(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
6 June 2002 (06.06.2002)

PCT

(10) International Publication Number
WO 02/43960 A1

(51) International Patent Classification[7]: B32B 31/00

(21) International Application Number: PCT/US01/44618

(22) International Filing Date:
27 November 2001 (27.11.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/250,559 1 December 2000 (01.12.2000) US

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(81) Designated State *(national)*: US.

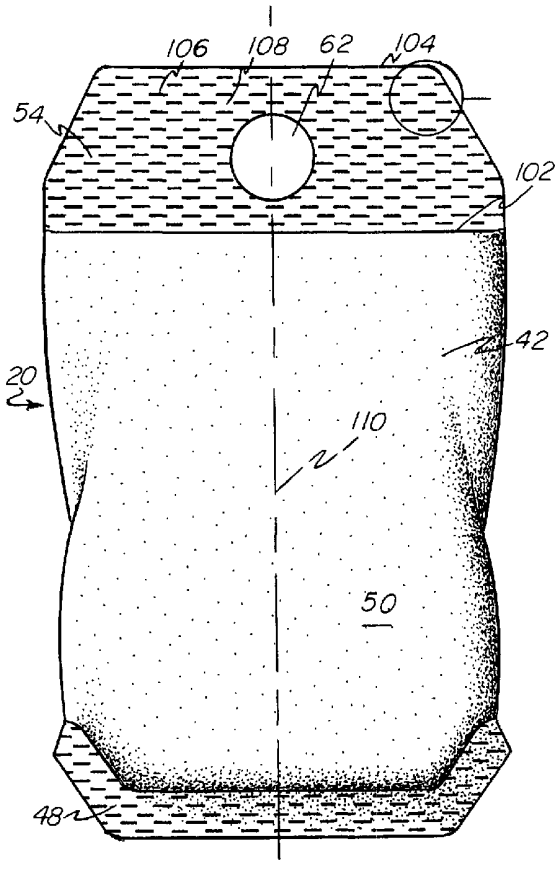
(84) Designated States *(regional)*: European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 02/43960 A1

(54) Title: IMPROVED ULTRASONIC WELD PATTERN FOR ADSORBENT CONTAINING PACKAGE



(57) Abstract: Method of preparing an adsorbent containing package and package (20) made thereby. The method comprises providing a mounting surface of the package and heat fusing the mounting surface via ultrasonic welding to provide a multiplicity of depressed hard seal portions (106) and relief surfaces (108) on the mounting surface.

IMPROVED ULTRASONIC WELD PATTERN FOR ADSORBENT CONTAINING PACKAGE

CROSS REFERENCE TO RELATED APPLICATION

[0001] The benefit of prior U.S. Provisional Application No. 60/250,559 filed December 1, 2000 is hereby claimed.

FIELD OF THE INVENTION

[0002] The invention relates to adsorbent containing packages having improved ultrasonically welded seam components with intermittent sealed portions and relief portions.

SUMMARY OF THE INVENTION

[0003] Typically a large area of material is ultrasonically welded to seal the desiccant package closed and provide a means to attach the package to the inside of an automotive air conditioning accumulator, condenser or receiver/dryer. Once welded, this large sealed area restricts the flow of oil and refrigerant thus reducing the oil circulation efficiency of the ac system. To make a weld, an ultrasonic horn and a smooth faced steel anvil are used to compress the bag materials therebetween. Energy is then applied to the ultrasonic horn thus welding the bag material. Typically a smooth faced horn is used to provide for a continuous smooth weld that is very dense and fluid impermeable. This invention provides for a texture to be applied to the face of the anvil. This texture produces a pattern weld in the bag material including hard sealed areas where the weld is extremely dense and fluid impermeable and relief areas where the bag material is not welded and is very permeable.

[0004] Care must be taken to ensure that the seam area comprises the proper proportion of the hard sealed portions and relief portions so that the weld area will be properly sealed while allowing for desired permeability. An additional advantage is that the textured weld reduces the energy required to produce a weld and thus reduces the cycle time of the machine to manufacture the bag.

[0005] The adsorbent material package of the present invention comprises an

elongated pouch or the like adapted for filling with desiccant or other adsorbent medium therein. Preferably, the package is made of a porous, non-woven, material such as a spun bonded nylon material, spun bounded polyester material, or polyester felt. An aperture is provided in one end of the package and is surrounded by an ultrasonically sealed mounting zone. The package aperture is force or snap fit over a flange or the like associated with the bleed filter that is in turn connected to the bight portion of the suction tube of the accumulator or similar a/c piping structure. In typical accumulator structures, the bight portion is oriented transversely with respect to the longitudinal axis of the cylindrical housing and connects upwardly extending legs of the fluid flow tube.

[0006] A longitudinally disposed seam member is formed along the length of the top or bottom side of the adsorbent pouch. This seam includes a double fabric layer area and may be formed via conventional means such as heat sealing, ultrasonic sealing, or other electronic sealing or fusing means.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Fig. 1 is a top plan view of an adsorbent material package in accordance with the invention;

[0008] Fig. 2 is a bottom plan view of the package shown in Fig. 1;

[0009] Fig. 3 is a magnified view of a section of the mounting zone of the package shown by the broken line circle in Fig. 1;

[0010] Fig. 4 is a schematic view of an ultrasonic welding apparatus that is used to ultrasonically form the mounting zone in accordance with the invention; and

[0011] Fig. 5 is a schematic view of the top surface of the anvil portion of the ultrasonic welding apparatus shown in Fig. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0012] Turning now to Figs. 1 and 2, there is shown an adsorbent package 20 in accordance with the invention. The top side or surface 42 of the package or packet is shown in Fig. 1. Here, the elongated packet material comprises pouch end seams 48, 54 sealing the respective longitudinal ends of the package. A longitudinally extending seam 44 (Fig. 2) extends longitudinally along the length of the back of the

elongated packet and is slightly laterally offset from a longitudinally extending bisector line extending through the package. This seam 44 provides a double thickness of the felt like material used to form the packet 20 and therefore can be referred to as a reinforcement area.

[0013] The pouch end seams 48, 54 and the longitudinally extending reinforcement seam 44 define a pouch 50 therebetween adapted to contain adsorbent material (not shown) therein.

[0014] The end seam 54 serves as a mounting zone by which the packet will be attached to the bight tube filter or the like in an accumulator, receiving dryer or condenser. As shown, a centrally located aperture 62 is adapted for snap fitting over the bleed filter positioned on the bight tube.

[0015] The mounting zone surrounds the aperture and extends between transverse borders 102, 104 of the packet.

[0016] As shown herein, both the mounting zone and the end seam 48 are ultrasonically welded to include a multiplicity of spaced, hard sealed areas 106, existing in a sea or matrix of relief areas 108. More specifically, as shown, the areas 106 and 108 alternate along vectors that are parallel to the longitudinal axis 110 of the packet and along vectors parallel to a direction perpendicular to the axis 110. The hard sealed areas 106 are highly compressed and relative to the generally planar relief areas 108, comprise generally oblong shaped areas of depression. These areas 106 are generally indented or depressed at a distance of about .030" relative to the plane of the surfaces 108.

[0017] Preliminary observations reveal that the positioning of the multiplicity of relief areas throughout the mounting zone aids in increased permeability of fluid including refrigerant, air, moisture and compressor lubricating oil through the zone. At the same time, the multiplicity of hard sealed areas 106 ensure adequate sealing of the plies of the packet material together.

[0018] In order to make the packet 20, a tubular material is first provided. At present, it is preferred to provide a non woven spun bonded nylon material for the packet. Presently, this material is available under the designation "Cerex PBN-2" sold by Cerex, Advanced Fabrics, L.P., Cantonment, Florida. This product is described as a non-woven that is made by spinning and thermally bonding

continuous filaments of nylon into a "drapable, conformable, textile-like fabric." Some have also referred to this material as a point bonded nylon.

[0019] The bottom of the material is then sealed via heat seal, or other electronic sealing system with the instant ultrasonic sealing method preferred, to form a pouch. Then, the desired desiccant is filled into the pouch. The top longitudinal edge of the packet comprising the above noted mounting zone is ultrasonically welded to provide alternating hard sealed and relief areas. At the same time, the bottom half of the next succeeding bag in the production run is sealed and the procedure repeated so that successive bags can be made. After each bag 20 is cut, the mounting aperture is cut in the middle of the mounting zone.

[0020] In accordance with the invention, ultrasonic welding of the mounting surface may be performed in conjunction with an apparatus of the type shown schematically in Fig. 4. Details pertaining to this apparatus may be gleaned by review of U.S. Patent 4,767,492, the disclosure of which is hereby incorporated by reference herein.

[0021] As shown in Fig. 4, the ultrasonic welding apparatus comprises a horn member 204 and anvil 202 adjacent the horn. As shown, the anvil member 202 is retractable into a bag engaging and bag release position. In Fig. 4, the apparatus is shown in a position prior to ultrasonic fusion of the mounting surface 54.

[0022] During the fuse bonding process, the mounting surface 54 of the bag is clamped between the horn 204 and cooperating anvil 202. At the same time, the bottom edge 48 of the packet 20 is firmly grasped within holding member 206 that may be disposed on a conveyor 208 or the like.

[0023] In accordance with conventional ultrasonic welding methods, the surface 54 is fuse bonded by the frictional heat caused by ultrasonic vibration of the horn member 204. As is conventional in the art, the horn 204 is electrically connected to a suitable oscillator and vibrator (not shown). In the apparatus set forth in U.S. Patent 4,767,492, the horn operates at a vibration frequency of 20 KHz with a power output of 1.8 kW.

[0024] Turning now to Fig. 5, the face of the anvil member 202 is shown. Face 210 is provided with a multiplicity of raised portions 212 and planar relief portions 214. In accordance with the ultrasonic welding method, the edges of the

packet that ultimately form the mounting surface 54 are pressed between the horn and anvil 202 and the raised surfaces 212 of the anvil impart the specific heat sealed areas 106 that are formed in the mounting zone of the packet.

[0025] In one particular embodiment of the invention, (shown in Fig. 3) the hard sealed areas each comprise a generally oblong shape with length measured along the longitudinal axis of .089" (dimension 301, 302) and a transverse dimension of .012" (dimension 303, 304).

[0026] Although only the anvil member is herein shown to include raised portions to provide the desired texture to the mounting zone 54 of the packet, the artisan will appreciate that the horn surface could also be provided with such a texture forming area or in some cases both the anvil and horn could be provided with complementary texturing surfaces.

[0027] As shown, the hard sealed areas are provided in a plurality of horizontally extending rows with the rows of raised portions separated by .075" (dimension 305, 306). As positioned along each row, a hard sealed area is spaced from its neighboring hard sealed area by .200" (dimension 307, 308) as measured from one end of a hard sealed area to the corresponding end of an adjacent hard sealed area in the row.

[0028] Although the embodiments shown above are directed to desiccant containing pouches or packets designed primarily for use in automotive structures and systems, the artisan will appreciate that the packets may also be used in conjunction with other desiccant containing packages adapted for a variety of industries.

CLAIMS

1. A method of preparing a pouch including an improved fluid permeability fused surface comprising providing a multiplicity of depressed hard sealed portions and relief portions in said fused surface.

2. A method of preparing an adsorbent containing package including an improved fluid permeability mounting surface for mount of said package to a cooperating support structure of an automotive air conditioning system comprising fusing said package at said mounting surface, and providing a multiplicity of depressed, hard sealed portions and relief portions in said mounting surface.

3. A method of preparing an adsorbent containing package including an improved fluid permeability mounting surface adapted for mounted disposition adjacent a cooperating support structure of an automotive air conditioning system said method comprising, heat fusing said mounting surface of said package by ultrasonic welding, said ultrasonic welding comprising placing said package between a vibratory horn and a cooperating anvil surface, and providing a multiplicity of raised surfaces on one of said horn and anvil surfaces whereby, during said ultrasonic welding of said package a multiplicity of depressed hard sealed portions and relief portions are formed in said mounting surface.

4. A method as recited in claim 3 wherein said raised surfaces are provided on said anvil surface.

5. A pouch comprising a fused surface portion, said fused surface portion comprising a multiplicity of hard sealed portions and relief portions.

6. An adsorbent containing package, said packet having first and second sealed longitudinal ends, a sealed mounting zone located between said first and second sealed ends, said mounting zone including a fused section of said package and including a multiplicity of depressed hard sealed portions and relief portions formed therein.

7. An adsorbent containing package as recited in claim 6 further comprising an aperture in said mounting zone.

8. An adsorbent containing package as recited in claim 6 wherein said multiplicity of depressed hard sealed portions comprise a multiplicity of generally oblong shaped depressions, with adjacent depressions separated by a relief area.

9. An adsorbent containing package as recited in claim 6 wherein said package is composed of a member selected from the group of polyester felt, spun bonded polyester and spun bonded nylon.

10. An adsorbent containing package as recited in claim 9 wherein said package is composed of spun bonded nylon.

11. An adsorbent containing package as recited in claim 6 wherein said oblong shaped depressions are arranged in a plurality of rows transverse to a longitudinal axis passing through said package.

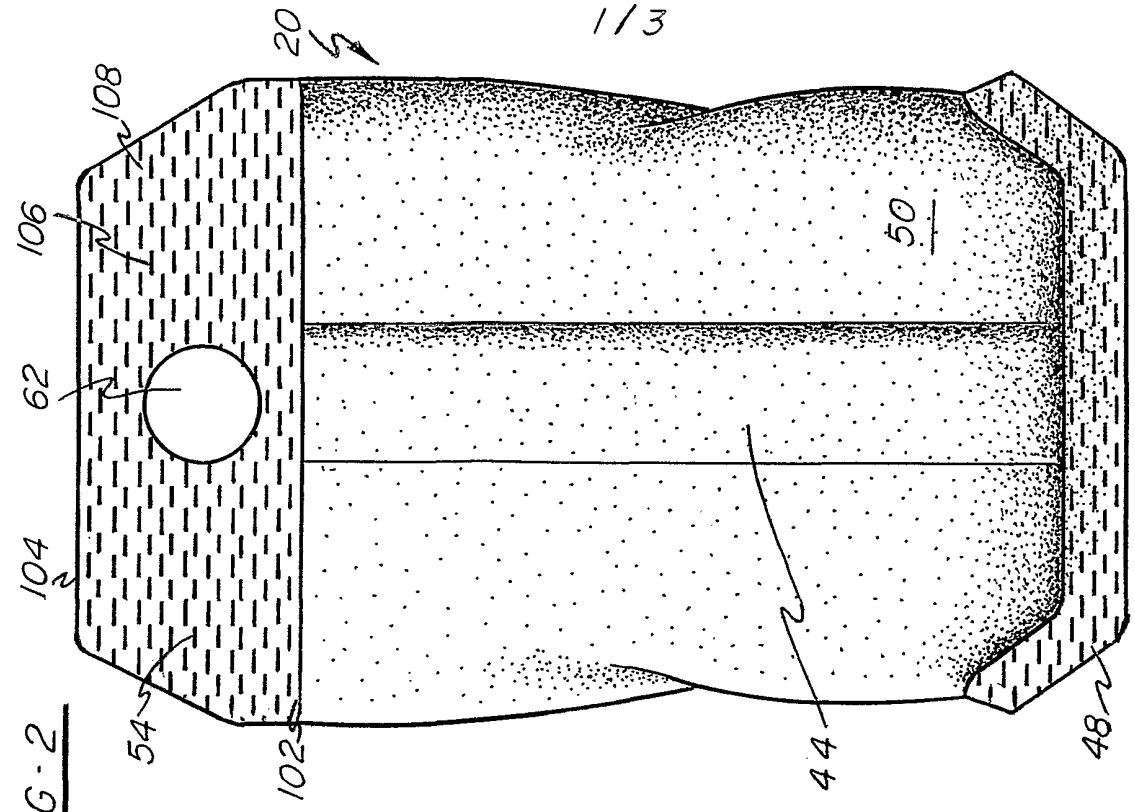

113
20
108
106
62
104
54
102
44
50
48

FIG - 2

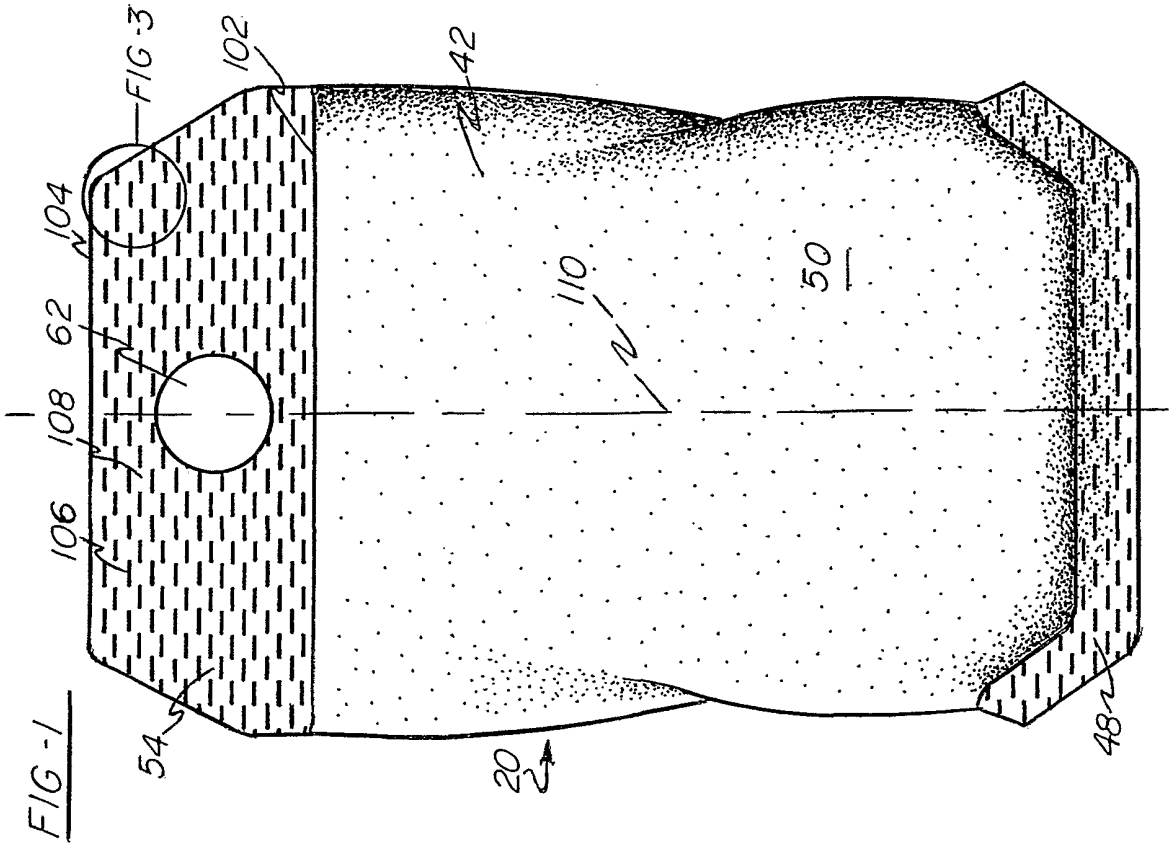

FIG-3
102
42
104
62
108
106
110
50
54
20
48

FIG - 1

FIG -3

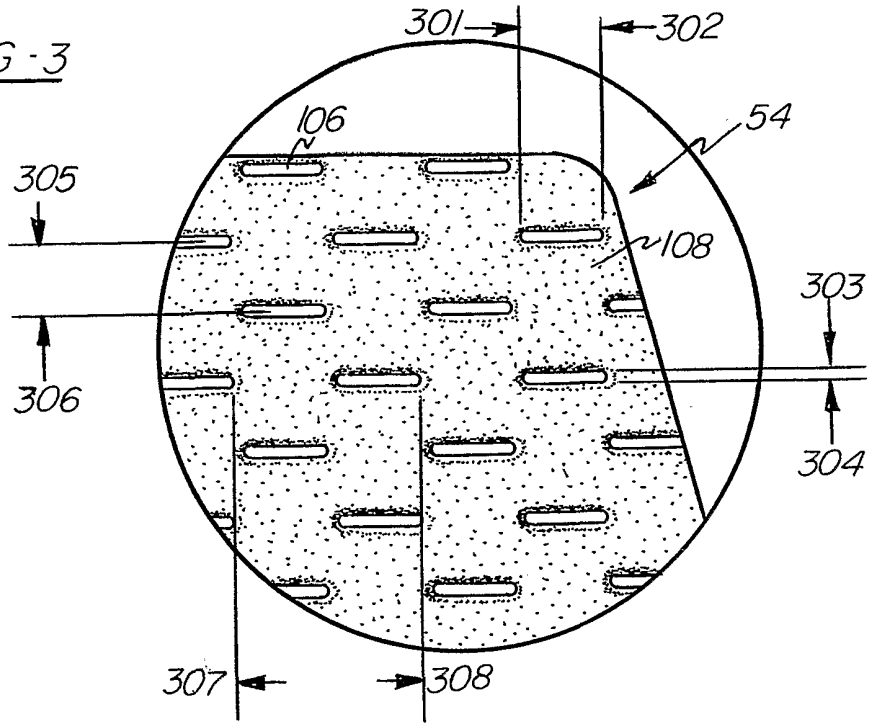


FIG - 4

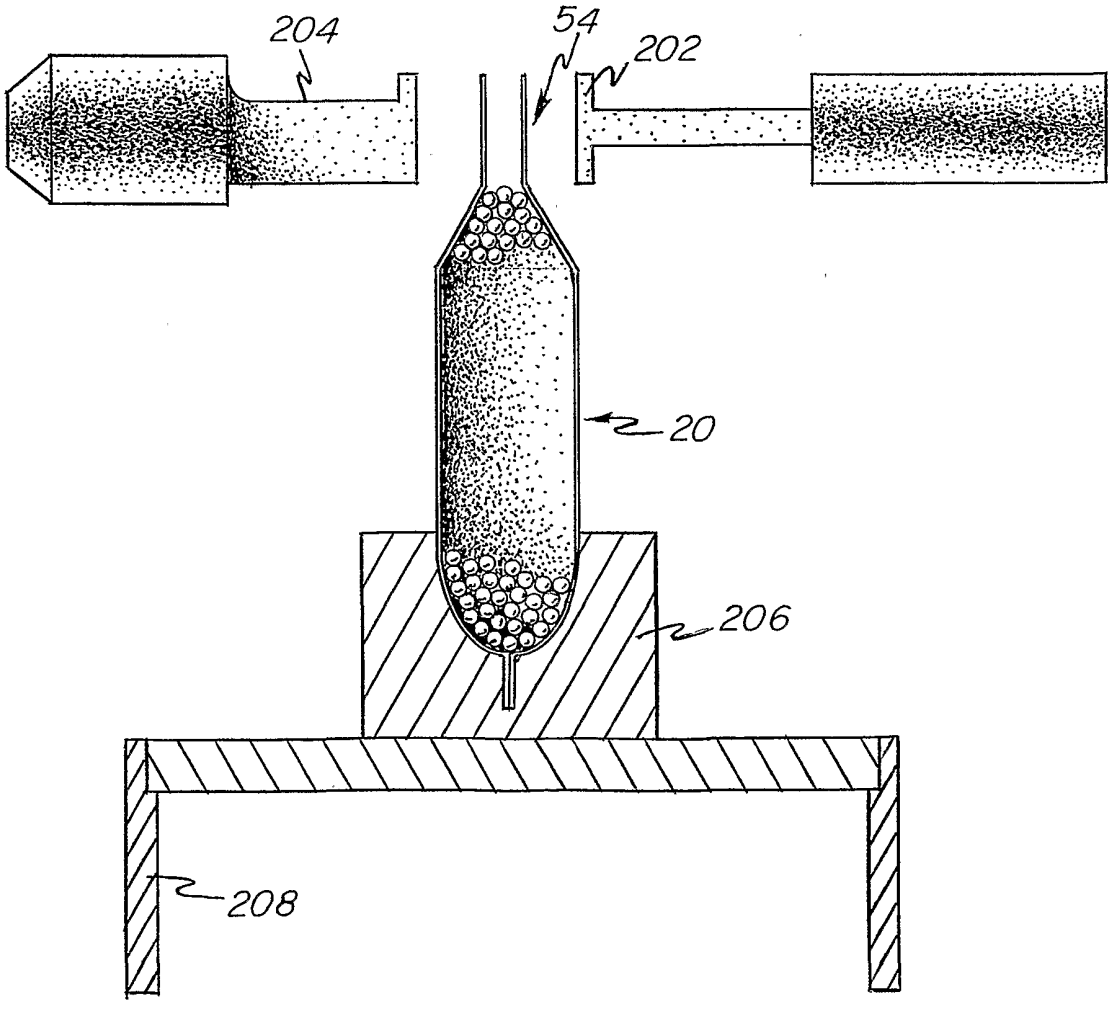
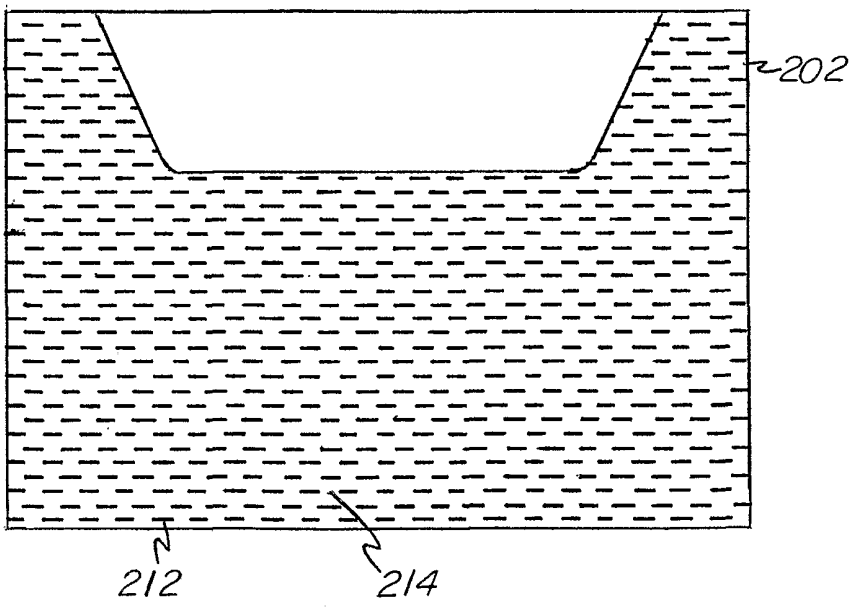


FIG - 5



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/44618

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :B32B 31/00
US CL :156/73.1, 308.2; 206/524.1
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 156/73.1, 290, 292, 308.2, 308.4, 580.1, 580.2; 206/524.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 4,767,492 A (FUKUSIMA et al) 30 August 1988, col. 7, line 42 through col. 8, line 41.	5 --- 1-4, 6-11
Y	US 4,517,790 A (KREAGER) 21 May 1985, col. 3, lines 13-41.	1-4, 6-11

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 05 FEBRUARY 2002	Date of mailing of the international search report 25 FEB 2002
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