

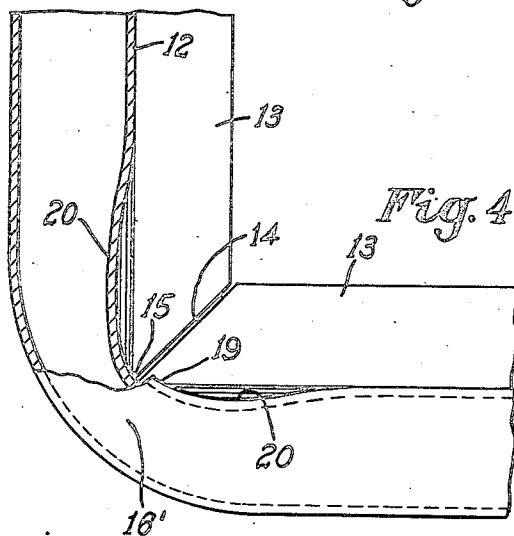
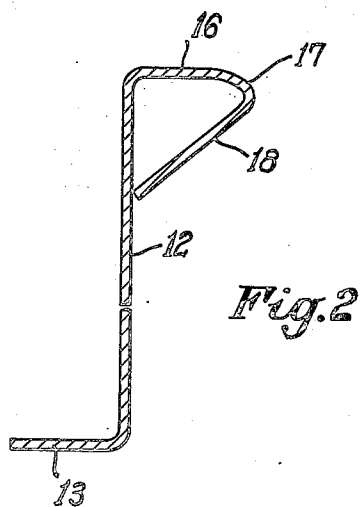
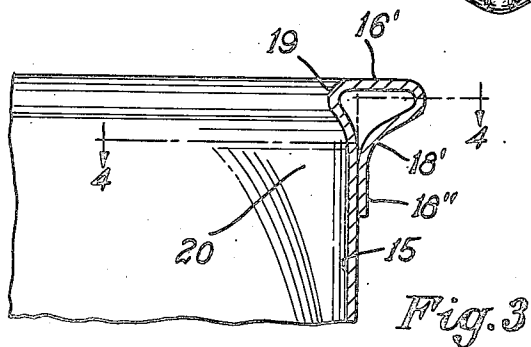
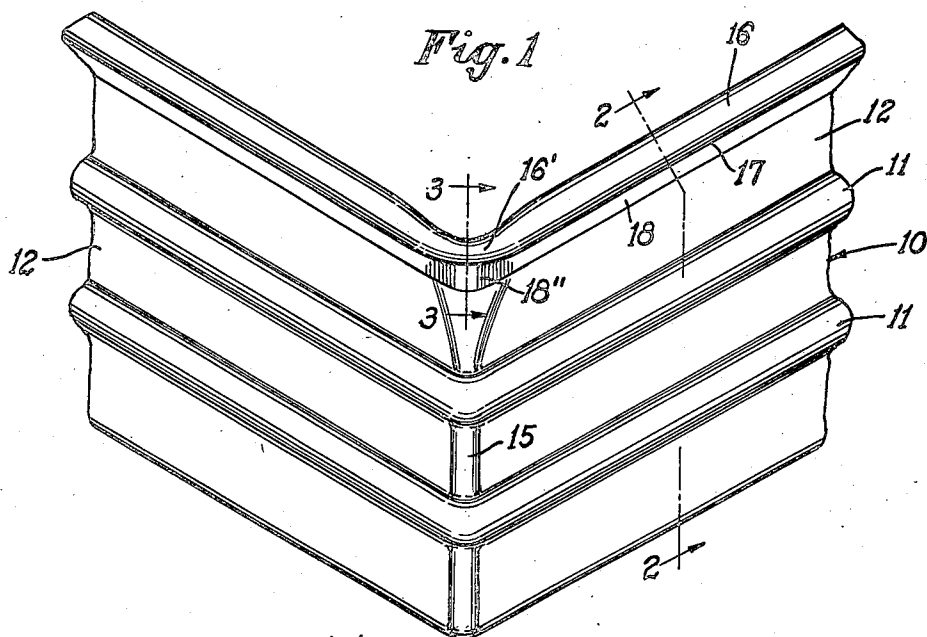
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METAL BOX RIM CONSTRUCTION

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METAL BOX RIM CONSTRUCTION

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The invention relates generally to sheet metal material handling boxes, and more particularly to a beaded rim construction for such boxes adapted to be supported on skids or pallets.

A primary requirement of material handling boxes is that they have maximum strength for minimum weight because they are subjected to heavy loads and rough handling, but should be light in weight so as to add as little as possible to the weight of the material contained therein. The requirement of minimum weight is especially important in cases where the boxes are shipped via train or truck so as to transport a maximum pay load.

Another important requirement is that the boxes be adapted for tiering or stacking in a stable condition, because it is common practice to tier skids or pallets each carrying such a box, for conserving space in storage and transportation.

A further requirement is that such boxes must be simple and inexpensive to manufacture, so as to add as little as possible to the manufacturing cost, and to handling and shipping costs, of the articles transported in the boxes.

Material handling boxes of this type are conventionally made of light gauge sheet metal having corrugations in the side walls for increasing their strength, and the most economical way of forming the box is to start with a corrugated strip and bend it at right angles in dies to form the side walls and corners of the box. The top rim of the box is ordinarily formed with a flat bead prior to bending so as to provide a flat top rim to facilitate tiering of the boxes. However, it has been an extremely difficult problem to construct a bead which can be bent or formed at right angles around the corners of the box and still provide the required flat top rim after bending.

Accordingly, it is a general object of the present invention to provide a continuous bead construction which can be formed or bent around the right-angled corners of a sheet metal box and still provide a substantially flat top rim suitable for tiering.

In attempting to solve this problem, it was first attempted to form along the edge of the strip a right-angled flange which consisted of a reversely bent or folded-under portion, which was intended to give a flat or horizontal rim around the finished box. However, the excessive stretching of the metal at the outer folded edge of such a folded rim flange, during the bending of the metal around the box corners, caused cracking or breaking of the metal in the folded portion at the corners, and also caused the top wall of the rim

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to angle or warp up or down at the corner portion.

Obviously, these difficulties with cracking and distorting due to stretching of the metal can be overcome by providing a joint at each corner in the rim or bead, but such a joint requires an additional manufacturing operation, and greatly decreases the strength of the rim as required for tiering purposes.

It was next attempted to provide a rolled circular bead along the edge of the strip, and this eliminated some of the cracking at the corners, but did not provide a flat top rim for tiering; and also when bent around the corners this bead was flattened or squeezed laterally to an egg shape which distorted and further narrowed the top of the rim.

Finally, a bead constructed according to the present invention was invented and constructed, and when tested was found to overcome the difficulties experienced with the prior constructions, and to accomplish the following specific objects.

It is an object of the present invention to provide a rim construction for a rectangular material handling metal box including a continuous bead having a flat top and extending around the corners on a small radius.

Another object is to provide an improved continuous bead extending around the upper end of a rectangular metal box and bent around the corners on a small radius without any cracks or breaks in the bead corner portion.

A further object is to provide a rim construction for a rectangular metal box comprising a continuous bead having maximum strength with a minimum amount of metal.

Finally, it is an object of the present invention to provide a rim construction for a rectangular metal box consisting of a continuous triangular bead with a flat top extending around the corners on a small radius, the skirt of the bead permitting stretching of the metal in the outer edge of the bead at the corners to maintain a flat top portion around the corners without excessively straining the metal of the bead at the corner portions.

These and other objects are accomplished by the parts, elements, beads and box rim constructions comprising the present invention, a preferred embodiment of which is shown in the accompanying drawing and described in the following specification as exemplifying the best known mode of carrying out the invention, the invention being set forth in general terms in the following general statement, and the scope of the invention being defined in the appended claims.

In general terms, the rim construction comprising the present invention may be set forth as including, in a rectangular sheet metal box, a continuous integral rim extending around one end of the box and consisting of an out-turned flange at right angles to the side walls of the box, said flange being turned downwardly at its outer edge and formed into a downwardly inclined skirt portion terminating at the side walls of the box, the out-turned and downwardly inclined flanges, forming with the box side walls a triangular bead, the out-turned flange forming a flat top rim extending continuously around the corners of the box on a small radius, and the inclined skirt permitting stretching of the metal in the rim portion around the corners of the box without subjecting the rim portion to excessive strains causing cracks or breaks therein.

Referring to the drawing forming part hereof, in which a preferred embodiment of the invention is shown by way of example;

Figure 1 is a fragmentary perspective view of an exterior corner of a metal material handling box having the improved continuous triangular bead construction around its upper end;

Fig. 2 is an enlarged fragmentary sectional view through the bead and its adjoining side wall as on line 2-2, Fig. 1;

Fig. 3 is a similar fragmentary sectional view through the corner portion of the bead, as on line 3-3, Fig. 1; and

Fig. 4 is a fragmentary plan elevational view, partly in section, of the corner portion of the bead.

Similar numerals refer to similar parts throughout the several views of the drawing.

The improved triangular bead is shown by way of example as a continuous top rim on a rectangular corrugated sheet metal skid box indicated generally at 10 in Fig. 1. The skid box may have continuous corrugations 11 extending around the side walls 12 and corners of the box, and the side walls may have in-turned bottom flanges 13 cut to form beveled joints 14 at the corners when the side walls are bent at right angles to each other. The metal box 10 is adapted to be used as a material handling box resting on the top of a skid or platform designed to be raised by a lift truck, but it will be understood that the improved rim construction of the present invention may be applied to other rectangular metal material handling boxes requiring a flat rim around their upper ends.

As shown in Fig. 4, the corners 15 of the box are formed on a relatively small radius so that the right-angle bends forming corners between the side walls 12 are quite sharp to provide a maximum of space in the corners of the box for the storage of material. The radius of the inner surface 15 of the corners may be approximately one-half inch. Referring to Fig. 2, the upper rim of the box consists of a triangular bead which consists of an out-turned rim flange 16 integral with and formed at right angles to the side wall 12, with the outer edge portion of the flange bent at 17 downwardly under said flange and merging into a downwardly inclined skirt flange 18 which preferably terminates at the side wall 12 and substantially engages its outer surface. This bead is formed continuously along one edge of the corrugated sheet from which the box is made, before the sheet is bent at right angles at the corners 15 to form a rectangular box, so that the box can be most economically made from a corrugated sheet merely

by forming the continuous triangular bead along one edge and discontinuous in-turned flanges 13 along the other edge, and then bending the strip in complementary V dies to make the corner bends and form the rectangular box.

If it were attempted to form the triangular bead portion after the corner bends are made, the corner portions of the bead could not be formed without cracking or breaking the metal in the outer edge of the bead, due to the excessive stretching of metal around the corners which would be required, and if the triangular bead was formed with a joint at each corner, the strength of the bead in respect to supporting loads as in tiering a plurality of skids and boxes would be so greatly diminished as to require expensive reinforcement.

By making the continuous triangular bead in the cross-sectional shape shown in Fig. 2, when the corrugated sheet with the bead preformed thereon is bent at the corners 15, the cross-sectional shape of the bead becomes somewhat distorted as shown in Figs. 3 and 4, but the metal at the outer bend 17 does not crack and the width of flat horizontal surface provided by the top flange corner portion 16' is substantially the same as in the remainder of the rim portion 16. Moreover, the triangular bead has been found to be at least as strong for the same amount of metal as a rolled circular bead.

The stretching of the metal around the outer edge portion of the bead at the corners is absorbed largely by the skirt flange 18, which due to its downward inclination and its free bottom edge can warp or neck inwardly toward the corner portion 15 of the side walls as indicated at 18'. The result is that the lower portion of the skirt hugs the corner 15 as indicated at 18'' and the metal in the outer edge portion 17 of the bead draws inwardly and slightly downwardly into the skirt, while the metal between the side wall 12 and the flange 16 at the inner corner also draws inwardly a slight amount as indicated at 19. Thus, the triangular bead shown in Fig. 2 can be bent around the corners 15 on an inner radius of about one-half inch, without subjecting the metal in the rim to excessive strains causing cracking and warping of the top flange 16.

As shown in Fig. 4 the metal in the side walls 12 adjacent to the top inner corner portion 19 may become slightly stretched outwardly of the corner to form shallow concave portions 20 in the side walls, but these concave portions are so slight that they do not materially affect the shape or strength of the box.

In the foregoing description, certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom, beyond the requirements of the prior art, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiment of the improved construction, illustrated and described herein is by way of example, and the scope of the present invention is not limited to the exact details of construction.

Having now described the invention, the construction, the operation and use of a preferred embodiment thereof, and the advantageous new and useful results obtained thereby; the new and useful methods and constructions, and reasonable mechanical equivalents thereof obvious

to those skilled in the art, are set forth in the appended claims.

I claim:

1. Rim construction for a rectangular materials handling box having sheet metal side walls integrally bent at right angles to form a relatively sharp corner between adjacent side wall, including a continuous, integral, flat-top, rim bead, generally triangular in cross-section, at the upper ends of said side walls and sharp corner; said triangular rim including, a top flange portion extending outwardly from and at right angles with respect to each adjacent side wall, a top rim corner flange portion integrally continuous with and connecting said top flange portions above the sharp corner between said adjacent side walls, each top flange portion being turned downwardly at its outer edge and then downwardly inwardly as an inclined skirt flange portion terminating at its connected side wall beneath said top flange portion, the top rim corner flange portion being turned downwardly at its outer edge, then downwardly inwardly as an inclined corner portion and then downwardly along, around and contiguous with the sharp corner between adjacent side walls as a skirt corner portion, said inclined and skirt corner portions being integrally continuous with and connecting said adjacent inclined side wall skirt flange portions, the metal at the place of merger between the side walls and the top rim corner flange portion being displaced slightly inwardly with respect to the sharp corner, and the side wall metal immediately below said place of merger being displaced slightly outwardly with respect to the sharp corner to form shallow concave portions.

2. Rim construction for a rectangular materials handling box having sheet metal side walls integrally bent at right angles to form a relatively sharp corner between adjacent side walls having an inner radius of about one-half inch, including a continuous, integral, flat-top, rim bead, generally triangular in cross-section, at the upper ends of said side walls and sharp corner; said triangular rim including, a top flange portion extending outwardly from and at right angles with respect to each adjacent side wall, a top rim corner flange portion integrally continuous with and connecting said top flange portions above the sharp corner between said adjacent side walls, each top flange portion being turned downwardly at its outer edge and then downwardly inwardly as an inclined skirt flange portion, the top rim corner flange portion being turned downwardly at its outer edge, then downwardly inwardly as an inclined corner portion and then downwardly along, around and contiguous with the sharp corner between adjacent side walls as a skirt corner portion, said inclined and skirt corner portions being outwardly concave around said sharp side wall corner and being integrally continuous with and connecting said adjacent inclined side wall skirt flange por-

tions, the metal at the place of merger between the side walls and the top rim corner flange portion being displaced slightly inwardly with respect to the sharp corner, the side wall metal immediately below said place of merger being displaced slightly outwardly with respect to the sharp corner to form shallow concave portions, and the inner zone between the side walls immediately below said place of merger having a larger radius than the remainder of the corner portion.

3. Rim construction for a rectangular materials handling box having sheet metal side walls integrally bent at right angles to form a relatively sharp corner between adjacent side walls having an inner radius of about one-half inch, including a continuous, integral, flat-top, rim bead, generally triangular in cross-section, at the upper ends of said side walls and sharp corner; said triangular rim including, a top flange portion extending outwardly from and at right angles with respect to each adjacent side wall, a top rim corner flange portion integrally continuous with and connecting said top flange portions above the sharp corner between said adjacent side walls, each top flange portion being turned downwardly at its outer edge and then downwardly inwardly as an inclined skirt flange portion, the top rim corner flange portion being turned downwardly at its outer edge, then downwardly inwardly as an inclined corner portion and then downwardly along, around and contiguous with the sharp corner between adjacent side walls as a skirt corner portion, said inclined and skirt corner portions being outwardly concave around said sharp side wall corner and being integrally continuous with and connecting said adjacent inclined side wall skirt flange portions, and the metal at the place of merger between the side walls and the top rim corner flange portion being displaced slightly inwardly with respect to the sharp corner.

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