A stiffener is provided for use in grain bin walls which have a plurality of wall sheets. The stiffener comprises an elongated, generally U-shaped member having two opposite side members adjacent to a middle portion. The stiffener also includes side flanges formed in the sides of the U-shaped member. The side flanges include a bent over side edge, which increases the strength of the stiffener. The stiffener further comprises an elongated dimple running longitudinally along the center of the middle portion of the U-shaped member, significantly increasing the load-carrying capacity. Two offset rows of bolt holes straddle the dimple for attaching the stiffener to the wall sheets to strengthen the connection between the stiffener and the grain bin walls.
Dimple Stiffener for Grain Bin

BACKGROUND OF THE INVENTION

[0001] The present invention relates to grain bins and, more specifically, to an improved stiffener for grain storage bins.

[0002] Conventional grain storage bins are generally cylindrical in shape and are clad in wall sheets. The wall sheets typically are sections of corrugated steel that are bent to a specific radius. As such, the sections of wall sheets are bolted together to form the grain bin.

[0003] In this conventional grain bin design, stiffeners are used as columns to provide circumferential rigidity and increase the vertical load-carrying capacity of the grain bin. Stiffeners typically are equidistantly positioned around the perimeter of the grain bin walls, running vertically about the grain bin. The stiffeners are bolted to the walls, allowing the stiffeners to function as the main load-carrying member of the structure.

[0004] Conventional stiffeners are long U-shaped members, L-shaped members, or channels. Typically, stiffeners comprise two opposite side members attached to a middle portion. A flange is sometimes attached to each side member. A row of bolt holes typically runs down the center of the middle portion for attaching the stiffener to the bin walls. To increase the strength of the stiffeners, some prior art designs have added bent over side edges to the flanges.

[0005] One disadvantage with conventional stiffeners is that the size and load-carrying capacity of grain bins are limited by the buckling strength of the stiffeners due to lower effective sectional properties such as moment of inertia and effective area.

[0006] It is therefore a principal object of this invention to provide an improved stiffener for use in grain bin walls that significantly increases the load-carrying capacity of the grain bin walls.

[0007] A further object of this invention is to provide a stiffener with a dimpled portion for increasing the yield and tensile strengths of the stiffener, and structural efficiency of the member which results in a higher load-carrying capacity.

[0008] Still a further object of this invention is to provide two offset rows of bolt holes for a stronger connection between the stiffener and the grain bin walls.

[0009] These and other objects will be apparent to those skilled in the art.

BRIEF SUMMARY OF THE INVENTION

[0010] The present invention is directed toward a stiffener for use in grain bin walls which have a plurality of wall sheets. The stiffener comprises an elongated, generally U-shaped member having two opposite side members adjacent to a middle portion. The stiffener also includes side flanges formed in the sides of the U-shaped member. The side flanges include a bent over side edge, which increases the strength of the stiffener. The stiffener further comprises an elongated dimple running longitudinally along the center of the middle portion of the U-shaped member, significantly increasing the load-carrying capacity. Two offset rows of bolt holes straddle the dimple for attaching the stiffener to the wall sheets to strengthen the connection between the stiffener and the grain bin walls.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a side perspective view of the present invention;

[0012] FIG. 2 is a top perspective view of the present invention; and

[0013] FIG. 3 is a cross-sectional view of the side of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

[0014] With reference to the drawings, a stiffener 10 is disclosed for use with conventional grain storage bins. The stiffener 10 is an elongated member that is made of a single piece of metal. The stiffener 10 is bent to form various features, including a middle portion 12, side members 14, and flanges 16. Flanges 16 are further bent to form side edges 18, which provide extra strength and rigidity to the stiffener 10.

[0015] An elongated dimple portion 20 is formed along the center of the middle portion 12 of the stiffener 10 and extends outwardly therefrom. The dimple portion 20 significantly increases the load-carrying capacity of the stiffener 10 as much as 40%, depending on the thickness of steel, as compared to a center that is flat construction.

[0016] The flanges 16 each include a row of bolt holes 22 for attaching adjacent stiffeners 10 together via a splice member (not shown). Bolt holes 22 typically are located at the ends of the stiffener 10.

[0017] The middle portion of the stiffener 10 includes two rows of bolt holes 24 for attaching the stiffener 10 to the grain bin walls. The rows of bolt holes 24 are located on opposite sides of the dimple 20 such that the bolt holes 24 straddle the dimple 20. Further, the rows of bolt holes 24 are offset with respect to one another, as best shown in FIG. 2. The offset rows of holes 24 are interrupted at 25 and two pairs of oppositely located holes 25A are used to permit the “bottom” of one wall sheet to be spliced with the “top” of a lower adjacent wall sheet. The stiffener 10, including bolt holes 22 and 24, is symmetrical about its center to ease handling thereof during construction.

[0018] The use of two offset rows of bolt holes 24 significantly increases the connection points between the stiffener 10 and the grain bin walls and tributary area of loading, thereby increasing the rigidity and further increasing the load-carrying capacity of the grain bin. The load on the connection between the stiffener and the walls is distributed over a larger area to create a less concentrated load.

[0019] It is therefore seen that by the use of a dimple portion and two offset rows of bolt holes, this invention significantly increases the load-carrying capacity of grain bin walls.

What is claimed is:

1. A stiffener for use in grain bin walls which have a plurality of wall sheets, the stiffener comprising:

an elongated, generally U-shaped member having two opposite side members adjacent to a middle portion;
side flanges formed in the sides of the U-shaped member; and
an elongated dimple running longitudinally along the center of the middle portion of the U-shaped member.

2. The stiffener of claim 1 further comprising two rows of bolt holes running longitudinally along the middle portion of the U-shaped member on opposite sides of the dimple wherein one row of bolt holes is generally offset from the other row of bolt holes.

3. The stiffener of claim 1 further comprising a bent over side edge on each flange.

4. The stiffener of claim 1 wherein the stiffener is of one-piece construction.

5. The stiffener of claim 2 wherein the stiffener is of one-piece construction.

6. The stiffener of claim 3 wherein the stiffener is of one-piece construction.

7. The stiffener of claim 1 wherein the stiffener is symmetrical about its center.

8. The stiffener of claim 2 wherein two pairs of oppositely located holes are located in a central portion of the stiffener to accommodate adjacent edges of adjacent wall sheets.

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