A finger scarfed joint between adjacent zig-zag web members of a wood truss, to transmit forces from one web member directly to the adjacent web member. Additional finger scarfing connecting the joined webs to the chord.

**Background of the Invention**

The present invention relates to a wood joint. More particularly, the invention relates to a joint for a truss comprising wood top and bottom elongate chords or booms and zig-zag wood brace means or web members connected to the chords and to each other.

Such trusses have been made in the past by using metallic fastenings to transfer force from one member to another. Such fastenings have a limited capacity for transfer of force because excessive shear stress is developed in the fastener parts and/or excessive local compression or shear stresses are developed in web or chord members.

Other trusses are made with web members tenoned into each other and into the chord and secured by glue. Most of these are constructed in such a manner that forces at the joint are transmitted substantially by shear stress in the wood parallel to the grain. Wood is particularly limited in its ability to withstand shear stress parallel to the grain. Gusset blocks are also used at times.

A weakness of the above types of truss joint construction is that they attempt to produce a tension or compression stress in the wood parallel to the grain substantially by applying a shear stress parallel to the grain of the member.

A further characteristic of this type of truss construction is that the tenons of the web members, and the members themselves, in order to transmit sufficient force by shear, are larger than would be necessary for transmission of force by tension or compression stress parallel to the grain within the member itself.

A further disadvantage of the above types of construction is that, due to the size of tenon required to transmit forces, notches are cut out of the chord thus reducing its strength, or requiring the use of larger, heavier and more expensive chords.

**Summary of the Invention**

The invention provides a truss construction in which adjoining zig-zag web members are joined to one another adjacent the chord by means of a type of glued joint commonly known as finger scarfing, which means I refer to as the web finger scarf means, or web scarfing. The web scarfing is constructed and arranged so that forces which are transmitted from one web member to an adjoining contiguous web member are transmitted, at least in material part, directly from web member to web member by separate web finger scarf means, rather than indirectly from web to chord to web.

The invention further provides, in combination with the foregoing, structure in which the web members are connected to the chords by additional finger scarf connecting means, which connection means I refer to as the chord finger scarfing.
zigzag interconnected web members 23 and 24, secured to one another and to the chords. The structure is distinguished by web finger scarf means 25, connecting the said inclined web members to one another, and by chord finger scarf means connecting the joined adjacent web members to facing surfaces of each other aforesaid. Referring to FIGURES 2, 3 and 4, each web member 23 has at least two side finger scarf fingers 27, and at least two end finger scarf fingers 28A. A cooperating web member 24 has complementary side finger scarf grooves 29, and end finger scarf fingers 28B. When assembled to one another, as shown in FIGURE 4, the side finger scarf fingers 27 of the member 23 engage the complementary side finger scarf grooves 29 of the member 24 aforesaid, and it is seen that the finger scarf fingers 27 and cooperating grooves 29 are formed in parallel portions of adjoining web members. When so assembled, the end finger scarf fingers 28A and 28B are aligned, thus to form a continuous composite finger scarf means indicated generally in FIGURE 4, by the numeral 28. Hence, each assembly of a member 23, to an adjacent member 24 has at least two parallel end finger scarf fingers 28. I refer to the fingers 28 as chord finger scarf fingers.

As seen in FIGURES 5 and 6, the chord member has a plurality of finger scarf grooves 30 adapted to cooperate with the said finger scarf fingers. The chord finger scarf means 26 (FIGURE 1) is thus seen to include the end fingers 28 and the cooperative grooves 30, and the web finger scarf means 25 (FIGURES 1 and 4) to include the fingers 27 and cooperating grooves 29. As stated above, grooves 30 cooperate with the end fingers 28A, 28B, FIGURES 2, 3, 4, and accordingly the grooves 30, are of such depth as to accomplish the aforesaid cooperation—see particularly FIGURE 6 showing this depth much less than the chord depth.

The junction of zigzag web members 23, 24, to one another and to the upper chord 21, FIGURE 1, is as above described. It is seen that the web, finger scarf means 25 are disposed generally normal to the plane of the cooperating chord—the two words being parallel in the example shown in FIGURE 1.

FIGURES 7, 8, 9 show an alternate end or chord finger scarf finger configuration for adjoining web members 23 and 24 respectively.

As seen in FIGURES 10, 11, 12, complementary arcuate grooves are now provided in the chord 22, for engagement with the end web fingers 31 aforesaid. A further arcuate embodiment of the chord finger scarfing is shown in FIGURES 13, 14, 15. This differs from the previous arcuate configuration in that the fingers 33A are in part arcuate having an outer radius R and an inner radius r, and in part tangent to a face of the web member as shown. In FIGURE 13 only, the arcuate portion is indicated by the numeral 34, and the tangent portion by the numeral 35. As seen in FIGURES 16, 17, 18, complementary chord grooving 36 is provided, also having radial R and r.

Both arcuate embodiments are otherwise, including the side or web scarfing 25, as described above with reference to FIGURES 2-6.

The finger scarfing described in all of the examples given is triangular in section. The pitch of the sides of the triangles—shown in FIGURE 1—is 1/6. If the angle at the apex of the section is about 18°, the aperture is reduced much below 10°, there is difficulty in fabricating and in assembly. When the angle is unaided increased, the joint is weakened. A value between about 10° and about 35° is however satisfactory.

In all cases, the finger scarf fingers substantially bottom in the complementary finger scarf grooves, so that cooperating faces are separated only by a thin glue film.

To produce an accurately triangular section, that is a section the sides of which are plane surfaces intersecting at ridges and valleys, is difficult to accomplish with ordinary woodworking machinery. Because of this and attendant difficulties, I prefer to use a section such as shown in FIGURE 19, where sloping faces of adjacent fingers have short butts c at the ridges and valleys. The finger faces 37 have pitch a, where, as before, a, b is as aforesaid. The spacing between adjacent fingers is designated d, e should be small, in practice a value of c between about d/4 and d/15 is satisfactory.

It is known in the art that the tolerances in machining mating members of the subject general type should be kept close. The provision of butts such as shown in FIGURES 19, permits effective utilization close tolerances so that well mated surfaces are provided for gluing. FIGURE 20 shows a truss construction wherein blocks 38 are glued or otherwise secured to opposing chord faces. In this embodiment, the scarfing may be according to any example above, and the particular finger scarf grooves required are cut in the block.

Further summary of the invention

According to the invention, web finger scarf jointing means are provided to secure adjacent zigzag web members to one another at continuous side portions adjacent ends thereof. By means of this construction, much of the web stress may be transmitted directly from a web member to an adjacent web member. As well, in combination with the foregoing I provide continuous composite finger scarf means of the web members, joined as aforesaid, which finger scarf means cooperate with complementary finger scarf grooves of a chord face, or of a face of a block secured to the chord.

The nature of the glue to be used according to the particular conditions, for instance, humidity, is well known in the art. For this reason I have not specified glues or gluing procedures.

It will be apparent to those skilled in the art that the basic principles of my invention are not confined to the particular web arrangement shown in FIGURES 1 and 20, but may be embodied in other chord and lattice web constructions.

It is not essential that the web finger scarfing be substantially normal to the adjacent chord surface, I however prefer this construction since it is convenient and results in fingers and grooves of the same length in adjacent web members 23, 24.

Those skilled in the art will understand that the advantages of joining a web member to an adjacent web member, in a manner described, will generally be attained regardless of the means employed to secure web members, joined as aforesaid, to a chord. Notwithstanding that I prefer to use a chord finger scarf means according to an example given above, any one of many well known jointing means may be substituted for the chord finger scarf means described.

I have stated that I prefer that the scarf elements be generally triangular in section with an apex angle of some 18°. In a limit wherein the apex angle approaches zero, the elements could be rectangular in section and of width c, FIGURE 19. In this limit, my invention of using separate chord and web scarfing or mortise and tenoning as it would then substantially be, would still be of advantages from the web directly to web, and from chord to web, as above explained.

However, in a rectangular section embodiment much of the stress is, inherently, transmitted at the joint by shear, and in consequence the full advantages of the disclosed construction would not be attained. These advantages are, however, substantially realized when the apex angle is within the approximate range I have given above.

I claim:

1. In a wood truss, the combination of a chord member and a pair of webs extending in mutually convergent
relation to said chord member, the convergent end portions of said webs being in abutment and having side edges contiguous with each other and also having coplanar end edges contiguous with a web-abutting surface of said chord member, the side edge of each web being provided with a plurality of transversely spaced scarf fingers defining grooves therebetween, the scarf fingers of each web being supportingly seated in the grooves of the other web when the convergent end portions of the webs are in abutment so as to transmit stress primarily from one web to the other, said end edges of the webs also being provided with a plurality of transversely spaced scarf fingers which are aligned in a direction longitudinally of said chord member, said web-abutting surface of the chord member being provided with a plurality of longitudinally extending and transversely spaced grooves of a depth substantially smaller than the thickness of the chord member, said aligned scarf fingers on the end edges of said webs being seated in said chord member grooves when the web end edges are in abutment with said chord member surface.

2. The combination as defined in claim 1 wherein said scarf fingers and said grooves are of a complemental substantially triangular cross-section.

References Cited
UNITED STATES PATENTS
2,444,133 6/1948 Groat 52—639
2,780,842 2/1957 Hess 52—693
FOREIGN PATENTS
223,362 9/1962 Austria
306,573 7/1955 Switzerland
733,288 7/1955 Great Britain
1,154,253 9/1963 Germany.

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