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BUTT JOINT

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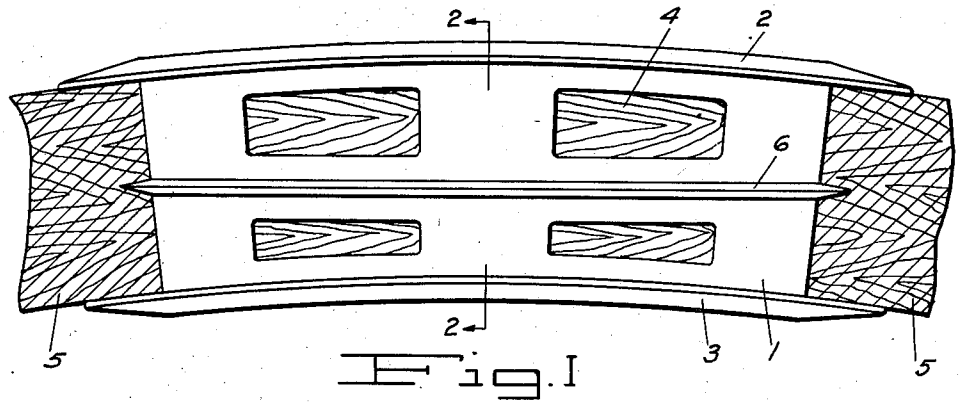


Fig. I

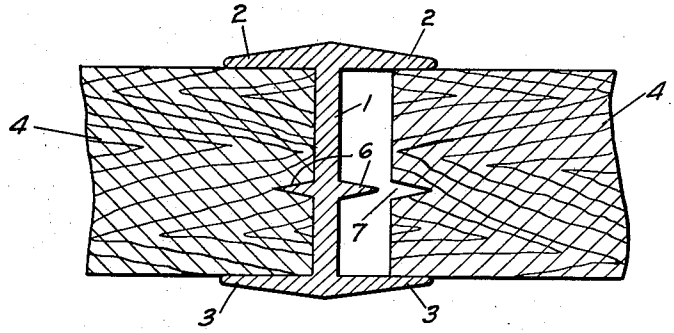


Fig. II

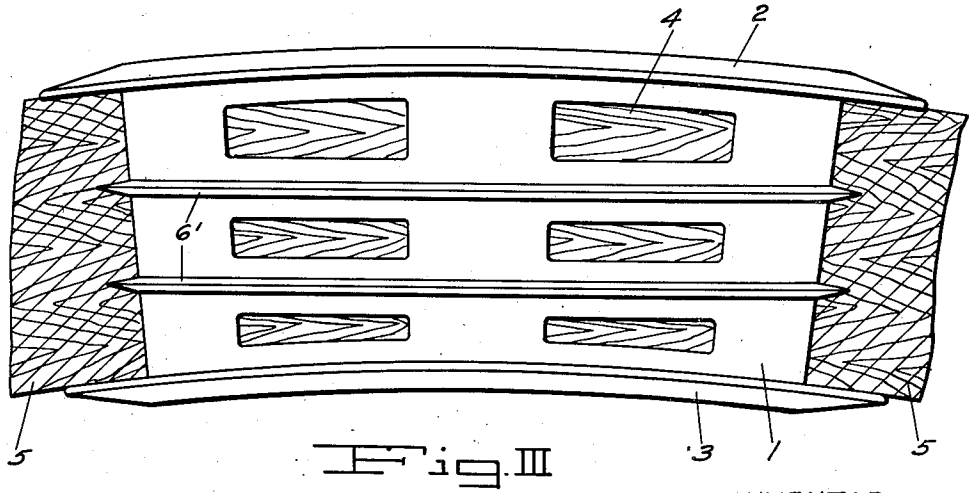


Fig. III

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BUTT JOINT

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3 Claims. (Cl. 138—79)

This invention relates to improvements in butt joints, such as are used in wood stave pipe, tank or flume construction.

An early form of butt joint comprised a web disposed between the ends of abutting wood staves and having inner and outer flanges projecting laterally and longitudinally from the edges of the web to cover the joint on the inside and outside of the staves. This form of butt joint did not prove acceptable, in that it did not effect a water tight joint, and the device was improved by the addition thereto of a wedge-shaped tongue or rib extending laterally from each face of the web intermediate the flanges. This rib was arcuated, its longitudinal curvature being concentric with that of the edges of the web. In practice the wood staves were driven in place, so that these wedge-shaped ribs split into the ends of the staves. This form of butt joint has been in use by the industry for more than a quarter century, notwithstanding certain objections to its use, and certain other contributions to the art presently to be described.

The butt joint just described has proved to be more or less effective in providing a water tight joint between abutting staves. However, the splitting action of the curved rib has proved to be the greatest objection to its use. Examination of wood stave constructions has revealed that the splitting action of the wedge-shaped rib often has caused long crevices in the ends of the abutting staves and, in some cases where the grain of the wood has extended obliquely to the longitudinal axis of the timber, a wedge-shaped portion has been split off from the end of the stave. Frequently one or both of the abutting staves have been found to have been split, thus weakening the structure and opening new crevices for decay. Furthermore, the efficacy of the joint as a water tight seal between abutting staves is destroyed where such splitting takes place, and such defects have necessitated the replacement of injured staves long prior to the attainment of the full life of the structure.

A more recent contribution to the art has been a wood stave shoe having a longitudinally straight, squared rib extending from opposite faces of the web intermediate the flanges. The rib employed in this construction extends beyond the edges of the flanges so as to permit initial engagement of the rib with the stave. For the reception of this rib a deep groove is sawed in the ends of each of the abutting staves. In practice, however, it has been found that this deep groove simulates the deep crevices caused by the splitting action of the wedge-shaped rib previously described. The groove must be sawed so as to permit easy reception of the wide rib, else even a greater tendency to split the stave results. Especially is this true if the grain of the wood is at an angle to the longitudinal axis of the stave, as mentioned. Furthermore, when delivering the staves in the field for construction purposes. this deep groove frequently becomes partially filled with dirt or small rock particles not readily discernible upon inspection nor easily removed. A further objection to this stave shoe is the necessity for cutting a croze in the inner face of the stave adjacent its end for the reception of the inner flange. The cost of cutting such croze in each of the abutting staves, as well as the increased number of square corners necessarily presented by each stave end in consequence thereof, they being easily bruised so as to interfere with assembly operations, each contributes to the expense of employing such construction.

It has remained for applicant to solve these problems, which have long confronted a specialized industry, and to design a butt joint which will effectively form a water tight seal between the ends of abutting wood staves, and at the same time relieve that industry of the losses of time and material which heretofore have been incidental to the assembly of wood stave structures and their maintenance.

It is, therefore, an object of the present invention to provide a butt joint for wood staves which will effectively provide a water tight joint for abutting ends of wood staves without damage to the staves.

A further object of the invention is to provide a butt joint for wood staves which will be inexpensive to manufacture, and which will effect an economy in the assembly of wood staves in tank, pipe or flume construction and maintenance.

A further object of the invention is to provide a butt joint which will effectively provide increased resistance to the flow of water between abutting wood staves.

With such objects in view, as well as others which will become more apparent hereinafter, the invention will best be understood by reference to the accompanying drawing, in which:

Figure I is a side elevation of a butt joint embodying the principles of the present invention, the staves being shown in section.

Figure II is a sectional elevation of the device taken along the line 2—2 of Figure I, one of the staves being slightly displaced to better illustrate the stave end construction.

Figure III is a side elevation of a modified form of the device illustrated in Figure I.

Referring to Figure I of the drawing, the device illustrated comprises a web 1, the edges of which are arcuated to conform to the curvature of the outside and inside faces of contiguous staves. Integral with said web and extending at right angles thereto is an outer flange 2 and an inner flange 3, each having a longitudinal curvature concentric with that of the edges of the web 1. These flanges project both laterally and longitudinally from either edge and the ends of the web 1 and are designed sufficiently broad and long to align the ends of the abutting staves 4, and to hold the same in juxtaposition with adjoining staves 5.

A longitudinally straight rib 6 projects horizontally from either face of said web 1 intermediate the inner and outer flanges, said rib being wedge-shaped in cross section and extending the full length of the web 1 and from either end thereof so as to completely encircle the web. In applicant's construction this rib is of lesser width and length than the flanges, its projection from the face of the web 1 being approximately one-fourth inch. While applicant's construction contemplates the shortest possible projection of the rib 6 beyond the face of the web 1, the wedge or V shape of the rib is sufficient to spread the ends of the staves and compress their side faces against the inner surface of the opposed flanges 2 and 3, as shown in the left hand portion of Figure II. Preferably, though not necessarily, the ends of each of the abutting staves 4 may be milled as at 7 with a straight groove which is intended to be engaged by the longitudinally straight rib 6. When a stave 4 is driven into place, as in assembly operations, the end of the stave is first engaged by the outer edges of the flanges 2 and 3. Further positioning of the stave causes the rib 6 to enter the groove 7, and the joint is made water tight by reason of the snug fit secured between the sides of the end portions of the staves and the inner surface of the opposed flanges by reason of the wedging effect of the rib 6 as it enters the groove 7. The staves are assembled in the usual manner to form a pipe or tank, the butt joint being inserted in position so that when the staves are driven in place the oppositely disposed beveled ribs 6 enter the milled grooves 7 in the ends of abutting staves, and the ends of the rib 6 penetrate the side face of the adjoining staves 5. The flanges 2 and 3 are so spaced as to exactly fit over the edges of the abutting staves, without the necessity of crozing the staves or of other fitting operations.

A particular advantage of the construction illustrated is the considerable reduction in weight of the butt joint over previous constructions employing longitudinally straight ribs, as well as completely avoiding damage to the stave by splitting. Furthermore, the relatively shallow groove in the end of the stave required for reception of the rib 6 is readily inspected and freed of dirt or other obstructions at the time of assembly of the pipe or tank, and the comparatively solid end presented by the stave is less susceptible to injury during handling operations.

Considerable leakage at stave joints has been experienced heretofore in tanks or flumes of large capacity, the increased water pressure causing seepage along the contact line between the two different classes of materials. In searching for a solution to this problem, applicant has discovered means to apply a well-known principle of hydraulic engineering, i. e., that a crooked pathway may be relied upon to provide increased resistance to the flow of water, and in applying this principle to the solution of a problem which has long confronted the industry, applicant has evolved the butt joint illustrated in Figure III. By means of the double rib construction 6', as the head or pressure of the contained liquid is increased the path which the liquid has to travel to escape may be correspondingly increased, and the joint between the abutting staves made water tight with little, if any, additional labor or materials therefor.

Having now described my invention and in what manner the same may be used, what I claim as new and desire to protect by Letters Patent is:

1. In a wood stave pipe or tank, means for aligning the ends of abutting staves and holding the same in juxtaposition with adjoining staves, said means including a web disposed between the ends of abutting staves, said web being provided with opposed flanges for engaging the respective inner and outer surfaces of said staves, and a longitudinally straight, wedge-shaped rib integral with said web for wedging the sides of the end portions of the staves against the opposed flanges to form a water tight joint between the flanges and the staves.

2. In a wood stave pipe or tank, means for aligning the ends of abutting staves and holding the same in juxtaposition with adjoining staves, said means including an arcuated web conforming to the curvature of contiguous staves, a pair of opposed longitudinally curved flanges projecting laterally and longitudinally from either edge and the ends of said web, a longitudinally straight, wedge-shaped rib integral with said web intermediate said flanges, said rib being of lesser width than said flanges, for wedging the sides of the end portions of the staves against the inner surfaces of the opposed flanges after the staves have been initially engaged by said flanges to effect a water tight joint between the flanges and the staves.

3. An apparatus for effecting a water tight seal between the ends of abutting staves in a wood stave pipe or tank, comprising a pair of opposed flanges overlying the abutting ends of the staves, and a longitudinally straight rib disposed intermediate said flanges for compressing the inner and outer surfaces of said stave ends against the inner surfaces of said opposed flanges.

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