July 22, 1969 J. C. SHAFFER 3,456,415

TRUSS CONSTRUCTION

Filed Nov. 13, 1967

FIG. 1.

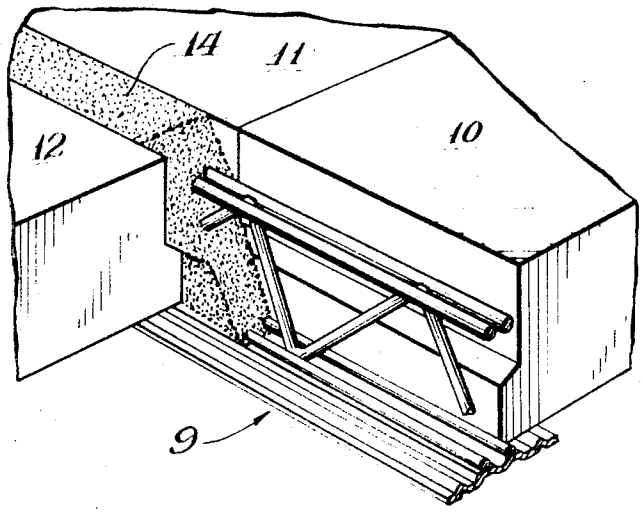


FIG. 2.

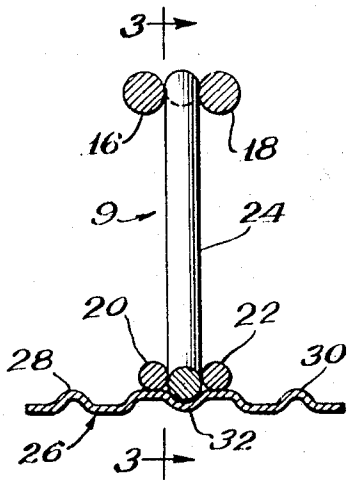


FIG. 3.

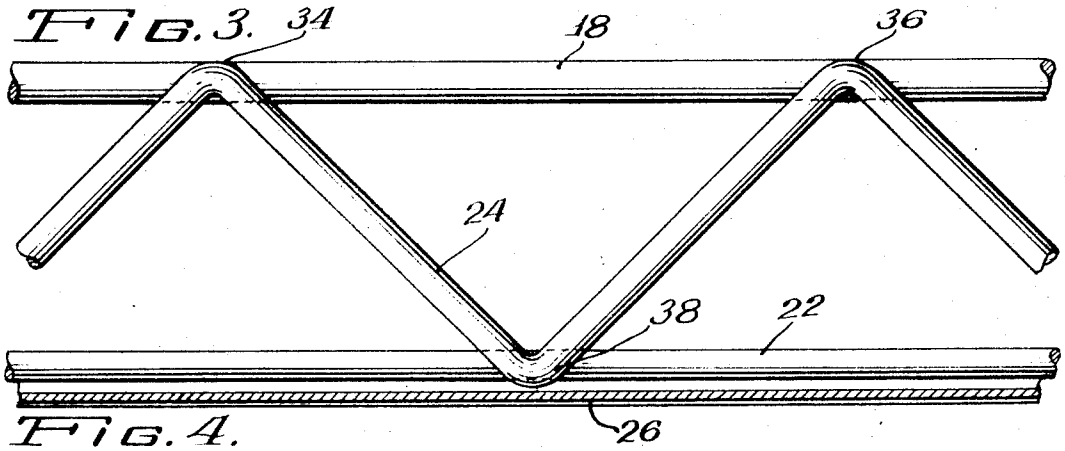
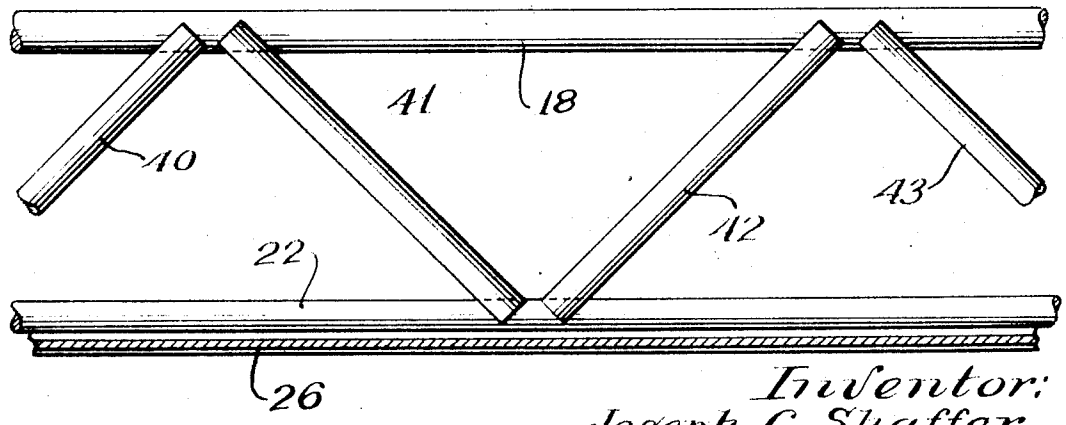


FIG. 4.



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TRUSS CONSTRUCTION

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U.S. Cl. 52—694 4 Claims

ABSTRACT OF THE DISCLOSURE

A structural truss fabricated from a zig-zag shaped rod member as the central web portion of the truss, two straight rod members attached on opposite sides of the web adjacent to one set of vertices of the zig-zag rod member to form the upper truss chord, and two straight rod members attached on opposite sides of the web adjacent to the remaining set of vertices of the zig-zag rod member to form the lower truss chord. A flat plate is attached to the truss as part of the lower chord. The flat plate is perpendicular to the plane of the web and runs the length of the truss parallel to the rod members.

BACKGROUND OF THE INVENTION

This invention relates to a truss construction and, more particularly, this invention relates to a truss construction which may advantageously be combined with formboards and gypsum for the construction of roof decks.

One of the many ways of constructing a roof deck or a floor deck is the combination of a truss with concrete or gypsum materials. A method for manufacturing a truss used for such deck construction is disclosed by W. S. Edge, in U.S. Patent No. 3,158,925 granted Dec. 1, 1964.

The truss of Edge is fabricated from two sheet metal strips, each strip having an upstanding flange and a horizontal flange joined by a bend, and three rod members. The upstanding flanges are faced against each other with the horizontal flanges placed in the same plane. One of the rod members is formed in a zig-zag shape and inserted between the backs of the angle members. The remaining two rod members are welded to those alternate vertices of the zig-zag rod which are spaced a distance from the horizontal flanges and form the upper chord of the truss.

A number of the trusses are then set in a spaced, parallel arrangement and gypsum slabs or other suitable support members are rested on the horizontal flanges of adjacent trusses. A slurry of concrete or gypsum is then placed over the truss and on the support members. The slurry is allowed to harden to form the deck.

Building construction utilizing such a truss or purlin has proven to be economical and productive of a highly reliable, structurally sound roof or floor deck. However, there are drawbacks to the purlin described above. For example, the flanged strips are welded back-to-back with a zig-zag rod member between them. This provides a source of leakage for the gypsum slurry between the upright flanges.

SUMMARY OF THE INVENTION

In a principal aspect the present invention of a truss construction comprises four straight rod members, a flat strip plate member and a co-planar configuration of rod segments or of a rod. The configuration defines a web to which the straight rod members and the plate member are attached. Two of the straight rod members form the upper chord of the truss construction. The remaining two rod members and the plate member form the lower chord. The web is interposed between the rods forming the upper chord and the rods forming the lower chord and is attached to the plate member to define a plane substantially perpendicular to the plate member.

It is thus an object of the present invention to provide an improved truss construction.

It is a further object of the present invention to provide a truss construction which may be formed from a fewer number of inventory components with a new ease of assembly and with a lower cost of assembly.

One further object of the present invention is to provide a simplified yet reliable truss construction.

One other object of the present invention is to provide a truss construction which substantially eliminates the possibility of leakage through the truss during deck construction.

These and other objects, advantages and features of the present invention will be more fully set forth in the detailed description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

In the detailed description which follows, reference will be made to the drawings in which:

FIGURE 1 is a perspective view of the new truss construction in combination with decking material;

FIGURE 2 is a cross sectional view of the new truss construction;

FIGURE 3 is a cross sectional view taken substantially along the line 3—3 of FIG. 2; and

FIGURE 4 is a cross sectional view similar to that shown in FIGURE 3, however, with an alternative web construction.

DESCRIPTION OF THE PREFERRED EMBODIMENT

There are innumerable ways to use a truss construction (truss) or purlin of the type disclosed by this invention. For purposes of this description, however, reference is limited to construction of a roof deck. FIGURE 1 illustrates the new truss of the present invention in combination with a number of slabs or formboards **10**, **11**, **12** of decking material. The construction of FIGURE 1 utilizes a decking material having a thickness greater than the height of the purlin **9**. The space adjacent the purlin between the slabs **10**, **11** and **12** of the deck material is then filled with a grout material **14** to provide a completed roof deck.

A popular alternative deck construction utilizes gypsum or fiber formboard in place of the slabs **10**, **11** and **12** shown in FIGURE 1. The formboard is generally not as thick as the height of the purlin **9**. A reinforcing wire screen or mesh is then placed over the formboard and the purlin **9**. Next a gypsum slurry is poured over the entire combination to cover the wire mesh and the purlin. The gypsum slurry then hardens forming a strong, serviceable deck.

FIGURES 2 through 4 more clearly illustrate the details of construction of two preferred embodiments of the purlin. FIGURES 2 and 3 illustrate a first preferred embodiment, and FIGURE 4 illustrates a second preferred embodiment.

In FIGURE 2, the first preferred embodiment, there is illustrated the purlin **9** which is fabricated from first and second upper chord rods **16** and **18** respectively, first and second lower chord rods **20** and **22** respectively, a zig-zag shaped web rod **24** and a flat strip plate member **26**. Preferably all of the structural components, rods **16**, **18**, **20**, **22** and **24** and plate **26**, are fabricated from high strength steel.

The size of the rods or wires forming the purlin and the length of the completed purlin are dependent upon the load requirements of the finished deck. Such requirements and proper sizing may be determined by utilizing fundamental methods of structural analysis.

The various rods and the plate are arranged in a jig assembly and welded together. Because a single size of plate may be combined with many variously sized rods in the same jig, production costs are substantially reduced in relation to production costs for a purlin of the type disclosed by Edge, proviously described.

As evident from FIGURE 2, the plate **26** has defined therein longitudinal ridges **28** and **30** on either side of the web rod **24**. Running parallel to the ridges **28** and **30** down the center of the plate **26** is a central trough **32**. The web rod **24** is bent into a zig-zag shape with alternate vertices (for example, vertex **38** in FIGURE 3) engaged and welded in the central trough **32**.

FIGURE 3 better illustrates the configuration of the web rod **24**. The web rod **24** is bent in a zig-zag shape with the alternate upper vertices **34** and **36** in combination with the first and second upper chord rods **16** and **18** forming the upper chord of the purlin. The upper chord rods **16** and **18** are positioned on opposite sides of plane of the web rod **24**. In a similar manner the lower vertex **38** of the web rod **24**, which fits into the central trough **32**, is combined with the first and second lower chord rods **20** and **22** and the plate **26** to form the lower chord.

FIGURE 4 illustrates an alternative arrangement for the construction of a web connecting the upper chord and the lower chord of the purlin. In the alternative construction of FIGURE 4 a plurality of rod segments **40** through **43** are arranged in a zig-zag pattern to connect the upper chord rods **16** and **18** to the lower chord rods **20** and **22**. The remainder of the construction of the embodiment illustrated in FIGURE 4 is essentially the same as previously described for the embodiment shown in FIGURES 2 and 3. However, the construction of the web is not limited to the zig-zag embodiment previously described.

There are numerous advantages in the present purlin construction. First, it is possible to use the same size or gauge or plate along with various sizes of rods to construct purlins having variously desired structural characteristics. For example, the plate **26** may be combined with longitudinal rods **16**, **18**, **20** and **22** and a web rod **24** of any number of various sizes without requiring a different plate **26** size. Thus, in the manufacture of the purlin, purlins of many various sizes can be manufactured on the same mill set-up without changing the pattern and/or the size of plate strip. This reduces the inventory of strip stock necessary through the elimination of multiple sizes of strip stock.

Second, the combination of the purlin of the present invention with a formboard eliminates the void space found in prior art devices in the area of the lower chord rods **20** and **22**. In prior art purlins the rods **20** and **22** were non-existent. Therefore a formboard resting on the ridge **28** or **30** of the plate **26** could slide back and forth in the area now occupied by the lower chord rods **20** or **22**. The formboards were necessarily shortened by this amount in the old construction methods in order that they could properly be inserted past the upper chord rods **16** and **18**. In addition to the slippage of the formboard that could result, the void area adjacent the end of the formboard near the junction of the web and the plate would often not be properly filled with gypsum or grout. The void area would thus weaken the deck structure and also provide a source for leaks.

Third, the heat transfer through the purlin is minimized by the welded point to point contact construction

of the purlin. Thus heat transfer through the purlin is restricted to the points of contact at the welded junctions.

Fourth, the purlin in the present construction utilizes more steel as a bracing material than prior art purlins of comparable weight. This provides greater stability in the purlin as a structural element.

Fifth, the seam between angle irons in a base strip has been eliminated and thus a source of leakage and structural failure has been greatly diminished.

Sixth, the purlin of the present invention provides an improved moment of inertia about the vertical center line due to the wire rods **20** and **22** in the lower chord region.

I claim:

1. A truss construction suitable for the fabrication of decks, said truss construction comprising a lower chord, an upper chord and an interconnecting portion connecting said lower chord to said upper chord, said lower chord including a single, substantially planar, structural strip member having a longitudinal axis and a central trough parallel to said axis, said lower chord also including two longitudinal rod members attached to said strip member, parallel to said axis on opposite sides of said trough, said upper chord comprising two longitudinal rod members, parallel to said axis, said upper chord rod members being spaced from said strip member and from each other, each upper chord rod lying in a plane substantially perpendicular to said strip member, each of said planes being substantially coincident with a separate one of said lower chord rod members, and said interconnecting portion including a plurality of structural segments positioned between rod members and also interconnecting said lower chord rod members with said upper chord rod members, said segments defining a plane substantially perpendicular to said strip member, said segments being partially disposed in said trough.

2. The truss construction of claim **1** wherein said interconnecting segments comprise a plurality of rod member segments, said rod member segments defining a continuous zig-zag pattern.

3. The truss construction of claim **1** wherein said interconnecting segments comprise a single continuous, zig-zag shaped rod member having substantially straight rod portions between adjacent apexes of said zig-zag shaped rod member, said straight portions interconnecting said upper chord rod member to said lower chord rod member.

4. The truss construction of claim **1** wherein said strip includes first and second ridge sections defined in said strip member parallel to said longitudinal axis, said first and second ridge sections disposed on opposite sides of said interconnecting portion.

References Cited

UNITED STATES PATENTS

1,880,003	9/1932	White et al.	52—694 X
1,911,018	5/1933	Goeltz	52—694 X
1,949,818	3/1934	Tarbox	52—694
2,514,607	7/1950	McLean	52—693 X
2,630,890	3/1953	Macomber	52—694 X
3,158,925	12/1964	Edge	52—694 X

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