The present invention relates to metallic building structure, and more particularly to buildings of the roof truss and column type. The invention has utility in connection with the provision of a wide variety of building constructions that can be relatively quickly assembled in the field from shop-assembled sections, and has particular utility in connection with building constructions designed to bear substantial lateral loads imposed from within, such as grain storage buildings and the like.

Metallic buildings of the roof truss and column type ordinarily include a plurality of vertical columns disposed in pairs on opposite sides of the building. Each pair of opposed columns carries at the upper ends of the columns comprising a roof truss which extends across the top of the building structure from side to side thereof. The roof trusses support the weight of the roof; and to achieve suitable stress distribution and strength they are often comprised of a rigid top member or top chord and a rigid bottom chord, the chords being vertically spaced apart and interconnected by generally upright web members. The roof trusses are disposed in vertical planes and are parallel to each other and spaced from each other lengthwise of the building. Thus, the top chords of the roof trusses serve in effect as rafter beams, the bottom chords and web members serving in effect to strengthen the rafter means.

Metallic buildings of this type also commonly include members known as purlins which are supported by the top chords and extend lengthwise of the building parallel to each other and perpendicular to the top chords. These purlins, in turn, support the roof proper, which is ordinarily in the form of metal roofing sheets.

In addition to the roof sheeting, metallic side wall sheeting is provided. It is common practice to secure a plurality of horizontally disposed vertically spaced members known as girts to the columns, and to secure the side wall sheeting in vertical relationship on the side of the girts. Eave structure is also provided which in effect ties together the side walls and the roof and extends along each side of the building at the top thereof. The structure is completed by suitable end walls.

It is an object of the present invention to provide improved metallic building structure in which the forces imposed on the structure are distributed in such a way that they tend to balance each other, so that the strength, weight and cost of the structure may be substantially reduced.

Another object of the invention is the provision of metallic building structure of the roof truss and column type so constructed that the reaction forces imposed on the top chords of the roof trusses by the columns are largely relieved.

Still another object of the present invention is the provision of metallic building structure having roof purlins so mounted and arranged relative to the top chord and the web members of the roof truss as to distribute and relieve stresses that would otherwise be concentrated in the top chord.

A still further object of the invention is the provision of metallic building structure having an improved eave assembly.

Finally, it is an object of the present invention to provide metallic building structure that is relatively simple and inexpensive to manufacture, easy to erect, and rugged and durable in use.

Other objects and advantages of the present invention will become apparent from a consideration of the following description, taken in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective interior view of metallic building structure according to the present invention;

FIGURE 2 is a transverse cross-sectional view of one side of metallic building structure according to the present invention;

FIGURE 3 is a fragmentary perspective view of an eave assembly of the present invention;

FIGURE 4 is an elevational view of a roof truss in accordance with the present invention;

FIGURE 5 is a cross section taken on the line 5-5 of FIGURE 4;

FIGURE 6 is a cross section taken on the line 6-6 of FIGURE 4; and

FIGURE 7 is an enlarged fragmentary cross-sectional view of a ridge assembly according to the present invention.

Referring now to the drawings in greater detail, there is shown metallic building structure comprising a plurality of vertical main columns 1 disposed in opposed pairs on opposite sides of the building structure, the columns 1 on each side of the building structure being in alignment longitudinally of the structure and being supported at their bases by the usual flooring or footings. Each column 1 comprises a vertical web 3 and vertical inner and outer flanges 5 and 7, respectively.

Each pair of opposed main columns 1 carries at the upper ends of the columns comprising the pair a roof truss 9 which extends across the top of the building structure. Each truss 9 comprises a peaked top chord 11 made up of a pair of straight hat sections 13 disposed at an obtuse angle to each other. Each hat section 13 is inclined at an acute angle to the horizontal corresponding to the pitch of the roof, and each comprises an upper web 15 lying in a plane disposed at that pitch angle.

From opposite edges of web 15 depend a pair of vertical flanges 17 which terminate downwardly in oppositely outwardly extending flanges 19 parallel to web 15. Flanges 17 thus comprise a pair of spaced parallel vertical plates secured together in unitary assembly by web 15. At least the outer faces of these vertical plates are also vertical.

A splice member 21 secures sections 13 together in rigid unitary assembly at their adjacent ends at the ridge of the building structure. Splice member 21 is a short hat section of the same general cross-sectional configuration as hat sections 13 except that its depending flanges are spaced farther apart so as to receive between them the ends of flanges 17 in bolted relationship.

Each truss 9 also includes a straight horizontal bottom chord 23 comprised of a plurality of channels 25. In the illustrated embodiment, bottom chord 23 is comprised of two sections each made up of a pair of channels back to back but spaced apart. Each channel 25 has a vertical web 27 and a pair of horizontal flanges 29 extending away from the longitudinal coextensive channel 25 of the pair. The two sections of bottom chord 23 are secured rigidly together in endwise alignment by means of splice plates 31 which interconnect the webs 27 of longitudinally aligned channels 25.

A plurality of web members 33 extend between and interconnect top and bottom chords 11 and 23. Each web member 33 is a channel shape having parallel flanges 35. The distance between the outer surfaces of flanges 35 is about the same as the distances between the inner or confronting surfaces of flanges 17 and webs 27. The ends of web members 33 are disposed between flanges 17 and webs 27 and each flange 35 is secured to its adjacent...
flange 17 by a single field bolt 37 and to its adjacent web 27 by a further single field bolt 37. The lower ends of the several web members 33 at opposite ends of each truss 9 are also secured to a gusset plate 39 in view of the stress concentrations at these points. In this way, the great majority of the web members 33 are directly flange-connected to the top and bottom chords by simple single bolt connections. Accordingly, there is no need to support these web members and the gusset plate would have to be faced together, nor is there any need for swedging or flattening the web member flanges so that the connectors could pass through them as through one thick member.

Each roof truss 9 is secured at its ends to a pair of opposed main columns 1 adjacent the tops of those columns. The connection at each end of the truss is made below the top of the column at the end of bottom chord 23, the end of the bottom chord being secured to inner flange 5 of the associated column 1 by means of conventional field bolts and angles or the like. This connection bears no substantial part of the weight of the assembly but resists primarily only stresses imposed lengthwise of the bottom chord and perpendicular to the column. Hence, this connection need comprise only the simplest form of buttwise tie to the bottom chord.

The other connection between each end of the roof truss 9 and the main columns 1 is a comprising an important feature of the present invention. As is best seen in FIGURES 2 and 4, there is provided a column cap plate 41 having two portions related to each other at an obtuse angle. The top of each column 1 is cut off on a bias so as to present uppermost surfaces inclined downwardly outwardly at about the same angle as the adjacent web member 33 of roof truss 9, while the other or outer end 45 of cap plate 41 extends from the top of the column downwardly and inwardly at about the same angle as the adjacent web member 33 of roof truss 9, while the other or outer end 45 of cap plate 41 extends from the top of the column downwardly and outwardly at the roof pitch. Inner end 43 is bolt-connected to the upper outer end of the extreme end web member 53 of the truss, while the lower outer end of top chord 11 is bolt-connected through flanges 19 to a portion of cap plate 41 between ends 43 and 45 thereof. Top chord 11 terminates short of end 45 of cap plate 41. In actual practice, column 1 and cap plate 41 will be shop-assembled, while cap plate 41 and truss 9 will be field-assembled. Column 1 and cap plate 41 are shown in assembly in FIGURE 4 separate from the columns simply for purposes of better illustrating cap plate 41.

There is thus provided a construction characterized by an end web member of the roof truss extending upwardly and outwardly between the top and bottom chords thereof, the bottom chord being secured at its ends to the column below the top of the column so that the point of securement of the end web member to the bottom chord is spaced a substantial distance inwardly of the point of securement of the bottom chord to the column. At the same time, the upper outer end of the end web member is connected to the top of the column through a cap member which bears on the top of the column, while the top chord merely rests on this cap member.

Thus, the load carried through the end web member is carried to column 1 through cap plate 41 and generates no bearing force in top chord 11. At the column connection, the top chord is thus required to resist axial loads only and not shear loads. The roof itself is supported by a plurality of roof purlins 47 which extend longitudinally of the building structure at the top thereof and are spaced apart and parallel to the ridge. Purlins 47 have an application Serial No. 644,087, filed March 5, 1957. Instead of being disposed on top of top chord 11, however, purlins 47 extend between hat sections 13 and have a principal portion of their vertical extents coincident with the vertical extents of hat sections 13. Thus, each purlin 47 has a web 49 disposed in a plane perpendicular to the planes of web 15 and flanges 17 of the associated hat section 13, each web 49 extending upwardly from the lower flanges 19 of the hat sections to an upper edge a substantial distance above web 15 of the hat sections. Thus, webs 49 are substantially taller than flanges 17. Webs 49 terminate upwardly in upper flanges 51 which are spaced at equal distances from the peaks of the roof which would have to be maintained directly downwardly in oppositely directed lower flanges 53 which rest on lower flanges 19 of the hat sections of the upper chord of the roof truss. Flanges 51 and 53 are parallel to each other and perpendicular to webs 49.

The ends of purlins 47 are picked up by brackets comprising angles 55 having flanges 57 and 59 at right angles to each other. Flanges 57 are secured by field bolts 37 to the outer vertical faces of flanges 17, the ends of webs 49 of purlins 47 being bolt-connected to flanges 59. Conventional roofing sheets 61 are bolt-connected to upper flanges 51 of purlins 47 and are thereby maintained parallel to but spaced above the top chords of the roof trusses. A ridge cap 63 extends lengthwise of the top of the building structure and overlies the gap between the roofing sheets on each side of the building. Ridge cap 63 is bolted to the roofing sheets on each side and may have a flange between the edges of the ridge cap and the upper ends of the roofing sheets.

Apart from the usual advantages of a Z-shaped purlin as shown at 47, the use of such a purlin in the particular environment and location of the present invention is attended by further advantages. In the first place, the component of the vertical load of the roof normal to the top chord is transmitted through angles 55 directly to web members 33, and the top chord is thus required to resist axial loads only. In the second place, the forces which act longitudinally through purlins 47 are not applied to the web 15 of the hat section edgewise thereof, as would be the case if the purlins were mounted on web 15, but instead are distributed broadside over vertical flanges 17. The result is that the hat section presents to the end of the Z-shaped purlin 47 a structural member which itself is effectively Z-shaped and is comprised of web 15 and the adjacent flanges 17 and 19.

Also, adjacent the ridge cap, the purlin attachment of the present invention provides a uniquely compact assembly having great strength characteristics. Specifically, it will be noted from FIGURE 4 that the flanges 59 of angles 55 are all disposed on the outer side of the angles except that they adjoin the ridge, of which the flanges 59 are disposed adjacent each other and are also noted from FIGURE 7 that the two angles 55 immediately adjacent the ridge are spaced above the adjacent flanges 19. The purpose of this spaced angle arrangement adjacent the ridge is to permit positioning of purlins 47 as close as possible to the ridge to support the uppermost ends of the roofing sheets. This is accomplished by positioning flanges 59 on the ridge side of the associated brackets and the accommodation of the lower flanges of purlins 47 is in turn effected by disposing them under angle flanges 59, between flanges 59 and flanges 19.

By this construction, the upper ends of the roofing sheets are firmly supported above splice member 21 with both these upper ends and the splice member disposed beneath the ridge cap.

A still further advantage of the purlin arrangement of the present invention is that it permits connection of the upper ends of a number of web members 33 to the top chord by the same elements which secure angles 55 to the top chords. This, in turn, assures that a large portion of the weight of the roof will be transmitted through purlins 47 and angles 55 and the common field "bolts" 37 directly to form illustrated members of the web of the truss without further stressing the top chord of the truss. Thus, as seen in FIGURE 6, the same field bolt 37 which secures a portion of angle 55 to the hat section also secures a portion of web member 33 to the hat sec-
tion. In addition to reducing the stresses in the hat sections of the inner chord, this arrangement also simplifies the construction and assembly of the building structure.

Disposed in a row along each side of the building structure are vertical stub columns 65. Columns 65 are in line with each other and with main columns 1, and are disposed in alternate relationship with the main columns. Each stub column 65 comprises a vertical web 67, a vertical inner flange 69 and a vertical outer flange 71. Secured to outer flanges 7 and 71 of main columns 1 and 65 is a plurality of vertically spaced horizontal girts 73. Girts 73 are secured at their ends to outer flanges 7 of main columns 1 and at their mid-points to outer flanges 71 of stub columns 65, by the usual bolts and angles or the like. In a less preferred embodiment, the ends of the girts may be positioned between the inner and outer flanges of the columns so as to position the girts in effect in the plane of the columns. Girts 73 in the illustrated embodiment are comprised of Z-shaped purlins having horizontal webs. Secured to the inner vertical flanges of girts 73 are vertically disposed sections of inner sidewalk sheeting 75 which may be of conventional corrugated sheet metal construction. The vertical side edges of sheeting sections 75 overlap the inner sides of outer flanges 7 and 71 of main columns 1 and stub columns 65, respectively, so that these outer flanges in effect close the gaps between the sheeting and the purlins and provide a fairly tight joint at the vertical side edges of the sheeting sections. When the building structure is intended for use in connection with materials which will contact and bear against the inner sidewalk sheeting, such as grain and the like, it is desirable to vary the vertical spacing of the girts 73. Thus, as indicated in FIGURE 3, the spacing between the girts increases from a minimum of about one foot at the bottom of the building structure to a maximum of about two feet adjacent the top of the building structure. In FIGURE 1, a metallic building according to the present invention is shown partly filled with grain stored in bulk. It will be recognized that the grain exerts lateral outward pressure against its sides, the height of the sheeting and the outer flanges by virtue of wind action. Thus, it is evident that the planes of lips 91 and 93 are spaced apart a distance equal to the thickness of the contour of sheeting 101. The

in tie rods 77 tends to balance the tension imparted to the end web members 33 by the weight of the roof and particularly the tension at the connections between the bottom chords of the roof trusses and the main columns. As the tie rods are substantially in the plane of the bottom chords, the stress in the bottom chords adjacent their connections with the main columns is very greatly reduced; and the weight borne by the main columns which is imparted thereto through the end web members 33 is substantially reduced. The size and weight of the main columns and roof trusses can be correspondingly reduced. In effect, the weight of the roof and the outward pressure of the material confined within the building structure tend to balance the reaction of the ceiling which is imparted thereto through the end web members 33. Thus, the reaction of the weight of the roof is borne not by the main columns but by the stored material itself. Hence, the remarkable result is obtained that a building structure which is subjected to two different types of loading can be made lighter and weaker by the present invention than if it were subjected merely to one type of loading.

Another important feature of the present invention is the eave structure which ties together the upper ends of the inner and outer sidewalk sheeting, the lower outer ends of the roof sheets and the outer ends 45 of the column cap plates 41. An eave strut 83 is provided which extends along each side of the building structure and is coplanar thereto. Each eave strut 83 comprises a C-shape having a flat web 85 and a pair of flat upper and lower flanges 87 and 89 extending in the same direction at right angles to web 85 and parallel to each other. Upper flange 87 terminates in an upper lip 91 disposed thereto at an angle equal to a right angle plus the angle of roof slope and lower flange 89 terminates in a lower lip 93 disposed thereto at an angle equal to a right angle minus the angle of roof slope, so that lips 91 and 93 are parallel to each other and vertical. In a less preferred embodiment, lips 91 and 93 may be coplanar and perpendicular to web 85.

As seen in FIGURES 2 and 3, eave strut 83 is supported flat on outer ends 45 of column cap plates 41 and is bolted thereto, so that flanges 87 and 89 of the eave strut are inclined at the roof pitch and web 85 is perpendicular to the roof pitch. Lower flange 89 is bolted to outer ends 45. As upper flange 87 is disposed at the roof pitch, the lower outer ends of roofing sheets 61 may be secured substantially flat thereagainst by means of bolts 95 passing through the roofing sheets and the upper flange of the eave strut. If desired, a thin closure strip 97 of rubber or other elastic deformable material may provide a seal between the roofing sheets and the eave struts. The upper ends of inner sidewalk sheeting 75 extend upwardly beyond the upper ends of column 1 and are field-cut to accommodate column cap plates 41 and are disposed closely adjacent the inner sides of the eave struts. These upper ends of the inner sidewalk sheeting are secured to the eave struts by means of bolts 99 which pass through the upper ends of sheeting 75 and the lower portions of web 85 of the eave strut. There is thus provided an eave strut having confronting lips 91 and 93, the upper of which is disposed slightly outwardly beyond the lower. This arrangement of lips 91 and 93 makes it possible to assemble outer sidewalk sheeting 101 in a highly convenient manner. Specifically, the upper ends of sheeting 101 are introduced into the gap between lips 91 and 93 interiorly of eave strut 83 until they contact upper flange 87 of the eave strut. As introduced, sheeting 101 will be disposed at an angle to the vertical such that it extends downwardly and outwardly toward its lower end. The sheeting in the eave strut is then swung down to the vertical, whereupon the sheeting at its uppermost end contacts upper lip 91 on the inner side thereof and lower lip 93 on the outer side thereof. In the preferred embodiment, flanges 87 and 89 of eave strut 83 are of a width such that the planes of lips 91 and 93 are spaced apart a distance equal to the thickness of the contour of sheeting 101. The
upper ends of the outer sidewall sheeting are thus held tightly within the eave strut and are secured in such a position that the outer sidewall sheeting can be conveniently attached to girts 73 by bolting or the like.

The upper ends of the outer sidewall sheeting are firmly held in place in the eave strut by means of bolts 103 which pass through the sheeting and through lower lip 93 of eave strut 83. Thus, a means of securing of the outer sidewall sheeting to the building structure is provided which makes it possible for a single workman to install the outer sidewall sheeting. At the same time, the securing of the outer sidewall sheeting is so firm that it is locked in place from top to bottom. Preferably, the sidewall sheeting is in the form of sheets of a length to extend full height of the sidewall of the building and of a width that it may be conveniently handled by a single workman.

A pair of opposite end walls, which may if desired be of conventional construction, completes the metallic building structure of the present invention.

From a consideration of the foregoing disclosure, it will be obvious that all of the initially recited objects of the present invention have been achieved.

Although the present invention has been described and illustrated in connection with preferred embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit of the invention, as those skilled in this art will readily understand.

Such modifications and variations are considered to be within the purview and scope of the present invention as defined by the appended claims.

What is claimed is:
1. Metallic building structure comprising two pairs of opposed main columns, a main column of each pair being disposed at each side of the building structure, a pair of roof trusses one extending between and supported by each pair of main columns, a stub column between the main columns at each side of the building structure, a plurality of vertically spaced girts secured to each stub column, vertical side wall sheeting disposed on the inner sides of the girts, and tension members secured to and extending between each stub column and each truss of the pair of roof trusses, the tension members being secured to the stub columns at locations above the bottoms of the stub columns.
2. Metallic building structure as claimed in claim 1, the tension members being horizontally disposed.
3. Metallic building structure as claimed in claim 2, the roof trusses having top chords and horizontal bottom chords, the tension members being secured to the bottom chords.
4. Metallic building structure comprising two pairs of opposed columns, a column of each pair being disposed at each side of the building structure, a pair of roof trusses one extending between and supported by each pair of columns, each roof truss having a top chord, the ends of the top chords being disposed at acute angles to the horizontal, a roof supported by and parallel to the top chords, an eave strut perpendicular to the columns and to the ends of the top chords and extending lengthwise along a side of the building structure, the eave strut comprising a channel member having a web and an upper flange and a lower flange, the upper flange being parallel and secured to the underside of the roof, the flanges having lips extending toward each other, and a vertical section of side wall sheeting the upper end of which extends between the flange lips.
5. Metallic building structure comprising a plurality of columns disposed at each side of the building structure, a plurality of roof beams supported by the columns with the ends of the roof beams disposed at acute angles to the horizontal, a roof supported by and parallel to the roof beams, an eave strut perpendicular to the columns and to the ends of the roof beams and extending lengthwise along a side of the building structure, the eave strut comprising a channel member having a web and an upper flange and a lower flange, the upper flange being parallel and secured to the underside of the roof, the flanges having lips extending toward each other, and a vertical section of side wall sheeting the upper end of which extends between the flange lips.
6. Metallic building structure as claimed in claim 5, and means extending through and fastening together the section of side wall sheeting and the lip of the lower flange of the eave strut.
7. Metallic building structure comprising a plurality of columns disposed at each side of the building structure, a plurality of roof beams supported by the columns with the ends of the roof beams disposed at acute angles to the horizontal, a roof supporting and parallel to the roof beams, a plurality of vertically spaced girts secured to the columns, inner side wall sheeting disposed on the inner side of the girts, outer side wall sheeting disposed on the outer side of the girts, and an eave strut perpendicular to the columns and to the ends of the roof beams and disposed above the girts, the eave strut comprising a channel member having a web and an upper flange and a lower flange, the upper flange being parallel and closely underlying the roof, the flanges having lips extending toward each other, the upper end of the outer side wall sheeting extending beyond the upper flange lips, and the eave strut being disposed on the outer side of the upper end of the inner side wall sheeting.
8. Metallic building structure as claimed in claim 7, and means extending through and fastening together the upper end of the inner side wall sheeting and the web of the eave strut.
9. Metallic building structure comprising a pair of opposed columns disposed on one each side of the building structure, a roof truss extending between and supported by the columns, the roof truss having a top chord and a bottom chord interconnected by a plurality of web members, the bottom chord being secured at its ends to the columns at locations spaced below the tops of the columns, a web member at each end of the roof truss being secured to the bottom chord at a point spaced inwardly from the end of the bottom chord and extending diagonally upward and outward from its point of securement, each end web member including a cap plate at its upper outer end, the cap plate resting flat on top of and being secured to the upper end of the associated column, so that tensile forces in the bottom chord are transmitted through the bottom chord to the end web members, through the cap plates to the tops of the columns and are applied by the cap plates to the tops of the columns as compressive forces applied downward endwise of the columns.
10. Metallic building structure as claimed in claim 9, the bottom chord being straight and horizontal.
11. Metallic building structure as claimed in claim 10, the top chord being peaked and comprising a pair of straight members disposed at acute angles to the bottom chord and at an obtuse angle to each other.
12. Metallic building structure as claimed in claim 11, and a peaked roof supported by the peaked top chord.
13. Metallic building structure comprising two pairs of opposed columns, a column of each pair being disposed at each side of the building structure, a pair of roof trusses one extending between and supported by each pair of columns, each roof truss having a top chord and a bottom chord and a plurality of web members extending between and connecting the top and bottom chords, the top chord of one roof truss having a vertical face confronting a vertical face of the top chord of the other roof truss, a plurality of brackets secured to each of said confronting faces in opposed pairs, a plurality of parallel roof purlins extending between said confronting faces and secured each at its ends to the brackets of an opposed pair of brackets, a fastening member passing...
through the bracket and said vertical face and the upper end of the web member at each end of the purlins, and a roof supported jointly by upper surfaces of the purlins thereby to transmit roof weight from the purlins to the web members to the bottom chords.

14. Metallic building structure as claimed in claim 13, the brackets and upper ends of the web members through which the fastening members pass being disposed on opposite sides of the associated said vertical faces.

15. Metallic building structure comprising two pairs of opposed columns, a column of each pair being disposed at each side of the building structure, a pair of roof trusses one extending between and supported by each pair of columns, each roof truss having a top chord and a bottom chord and a plurality of web members extending between and interconnecting the top and bottom chords, each top chord comprising a pair of spaced parallel vertical plates secured together in unitary assembly, each web member comprising a channel member having parallel flanges, the upper ends of said web members being disposed between the vertical plates of each top chord with the flanges of the web members contiguous and parallel to the associated said vertical plates, a vertical plate of one top chord having a vertical face confronting a vertical face of a vertical plate of the other top chord, a plurality of brackets secured to each of said confronting faces in opposed pairs, a plurality of parallel roof purlins extending between said confronting vertical faces, the purlins having webs and top flanges, the purlins being spaced above said bottom flanges, and the purlins having bottom flanges disposed between the brackets and the bottom flanges of the top chords of the roof trusses.

17. Metallic building structure as claimed in claim 16, the top chords of the roof trusses having bottom flanges extending toward each other, the brackets being spaced above said bottom flanges, and the purlins having bottom flanges disposed between the brackets and the bottom flanges of the top chords of the roof trusses.

18. Metallic building structure comprising a pair of spaced parallel rafter beams, one beam having a vertical face confronting the vertical face of the other beam, a plurality of brackets secured to each of said confronting vertical faces in opposed pairs, a plurality of purlins extending between said confronting vertical faces, the purlins having webs and top flanges, the purlins being spaced at their ends to the brackets of opposed pairs of brackets, the purlin flanges having upper surfaces spaced above the upper edges of said confronting vertical faces, and a roof supported jointly by the upper surfaces of the purlin flanges.

19. Metallic building structure as claimed in claim 18, the roof beams having bottom flanges extending toward each other, the brackets being spaced above said bottom flanges, and the purlins having bottom flanges disposed between the brackets and the bottom flanges of the roof beams.

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