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METAL ROOF STRUCTURE

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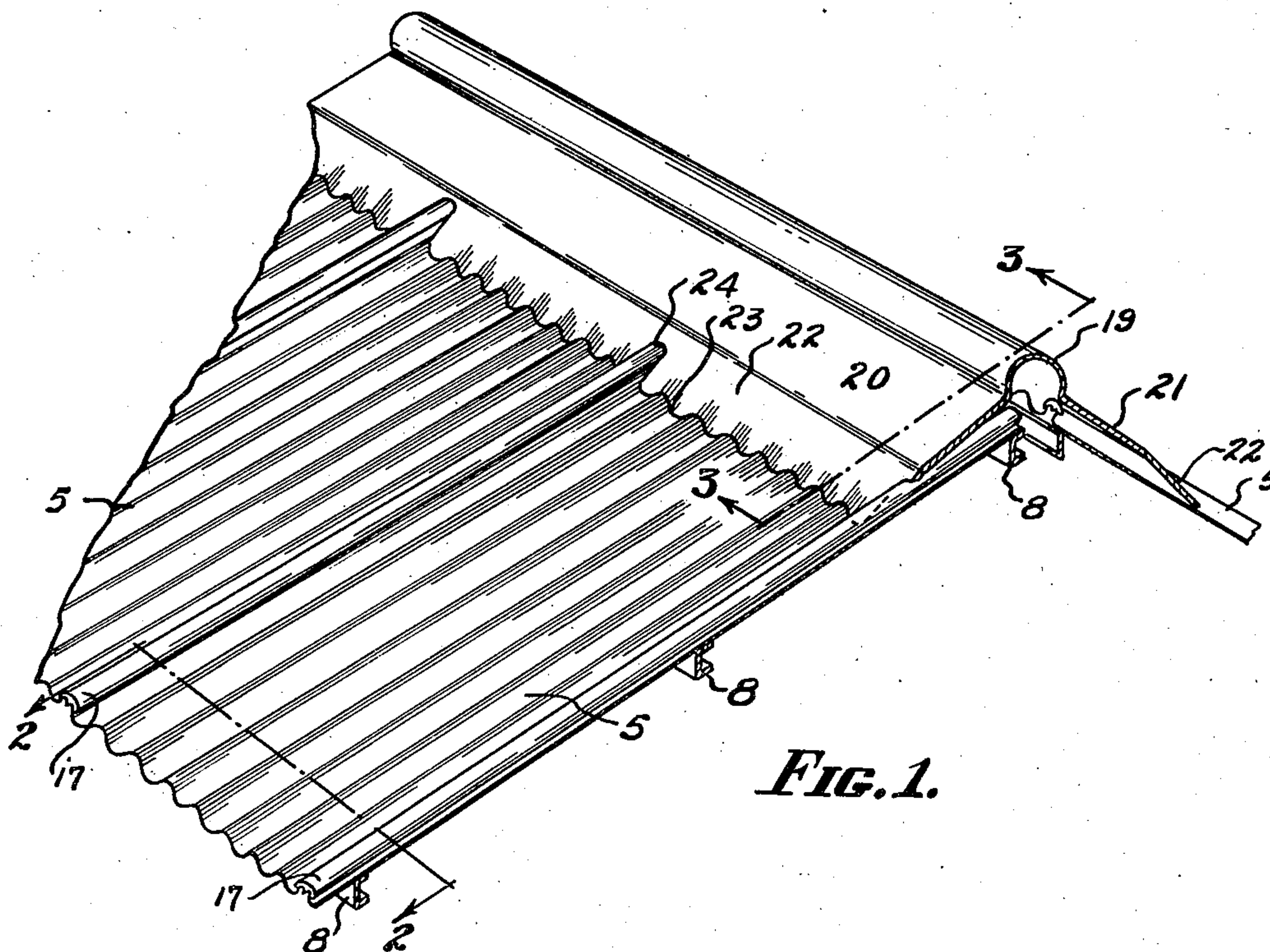


FIG. 1.

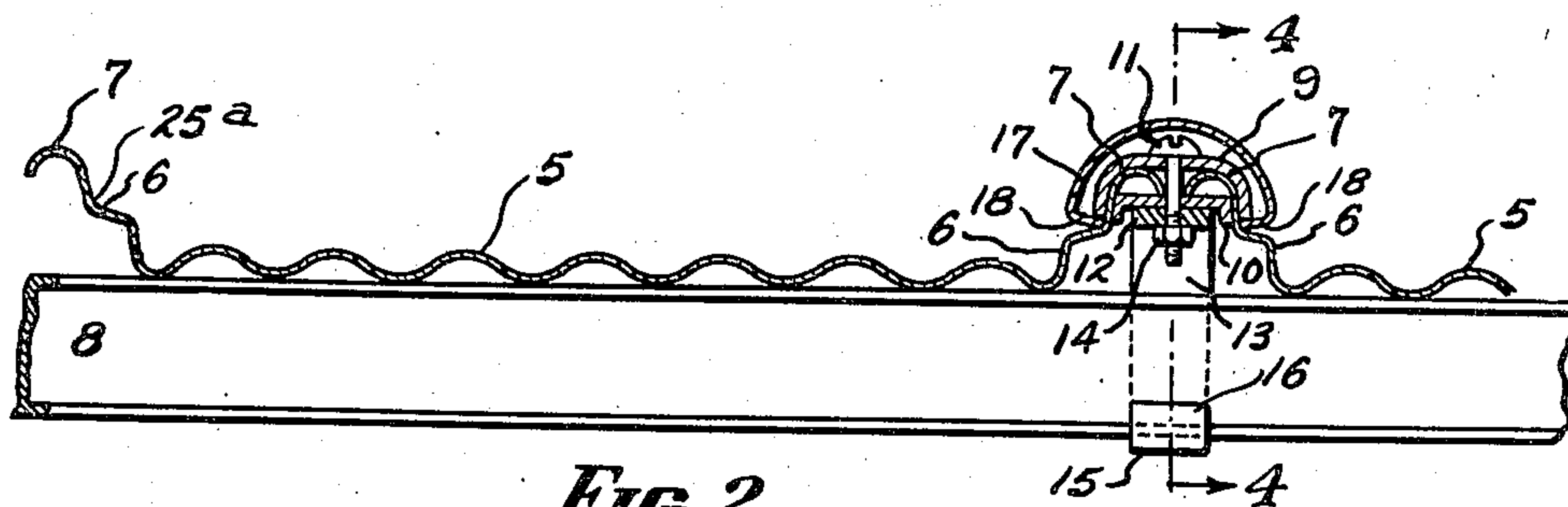


FIG. 2.

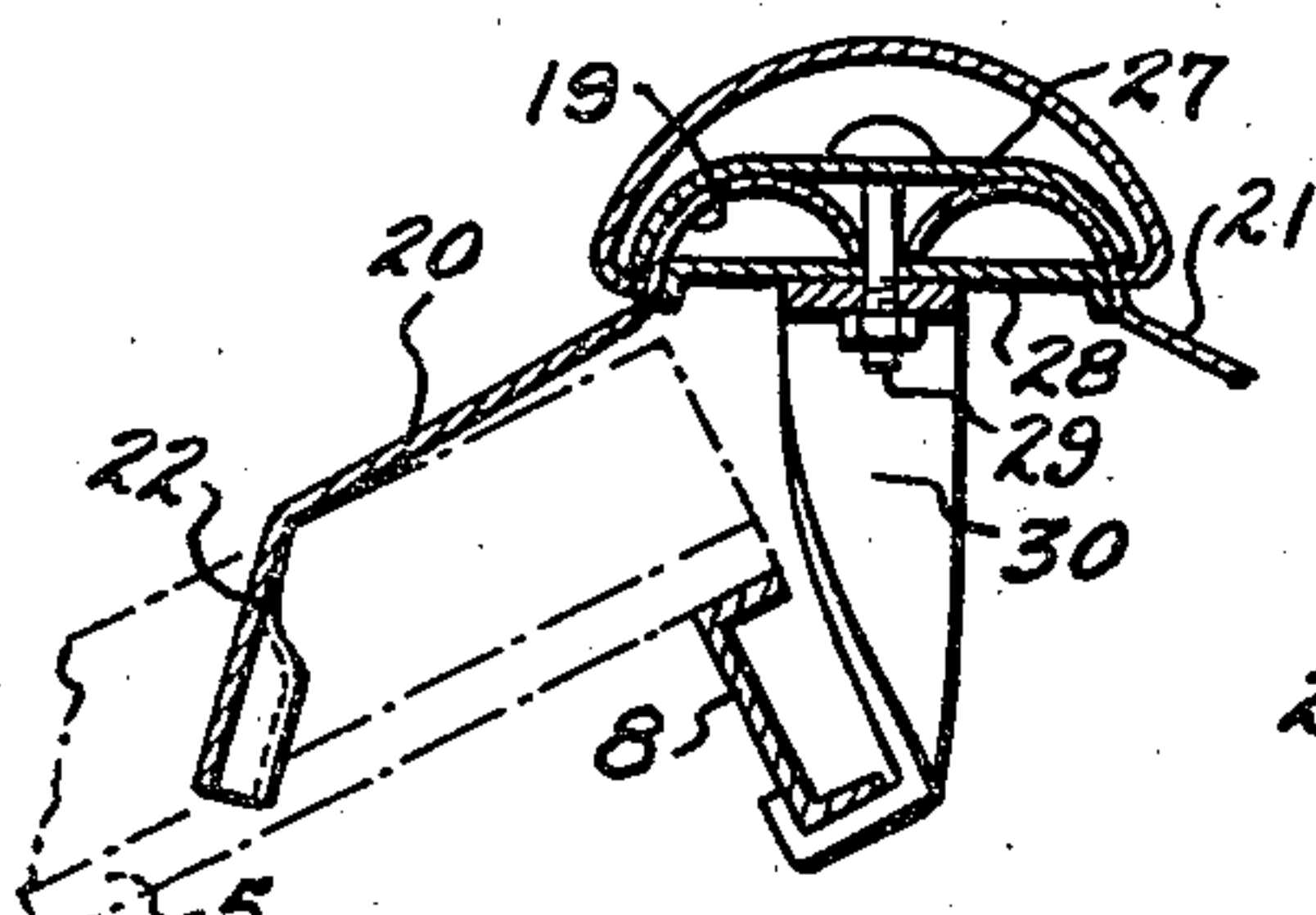


FIG. 3.

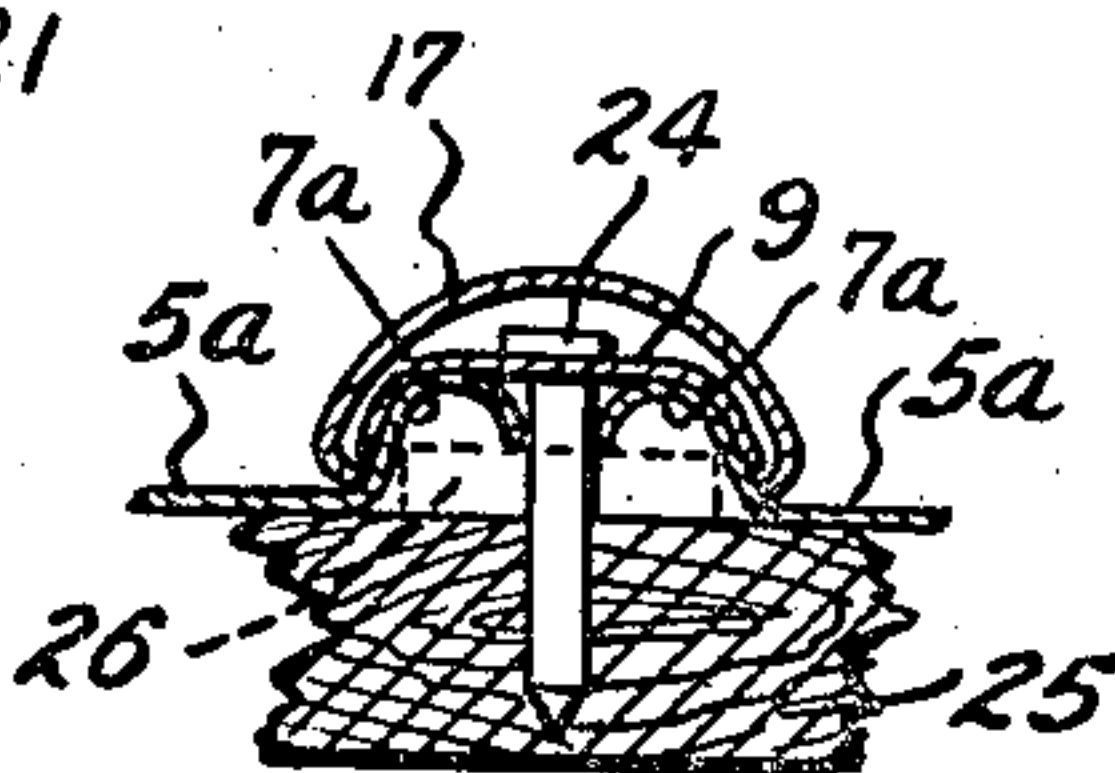


FIG. 5.

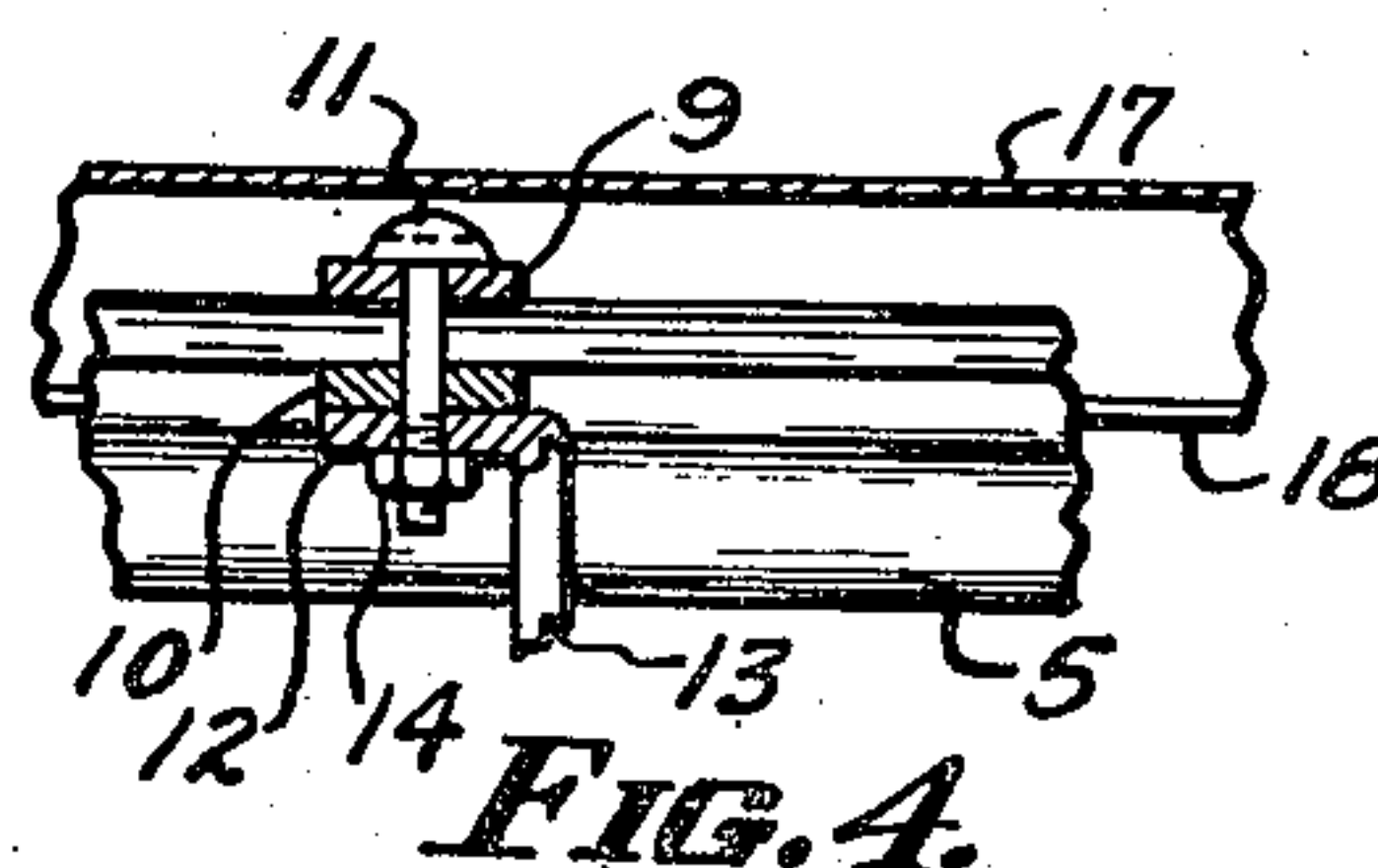


FIG. 4.

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UNITED STATES PATENT OFFICE

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METAL ROOF STRUCTURE

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14 Claims. (Cl. 108—21)

My invention is addressed to sheet metal roof-
ing and roof structures, and in particular to a
type of roofing known as the standing seam type.
A large number of forms of metal roofing have
been devised, but those which have proved com-
mercially satisfactory have heretofore been of
complicated construction. It is a fundamental
object of my invention to provide a type of roof
and roofing structure which is greatly simplified
both as to manufacture and as to installation
without sacrificing any factor of safety.

It is an object of my invention to provide an
easily manufactured and easily applied metal
roofing which does not ordinarily require any
rivets or nails. Still another object of my inven-
tion is to provide a roofing which comprises a
standard roofing sheet made from standard sizes
of sheet metal, which roofing sheet can be nested
for shipment.

Still another object of my invention is to pro-
vide a roofing element or sheet which does not
require the making of sharp bends in the sheet
material, or complicated locking arrangements.
This object is of particular importance inasmuch
as roofing of this class is ordinarily made of gal-
vanized sheet metal; and the making of sharp
bends in such sheet metal is likely to impair the
protection afforded by the galvanized coating.
Moreover, it is my object to provide a type of
roofing in which substantially the entire width
of the initial sheets from which the roofing is
constructed is available for covering purposes,
i. e., a roofing sheet, or element in which no im-
portant percentage of the original width of the
sheet is taken up in the formation of interlocking
joint structures.

Still another object of my invention is to pro-
vide a joint structure in roofing of the class
referred to which structure is free of capillary
action. These and other objects of my invention,
which will be set forth hereinafter or will be
apparent to one skilled in the art upon reading
these specifications, I accomplish by that certain
construction and arrangement of parts of which
I shall now describe a preferred embodiment.

Reference is made to the drawing, wherein:

Figure 1 is a perspective view of a roof to which
my novel roofing has been applied, certain parts
being shown in section.

Figure 2 is a sectional view taken along the
lines 2—2 of Figure 1.

Figure 3 is a sectional view through a ridge roll,
and is taken along the lines 3—3 of Figure 1.

Figure 4 is a sectional view through a portion of
the anchoring arrangement taken along the lines
4—4 of Figure 2.

Figure 5 is a typical cross section of my joint or
sheet lap as I prefer to use it where a "nailed on"
roof or siding is used instead of the clipped on type.

Sheet metal roofing in accordance with my in-

vention may be made of any suitable gauge or
character of metal, and may be made of plain,
corrugated, stamped, or embossed sheets, as may
be desired. In my drawing I have shown the
roofing sheets proper made from corrugated sheet
metal. There is no limitation upon the size of
the metal elements which make up my roofing
sheets. It is the usual practice to manufacture
these elements from standard sized galvanized
sheets. The roofing sheets themselves are indi-
cated at 5 in the several figures. In the form
shown they have corrugated bodies and, on each
end are bent upwardly as at 6 to form a standing
seam element; and the extreme edges of the
roofing elements are rolled or given a curved
formation as indicated at 7. It will be noted that
this form of roofing element is extremely simple
to manufacture, and is a form well adapted to
nesting during transit.

In Figure 1, I have shown certain structural
elements of the roof of a building comprising pur-
lins 8. These purlins are shown as running
lengthwise of the roof; but my roofing is of such
character that it may be applied to purlins which
run from the eaves to the ridge, providing the
width of the roofing element 5 is such that the
edges thereof will overlie the purlins. My sheet
metal members 5 are laid side by side longitudi-
nally on the roofing structure. If the distance
between the eaves and the ridge is greater than
the length of my elements 5, the elements are
laid in overlapping courses as will be readily
understood.

It will be apparent from Figure 2 that when the
elements are laid in side by side relationship,
rolled portions 7 of adjacent sheets are brought
close to each other so as to form the underlying
structure of a standing seam. A U shaped
saddle member 9 of strap metal or the like is
placed over the adjacent rolled edges. A sub-
stantially U shaped seat member 10 of strap
metal or the like is placed beneath the member 9.
A bolt 11 is passed down through perforations in
the members 9 and 10, and through a perforation
in a bent over leg 12 of a fastening member 13;
and a nut 14 is tightened on the bolt. This has
the effect of clamping the rolled portions 7 be-
tween the members 9 and 10 so as to provide a
firm joint; and it also has the effect of fastening
to this joint the mounting means 13.

The mounting means 13 may have any form
suitable to the type of roof construction of the
building. The number of purlins is dependent
upon the length and gauge of the sheet being used
for the member 5. Where the metallic purlins,
such as the I-beams 8 are employed, the mounting
member 13 may be of strap metal of substantial U
shape having a shorter leg 12 and a longer leg 15
which is carried beneath the purlin and bent back
over its lower flange, as indicated at 16 in Fig-

ure 2. Throughout the length of the elements 5 a series of these joints and mountings are made, usually wherever there are purlins, or along the length of a single purlin as the case may be. It will be noted that if a joint structure is made at a place where courses of the elements 5 overlap, the rolled portions 7, clamped between the members 9 and 10, will be of double thickness; but the manner of making the joints and the joint itself is not varied. For other types of roof structures, other types of mounting members 13 may be employed, as will be clear. By way of example, in a roof structure having stringers and a wooden deck, the mounting means 13 may be appropriately shaped so as to be fastened to the decking by screws, nails or bolts. Further, in any construction where the joint is not accessible from beneath for the tightening of the bolt 14, the bolt may be reversed so that the nut can be tightened on it from above, or the member 13 may have fastened to it a suitable upstanding threaded lug.

In Figure 5 I have shown a modified form of sheet edge joint especially adapted for use on a wooden deck. Here adjacent sheets are indicated at 5a. They have the upstanding, preferably rolled portions 7a, as in Figure 2, except that the upstanding portions at the sheet edges may advantageously be of less height, as shown. A saddle member 9 is again used; and may be held in place by a nail 24 which is driven into the roof deck 25. The cover piece 17 engages over the saddle members, as will presently be described. It is not usually necessary, but if desired, a perforated block or strip 26 may be employed as shown in dotted lines to serve as a seat member.

The constructions thus far described effect a firm joint between adjacent roofing elements as well as between courses, and further serve to mount the roofing structure firmly on the purlins or decking, as the case may be. After the roofing has been applied as indicated, a seam cover piece 17 is put in position. As illustrated, this cover piece has a semi-circular cross section and inwardly extending ears 18. It may be made of the same metal as the roofing elements 5 or 5a, or not, as desired; but it will have sufficient springiness so that when it is laid over a joint formed as hereinabove described and pressed downwardly into place, the ears 18 will engage beneath the ends of the legs of the saddle member 9. This engagement is sufficient to hold the cover piece firmly in place and to render the joint between the roofing elements 5 water-proof; but it will be noted that my construction offers no opportunity for leakage due to capillarity. The edge portions of the sheets 5 or 5a merely approach each other, and the adjacent sheets are contacted merely by the edges of the turned over ears or flanges 18 on the cover piece. It will be understood that these ears 18 preferably form a continuous flange along the full length of the cover piece 17. Where more than one cover piece is necessary in a direction extending from the eaves to the ridge, the cover pieces are overlapped just as the elements 5 are overlapped. There is usually sufficient springiness in the metal to take care of this; but it is not without the spirit of my invention to manufacture the cover pieces slightly smaller at one end than at the other in order to accommodate the overlap, and in order to make it possible to snap the pieces more snugly over each other.

Where the two sides of the roof come together at the ridge, I employ a piece which is known as a ridge roll in order to seal the joint from the elements. This ridge roll is illustrated in Figure 1 as

being in one piece, and it comprises a semi-circular central roll 19, and extending radial flange portions 20 and 21. These flange portions, near their ends, may be bent sharply downwardly as at 22. The extreme edges are corrugated as at 23 (where the elements 5 are corrugated) so as to fit snugly against the surfaces of the elements 5 or 5a. As the intervals of seam formation, the bent over portion 22 is cut-away as at 24 to accommodate the standing seam.

The ridge roll is often made in two pieces, as illustrated in Figure 3, where like parts are indicated by like index numerals. It is frequently of advantage to use a two piece ridge roll since the corrugations or ridges in the members 5 or 5a on opposite sides of the roof do not then have to be kept exactly opposite each other.

In the form illustrated in Figure 3 the ridge is made in a manner similar to the making of my standing seam. Two of the ridge roll members are placed in position with the rolled edges (in this instance comparable to the rolled edges 7 or 7a of the sheets 5 or 5a) placed in juxtaposition. A saddle member 27 is placed over the edges, and a seat member 28 beneath. The two are held together by a bolt 29 which also engages a mounting member 30. This member may be bent around the lower edge of a purlin 8, as shown, or otherwise held in position.

Modifications may be made in my invention without departing from the spirit of it, and for the purpose of adapting it to different types of roofing construction, I prefer to provide a shoulder 25a in the upwardly extending side portion 6 of the roofing elements of the type shown in Figure 2. When this is done, the ears 18 of the cover piece are then securely caught and held between this shoulder and the ends of the legs of the member 9. It will be understood that the cover piece can be substantially varied as to body shape; and different, and/or ornamental shapes may be adopted. A higher body structure in the cover piece will usually be found necessary where one has to reverse the position of the bolt 11 or tighten the nut 14 from above.

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

1. In a roofing structure, the combination of roofing elements of sheet form having upstanding side portions and bent over edge portions, said edge portions juxtaposed, a saddle member closely embracing a major portion of said juxtaposed edge portions, a seat member beneath said saddle member and said juxtaposed edge portions, and means for clamping said saddle member and said seat member together.

2. In a roofing structure, the combination of roofing elements of sheet form having upstanding side portions and bent over edge portions, said edge portions juxtaposed, a saddle member embracing said juxtaposed edge portions, a seat member beneath said saddle member and said juxtaposed edge portions, and means for clamping said saddle member and said seat member together, said saddle and seat members both being of substantial U shape whereby both the turned over portions of said sheet edges and parts of the upstanding portions thereof are clamped therebetween.

3. In a roofing structure, the combination of roofing elements of sheet form having upstanding side portions and bent over edge portions, said edge portions juxtaposed, a saddle member embracing said juxtaposed edge portions, a seat

member beneath said saddle member and said juxtaposed edge portions, and means for clamping said saddle member and said seat member together, said saddle and seat members both being of substantial U shape whereby both the turned over portions of said sheet edges and parts of the upstanding portions thereof are clamped therebetween, said bent over portions of said sheet edges being of rolled configuration whereby to exert resilient back pressure against said clamping pressure.

4. In a roofing structure the combination of roofing elements of sheet form having upstanding side portions and bent over edge portions, said edge portions juxtaposed, a saddle member embracing said juxtaposed edge portions, a seat member beneath said saddle member and said juxtaposed edge portions, and means for clamping said saddle member and said seat member together, said saddle and seat members both being of substantial U shape whereby both the turned over portions of said sheet edges and parts of the upstanding portions thereof are clamped therebetween, said bent over portions of said sheet edges being of rolled configuration whereby to exert resilient back pressure against said clamping pressure, and a mounting means, said clamping means serving to hold said mounting means to said saddle and seat means.

5. In a roofing structure, the combination of roofing elements of sheet form having upstanding side portions and bent over edge portions, said edge portions juxtaposed, a saddle member embracing said juxtaposed edge portions, a seat member beneath said saddle member and said juxtaposed edge portions, and means for clamping said saddle member and said seat member together, said saddle and seat members both being of substantial U shape whereby both the turned over portions of said sheet edges and parts of the upstanding portions thereof are clamped therebetween, said bent over portions of said sheet edges being of rolled configuration whereby to exert resilient back pressure against said clamping pressure, and a mounting means, said clamping means serving to hold said mounting means to said saddle and sheet means, said mounting means comprising a metal strip having a portion so clamped and a tongue extending angularly therefrom and adapted to be engaged with a purlin.

6. In a roofing structure, the combination of roofing elements of sheet form having upstanding side portions and bent over edge portions, said edge portions juxtaposed, a saddle member embracing said juxtaposed edge portions, a seat member beneath said saddle member and said juxtaposed edge portions, and means for clamping said saddle member and said seat member together; and a cover piece having a hollow body portion and intumed edge flanges, said cover piece engaged over the joint formed as described, said flanges engaged beneath the ends of said saddle member.

7. In a roofing structure, the combination of roofing elements of sheet form having upstanding side portions and bent over edge portions, said edge portions juxtaposed, a saddle member embracing said juxtaposed edge portions, a seat member beneath said saddle member and said juxtaposed edge portions, means for clamping said saddle member and said seat member together, and a cover piece having a hollow body portion and intumed edged flanges, said cover piece engaged over the joint formed as de-

scribed, said flanges engaged beneath the ends of said saddle member, the upstanding portions at the sides of said roofing element being provided with shoulders also engaging the flanges on said cover piece.

8. In a roofing structure, the combination of roofing elements of sheet form having upstanding side portions and bent over edge portions, said edge portions juxtaposed, a saddle member embracing said juxtaposed edge portions, a seat member beneath said saddle member and said juxtaposed edge portions, and means for clamping said saddle member and said seat member together, said saddle and seat members both being of substantial U shape, whereby both the turned over portions of said sheet edges and parts of the upstanding portions thereof are clamped therebetween, the upstanding portions at the sides of said roofing element being provided with shoulders lying below the ends of said saddle member.

9. The combination as claimed in claim 5 including a ridge member having rolled edge portions, a flange extending therefrom, a bent over portion on the edge of said flange contacting the surface of said sheet metal roofing members, said bent over portion being cut-away to accommodate the standing seam between said roofing members.

10. A ridge roll member comprising a strip of metal having a rolled edge portion along one side thereof adapted to be caught beneath a saddle member and be closely embraced thereby over a major portion thereof and having a flange portion extending from said rolled portion, and means on said flange portion for conforming to the surface configuration of a roof covering.

11. In a roofing structure the combination of a flat deck, roofing sheets having rolled edges in juxtaposed relationship, a saddle member closely embracing a major portion of the juxtaposed rolled edges of said roofing elements and a fastening member engaging said saddle member, extending between said juxtaposed edges and engaging said roof deck for holding said saddle member in engagement with said edges.

12. In a ridge roll structure a pair of ridge members having juxtaposed edges, said edges being rolled, a saddle member closely embracing a major portion of said rolled edges, means for fastening said saddle member to the supporting elements of a roof and a cap member engaged over said saddle member and covering the juxtaposed edges of said ridge members.

13. A ridge roll structure comprising a pair of ridge members having juxtaposed rolled edges and flange portions for overlying roofing on the sides of a roof, a saddle member closely embracing a major portion of said rolled members, a seat beneath said rolled members, and means for fastening said seat and said saddle together whereby to clamp said rolled edges, and a cap member engaging over said rolled edges and held in place by said saddle member.

14. A ridge roll structure comprising a pair of ridge members having juxtaposed rolled edges and flange portions for overlying roofing on the sides of a roof, a saddle member closely embracing a major portion of said rolled members, a seat beneath said rolled members, and means for fastening said seat and said saddle together whereby to clamp said rolled edges, and a cap member engaging over said rolled edges and held in place by said saddle member, and mounting means also engaged by said clamping means.

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