Oct. 16, 1962 G. O. SCHROEDER 3,058,868

METHOD OF FORMING LAP SEAMS

Filed Dec. 23, 1960

Fig. 1

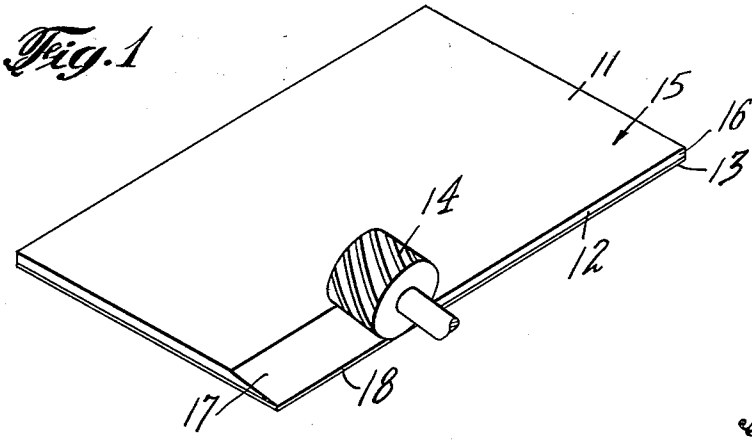


Fig. 2

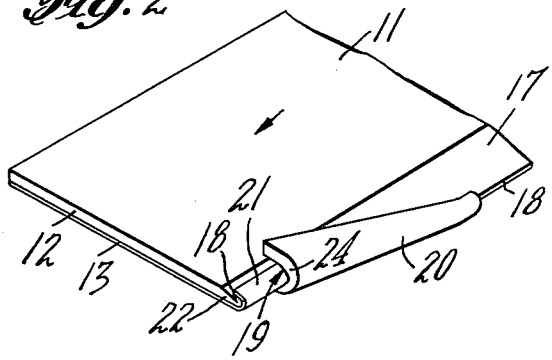


Fig. 5

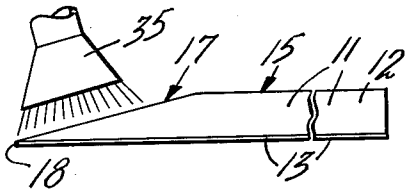


Fig. 6

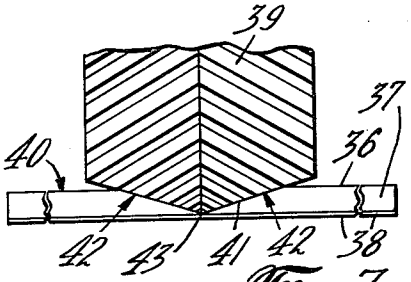


Fig. 3

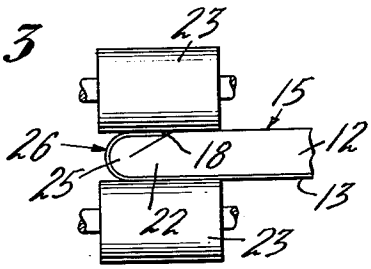


Fig. 7

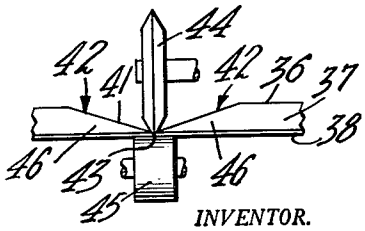
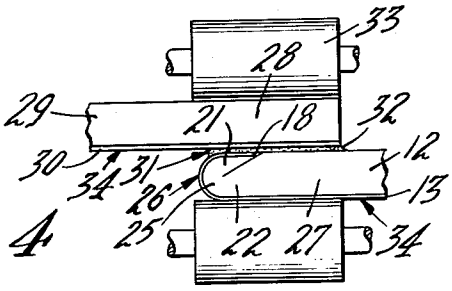


Fig. 4



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METHOD OF FORMING LAP SEAMS

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The present invention relates to the formation of a lap seam for joining fiber material having a liquid impervious layer on one surface thereof, and has particular reference to an improved method of forming such a lap seam having a substantially uniform thickness and in which the liquid impervious layer extends completely over and covers an exposed surface of the joined material including the seam portion.

In the production of vessels or containers for holding liquid substances from coated fiber materials, lap type seams are widely employed because of their strength, simplicity of construction and ease of fabrication. However, an undesirable feature of a conventional lap seam is the fact that the marginal cut edges of the interiorly disposed laps expose the fiber portions to the liquid contents. Due to a wicking action, the unprotected fiber tends to soak up liquids placed within the container or vessel which weakens the fiber material and often leads to a failure of the seam.

One method used to overcome this problem has been to apply a coating of wax or like material over the exposed fiber edge of the inner lap of the seam. However, the practical utility of this method depends upon the configuration of the container and the disposition of the seams. For example, this method may not be applicable where the lap seam having the exposed fiber edge on the inner lap is the seam securing a closure element to a container. Even if the interiorly disposed fiber edge is accessible through an opening, the configuration of the formed container or vessel may be such as to make it difficult and relatively costly to apply the wax or like coating over the exposed fiber edge.

Another method heretofore used to protect the raw inner edge of the fiber portion of the inner lap from contact with liquids placed within the container has been to fold back the edge portion of the margin which is to form the inner lap of the seam so that in the completed seam the protective coating or layer extends around and fully encloses the fiber. However, the fiber stock used in making containers for packaging milk, fruit juices, etc., is generally composed of a number of layers or laminae. In folding back an edge portion of the full thickness fiber material, the layers or laminae tend to separate and pull apart which complicates the seam forming operation. Furthermore, with the fiber stock thicknesses ordinarily used, bending back a narrow margin of full thickness fiber material so that it will remain in the bent or folded position is not readily accomplished since the material tends to spring out of the folded position as soon as the bending force is removed. Consequently, adhesively bonding the adjacent surfaces within the fold is generally necessary to maintain the edge in the folded position.

Moreover, this method results in a double thickness of material along portions of the marginal edges of the fiber blank prior to formation of the blanks into container components. The extra edge thickness tends to interfere with the free movement of adjacent blanks relative to one another. As a result, the handling, stacking and feeding of the blanks during the forming operations requires more complicated procedures and equipment than would be the case where the blanks have a substantially uniform thickness throughout. The extra edge thickness also results in a lap seam having a triple thickness portion which necessitates more complex seam forming equipment than could otherwise be used.

Accordingly, an object of the present invention is to provide an improved method of forming a lap seam for joining fiber material having a protective coating or layer on one surface thereof which will overcome the problems hereinbefore pointed out.

Another object is to provide a method of forming such a lap seam which encloses and protects the raw fiber edge of the inner lap from the deteriorating effects of liquids which come into contact with the seam.

Another object is to provide a method of forming such a lap seam having substantially the same thickness throughout.

A further object is to provide such a method wherein the thickness of the lap seam is approximately equal to the combined thicknesses of the material being joined.

Still a further object is to provide such a method which can be easily accomplished and at low cost.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

FIGURES 1 and 2 are perspective views showing the initial operations in the formation of the lap seam of the present invention;

FIGURES 3 and 4 are schematic views showing the subsequent seam forming operations;

FIG. 5 is a schematic view showing an additional step used in a modified form of the invention;

FIGURES 6 and 7 are schematic views showing a modified method of achieving the same result as by the operation illustrated in FIG. 1.

In the method of forming the lap seam of the present invention as disclosed in FIGURES 1 thru 4, a flat blank 11 consisting of a layer of fibrous material 12 having a liquid impervious layer or coating 13 on one surface thereof is suitably supported and conveyed past a rapidly rotating cutter 14 with the fiber surface 15 adjacent the cutter. The cutter 14 removes a substantially wedge-shaped portion of the fiber adjacent a marginal edge 16 to produce a narrow skived or tapered strip 17 which terminates in substantially a feather edge 18 at the liquid impervious layer 13.

As the blank 11 is advanced from the skiving station, the skived edge strip 17 is engaged by a curved groove 19 of a folding member 20 (FIG. 2). The curved groove 19 is angled towards the skived strip 17 in the direction of travel of the blank 11 past the folding member 20. The curved groove 19 also has an increasingly sharp curvature in the direction of travel of the skived edge strip 17 therethrough. Consequently, as the skived strip 17 is advanced through the folding member 20, the curved groove 19 folds a portion 21 of the skived strip 17 back towards the remaining portion 22 with the liquid impervious layer 13 disposed outside of the fold.

Immediately upon emerging from the groove 19, the folded margin passes between pressure rollers 23 positioned adjacent the exit end 24 of the folding member 20. The rollers 23 press the folded portion 21 into close contact with the remaining portion 22 of the skived strip 17 to form a folded edge 25 (FIG. 3). The dimensions of the skived strip 17 and the location of the bend are preferably preselected to result in the folded edge 25 having a thickness approximately equal to the thickness of the blank 11. The liquid impervious layer 13 extends completely around the folded edge 25 and continues back a short distance flush with the fiber surface 15 so that the terminal edge 18 of the liquid impervious layer is disposed inwardly from the rounded portion 26 of the folded edge.

The folded edge 25 forms the terminal portion of a margin 27 which is lapped and bonded to an adjacent mar-

gin 28 of a like or similar material consisting of a fibrous layer 29 having a liquid impervious layer 30 on one surface thereof to form a lap seam 31 (FIG. 4). The manner of bonding together the overlapped margins 27 and 28 may be any of the various well-known procedures for achieving the desired result. As shown in FIG. 4 an adhesive layer 32 is disposed between the overlapping margins 27 and 28 and pressure rollers 33 used to press and bond the margins together.

The margin 28 has the liquid impervious layer 30 disposed within the seam 31. The liquid impervious layer 13 of the folded edge margin 27 is disposed outwardly of the seam 31 with the feather edge 18 being disposed within the seam. Thus there is provided a strong lap seam 31 bonding two sections of coated fiber material having one surface 34 of the bonded sections including the seam completely covered by the liquid impervious layers 13 and 30.

Where the surface 34 forms the interior surface of a vessel or container, the fiber is completely protected from contact with the contents of the container. The protection of the inner side seam edge of the fiber material is important to prevent wicking which results in liquid seepage into the fiber and failure of the seam when the vessel or container embodying the seam is used for holding liquids or liquid containing substances. Similarly, the surface 34 may form the exterior surface of a container or vessel where it is desirable in a particular application that the exterior surface be free of exposed fiber edges which would be subject to wicking and absorb liquids coming into contact with the container.

Although the foregoing description has been confined to the formation of a lap seam for joining fiber material having a liquid impervious layer on only one surface thereof, it is to be understood that the subject method is equally applicable for joining fiber material having a liquid impervious layer or coating on both sides. It is to be further understood that in using the subject method to join fiber material having a liquid impervious layer on both sides thereof, both margins of the lap seam may have the folded edge structure disclosed so that both exposed surfaces of the joined material are free of exposed fiber edges.

I have found that the thinning or skiving of the fiber layer 12 prior to the folding operation facilitates the folding process and greatly increases the likelihood that the folded edge 25 will remain in the folded position without adhesive bonding as compared to the situation in which the material is not thinned prior to folding. For example, in the production of fiber containers such as are used for milk or other liquids, paperboard having thicknesses ranging from .010 to .025 inch are used. The paperboard generally has a liquid impervious layer on one surface, e.g., a metallic foil, a plastic film such as polyethylene, etc. It is relatively difficult to fold back a narrow margin of unskived or unthinned fiber material since the folded portion of such a folded edge often separates into a number of thin individual layers and the separated layers tend to spring back varying amounts towards the unfolded position as soon as the folding pressure is removed. Also, with the thicker paperboards, bending back a full thickness of material tends to fracture the liquid impervious coating at the bend.

By skiving a narrow strip approximately one-quarter inch in width and folding back approximately half this width, the folded edge 25 of the present invention can be formed relatively easily. Furthermore, with the thinner paperboards, adhesively bonding the folded portion 21 to the remaining portion 22 to maintain them in the folded position will generally be unnecessary. However, in some instances it may be desirable to apply an adhesive coating to a portion of the thinned fiber surface to bond together the portions 21 and 22 forming the folded edge 25. This would be the case, for example, where the fiber layer is originally very thick so that even though skived or thinned prior to folding, the folded edge 25 tends to open up or unfold. Also, instances in which the fiber stock having the folded edge 25 thereon will be subjected to subsequent forming operations which may tend to open or unfold the folded edge.

The application of an adhesive material to a portion of the skived strip 17 may be accomplished by spraying the adhesive material from a suitably positioned nozzle 35 as the blank 11 is continuously conveyed past the nozzle (FIG. 5). Other methods of application such as by a roller applicator are, of course, equally suitable. The adhesive application to the surface of the skived edge strip 17 is preferably performed before the skived strip is engaged by the grooved member 20 and folded thereby.

In the modified method of forming the skived edge 17 as illustrated in FIGURES 6 and 7, a web 36 of fiber material 37 having a liquid impervious layer 38 on one surface thereof is suitably supported and conveyed past a rapidly rotating cutter 39 with the fiber surface 40 of the web adjacent the cutter. The web 36 has dimensions corresponding in size to two or more blanks 11 and may be a continuous strip of the coated fiber material. The cutter 39 removes a portion of the fiber material 37 forming a substantially triangular shaped groove 41 in the fiber surface. The groove 41 has sloping sides 42 which intersect along a line 43 adjacent the liquid impervious layer 38 (FIG. 6). The line 43 formed by the intersecting sloping sides 42 of the groove 41 corresponds to the line defining the adjoining edges of adjacent blanks 11 to be cut from the web 36.

The grooved web 36 is passed between a rotating cutter 44 and support roller 45 (FIG. 7). The cutter 44 severs the web 36 substantially along the line 43 thereby forming a skived marginal edge 46 along each of the severed edges of the web. The skived edges 46 are then folded and formed into lap seams as heretofore described.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the steps of the method described and their order of accomplishment without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the method hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A method of forming a lap seam by joining two overlapping margins of a fiber sheet material having a liquid impervious layer on at least one surface thereof comprising the steps of providing one of said margins with a thinned strip adjacent the edge thereof and tapered towards said edge, said thinned strip being formed by removal of a portion of said fiber material on the surface remote from said liquid impervious layer while leaving said liquid impervious layer substantially intact, folding a portion of said thinned strip back upon the remaining portion with said liquid impervious layer disposed outwardly of the fold, pressing said folded portion into close contact with said remaining portion, the folded and pressed portion of said margin having a thickness not exceeding the thickness of the adjacent portion of said margin, and overlapping and bonding said folded edge margin to the other of said margins to form a lap seam therewith, said folded edge margin having said liquid impervious layer disposed outwardly of the seam and extending around said folded edge to terminate within the seam, the other of said lapped margins having said liquid impervious layer disposed within the seam whereby said liquid impervious layers extend over and completely cover an exposed surface of said seam.

2. The method set forth in claim 1 wherein an adhesive coating is applied to a portion of the fiber surface of said thinned strip prior to folding thereof, said adhesive coated surface being disposed within the fold to bond the folded portions and maintain them in the folded position.

3. The method set forth in claim 1 wherein said thinned strip is provided by skiving or tapering said fiber material towards a terminal edge forming substantially a feather edge at said liquid impervious layer.

4. The method set forth in claim 1 wherein said thinned strip is provided by forming a longitudinal groove in the surface of said fiber material remote from said liquid impervious layer, said groove having sloping sides intersecting adjacent said liquid impervious layer, and severing said groove substantially along the line of intersection of said sloping sides whereby a marginal strip adjacent each of the severed edges is skived, terminating in substantially a feather edge at said liquid impervious layer.

5. The method set forth in claim 1 wherein said folded and pressed portion of said margin has a thickness approximately equal to the thickness of the adjacent portion of said margin.

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