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ROOF DECK STRUCTURE AND RESTRAINING CLIP THEREFOR

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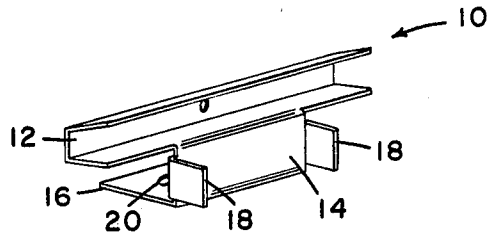


Fig. 1

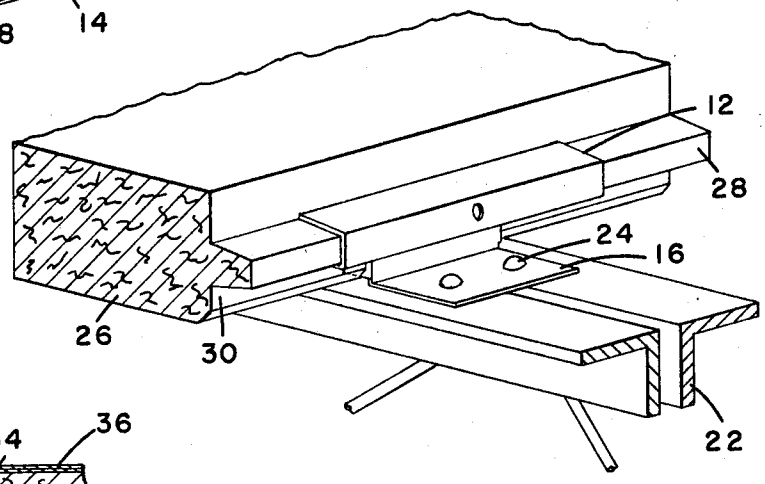


Fig. 2

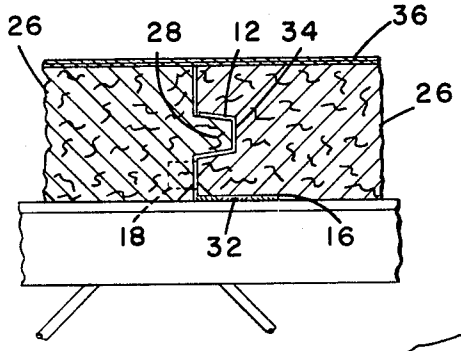


Fig. 3

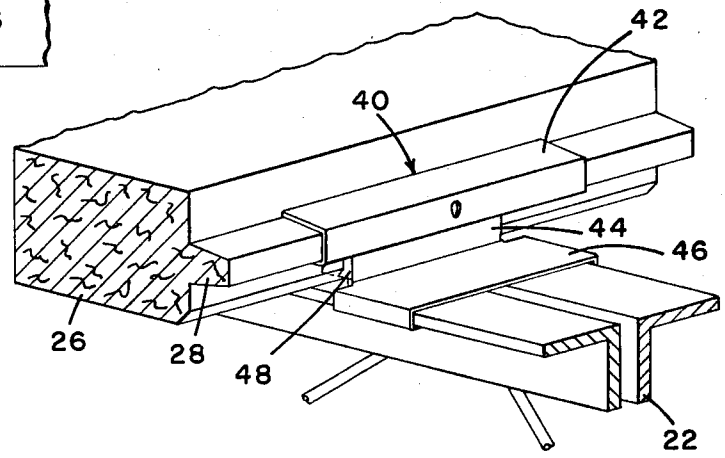


Fig. 4

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ROOF DECK STRUCTURE AND RESTRAINING CLIP THEREFOR

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10 Claims. (Cl. 52—483)

This invention relates to an improvement in roof deck structures embodying large roofing panels or planks and to an improvement in the means for affixing roofing planks to supporting joists.

It has been common practice to construct large, substantially flat roofs by incorporating large planks of a low density fibrous insulating composition, disposing them atop metal joists, and affixing the planks to the joists by metal clips capable of resisting tendencies for uplifting of the roofing. A weatherproofing top covering of asphalt, asphalt impregnated roofing fels and gravel is commonly laid over the planks of the roof.

Experience has shown that all of the materials involved in such roofing structures exhibit dimensional changes due to temperature and humidity changes. If these changes are allowed to have substantial cumulative effects, very substantial damage may result, such as the roof splitting, buckling, or pulling away from the parapets at the edges. To avoid these cumulative effects, it has been a practice to include a rigid, elongate T-bar or wood plank, welded or bolted to joists, extending between about every ten or fifteen lengths and about every ten or fifteen rows of planks, dividing the large roofs into a plurality of separate small areas independent of each other insofar as the effects of dimensional changes are concerned. Expressed in terms of footage, these positive lines of restraint have been recommended at every hundred feet of roof in a direction parallel to the long direction of the roof planks, and at every forty feet in the perpendicular direction, which latter direction normally undergoes greater expansion and/or contraction.

The closer spacing of the positive lines of restraint in the perpendicular direction in the above-discussed prior practice is also a result of the fact that the extent of potential damage by the cumulative effect on a plurality of roof planks is also a function of the number of joints, and there are a greater number of joints per given distance in the width direction of the planks. One reason for the number of joints being a factor in the cumulative effect is that in constructing the roof, it is difficult to abut the tongue and groove type edges as tightly as they will subsequently be forced together by the forces that will be created by the shrinkage of the built-up roofing adhered thereon after the outside temperature has dropped a few times, causing such repeated shrinkages. Drops and rises in temperature do not result in a built-up roof shrinking and then expanding again, but, instead, they result in shrinkage and then merely a softening without reexpansion, followed by repeated shrinkage and softening. If this effect can be cumulative over a substantial area, the roof planks will be moved together toward the center, forming large gaps at the edges of roof parapets. This problem in any direction is proportional to the number of joints extending perpendicular to that direction.

It is an object of the present invention to provide an improved metal clip for attachment of roof planks to metal joists.

It is a further object to provide such improved clips such that, with only the slight modification in the clip relative to prior clips, the need for the above-discussed spaced parallel restraints in the roof structure is eliminated.

It is a still further object to provide a novel clip which will function in combination with the roof planks to eliminate the prior need for special and separate lateral support elements for providing the amount of lateral support to the framing members required by the Bar Joist Institute.

These and other objects of the invention will become readily apparent from the following specification and the drawings in which:

FIG. 1 is an isometric view of a roof deck restraining clip embodying the present invention.

FIG. 2 is an isometric view of the clip of FIG. 1 engaging the edge of a roof plank and welded atop a bar joist.

FIG. 3 is an end view of the plank, clip, and joist of FIG. 2 in a finished roof.

FIG. 4 is an isometric view similar to FIG. 2 with a modified form of the roof deck restraining clip.

In FIG. 1, there is a novel roof deck restraining clip **10**, formed by the appropriate cutting and bending of a sheet of steel of a thickness of about 16 to 20 gauge. Clip **10** consists of a tongue-engaging elongated channel portion **12**, a vertical web portion **14**, a horizontal base portion **16**, and, at each of the two ends of web portion **14**, a small flange **18** extending perpendicularly thereto. Base portion **16** includes two small holes **20**, **20** for use in affixing the clip to a joist.

FIG. 2 shows clip **10** affixed atop a bar joist **22** by means of puddle welds **24** in holes **20**, **20**. The channel portion **12** and web portion **14** abut tightly against a roof plank **26** and conform to the edge contour, including an elongate tongue **28** and a lower edge surface **30**.

The two small perpendicularly extending flanges **18** at each end of the web portion **14** are piercingly extending into the plank at the lower edge surface **30**. By reason of the piercing engagement of the flanges **18** into the plank **26**, the firmly welded clip **10** is able to restrain any movement of plank **10** from expansion and contraction, at least to the extent which would produce cumulative effects. In the event expansion of the plurality of planks or a roof occurs, it will be seen how, with the novel clip **10**, the planks are prevented from moving from their proper disposition, in either direction. Accordingly, it will be readily understood that if the respective planks are prevented from moving in either direction from their proper disposition, an expansion of all of the planks of a roof will have no difference in its effect whether the roof is otherwise unrestrained for an area of ten feet by ten feet or an area of one thousand feet by one thousand feet.

The clips **10** thus provide both the restraint against tendencies for uplifting of the roof, as prior clips had, and simultaneously provide the type of restraint that previously required the construction of the roof in a plurality of small, independent sections, divided by rigid, elongate dividing members, such as T-bars and wood planks.

In FIG. 3, the clip **10** is shown mounted on a bar joist **22** by a fillet weld **32**, which is an alternative to the puddle welds **24** of FIG. 2. The channel portion **12** and web portion **14** are disposed in the joint between two planks **26**, one having an edge including the tongue **28** and the adjacent plank having a complementary elongate groove **34**. Extending into the tongued plank are the clip flanges **18**. Disposed over the planks and adhered thereto is a built-up roofing **36** consisting of the common laminations of roofing felts and asphalt with a gravel top surface.

FIG. 4 is a view similar to FIG. 2, with a modified clip **40**. Clip **40** includes a tongue-engaging elongate channel portion **42**, a vertical web portion **44**, a base portion **46**, and, at each of the two ends of web portion **44**, a small flange **48** extending perpendicularly thereto. Base portion **46** is of substantially greater length parallel to the chan-

nel portion **42**, in comparison to the base portion **16** of clip **10**, and the two ends of base portion **46** are folded downwardly and inwardly, enclosing the two edges of the top of bar joist **22**. Clip **40** will provide the restraint against tendencies toward uplifting of the roof, as did prior clips, and will simultaneously provide the type of restraint, in a direction parallel to the plank tongue and groove side edges, the previously required spaced, rigid, elongate dividing members at intervals extending perpendicular to the plank side edges. In the case of a relatively long, narrow roof, when such restraining members would normally have heretofore been required in only one direction, the clip **40**, with simple wrap-around edges, would be as advantageous, without need of any welding or equivalent steps, as the clip **10**, which must be affixed by welding or equivalent means.

Having completed a detailed disclosure of the preferred embodiments of my invention so that those skilled in the art may practice the same, I contemplate that variations may be made without departing from the essence of the invention or the scope of the appended claims.

What is claimed is:

1. A roof deck restraining clip comprising a horizontally disposed base plate for attachment to a roof support framing member, a vertical web portion extending upwardly from said base plate for disposition between the edges of a pair of adjacent roof planks, means for attachment of said clip to a plank edge capable of restraining movement of said plank edge vertically away from said base plate, and at least one short flange disposed above the plane of said base plate in a plane perpendicular to the plane of said web portion and perpendicular to the plane of said base plate, whereby said short flange will be forced to piercingly engage a roof plank edge, when mounted, and restrain movement of said plank horizontally in a direction parallel to said plank edge.

2. A clip as defined in claim **1**, wherein said means for attachment to a plank edge consists of an elongate channel for attachment to a plank edge elongate tongue.

3. A clip as defined in claim **2** wherein said web connects said base plate and said elongate channel.

4. A clip as defined in claim **3** wherein said web has one of said short flanges extending from each end thereof.

5. In a roof deck structure, the combination of a plurality of spaced parallel, horizontally extending, roof-supporting framing members, a plurality of rows of a plurality of roof planks mounted atop said framing members, a plurality of roof deck restraining clips each attached to a roof-supporting framing member and disposed at and extending into a joint of two adjacent planks and attached to an edge of at least one said plank, each said clip comprising a horizontally disposed base plate for attachment to a corresponding one of said roof-supporting framing members, a vertical web portion extending upwardly from said base plate for disposition between the edges of a corresponding pair of adjacent roof planks, means for attachment of said clip to a plank edge capable of restraining movement of said plank edge vertically away from said base plate, and at least one short flange disposed above the plane of said base plate in a plane perpendicular to the plane of said web portion and perpendicular to the plane of said base plate, whereby said short flange piercingly engages said roof plank edge and restrains movement of said plank horizontally in a direction parallel to said plank edge as defined in claim **1**.

6. The structure of claim **5** wherein said means for attachment to a plank edge consists of an elongate channel conforming to and engaged upon a plank edge tongue.

7. The structure of claim **5** wherein said web connects said base plate and said elongate channel.

8. The structure of claim **5** wherein said web has one of said short flanges extending from each end thereof.

9. The structure of claim **5** wherein said base plate is welded to said framing member.

10. The structure of claim **5** wherein said base plate extends across the entire width of the top of said framing member and has a portion folded downwardly and under each edge of said framing member.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

tent No. 3,393,488 July 23, 1968

Joseph W. Schneller

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 19, "fels" should read -- felts --; line , "of" should read -- or --. Column 4, line 19, cancel s defined in claim 1".

Signed and sealed this 16th day of December 1969.

EAL)
test:

ward M. Fletcher, Jr.
testing Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents