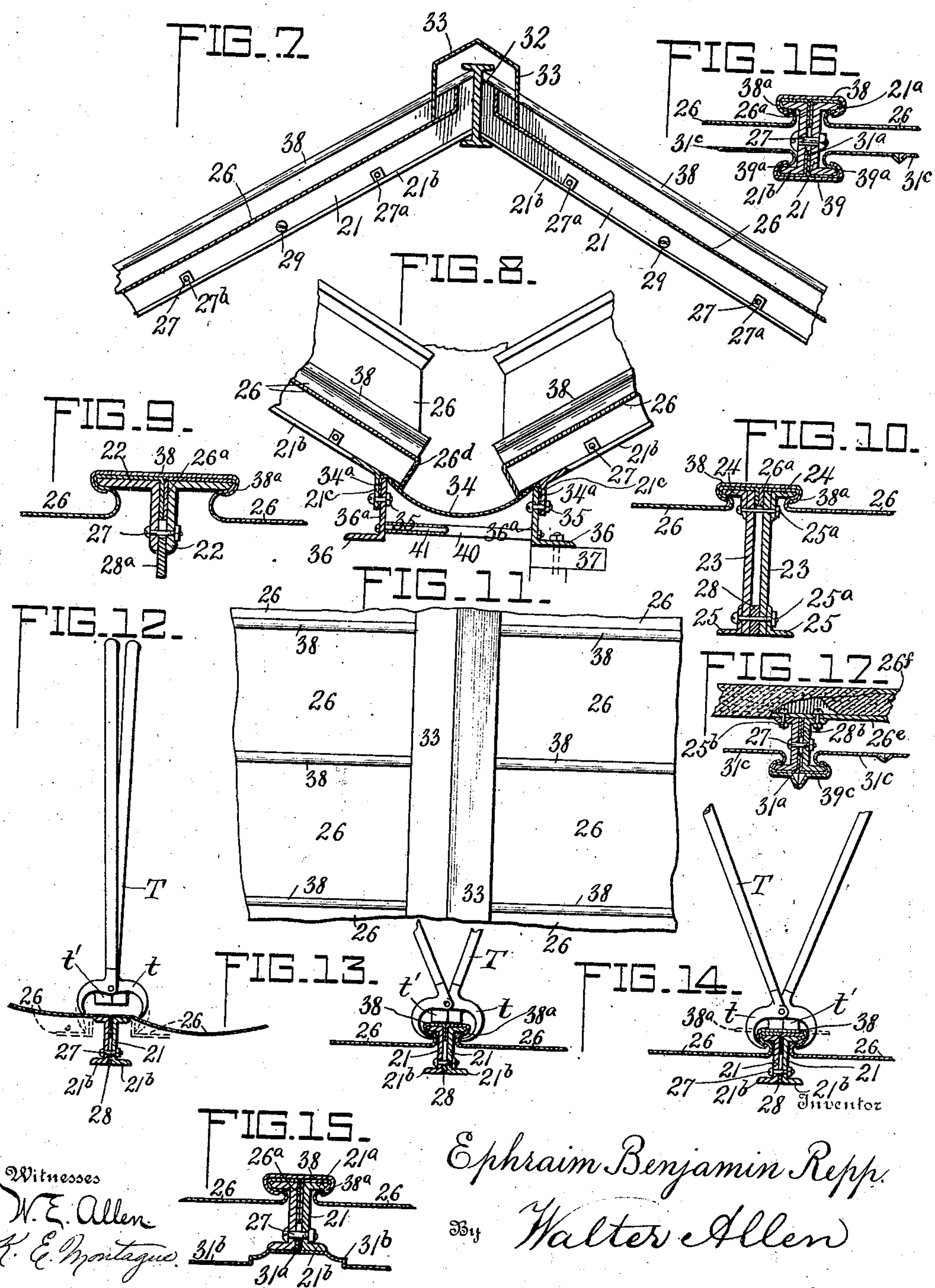
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

EPHRAIM BENJAMIN REPP, OF NEW WINDSOR, MARYLAND.

IRON STRUCTURE.

No. 864,557.

Specification of Letters Patent.

Patented Aug. 27, 1907.

Application filed February 12, 1907. Serial No. 356,982.

To all whom it may concern:

Be it known that I, EPHRAIM BENJAMIN REPP, a citizen of the United States of America, and a resident of New Windsor, in the county of Carroll and State of Maryland, have invented certain new and useful Improvements in Iron Structures, of which the following is a specification.

My invention is an improvement in framing for iron structures and relates particularly to the construction of walls, rafters, braces and ridges in which I employ structural iron shapes and metal sheets combined therewith as a roofing or covering.

The main object of my invention is to provide a framing for iron structures in which metal covering sheets can be detachably clamped to structural iron shapes, so as to provide a tight joint.

Another object of my invention is to provide means for clamping or binding the metal covering sheets to the structural iron shapes.

Another object of my invention is to provide a framing for iron structures to which metal ceiling or wall sheets can be detachably clamped to structural iron shapes.

With these and other objects in view my invention consists in the novel features of construction and arrangement of parts hereinafter described and claimed.

In order that my invention may be fully understood I will proceed to describe it with reference to the accompanying drawings, in which:

Figure 1 is a transverse section of my improved structural iron framing taken on the line 1-1 of Fig. 2 the middle part of the framing being omitted. Fig. 2 is in part a horizontal section taken on the line 2^a-2^a, a horizontal section in part taken on the line 2^b-2^b and in part a top plan view of that shown in Fig. 1. Fig. 3 is a transverse section of a part of my framing of modified construction showing one of the inserted edges of a metal sheet folded; a clamping or binding cap being omitted. Fig. 4 is a similar view showing the same provided with a clamping or binding cap. Fig. 5 is a transverse section of the folded and flanged edge of an outer metal sheet. Fig. 6 is a similar view of the flanged edge of an inner metal sheet. Fig. 7 is a transverse section of a part of a roof constructed of my improved structural iron framing. Fig. 8 is a similar view of the valley part of the roof. Fig. 9 is a transverse section of my improved structural iron framing in which right angle shapes are employed. Fig. 10 is a similar view in which truss shapes are employed. Fig. 11 is a top plan view of the part of my roof shown in Fig. 7. Fig. 12 is a transverse section showing the manner in which a roofing tool is applied for tonging or bending the metal sheets to conform approximately to the flanges of the shapes. Fig. 13 is a similar view showing the metal sheet tonged or bent to the flanges of the shapes. Fig. 14 is a similar view showing a

clamping or binding cap applied in a similar manner. Fig. 15 is a similar view showing metal ceiling sheets substituted for metal lathing sheets. Fig. 16 is a similar view showing lower metal sheets tonged or bent to the flanges of channel shapes and also having a clamping or binding cap tonged or bent thereto. Fig. 17 is a similar view showing my improvement applied to a concrete floor.

In carrying out my invention I employ structural iron shapes for the uprights, rafters, walls, braces or ridges of my framing, such as channels, forming sectional eyes, tees, angles, ells or zeos.

In Figs. 1, 2, 3, 4, 13, 14, 15, 16 and 17 I show a pair of channel shapes 21; in Fig. 9 I show a pair of right angle shapes 22 and in Fig. 10 I show a pair of built up or sectional channel shapes each constructed of a plain plate 23, outer right angle brackets 24, and inner right angle brackets 25 secured by adjustable fastening bolts 25^a. The shapes are so paired together, as to present their plain sides inward, and consequently their flanged sides outward, thus, in the instance of the channel shapes being employed there are provided outer outwardly projecting flanges 21^a and inner outwardly projecting flanges 21^b. The shapes of each pair are sufficiently spaced apart to admit the intumed edges 26^a of a pair of metal covering or roofing sheets 26, which are detachably inserted between the outer edges of the shapes and securely clamped by adjustable bolts 27 which provide means for fastening the paired shapes together free of the edges 26^a of the covering or roofing sheets 26. 28 are plates or filling strips inserted between the inner edges of the shapes to provide spacing means and of the same thickness, approximately as the combined thickness of the inserted edges of the metal sheets located at the outer part of the shapes. The fastening bolts 27 are so located as to be adjacent to the inner flanges 21^b of a pair of shapes so that their non-circular nuts 27^a may be kept from turning by having one of their flat sides resting, or seated against one inner flange while the head 27^b of the bolts are round or free of the other inner flange, so as to enable the bolts to be turned to permit of the clamping or unclamping of the shapes within which the edges of the metal sheets are inserted. 29 are spacing sleeves or tubes, extending from web to web of each pair of shapes and arranged in staggered manner, and 30 are tie rods extending through the sleeves and the paired shapes. The metal sheets extend from their inserted intumed edges 26^a outwardly over their respective outwardly projecting flanges 21^a of the shapes, around the edges thereof and then inwardly within the angles formed by these flanges with the body and then outwardly to the next pair of shapes where their opposite edges are intumed and inserted between their shapes.

Referring to Figs. 3 4 and 5 I show a modification in which one of the edges of the metal sheets is formed

with an infold, 26^b between the inserted edge 26^a of the other metal sheet and with a flange 26^c overlapping the latter.

In Fig. 5 I show the form of the outer edges of the metal plates having an infold formed therein before being inserted between the shapes and in Fig. 5 an inner edge without the infold.

As shown in Figs. 3 and 4 in the place of the plates or filling strips 28 I introduce the edges 31^a of metal wall or ceiling lathing sheets 31 but these lathing sheets 31 may be substituted by ornamental wall or ceiling sheets 31^b as shown in Figs. 15 or 31^c as shown in Figs. 16 and 17, having inturned and inserted edges 31^a. 39^c is an ornamental inner clamping or holding cap, see Fig. 15, 17. In this Fig. 17 I show paired channel shapes secured to the floor plate 26^a of a concrete floor 26^f by means of bolts 25^b.

In Figs. 7 and 8 I show my improved framing utilized for a roof, the paired shapes providing main or jack rafters. 32, in Fig. 7 is an I-shape, providing a ridge and 33 is a cap providing a cover for the converged upper ends of the main rafters and the covering sheets of the framing and the ridge. 34 in Fig. 8 is a metal valley trough located beneath the lower ends of the jack rafters and having down turned edges 34^a fastened by bolts 35 extending through the downturned flanges 21^c, to the vertical wings 36^a of L-shapes 36 supported upon walls 37 detachably or otherwise secured to the walls. 38 are outer clamping or binding caps having inturned edges 38^a whereby the tonged or inbent edges of the covering or roofing sheets are rigidly held in place and 39 (Fig. 16) is an inner cap having inturned edges 39^a for holding the tonged and inbent edges of the ceiling or wall sheets in place.

Referring to Fig. 10 it will be observed that the fastening bolts 25^a are utilized both as the securing means for the inner right angle brackets 25, and as the bolts for fastening the paired shapes together.

Referring to Fig. 8 the shapes 38 may be held in position by spacing sleeves 40 and tie rods 41 extending through these spacing sleeves and through the shapes.

It will be observed that the paired channel shapes, either single, or sectional, form sectional eyes.

In the process of building the framing, see Figs. 12, 13 and 14, pairs of shapes 21 are placed or arranged in the desired position and the bolts 27 adjusted so as to leave a sufficient space between each pair of shapes to admit the edges 26^a of a pair of metal sheets 26 between their outer edges; the edges of the metal sheets are then inserted the desired distance between the shapes 21. The spacing means 28 are then inserted between the inner edges of the shapes, and the bolts 27 are tightened to cause the shapes to securely clamp and hold the edges of the metal sheets and also the spacing means securely between them. The free parts of the metal sheets are then spread out so as to fold against the outer flanges of the shapes and their opposite edges inserted with the edges of the other metal sheets between the next pair of shapes and clamped in like manner as the first pair of metal sheets. The metal sheets are of such a width as to belly or sag between the adjacent pairs of shapes. I then take a pair of clamping tongs T having hook shaped jaws t and fulcrum blocks t' and by this means grasp and inbend the adjacent parts of the sheets to the outwardly projecting flanges of the shapes which

operation straightens out the bellying or sagging sheets and folds the inner parts of the sheets around the flanges into the angular recesses between the flanges and the bodies of the shapes. The clamping or binding caps are next applied to the tonged or bent parts of the sheets in a similar manner for securely holding the sheets from undue spreading.

An item of much importance in constructions of the kind hereinbefore described is the ease and facility by which parts of the framing especially the metal sheets can be detached for the purpose of making repairs as any portion can readily be removed and replaced without injury to or disturbing the remaining parts of the framing. It will be apparent that by bolting the framing together, expansion and contraction of the metal are completely provided for.

The structural iron shapes are spaced apart for ordinary metal sheets admit admirably for carrying concrete between the outer covering or roofing sheets and the inner wire lathing or perforate or imperforate ceiling or wall sheets.

Sheet metal of any kind now used in iron structures can be utilized for the covering or roofing sheets.

The whole framing is practically indestructible and inexpensive and forms a storm proof, water tight, and mechanically complete roofing or covering. The framing is watertight without the clamping caps which are merely employed for binding the edges of the covering or roofing sheets to the paired shapes.

Having thus described my invention the following is what I claim as new therein and desire to secure by Letters Patent:

1. A framing comprising a pair of structural iron shapes, metal sheets having their edges inserted between the shapes, and means whereby the shapes are fastened together for clamping the edges of the metal sheets. 100
2. A framing comprising a pair of structural iron shapes, metal sheets having their edges inserted between the shapes, and means whereby the shapes are fastened together free of the edges of the metal sheets for clamping the edges of the metal sheets while permitting of the ready removal and replacement of the metal sheets when the bolts are loosened. 105
3. A framing comprising a pair of structural iron shapes, metal sheets having their edges inserted between the outer edges of the shapes, spacing means located between the inner edges of the shapes, and means whereby the shapes are fastened together for clamping the edges of the metal sheets and for clamping the spacing means. 110
4. A framing comprising a pair of structural iron shapes, metal sheets having their edges inserted between the outer edges of the shapes, metal sheets having their edges inserted between the inner edges of the shapes, and means whereby the shapes are fastened together for clamping the edges of the metal sheets. 115
5. A framing comprising a pair of structural iron angle shapes having their flanges projecting outwardly, metal sheets having their edges inserted between the angle shapes and tonged or bent to conform approximately to the projecting flanges of the angle shapes, and bolts whereby the angle shapes are fastened together for clamping the edges of the metal sheets. 120
6. A framing comprising a pair of structural iron channel shapes having their flanges projecting outwardly, metal sheets having their edges inserted between the channel shapes and tonged or bent to conform approximately to the projecting outer flanges of the channel shapes, and means whereby the channel shapes are fastened together for clamping the edges of the metal sheets. 125
7. A framing comprising a pair of structural iron angle shapes having their flanges projecting outwardly, metal sheets having their edges inserted between the angle 130

shapes and tonged or bent to conform approximately to the projecting flanges of the angle shapes, bolts whereby the angle shapes are fastened together for clamping the edges of the metal sheets, and a clamping or binding metal cap having its edges tonged or bent to conform to the tonged or bent edges of the metal sheets for covering and holding the edges of the metal sheets in place.

8. A framing comprising a pair of structural iron shapes, a metal sheet having its edge inserted between the shapes, another metal sheet having its edge folded and inserted between the shapes and the inserted edge of the other sheet, and overlapping the latter and means whereby the shapes are fastened together for clamping the edges of the metal sheets.

9. A framing comprising a pair of structural iron angle shapes having their flanges projecting outwardly, a metal sheet having its edges inserted between the angle shapes, another metal sheet having its edge folded and inserted between the angle shapes and the inserted edge of the other sheet and overlapping the latter, and bolts whereby the angle shapes are fastened together for clamping the edges of the metal sheets; the edges of the metal sheets being tonged or bent to conform approximately to the projecting flanges of the angle shapes.

10. A framing comprising a pair of structural iron angle shapes having their flanges projecting outwardly, a metal sheet having its edge inserted between the angle shapes, another metal sheet having its edge folded and inserted between the angle shapes and the inserted sheet of the other metal sheet and overlapping the latter, bolts whereby the angle shapes are fastened together for clamping the edges of the metal sheets, and a clamping or binding metal cap; the edges of the metal sheets and the metal cap being tonged or bent to conform approximately to the projecting flanges of the angle shapes.

11. A framing comprising pairs of structural iron shapes, metal sheets having their edges inserted between the shapes, means whereby the shapes are fastened together for clamping the edges of the metal sheets, spacing sleeves between the pairs of shapes, and tie-rods extending through the sleeves and paired shapes.

12. A framing comprising pairs of structural iron shapes providing rafters, metal sheets having their edges inserted between their respective paired shapes, means whereby each pair of shapes is fastened together for clamping the edges of the metal sheets therebetween, a ridge shape and a ridge cap.

13. A framing comprising pairs of structural iron shapes providing rafters, metal sheets having their edges inserted between their respective paired shapes, means whereby each pair of shapes is fastened together for clamping the edges of the metal sheets therebetween, wall shapes, a metal valley sheet having its edges lapping the wall shapes, and bolts whereby the edges of the valley sheet are clamped to the wall shapes.

14. A framing comprising a structural metal shape formed in sections, metal roofing or covering sheets having their edges overlapping the flanges of the shape and inserted between the sections of the shape and a metal binding clamp for holding the edges of the sheets, to the flanges of the shape and the sections of the shape in position.

15. A framing comprising a structural metal shape formed in sections, metal roofing or covering sheets having their edges inserted between the sections of the shape, a metal binding clamp for holding the edges of the sheets to the flanges of the shape and the sections of the shape in position and means for securing the inner parts of sections of the shape together.

16. A framing comprising a series of structural metal shapes formed in sections, metal roofing or covering sheets having their edges overlapping the flanges of the shapes and inserted between the sections of the shapes, metal binding clamps for holding the sections of the shapes together and the edges of the sheets to the sections of the shapes.

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