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G. A. MOORE
CONTAINER

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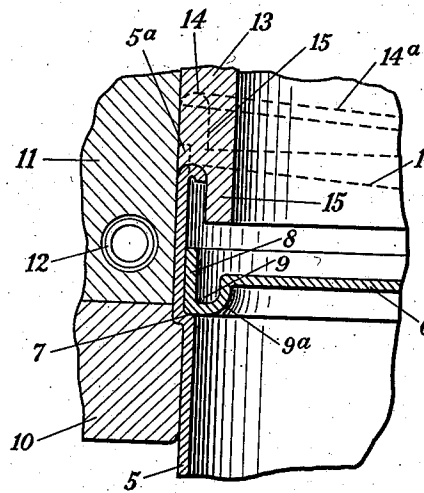


Fig. 1

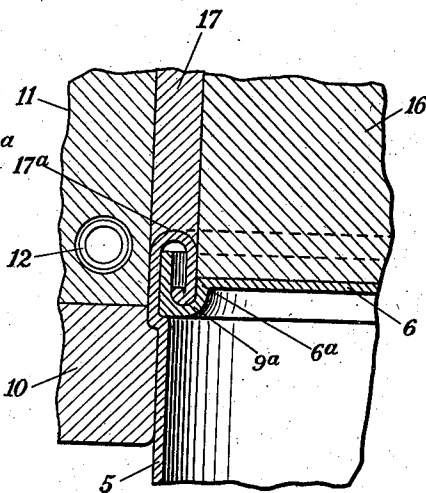


Fig. 2

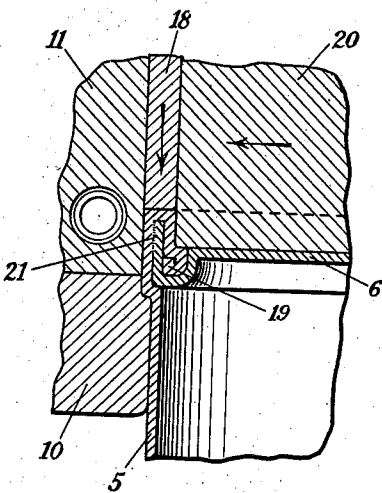


Fig. 3

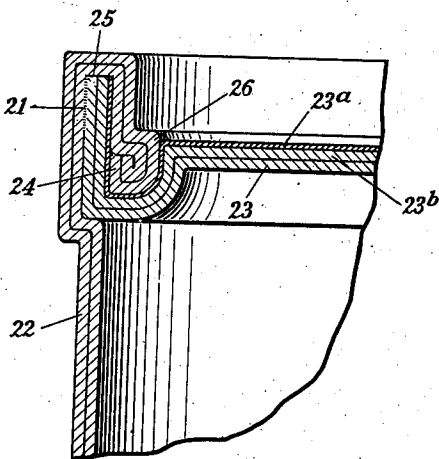


Fig. 4

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CONTAINER

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2 Claims. (Cl. 93—55.1)

This invention relates to a method of making articles of fibrous material, such as paper containers, and more particularly to a method of uniting two or more fibrous or paper members to make a joint or closure formation, and to the receptacle, container, or other article produced by said method.

It has heretofore been proposed to join a side wall and a flanged end wall of a paper or paper-like article by inflowing said side wall by means of a flowing die, and then inflowing said wall and the flange of said end wall, simultaneously, by means of a flowing die of larger radius to form a triple-ply joint, the inflowed plies being cradled or buried in a groove embossed in the end wall to lock the multiple-ply folds in position and to completely fill said groove, whereby there is provided an air and moisture proof joint.

In order to save material, among other reasons, it is desirable to decrease to a minimum the number of folds of the side wall and the flange of the end member but, as noted, this must be done without decreasing the bulk of the multiple folds to such an extent that the same will not completely fill the groove in the end wall. It is desirable to make the groove of a minimum width and to completely fill this groove with a minimum number of folds of the side wall, but in many instances the width of this groove cannot be safely reduced to the equivalent of one thickness of the side wall, for example, since fibrous or paper-like material will not safely withstand such excessive deformation. Accordingly, one of the objects of the present invention is to provide a novel method for fabricating a joint or closure formation for paper or paper-like articles which will meet the above requirements.

Another object of the invention is to provide a novel method of fabricating a joint or closure formation of the class described, whereby compensation is effected for variations in the dimensions of the stock used in making the joint.

Other objects include the provision of a method which will result in a saving of material, one which is adapted for forming articles and/or containers of various shapes and sizes, and one wherein a hem may be formed in one of the joined members, said hem being adapted to completely fill the groove in the other member, thus insuring that the groove width will be of a suitable dimension without excessive stretching of the material in which said groove is formed, and

that the hermetic qualities of the joint structure will be preserved.

A further object is to provide a joint or closure formation for multi-part paper or paper-like articles wherein the raw edge of one of the parts, as, for example, the top edge of the body portion, is pressed into a groove or recess in the adjoining member to prevent any objectionable effects which might otherwise arise from the hygroscopic action of said raw edge.

Another object is to provide a novel welded joint structure for paper or similar articles which acts as a resilient cushion to resist distortion and to absorb stresses and strains, whereby the hermetic qualities of the joint structure are at all times preserved.

The above and other objects and advantages of the invention will appear more fully hereinafter in the detailed description, which is to be read in connection with the accompanying drawing illustrating one manner of carrying out the novel process, and also one form of the resultant joint or closure formation. It is to be expressly understood, however, that this drawing is for the purpose of illustration only, and that reference is to be had primarily to the accompanying claims for a definition of the limits of the invention. In the drawing, wherein like reference characters refer to like parts throughout the several views:

Fig. 1 is a sectional view, with parts broken away, illustrating one of the steps in the process and one type of apparatus which may be employed in carrying out this step;

Fig. 2 is a view similar to Fig. 1 illustrating a second step in the process;

Fig. 3 is a view similar to Figs. 1 and 2 illustrating a third step in the process, and the joint or closure formation which is produced when the joined members are formed of one-ply stock; and

Fig. 4 is an enlarged sectional view, with parts broken away, illustrating one type of joint which may be formed by uniting two laminated members in accordance with the method of the present invention.

Referring more particularly to Figs. 1 to 3, inclusive, my novel method is illustrated in connection with the formation of a joint between the side and end walls 5 and 6, respectively, of a paper or paper-like container that is preferably, at least in part, of arcuate outline. As shown, the side walls of the article are deformed in any suitable manner well known in the art to provide an inner shoulder 7 to receive the flanged end

member 6. The flange 8 of the latter and a groove 9 are preferably formed in the manner illustrated, described and claimed in my Reissue Patent No. 19,504, dated March 19, 1935, said flange 5 being connected to the central portion of end member 6 by the arcuate portion 9a.

The preformed shell 5 and head 6 are assembled in any suitable manner, as by hand or automatic machinery, and are then mounted on segments or jaws, one of which is shown in part at 10, said jaws being provided with a shoulder corresponding to the shoulder formed in side wall 5. A stationary die bolster 11, having an inner diameter equal to the outer diameter or dimension of the side walls 5, is mounted in any suitable manner above segments 10 and preferably in engagement therewith. As shown, bolster 11 carries a heating element 12 of any suitable type, such as electrical, gas or steam, the heating of the fibrous stock facilitating the carrying out of the operation. Slidably mounted within die bolster 11 is a flowing die 13 which is provided with a circumferentially extending, endless, arcuate groove 14 and an overhanging lip 15, the outer wall of said lip merging into the arcuate surface of groove 14.

Preferably, the groove 14 is inclined to the horizontal a small amount, as, for example, two or more degrees, the inclination being shown exaggerated at 14a in Fig. 1. By this means the flowing die 13 engages a portion only of the upper edge of side wall 5 when first moved into engagement therewith so that said upper edge is progressively curled inwardly.

When flowing die 13 is moved downwardly from the dotted line position of Fig. 1 to the full line position, the upper edge of side wall 5, which is shown in section at 5a by means of dotted lines, is flowed downwardly, forming a curl of a small radius. Die 13 is now removed, and a plug 16 (Fig. 2) is inserted within the bolster, and moved into and held in engagement with the upper surface of member 6, the outer wall of said plug conforming to shoulder 6a of said member. A flowing die 17 is now inserted between plug 16 and bolster 11, the lower edge 17a of said flowing die being arcuate and having approximately twice the radius of curvature of the arcuate portion 14 of flowing die 13. When flowing die 17 is moved downwardly, the arcuate surface 17a progressively engages the upper curled edge of side wall 5 and continues the curling operation, the downward pressure on member 17 being continued until the curled edge of wall 5 is forced to the bottom of groove 9 in member 6.

The operative surface of groove 17a is perpendicular to the inner lateral wall of bolster 11 so that compensation is effected for the bias opposed on the upper edge of side wall 5 by the inclined groove 14 of flowing die 13. During the above operations, bolster 11 is maintained heated by the element 12.

Plug 16 and flowing die 17 are now removed, and a die 18 (Fig. 3) is inserted within the bolster, the cross-sectional width of said die 18 being substantially equal to three times the thickness of side wall 5. Die 18 is now forced downwardly, engaging the bight of the upper curled portion of wall 5, whereupon said wall is forced downwardly into close engagement with the top edge of flange 8.

The operation of flowing dies 13 and 17 results in the formation of a hem 19 in side wall 5, and this hem is forced downwardly by die 18 in groove 9, completely filling the bottom of said

groove. The portion of the side wall intermediate die 18 and hem 19 tends to bow inwardly, and sufficient pressure is placed on said die to force the side wall directly into engagement with the upper side of flange 8.

Expandible segments 20 are now inserted within die 18 and moved downwardly until they engage the upper surface of end member 6, whereupon said segments are expanded or moved outwardly compressing the inner vertical leg or bowed portion of the side wall, with the result that the excess material is forced outwardly and downwardly, further compacting the fibers in groove 9 so that said groove is completely filled and the raw edge of hem 19 is buried in said groove so that its hygroscopic qualities, as well as those of the raw edge of flange 8, are rendered ineffective to destroy the imperviousness of the joint or closure formation. Pressure is retained on die 18 during the outward movement of segments 20.

Preferably, the inner surface of side wall 5, or at least that portion thereof including shoulder 7 and the inner surface above said shoulder, or, if desired, the inner and outer surface of flange 8, or of both the side wall and the flange, has disposed thereon a thin thermoplastic film which is moisture proof but which may be activated by the heat of element 12 to render the same tacky. Accordingly, when members 18 and 20 are moved to the positions shown in Fig. 3, sufficient pressure will be exerted on the contacting surfaces of the flange and side wall to weld these surfaces, whereby a hermetic joint is formed.

The thermoplastic film preferably comprises a nitrocellulosic base having incorporated therein properly proportioned amounts of resins and plasticizer for suitable heat activation, as the requirements may demand. By proper selection and concentration of plasticizer and resin, the thermoplasticity of the lacquer or thermoplastic may be accurately controlled. The thermoplastic is also adapted, when deposited upon the surfaces stated, to constitute an extremely thin, dry film, substantially free from brittleness and free from tack, at the low temperatures employed in the fabrication of the container. When activated by heat at higher temperatures, it softens without tending to flow to an extent which would cause the dissipation thereof as a film and render the film unavailable for welding parts together. Preferably, a lacquer is employed which will be activated at a temperature of 150° to 200° Fahrenheit. A portion of the welded joint formed by the process of this invention is illustrated at 21 by means of short horizontally disposed hatching lines.

In Fig. 4 there is illustrated a joint or closure formation of the character produced by the present method when the joined members are laminated or formed of multi-ply stock. The two-ply side wall 22 is joined to a three-ply end member or head 23. The upper or outer ply 23a of head 23 may be formed of thin metal, such as foils of aluminum or lead, while the two inner plies 23b are formed of paper or fiber. The hem 24 of the inflowed portion and the upper edge 25 of the flange of the end member are buried within the joint, preventing any tendency of these portions to absorb moisture. The inflowed portion of the side wall within the groove of the head is materially compacted but is still sufficiently resilient to resist stresses and strains on the joint while said compacted portion and the

arcuate wall of the groove are effective to resist distortion. It will be noted that expandible segments 20, employed in forming the joint of Fig. 4, are not moved directly into engagement with the outer surface of end member 23, whereby an arcuate bead 26 is produced in side wall 22 immediately above the groove.

The disclosed method of forming a joint or closure formation is such that greater tolerances in the over-all dimensions of members 5 and 6, 22 and 23 are allowable without producing any objectionable effects in the joint formed. This results from the fact that any variations in dimensions will be compensated for in the hem and in the compacted portions within the groove in the end member.

The provision of the hem in the side wall provides for two thicknesses of material in the groove, thus reducing the extent of the fold required to fill said groove and avoiding any necessity for providing a groove of such small width as to unduly stress or strain the material of end member 6 or 23.

There is thus provided a novel method which may be carried out partly by hand or may be carried out by fully automatic machinery. The method is simple and inexpensive and lends itself to quantity production and saving of material. The joint or closure formation produced by the method constitutes a resilient cushion adapted to absorb stresses or strains imposed on the end or side wall members. The folds of the side wall are buried in a deformation groove whereby the same are locked against horizontal move-

ment, and a joint which is impervious to air and moisture is secured.

What is claimed is:

1. The method of forming a joint between a flanged and grooved end member and a side wall member having an inwardly directed shoulder which consists in placing said end member in engagement with said shoulder, inflowing the marginal edge of said side wall member to provide a curl, inflowing said side wall and curl into said groove, applying longitudinal pressure to the inflowed portion of the side wall to press the same into engagement with the upper edge of said flange and to bottom said curl in the groove, and applying radial pressure to said flange and inflowed side wall portion to completely fill said groove and lock said inflowed portion against lateral movement.

2. The method of making a container which comprises inserting a flanged head having a peripheral groove therein within a tubular body, curling the marginal edge of said body upon a radius to form a curl, flowing the marginal portion of said body upon a relatively wider radius than said first-named radius while guiding said curl into said groove, applying longitudinal pressure to the inflowed portion to press the same into engagement with the upper edge of said flange and to bottom said curl in said groove, and applying radial pressure to said flange and inflowed portion to completely fill said groove and lock said inflowed portion against radial movement.

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