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(54) Method of improving the manufacture of a bead on a carton

(57) A method of providing a cup-type carton with a bead (16) is disclosed wherein the carton is formed from a folding box board type material prone to delamination. The bead is formed by urging the edge (20) of the carton within an arcuate channel which, by virtue of the upward motion of the carton, cause the edge and the board material of the side wall immediately behind the edge to deform outwardly. When the curled edge emerges from the alternate side of said channel, an orientation means (24) is brought into contact therewith and forces the edge inwardly of the bead thus formed so that it contacts the outer surface of the side wall of the carton in a tangential manner. The edge is retained within the bead by virtue of its contact with the side wall, and the desire of the board material to elastically recover compresses the edge against said side wall. The effect of bead formation which is to delaminate plies of the board is minimised and a neat bead is ensured.

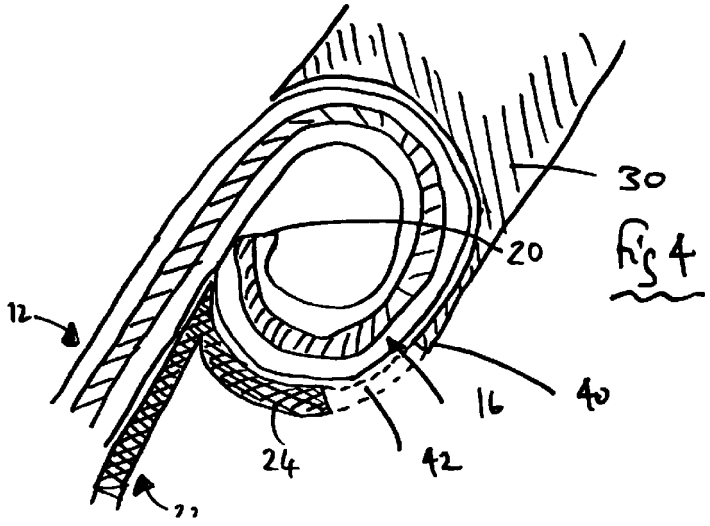

Fig 4

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Description

[0001] This invention relates to a method for manufacturing a bead on a carton, in particular for a "cup-type" carton made of folding box board and like types of board which are of laminar construction, as opposed to conventional cup-stock board which typically has only a single ply. The invention also relates to a carton provided with a bead manufactured from such board types. By "carton" is meant any board structure which has at least one continuous edge, for example being the uppermost edge around the side walls of a cup.

[0002] Although the following description relates exclusively to cartons for the containment of food products, it is to be appreciated that the invention may have broader application, especially in the provision of a method of improving the rigidity of flexible material manufactured from folding box board-type material sheets in the regions of their edges.

[0003] Cup-type cartons are conventionally manufactured from two pieces of coated board, one of which forms the base of the cup, the other forming the side walls thereof by being wrapped around the base such that a pair of edges overlap and may be sealed together to form a seam. A bead is provided on the uppermost edge of the carton to increase the rigidity and is produced by curling the material of the side walls outwardly of the carton and back underneath itself.

[0004] The curling of the board to form the bead is conventionally effected by forcing the peripheral edge of the previously erected cup into one side of a generally curved channel. As the edge is forced deeper into the channel, the curvature thereof urges the edge outwardly and imparts a curvature to the board which is plastically deformed in the process such that said curvature is partially retained proximate the edge of the board. As cup continues to be forced into said channel, the edge is curled outwardly of the cup and back underneath the portion of the board at that time disposed within and to which curvature is being imparted by the channel. The degree to which the curvature is retained by the board and the curvature of the channel itself is sufficient to ensure that the edge of the board is urged into sliding contact with the outer surface of the cup and continues to slide within the bead thus formed. Depending on the relative displacement towards the channel, the bead may take the form of an outwardly radiating spiral of board which terminates at the uppermost edge of the side walls of the cup.

[0005] To ensure that the beading operation can be correctly effected, all cup-type cartons are manufactured from cup-stock board which is typically constructed of at most two laminations adhered together, but more usually only a single lamination of pulp board. It will be appreciated that boards of only a single lamination are far better suited to the formation of beads around carton edges, and are furthermore suited to manufacture of cartons whose edges or sides are significantly curved because the inner and outer surfaces of a board which is curved are strained to different degrees as a result of the curvature, and therefore differential stresses are set up within the board between the inner and outer surfaces. Single ply boards can easily withstand such differential stresses without significant degradation of the board, as the work required to be done on the board to effect any separation of the inner and outer surfaces thereof is typically in the region of 220 J/m^2 which far exceeds that done during a simple beading operation. Furthermore, the stretch factor of common cup stock boards is approximately 7-8% which allows the board to stretch sufficiently during the formation of the bead without degradation.

[0006] Cup-stock board has however the inherent disadvantage of being expensive. It has been therefore proposed to use another type of board known to persons skilled in the art as "folding box board", so-called because its construction has previously been contrived such that the board will retain a fold line.

[0007] Folding box board commonly has at least 3 plies and the laminated construction of such board allows for only minimal stretch factor, at most in the region of 2-3% before degradation of the board, which is often manifested in the separation of the plies at the edges thereof. The stretch factor of the board is a measure of how much the board can be stretched before delamination of the board occurs wherein the individual plies of the board begin to separate from one another and fraying or "flagging" of the edges results. It is also important in determining by how much the radii of the carton can be decreased or alternatively the degree of curvature of the board which can be achieved before delamination occurs, and heretofore the stretch factor and the comparatively low degree of work which is required to separate adjacent plies of approximately 110 J/m^2 of such board has precluded the use of folding box board for the manufacture of cup-type cartons which are always provided with a bead.

[0008] The formation of a bead on cups manufactured from folding box board type materials has heretofore been impossible because the flagging of the board which occurs at the edges during the beading operation prevents that edge from sliding against the outer side walls of the cup and within the bead cavity. Instead, as the cup is forced towards the channel and the board proximate the edge is further curled within said channel, the flagged edges do not retain sufficient curvature for complete curling, and these edges are simply forced into the side walls of the cup, and in many cases at right angles thereto. Henceforth, the curved board portions proximate the edge are simply compacted against the side walls as the beading operation continues, and unsightly crease lines in the bead result.

[0009] Furthermore, the incomplete bead so formed has deleterious effects on the integrity and rigidity of the carton.

[0010] The problem is further exacerbated in the

region of the seam of the carton where an edge of double thickness is urged into a curved channel which is similar if not identical to that into which single thickness edges are urged during the beading operation. The increase in work performed on the board in the region of the seam and the increase in the differential strains and thus the differential stresses which are imparted to the board in this region generally always result in flagging of the board proximate the edges.

[0011] It is an object of this invention to provide an inexpensive carton provided with a satisfactory and complete bead within which the edge is disposed, said carton being manufactured from folding box and like boards which are constructed of a plurality of laminates or plies.

[0012] It is a further object of the invention to provide a method of providing a bead on a carton manufactured from folding box and the like boards which are constructed of a plurality of laminates or plies.

[0013] According to the invention there is provided a method of providing a bead on a carton edge which is continuous and defining a side wall of a carton, said method comprising the step of progressively urging the said edge into a continuous channel with a curved cross-section which imparts a curl to board material immediately behind the edge as said edge is urged thereinto, characterised in that the edge or a portion of the board immediately behind said the edge comes into contact with orientation means as it approaches the side wall of the carton underneath the bead thus formed, the said orientation means ensuring that the edge is deflected internally of the bead thus formed.

[0014] Preferably the carton is manufactured from a folding box board type material which is prone to delamination.

[0015] Preferably the edge comes into contact with the surface of the side wall and is permitted to slide thereon and within the bead thus formed.

[0016] Preferably the orientation means deflect the edge against the side wall such that the line tangential to the curved board proximate the edge makes an acute angle with the plane containing the side wall at the point of contact.

[0017] Preferably the orientation means deflects the edge simultaneously with the curling of the board to form the bead.

[0018] In one embodiment the orientation means are provided as an extension of the curved channel and deflect the edge back within the bead formed thereby.

[0019] In an alternative embodiment, the orientation means comprise at least one die ring provided behind the bead formed by the curved channel and which is separate thereto to deflect the edge during curling of the bead to ensure delaminated edges of the board move in the desired direction into and within the bead thus formed.

[0020] Preferably the die ring is provided with a deflection portion which contacts the edge and/or the board proximate the edge and deflects same into and within the bead thus formed.

[0021] Preferably said the deflection surface of said die ring permits slippage of the edge of the carton and board surface immediately behind said edge thereover to facilitate formation of the bead.

[0022] Preferably the deflection surface of the die rings is arcuate to deflect the edge as desired. However, it is to be noted that the deflection portion of the die ring can be of any cross-sectional shape which deflects of the edge into and within the bead during formation thereof. For example a simple stub may be sufficient provided that the stub is brought into contact with the outermost surface of the board proximate the edge and does not further separate any delaminated plies by being interspersed therebetween.

[0023] Preferably a lubricant is applied to the carton board on at least the uppermost edge of the side wall to improve the movement of said edge against a die ring to aid the curling process, or alternatively the lubricant may be applied within the primary bead forming channel and/or the deflection surface of the die ring.

[0024] It will be immediately appreciated that the active urging of the partially delaminated board edge during the formation of the bead ensures not only that the bead is formed, but also that the bead is prevented from deforming on use because the delaminated edges are effectively compressed by:

1. the die ring or edge orientation means which provide a greater curling effect on said edge, and
2. the elasticity of the board material which attempts to recover after the bead is formed, thus compressing the delaminated edges back against the side wall which they contact tangentially.

[0025] A well defined, neater and more rigid bead construction is thus achieved.

[0026] A specific embodiment of the invention is now provided by way of example with reference to the accompanying diagrams wherein:

Figure 1 shows a perspective view of a carton with a bead formed according to the invention,

Figure 2 shows a sectional view of the carton of Figure 1 showing its construction, in particular the final orientation of the uppermost edge of the carton after the bead has been formed,

Figure 3a shows an enlarged sectional view of the bead of a 3 ply board carton as in Figure 1 according to the invention,

Figure 3b shows an enlarged sectional view of a bead of a conventional 3 ply board carton where the board has delaminated,

Figure 4 shows an enlarged sectional view of a bead of a 3 ply board carton according to the invention, which is being guided via a die ring during the curling process.

[0027] Referring firstly to Figure 1 there is shown a carton 10 constructed from a side wall 12 and a base 14. A bead 16 formed in accordance with the invention as described hereinafter is provided around the uppermost edge of the carton, and the side wall is constructed from a single piece of board material wrapped around the base portion and joined to itself at a seam 18.

[0028] As is shown in Figure 2, the bead 16 is formed from curling the uppermost edge of the side wall underneath itself, and the process for providing said bead is described with particular reference to Figures 3 to 5 below.

[0029] In Figure 3a the side wall 12 consists of folding box board with three plies A, B, C. The formation of the bead 16 has been effected by curling the uppermost edge 20 of the side wall through an angle of greater than 270° from its original orientation. The curling of the board proximate the edge is effected by urging the free edge of a carton, to which has firstly been applied an optional preliminary flare to facilitate the curling process, into a curved channel 30 which imparts a curvature to the board as the carton is urge towards said channel as indicated by arrow 32.

[0030] The fundamental disadvantage associated with folding box board type materials and laminate materials is adequately demonstrated in Figure 3b. As the curling of the material within the curved channel is effected, the differential strains which are experienced by the innermost ply C and the outermost ply A which arise from the difference in curvature which imparted to these plies result in the creation substantial shearing stresses between the plies which causes flagging of the individual plies as shown at 34. This effect is not obtained when the carton is manufactured from convention cup stock board, and such board retains sufficient curvature imparted to it by the channel 30 that the edge is automatically deflected internally of the bead thus formed as shown in Figure 3a.

[0031] Henceforth, to prevent compaction of the flagged edge 34 against the side wall 12 as curling continues to be effected by the channel 30, orientation means in the form of a die ring 22 with a deflection portion 24 are simultaneously brought into contact with the outermost ply A in the region of the flagged edge 34 to nip same back within the bead 16 thus formed. It will be appreciated that the orientation means may form part of the channel 30 and be attached thereto at its extremity 40 as shown in Figure4 in dotted lines at 42.

[0032] Alternatively, the die ring may be brought into contact with the said outermost ply A as a separate operation from the curling effected by the channel 30 but simultaneously therewith.

Claims

1. A method of providing a bead on a carton edge which is continuous and defining a side wall of a carton, said method comprising the step of progressively urging the said edge into a channel with a curved cross-section which imparts a curl to board material immediately behind the edge as said edge is urged thereinto, characterised in that the edge or a portion of the board immediately behind said the edge comes into contact with orientation means as it emerges curled from the channel and prior to contacting the side wall of the carton underneath the bead thus formed, the said orientation means ensuring that the edge is deflected internally of the bead thus formed.

2. A method according to claim 1 characterised in that a folding box board type material prone to delamination is used to form the side walls of the carton.

3. A method according to any preceding claim characterised in that the edge comes into contact with the surface of the side wall and is permitted to slide thereon and within the bead thus formed.

4. A method according to any preceding claim characterised in that the orientation means deflect the edge against the side wall along a line tangential to the curved board proximate the edge and making an acute angle with the plane containing the side wall at the point of contact.

5. A method according to any preceding claim characterised in that the orientation means deflects the edge simultaneously with the curling of the board to form the bead.

6. A method according to any preceding claim characterised in that the orientation means are provided as an extension of the curved channel and deflect the edge back within the bead formed thereby.

7. A method according to any of claims 1-5 characterised in that the orientation means comprise at least one die ring disposed behind the bead formed by the curved channel and which is separate therefrom to deflect the edge during curling of the bead to ensure delaminated edges of the board move in the desired direction into and within the bead thus formed.

8. A method according to claim 7 characterised in that the die ring is provided with a deflection portion which makes contact with the edge and/or the board proximate the edge and deflects same into and within the bead thus formed.

9. A method according to claim 8 characterised in that the deflection surface of said die ring permits slippage of the edge of the carton and board surface immediately behind said edge thereover to facilitate formation of the bead.

10. A method according to any of claims 7-9 characterised in that the deflection surface of the die rings is arcuate to deflect the edge as desired.

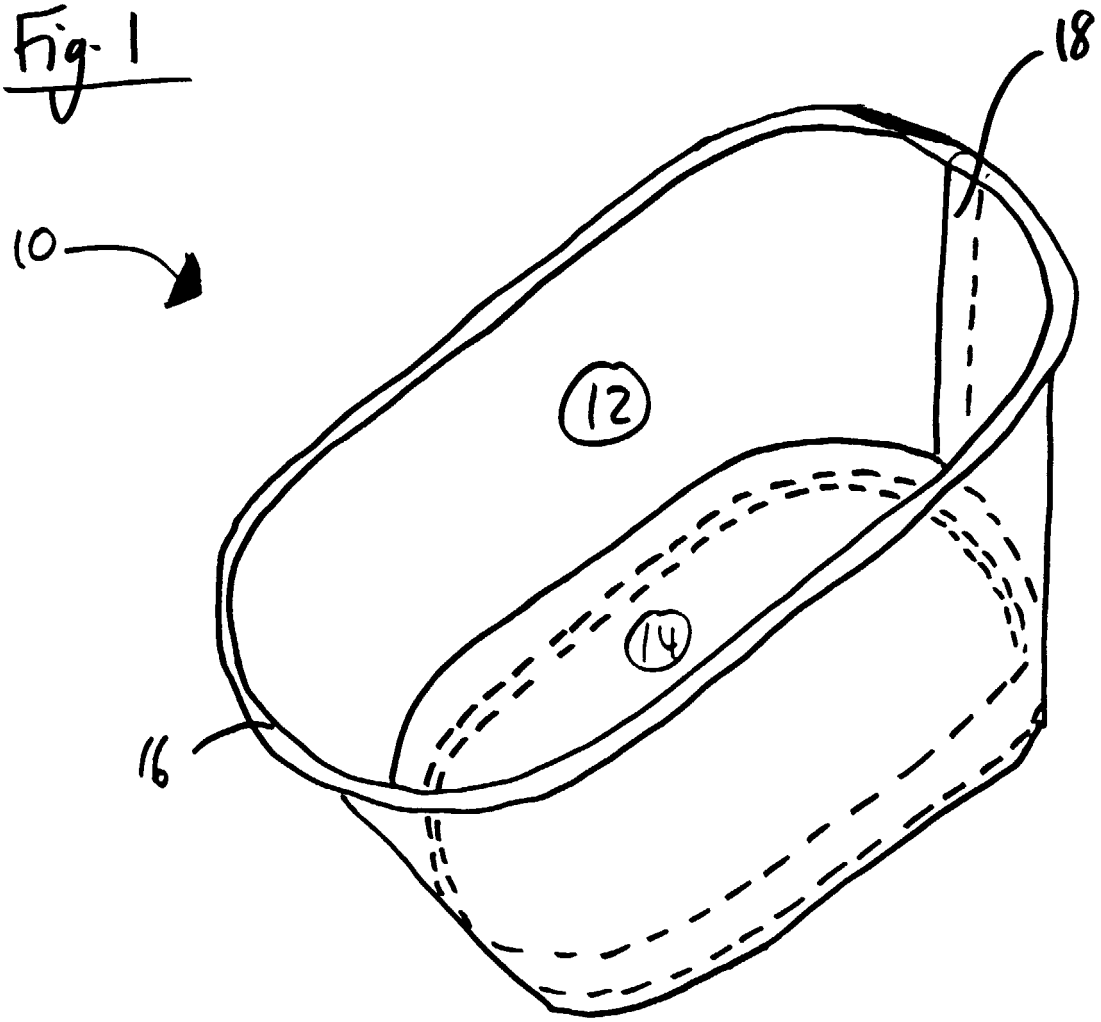
11. A method according to any of claims 1-5 characterised in that the orientation means comprise a stub which is brought into contact with the outermost surface of the board proximate the edge underneath the bead.

12. A method according to any preceding claim characterised in that a lubricant is applied to the carton board on at least the uppermost edge of the side wall to facilitate the movement of said edge within the channel and over the orientation means.

13. A method according to any of claims 1-11 characterised in that a lubricant is applied to inner surfaces of the channel and to the orientation means to facilitate to facilitate the movement of said edge therein.

14. A carton having a continuous edge a side wall, and a bead formed around the edge defining an arcuate rim of the carton, at least said side wall being formed from a folding box board type material prone to delamination, characterised in that in the completed bead construction, the edge contacts the outer surface of the side wall in a tangential manner within the bead at a distance from the rim less than the overall diameter of the bead, said edge being compressed against said outer wall of said carton by virtue of the desire of the board material to elastically recover.

Fig. 1



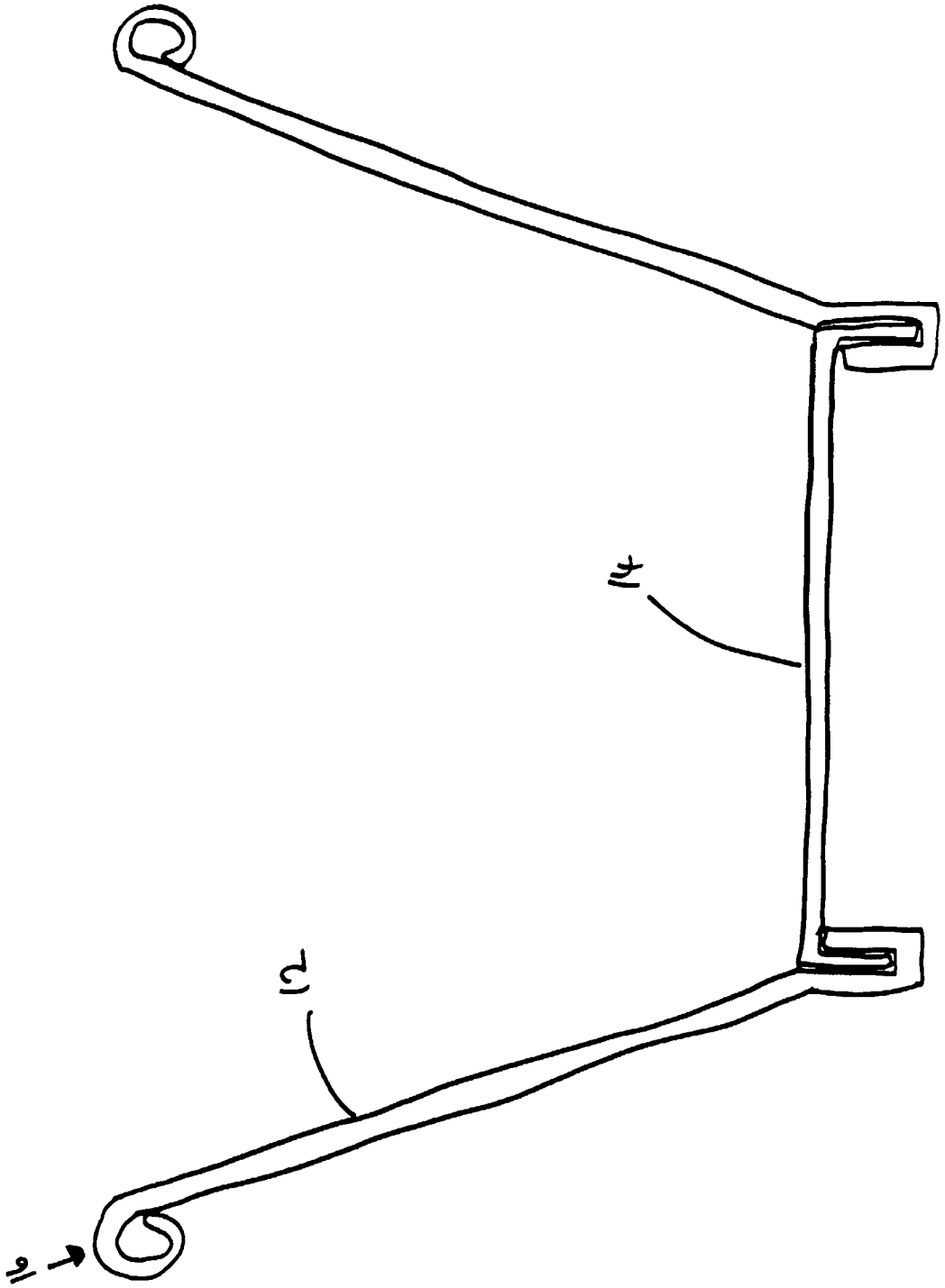
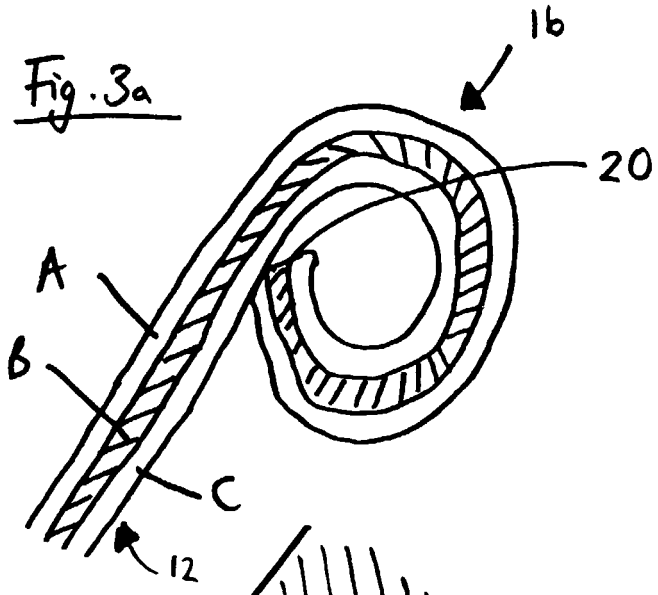


Fig 2

Fig. 3a



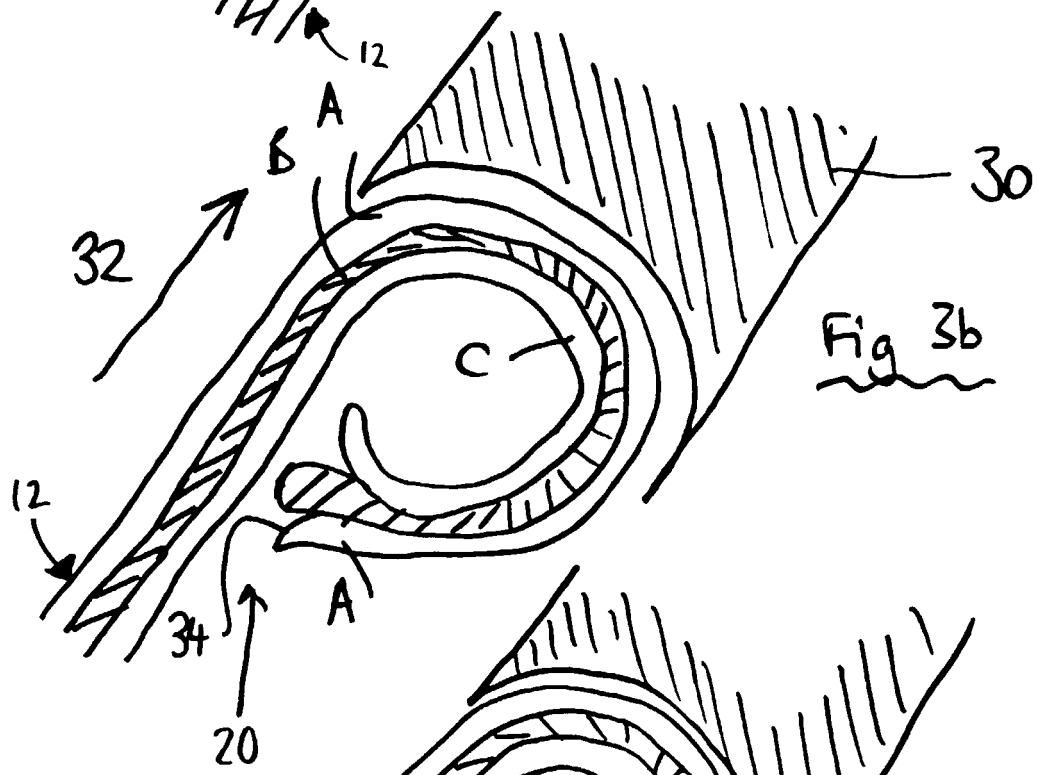


Fig 3b

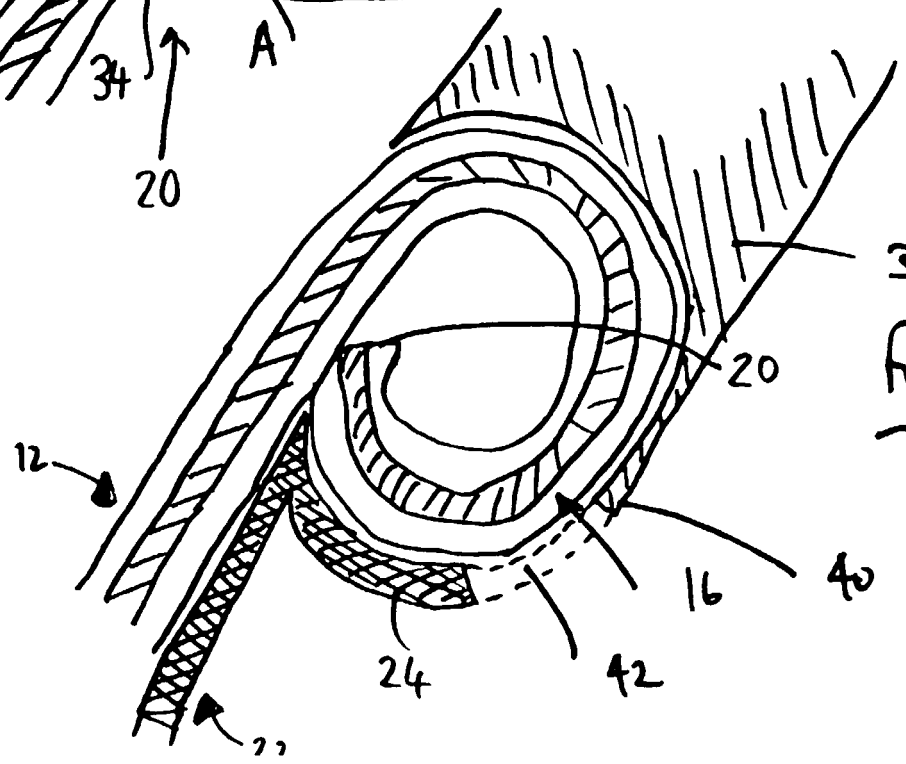


Fig 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 12 4381

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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X A	US 4 034 657 A (BOUSSAGEON PIERRE) 12 July 1977 (1977-07-12) * column 4, line 37 - column 39; claim 3; figures 1,6 *	14 1-6	
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X	WO 96 20684 A (MCNEIL PPC INC) 11 July 1996 (1996-07-11) * page 6, line 7 - line 9; figures 4-5C *	1,12,13	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B31F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15 March 2000	Pipping, L

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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