

[54] **ULTRASONIC SHEET MATERIAL TESTING APPARATUS**

[75] Inventor: James D. Logan, Pullman, Wash.

[73] Assignee: Metriguard, Inc., Pullman, Wash.

[21] Appl. No.: 926,702

[22] Filed: Jul. 20, 1978

[51] Int. Cl.<sup>2</sup> ..... G01N 29/00

[52] U.S. Cl. .... 73/618; 73/609

[58] Field of Search ..... 73/609, 610, 618, 632,  
73/633, 635, 639, 641, 642, 644

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Primary Examiner—Stephen A. Kreitman

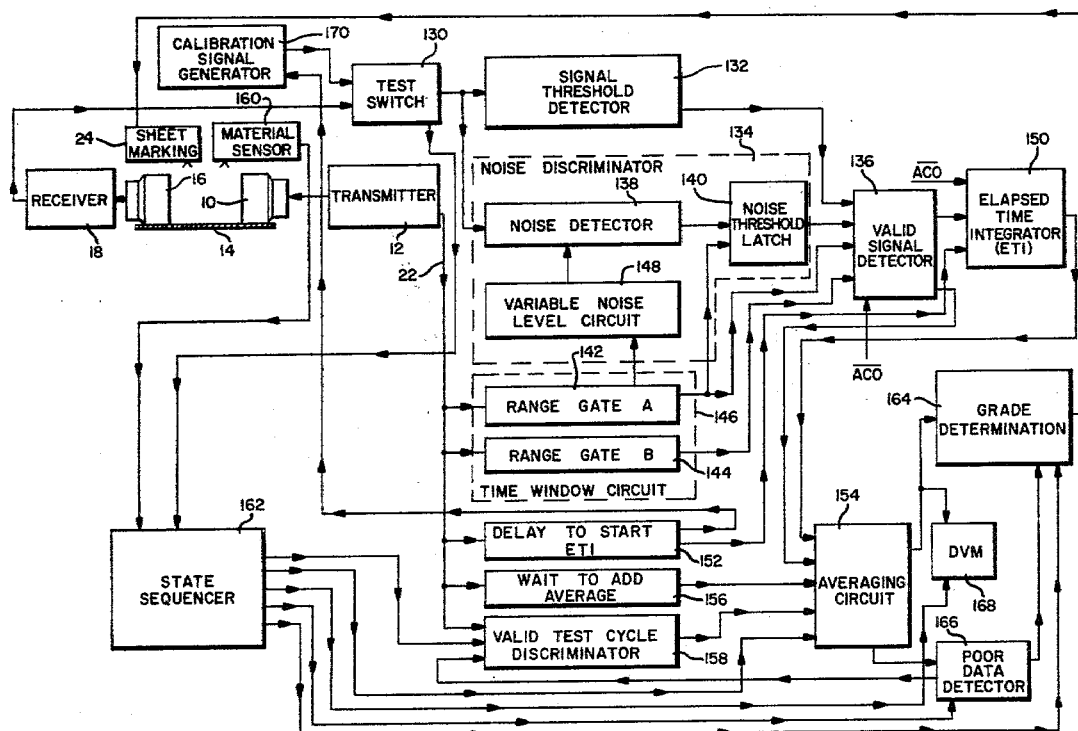
Attorney, Agent, or Firm—Klarquist, Sparkman,  
Campbell, Leigh, Hall & Winston

[57]

**ABSTRACT**

A device for testing sheet material, such as wood veneer, includes a rolling transducer for introducing ultrasonic signals into the veneer so as to cause travel of the signals generally in the plane of the veneer. Coupling oil filling this transducer facilitates the transmission of the signals into the veneer. Another similar rolling transducer is provided to detect the travelling ultrasonic signals. Each rolling transducer includes a special rim with an annular focusing ring for directing the ultrasonic signals to and from the veneer. A timer circuit produces a signal representing the travel time taken for an ultrasonic signal to pass between the transducers. An averaging circuit obtains an average of such travel times for each sheet and a grading circuit causes the sheet to be marked with a grade corresponding to the average travel time. A signal threshold detector prevents travel times for detected signals of a magnitude less than a preselected minimum level from being included in the average. Travel times for detected signals of a magnitude exceeding a noise level are blocked by a noise discriminator from being averaged. A variable noise level circuit adjusts the magnitude of the noise level at certain times following the transmission of an ultrasonic signal into the veneer. Detected signals having a travel time which is not between a preselected minimum and maximum time established by a time window circuit are disregarded. A calibration signal generator provides a signal of a known and adjustable time length for use in adjusting the grade corresponding to travel times.

28 Claims, 12 Drawing Figures



[54] **SONIC OR ULTRASONIC APPARATUS FOR  
SIMULTANEOUSLY CUTTING AND  
SEAMING SHEET MATERIAL**

[75] Inventor: **Abner D. Brown, Elkin, N.C.**

[73] Assignee: **Chatham Manufacturing Company,  
Elkin, N.C.**

[21] Appl. No.: **973,575**

[22] Filed: **Dec. 27, 1978**

[51] Int. Cl.<sup>2</sup> ..... **B23K 27/02; B23K 27/08**

[52] U.S. Cl. .... **156/515; 156/73.3;  
156/553; 156/580.2; 228/1 B**

[58] Field of Search ..... **156/73.1, 73.3, 510,  
156/515, 580.1, 580.2, 553; 228/1 R, 1 B**

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Primary Examiner—Michael G. Wityshyn

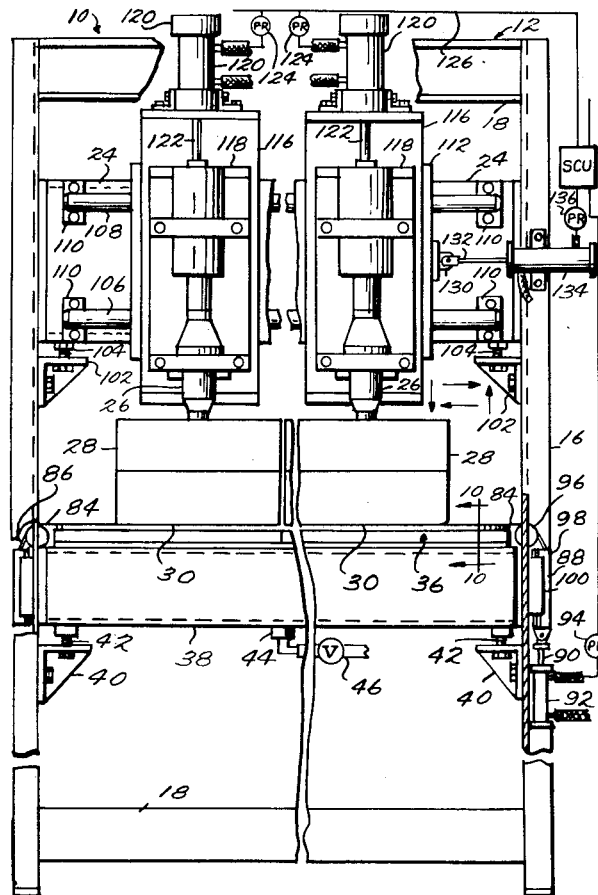
Attorney, Agent, or Firm—Cushman, Darby & Cushman

[57] **ABSTRACT**

A sonic or ultrasonic apparatus for exposing sheet mate-

rial having a heat fusible component disposed therein to high frequency vibrational or mechanical energy to perform an operation thereon. The apparatus includes a plurality of electro-acoustical converter units, each of which is energized by high frequency electrical energy that is converted into high frequency vibrational energy. The units are horizontally spaced in juxtaposition to each other in line transversely above the sheet material, and each electro-acoustical converter unit has a horn resonant at the high frequency vibrational energy which opposes stationary anvil means positioned beneath the sheet material. The horns are simultaneously moved vertically downwardly from an indexing position into engagement with the sheet material and then horizontally in a small increment while in engagement to perform the operation on the sheet material and then vertically upwardly and horizontally back to the initial indexing position for a next operation on the sheet material. The anvil means, which is stationary, permits the horns to simultaneously cut the sheet material and seam the cut edges by producing fusion bonds along the cut edges. Alternatively, the anvil means can be arranged to either provide an elongated seam transversely across the sheet material or provide an elongated transverse cut in the sheet material.

**41 Claims, 25 Drawing Figures**



[54] **ULTRASONIC TESTING OF SHEET AND PLATE STOCK**

[75] Inventors: **Hans-Jürgen Bäthmann, Moers; Gert Fischer, Mülheim; Heinz Schneider, Düsseldorf, all of Fed. Rep. of Germany**

[73] Assignee: **Mannesmann Aktiengesellschaft, Düsseldorf, Fed. Rep. of Germany**

[21] Appl. No.: **185,565**

[22] Filed: **Sep. 9, 1980**

[30] **Foreign Application Priority Data**

Sep. 7, 1979 [DE] Fed. Rep. of Germany ..... 2936737

[51] Int. Cl.<sup>3</sup> ..... **G01N 29/00; G01N 29/04**

[52] U.S. Cl. .... **73/600; 73/599; 73/613**

[58] Field of Search ..... **73/602, 600, 609, 610, 73/613, 618, 599**

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*Primary Examiner*—Edward R. Kazenske

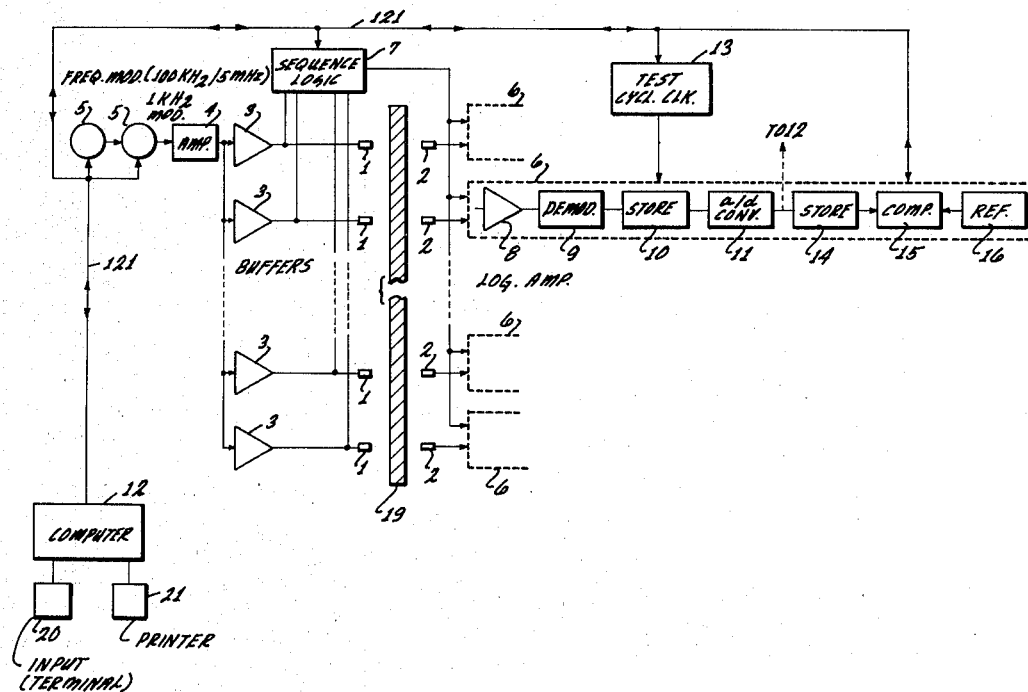
*Assistant Examiner*—David V. Carlson

*Attorney, Agent, or Firm*—Ralf H. Siegemund

[57] **ABSTRACT**

Sheet or plate stock is used as to defects by a row of ultrasonic transmitting transducers on one side and receiving transducers on the other. The transmitting transducers receive frequency-modulated signals via individual buffers, and the receiving transducers feed individual, digital amplitude envelope minima to detection circuits whose outputs are fed to a computer which also feeds operating parameters to the source for the modulated signals. Different types (autonomy) of the receiver channels are described as well as diagnostic and setup procedures.

**10 Claims, 2 Drawing Figures**



[54] **METHOD OF FABRICATING A FLEXIBLE COVER BY ULTRASONIC VIBRATIONS**

[75] Inventor: **Clark A. Denslow**, Wilton, Conn.

[73] Assignee: **Branson Ultrasonics Corporation**, Newtown, Conn.

[21] Appl. No.: **381,066**

[22] Filed: **May 24, 1982**

[51] Int. Cl.<sup>3</sup> ..... **B29C 27/08**

[52] U.S. Cl. .... **156/73.2; 156/296; 156/308.2; 156/580.1; 264/23**

[58] Field of Search ..... **156/73.1, 73.2, 296, 156/304.2, 304.6, 308.2, 580.1, 580.2; 264/23**

[56] **References Cited**

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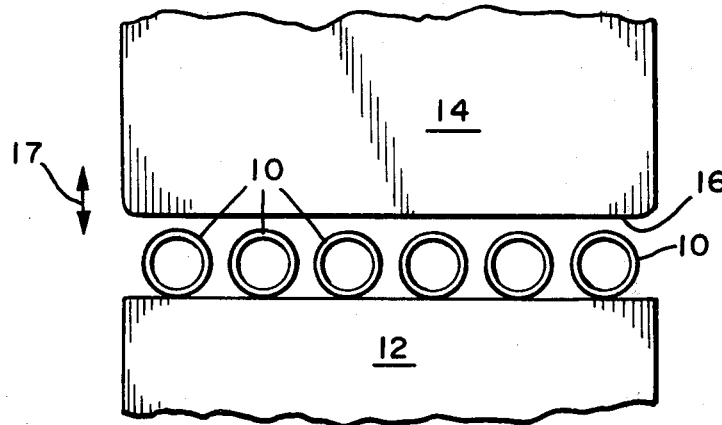
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*Primary Examiner*—Michael G. Wityshyn  
*Attorney, Agent, or Firm*—Ervin B. Steinberg; Philip J. Feig

[57] **ABSTRACT**

A flexible cover, blind or shade is fabricated from thermoplastic rod or tubular members which are spaced from another on a support. The free-standing side is engaged by an ultrasonic resonator to bond the members to one another. The pressure exerted during bonding is of such magnitude as to compress and flatten the members to cause a thin web joining juxtaposed members, the web forming a flexible joint.

**6 Claims, 5 Drawing Figures**



[54] STERILE COVER FOR INTRAOPERATIVE  
ULTRASONIC DIAGNOSTIC DEVICES AND  
METHOD AND KIT FOR PROVIDING SAME

[76] Inventors: Richard P. Poncy, 5105 Woodland  
Lakes Dr., Mark P. Poncy, 5125  
Woodland Lakes Dr., both of Palm  
Beach Gardens, Fla. 33410

[21] Appl. No.: 503,838

[22] Filed: Jun. 13, 1983

[51] Int. Cl.<sup>4</sup> ..... A61B 10/00

[52] U.S. Cl. .... 128/660; 206/305

[58] Field of Search ..... 128/660-663,  
128/132 R; 206/212, 438, 205, 305

[56] References Cited

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1979, pp. 128-138.

Primary Examiner—Kyle L. Howell

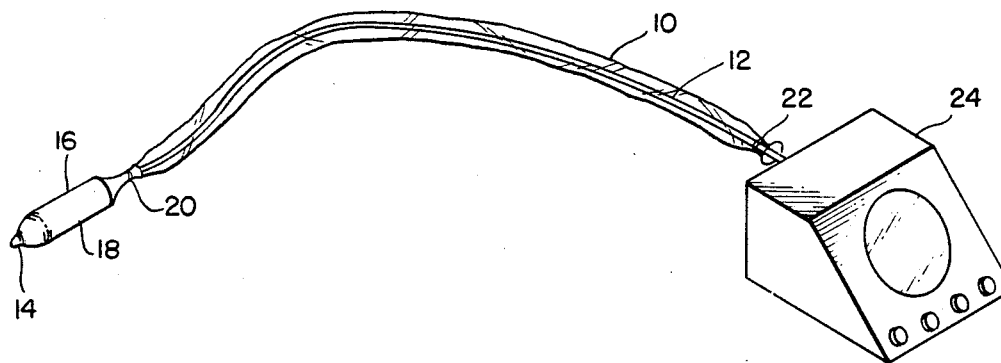
Assistant Examiner—Francis J. Jaworski

Attorney, Agent, or Firm—Lane and Aitken

[57] ABSTRACT

A sterile cover for a sonic probe and connecting cable  
of a sonic imaging instrument includes (1) a flexible  
sleeve, open at both ends and having a sterile exterior  
surface, covering at least a portion of the cable and all  
but a distal end of the probe and (2) a flexible sheath,  
open at one end and closed at the other end and having  
a sterile exterior surface, that fits over a portion of the  
sleeve and covers at least the distal end of the probe. A  
method and kit for providing a sterile cover is also  
described.

18 Claims, 7 Drawing Figures



[54] **ULTRASONIC APPARATUS FOR JOINING  
AND SEVERING SHEET MATERIAL**

[75] Inventor: **Gary N. Flood**, Washington Depot,  
Conn.

[73] Assignee: **Branson Ultrasonics Corporation**,  
Danbury, Conn.

[21] Appl. No.: **923,030**

[22] Filed: **Oct. 24, 1986**

[51] Int. Cl.<sup>4</sup> ..... **B29C 65/08; B32B 31/18**

[52] U.S. Cl. .... **156/510; 156/73.1;**  
156/580.2; 156/582; 493/197; 493/202

[58] Field of Search ..... 156/73.1, 73.3, 580.1,  
156/580.2, 582, 510, 515, 250, 251, 267; 264/23;  
493/195, 197, 200, 202, 208

[56] **References Cited**

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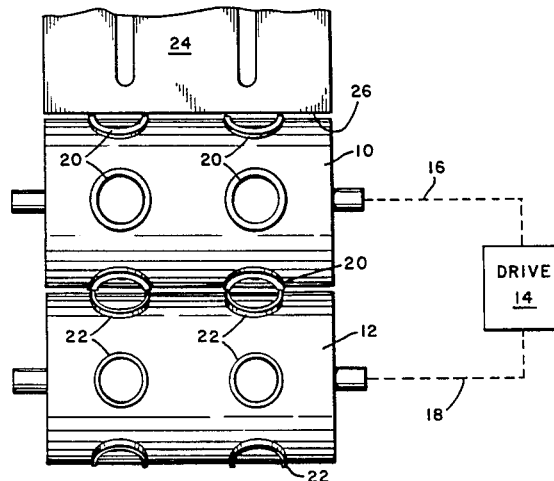
*Primary Examiner*—Michael Wityshyn

*Attorney, Agent, or Firm*—Philip J. Feig

[57] **ABSTRACT**

An apparatus for joining sheet material and cutting joined material comprises a set of drums rotating against one another. A first drum is provided along its surface with a raised pattern serving as welding surfaces when operating in conjunction with one or more ultrasonic resonators. As sheet material is fed through the nip formed between the drum and the resonator, the material is joined in accordance with the pattern. A second drum is provided along its surface with a complementary raised pattern of cutting surfaces. As the material subsequently is fed through the nip between both drums, the welded portions are severed from the surrounding material. The welding and cutting pattern surfaces are constructed to mesh for providing positive severing of the material interposed therebetween.

**6 Claims, 3 Drawing Figures**



[54] **ULTRASONIC WAVE VIBRATION APPARATUS FOR USE IN PRODUCING PREFORM WIRE, SHEET OR TAPE FOR A FIBER REINFORCED METAL COMPOSITE**

[75] Inventors: Toshikatsu Ishikawa, Tokyo; Haruo Teranishi, Machida; Yoshikazu Imai, Tokyo; Yoichi Nagata, Yokohama, all of Japan

[73] Assignee: Agency of Industrial Science & Technology, Tokyo, Japan

[21] Appl. No.: 932,595

[22] Filed: Nov. 20, 1986

## Related U.S. Application Data

[62] Division of Ser. No. 712,118, Mar. 15, 1985, Pat. No. 4,649,060.

## [30] Foreign Application Priority Data

Mar. 22, 1984 [JP] Japan ..... 59-53542

[51] Int. Cl.<sup>4</sup> ..... B05C 3/05

[52] U.S. Cl. .... 118/612; 118/429; 366/127

[58] Field of Search ..... 118/612, 429; 427/57; 366/127, 600

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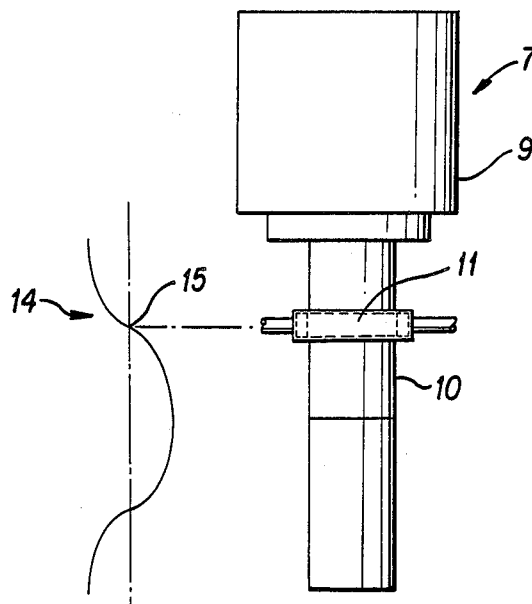
Primary Examiner—Evan K. Lawrence

Attorney, Agent, or Firm—Stevens, Davis, Miller & Mosher

## [57] ABSTRACT

A preform wire for fiber reinforced metal composite consisting of a metal/silicon carbide fiber composite material is light in weight and excellent in strength and elasticity, and can be easily obtained by impregnating a silicon carbide fiber bundle with a molten metal which is kept vibrated by means of an ultrasonic wave vibration apparatus having a hole for cooling water or a cooling-water jacket located at the node of the half-wavelength of the ultrasonic wave created by the vibration apparatus.

4 Claims, 1 Drawing Sheet



- [54] **ULTRASONIC EXAMINATION OF BWR  
SHROUD ACCESS COVER PLATE  
RETAINING WELDS**
- [75] **Inventors: David L. Richardson, Los Gatos;  
Jack P. Clark; Balasubramanian S.  
Kowdley, both of San Jose; Peter M.  
Patterson, Livermore; Richard W.  
Perry; Thurman D. Smith, both of  
San Jose, all of Calif.**
- [73] **Assignee: General Electric Company, San Jose,  
Calif.**
- [21] **Appl. No.: 293,158**
- [22] **Filed: Jan. 3, 1989**
- [51] **Int. Cl.<sup>5</sup> ..... G21C 17/00**
- [52] **U.S. Cl. .... 376/249**
- [58] **Field of Search ..... 376/249, 252, 245, 260;  
73/621**

[56] **References Cited**

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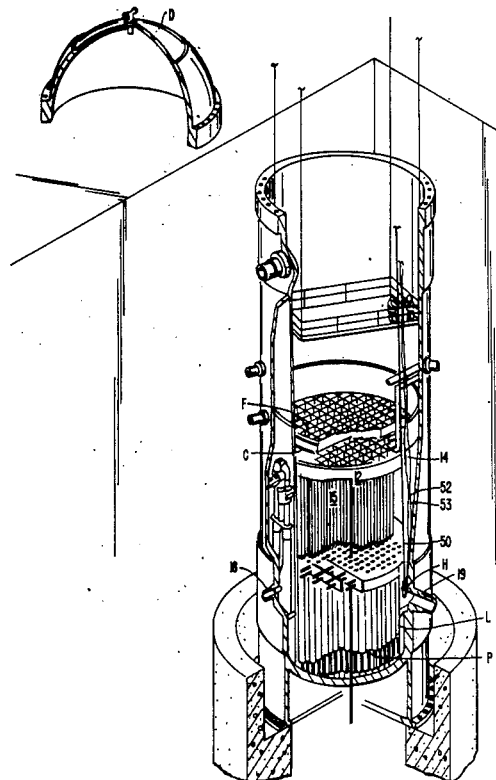
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*Primary Examiner*—Daniel D. Wasil  
*Attorney, Agent, or Firm*—Robert R. Schroeder

[57] **ABSTRACT**

In operation, the device is lowered with paired lines attached to both housing lugs but suspended under tension only from one line to one lug so that the streamline housing is vertically disposed. With the housing vertically disposed during lowering, obstacles can be avoided such as the guide rod for the steam separator and dryer as well as the feedwater and core spray spargers. When lowered to the vicinity of the ledge and cover plate to be inspected, the slack line is fished around any obstacle and thereafter placed under tension. The streamline housing is then lowered using both lines in a horizontal position so as to expose downwardly the pedestal and rubber foot. Lowering is completed with remote camera assistance. Sample sweeps with the ultrasound transducer of spaced apart sections of the cover plate weld are used for precise centering of the pedestal and rubber base with respect to the center of the cover plate. Repeatedly logging a longitudinal excursion of the ultrasound detector with indexed rotation of the housing permits scanning entirely around the weld of the cover plate. This enables remote ultrasound survey of the weld of the cover plate for stress corrosion cracking.

**6 Claims, 4 Drawing Sheets**





[54] **APPARATUS FOR ULTRASONIC EXAMINATION OF BWR SHROUD ACCESS COVER PLATE RETAINING WELDS**

[75] Inventors: **David L. Richardson**, Los Gatos; **Jack P. Clark**; **Balasubramanian S. Kowdley**, both of San Jose; **Peter M. Patterson**, Livermore; **Richard W. Perry**; **Thurman D. Smith**, both of San Jose, all of Calif.

[73] Assignee: **General Electric Company**, San Jose, Calif.

[21] Appl. No.: 476,086

[22] Filed: Feb. 7, 1990

**Related U.S. Application Data**

[62] Division of Ser. No. 293,158, Jan. 3, 1989, Pat. No. 4,966,746.

[51] Int. Cl.<sup>5</sup> ..... G01N 29/04

[52] U.S. Cl. .... 73/621; 376/249

[58] Field of Search ..... 73/621, 623; 376/249

[56] **References Cited**

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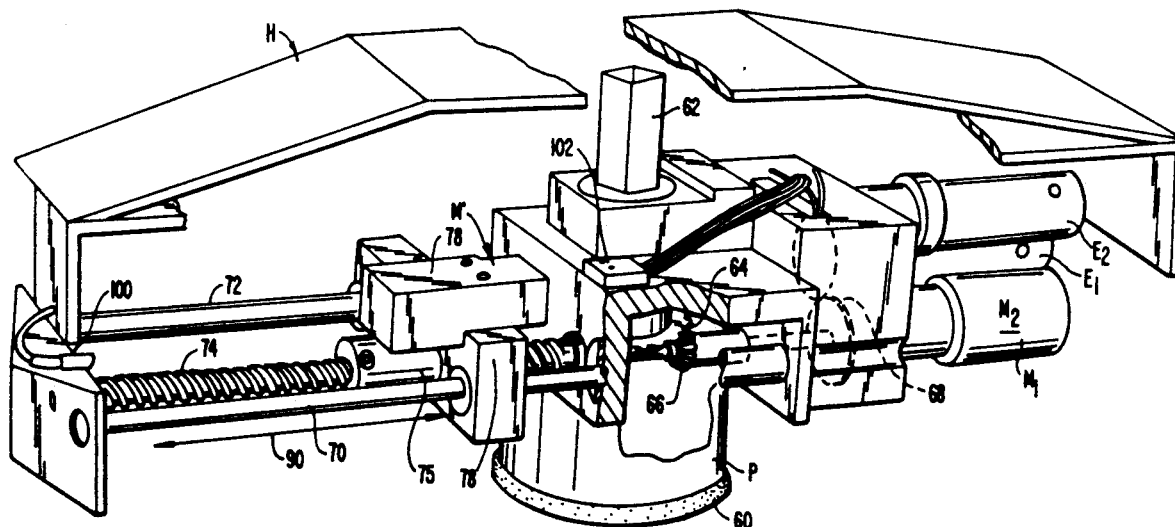
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Primary Examiner—Hezron E. Williams  
Assistant Examiner—Rose M. Finley  
Attorney, Agent, or Firm—Robert R. Schroeder

[57] **ABSTRACT**

An apparatus and process for the remote inspection for stress corrosion cracking of welded shut boiling water reactor shroud access cover plates is disclosed. The apparatus consists of a streamline housing having a top side with lugs for the attachment of lowering lines on either end of the housing. Medially of the streamline housing and projecting downwardly from the bottom of the streamline housing, there is provided a central rotating pedestal with a rubber base. The rotating pedestal and rubber base enable the entire housing to rest on and rotate relative to the pedestal and rubber base. A first motor interior of the housing rotates the housing at a bevel gear rigidly mounted to the central pedestal. A second motor rotates a threaded shaft driving a ball screw with an attached mount for an ultrasound transducer. The mount and transducer responsive to rotation of the ball screw traverse along the elongate dimension of the housing over an opening through the bottom of the housing. A focused ultrasound transducer passes above the metal to be inspected. This ultrasound transducer focuses the sound through the water at an oblique angle to and from the metal of the hatch cover plate for an ultrasonic examination for stress corrosion cracking.

1 Claim, 4 Drawing Sheets





US005090736A

**United States Patent** [19]**Minkus**[11] **Patent Number:** **5,090,736**[45] **Date of Patent:** **Feb. 25, 1992**

[54] **MULTI-SHEET LAMINATED  
IDENTIFICATION CARD WITH TAMPER  
RESISTANT, ULTRASONIC WELDMENTS**

[75] **Inventor:** **Morton Minkus, Winnetka, Ill.**

[73] **Assignee:** **Transilwrap Company, Inc., Chicago,  
Ill.**

[21] **Appl. No.:** **646,820**

[22] **Filed:** **Jan. 28, 1991**

[51] **Int. Cl.:** **B42D 15/00**

[52] **U.S. Cl.:** **283/77; 283/107;  
283/904; 283/108**

[58] **Field of Search:** **283/77, 107, 108, 109,  
283/904**

[56] **References Cited**

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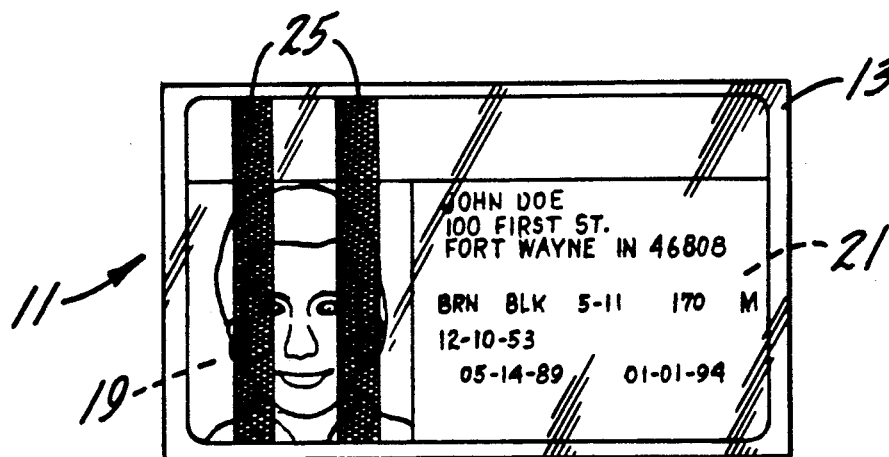
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**Primary Examiner**—Paul A. Bell  
**Attorney, Agent, or Firm**—Kinzer, Plyer, Dorn,  
McEachran & Jambor

[57] **ABSTRACT**

An identification card of the kind including at least two and usually three resin sheets bonded together, with identification data at an interface between sheets visible through the outermost sheet, which is transparent, and incorporates added anti-tampering protection in the form of a band or other limited area weldment between the sheets usually formed by an ultrasonic weldment; the weldment is clearly visible due to surface distortion caused by it but is not so extensive as to prevent effective viewing of the identification data in its limited area. In a more particularized aspect of the invention, a portion of the identification data is more significant than the remainder of the data and thus more susceptible to being tampered with and the weldments are placed in this susceptible area of the identification data.

**10 Claims, 1 Drawing Sheet**



[54] **ULTRASONIC SHEET FEEDER, LOW-PROFILE ULTRASONIC MOTOR, AND METHOD OF DRIVING THE SAME**

[75] Inventors: **Osamu Myoga; Takeshi Inoue; Michihisa Suga**, all of Tokyo, Japan

[73] Assignee: **NEC Corporation**, Tokyo, Japan

[21] Appl. No.: **854,541**

[22] Filed: **Mar. 19, 1992**

[30] **Foreign Application Priority Data**

Mar. 28, 1991 [JP] Japan ..... 3-64295

[51] Int. Cl.<sup>5</sup> ..... **H01L 41/08**

[52] U.S. Cl. .... **310/323; 310/328**

[58] Field of Search ..... 310/316, 317, 323, 328; 318/116-118

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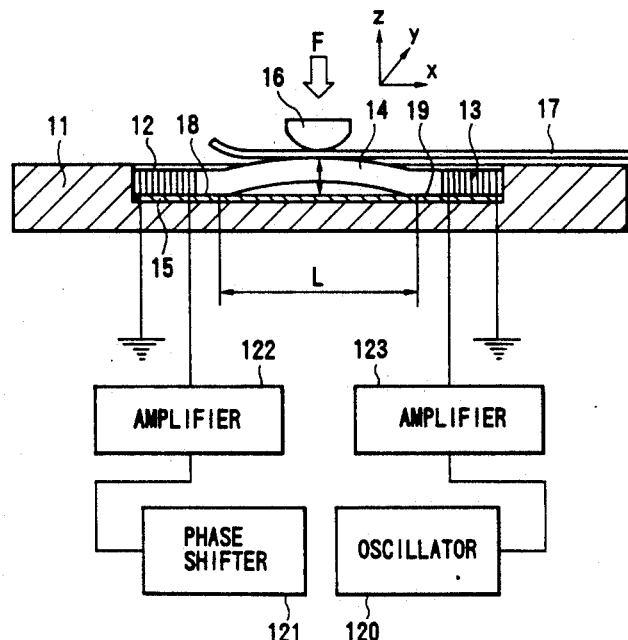
*Primary Examiner*—Mark O. Budd

*Attorney, Agent, or Firm*—Burns, Doane, Swecker & Mathis

## [57] ABSTRACT

An ultrasonic sheet feeder includes a convex shell, piezoelectric ceramic elements, a base, a roller, and a driving power source. The convex shell has a protruding middle portion. Each piezoelectric ceramic element has one end in contact with a corresponding one of the two ends of the convex shell. The base serves to fix the other end of each of the piezoelectric ceramic elements. The roller is arranged to oppose the protruding middle portion of the convex shell so as to urge a paper sheet against the convex shell when the paper sheet is loaded. The coefficient of friction of a contact portion of the roller with respect to the paper sheet is smaller than that of a contact portion of the convex shell with respect to the paper sheet. The driving power source applies AC voltages having a phase difference to the two piezoelectric ceramic elements. A low-profile ultrasonic motor used for the ultrasonic sheet feeder and methods of driving the motor and the sheet feeder are also disclosed.

**18 Claims, 12 Drawing Sheets**





US005259383A

**United States Patent** [19]

Holstein et al.

[11] **Patent Number:** 5,259,383[45] **Date of Patent:** Nov. 9, 1993[54] **STERILE ULTRASOUND COVER TUBE**

[75] **Inventors:** Klaus Holstein, Hamburg; Olaf Lehmann, Tangstedt; Robert Hebel, Erlangen; Karl-Jürgen Schmitt, Bamberg, all of Fed. Rep. of Germany

[73] **Assignees:** Johnson & Johnson Medical, Inc., N.J.; Siemens Aktiengesellschaft, Fed. Rep. of Germany

[21] **Appl. No.:** 757,794

[22] **Filed:** Sep. 11, 1991

[51] **Int. Cl.<sup>5</sup>** ..... A61B 8/00; A61B 8/12

[52] **U.S. Cl.** ..... 128/660.01; 128/662.03; 128/662.06

[58] **Field of Search** ..... 128/660.01, 662.03, 128/662.06, 663.01, 855, 856

[56] **References Cited****U.S. PATENT DOCUMENTS**

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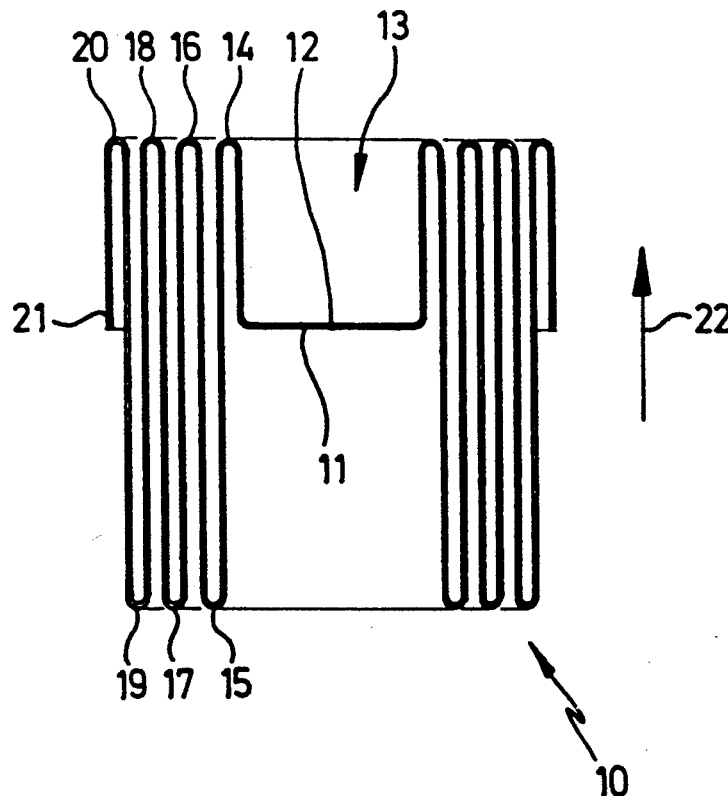
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*Primary Examiner*—Francis Jaworski

[57] **ABSTRACT**

Sterile cover tube for the transducer and connection cable of a medical ultrasound unit, in particular for intracorporeal or intraoperative sonography. The cover tube consists of a plastic foil tube (10) whose one end (11) is closed and is at least as long as the transducer and a connection cable part. The plastic foil tube is arranged ready for use in a telescopic folding (14 to 20). The closed tube end (11) projects into the telescopic folding by a length which is smaller than the length of the remaining telescopic folding (15 to 20) overlying the closed end on the outside. The sterile covering of the ultrasound head and of the connection cable of the ultrasound unit requires only two people. The plastic foil tube is suitable for all sonographic ultrasound probes. Coupling agents can be introduced into the closed tube end without any problem.

**11 Claims, 1 Drawing Sheet**



US005354392A

**United States Patent** [19]

Santo et al.

[11] **Patent Number:** 5,354,392[45] **Date of Patent:** Oct. 11, 1994

[54] **METHOD FOR CONNECTING A WIRING  
ARRANGED ON A SHEET WITH ANOTHER  
WIRING ARRANGED ON ANOTHER SHEET  
BY ULTRASONIC WAVES**

[75] **Inventors:** Kouichi Santo, Osaka; Naohiro  
Nishioka, Kyoto; Kenji Otomo; Kouji  
Tanabe, both of Osaka; Futoshi  
Matsui, Tsuyama, all of Japan

[73] **Assignee:** Matsushita Electric Industrial Co.,  
Ltd., Osaka, Japan

[21] **Appl. No.:** 3,913

[22] **Filed:** Jan. 13, 1993

[30] **Foreign Application Priority Data**

Jan. 24, 1992 [JP] Japan ..... 4-010681  
Jan. 27, 1992 [JP] Japan ..... 4-011690

[51] **Int. Cl.<sup>5</sup>** ..... B32B 31/16

[52] **U.S. Cl.** ..... 156/73.1; 156/291;  
156/292; 156/308.4; 156/311; 156/580.1;  
264/23; 228/110.1; 29/830; 29/832

[58] **Field of Search** ..... 156/73.1, 73.4, 311,  
156/580.1, 580.2, 291, 292, 295, 308.4; 264/23;  
228/1.1, 110.1; 29/830, 832

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*Primary Examiner*—David A. Simmons

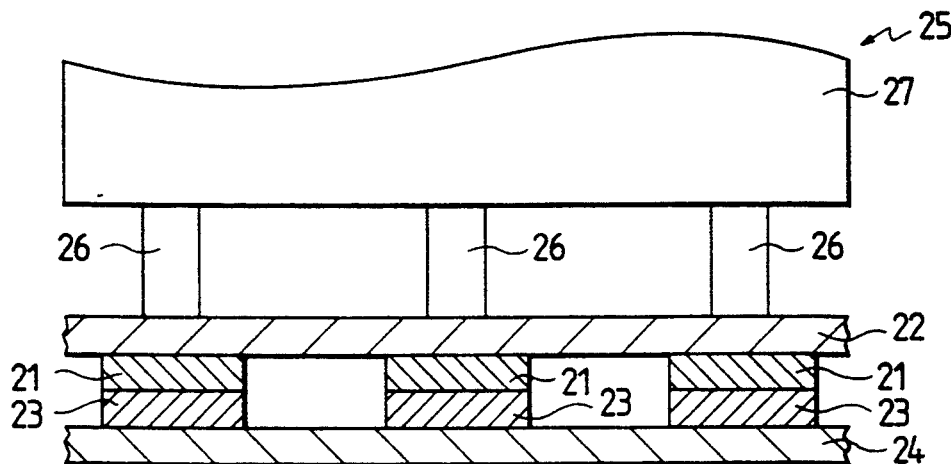
*Assistant Examiner*—J. Sells

*Attorney, Agent, or Firm*—Lowe, Price, LeBlanc &  
Becker

[57] **ABSTRACT**

A method for electrically connecting an upper wiring with a lower wiring consists of the steps of arranging the upper wiring mixed with thermo-softening material on an upper insulating sheet, arranging the lower wiring mixed with thermo-softening material on a lower insulating sheet, putting the upper insulating sheet on the lower insulating sheet to bring the upper wiring into contact with the lower wiring, and providing ultrasonic vibration to the upper and lower wirings and the upper insulating sheet while pushing the upper insulating sheet toward the lower insulating sheet. In these steps, the upper and lower wirings and the upper insulating sheet are heated and melted because friction heat is generated by the ultrasonic vibration. Thereafter, the upper insulating sheet is pushed into the upper and lower wirings while pushing these wirings aside and is bonded with the lower insulating sheet. Also, the upper wiring is bonded with the lower wiring so that these wirings are electrically connected.

**22 Claims, 13 Drawing Sheets**





US005359895A

**United States Patent** [19]

Isenberg et al.

[11] **Patent Number:** **5,359,895**[45] **Date of Patent:** **Nov. 1, 1994**

[54] **PROCESS AND DEVICE FOR THE  
ULTRASONIC TESTING FOR WELDS  
BETWEEN PLASTICS PACKAGING AND  
COVER FOILS**

[75] **Inventors:** **Heinz H. Isenberg**, Braunschweig;  
**Göran Vogt**, Burgwedel-Wettmar; **P.  
Gerhard Althaus**, Garbsen, all of  
Germany

[73] **Assignees:** **Schmalbach-Lubeca AG**,  
Braunschweig; **MPV MEB-und  
Pruftechnik Vogt GmbH**, Burgwedel,  
both of Germany; a part interest

[21] **Appl. No.:** **930,677**

[22] **PCT Filed:** **Mar. 19, 1991**

[86] **PCT No.:** **PCT/DE91/00232**

§ 371 Date: **Oct. 5, 1992**

§ 102(e) Date: **Oct. 5, 1992**

[87] **PCT Pub. No.:** **WO91/15759**

**PCT Pub. Date:** **Oct. 17, 1991**

[30] **Foreign Application Priority Data**

Apr. 15, 1990 [DE] Germany ..... 4010952

[51] **Int. Cl.<sup>5</sup>** ..... **G01M 3/00**

[52] **U.S. Cl.** ..... **73/582; 73/592;  
73/52**

[58] **Field of Search** ..... **73/582, 588, 592, 600,  
73/49.3, 52, 45.4, 41.2, 45**

[56] **References Cited**

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*Primary Examiner*—Tom Noland

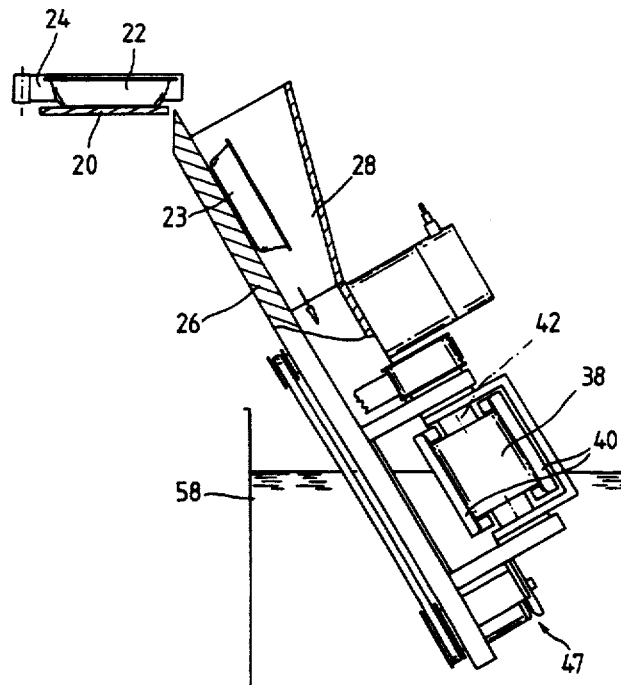
*Assistant Examiner*—Helen C. Kwok

*Attorney, Agent, or Firm*—Eckert Seamans Cherin &  
Mellott

[57] **ABSTRACT**

A process and an apparatus for the ultrasonic testing of  
welds between plastic packaging like food trays and  
cover foils. The welded joint between the tray and  
cover foil is periodically exposed to pulses of ultrasonic  
radiation. The pulses pass through the weld and are  
picked up or received by a receiver. The amplitude of  
the received pulses is evaluated. The cross-section of  
the beam of ultrasonic radiation is so small that the  
radiation only passes through the weld itself. The pack-  
ages and the ultrasonic tester are moved relative to each  
other in order to examine the whole circuit of the weld.  
The pulse rate is such that the weld areas covered by  
successive pulses overlap.

**20 Claims, 3 Drawing Sheets**





US00552287A

**United States Patent** [19]

Montecalvo et al.

[11] **Patent Number:** 5,522,878[45] **Date of Patent:** Jun. 4, 1996[54] **SOLID MULTIPURPOSE ULTRASONIC BIOMEDICAL COUPLANT GEL IN SHEET FORM AND METHOD**[75] Inventors: **David A. Montecalvo**, Plymouth;  
**David Rolf**, Minneapolis, both of Minn.[73] Assignee: **LecTec Corporation**, Minnetonka, Minn.[21] Appl. No.: **54,745**[22] Filed: **Apr. 26, 1993****Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 344,698, Apr. 28, 1989, Pat. No. 5,205,297, which is a continuation-in-part of Ser. No. 173,589, Mar. 25, 1988, abandoned.

[51] **Int. Cl.<sup>6</sup>** ..... **A61B 8/00**[52] **U.S. Cl.** ..... **607/152; 73/644**[58] **Field of Search** ..... 128/24 AA, 639-641,  
128/662.03, 663.01; 607/152, 97; 604/20;  
73/644; 252/500; 601/2[56] **References Cited****U.S. PATENT DOCUMENTS**

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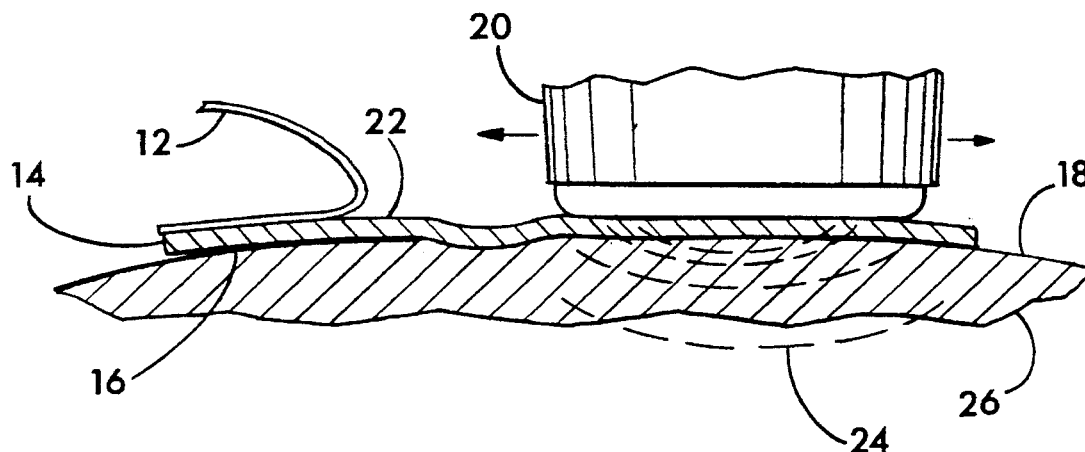
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*Primary Examiner*—Krista M. Zele*Assistant Examiner*—Brian L. Casler*Attorney, Agent, or Firm*—James V. Harmon[57] **ABSTRACT**

A solid, multipurpose, flexible, ultrasonic biomedical couplant hydrogel in sheet form is applied to the skin of a patient to facilitate the transfer of ultrasound energy between a standard ultrasound instrument and the body. The couplant sheet has broad upper and lower surfaces and a narrow peripheral edge which is usually circular, square or rectangular but can have other shapes such as the shape of the part of the body being monitored. During use, the lower surface of the sheet is applied to the skin of a patient and remain in place throughout use. The ultrasound instrument is then passed back and forth, usually in contact with the exposed upper surface of the hydrogel sheet while ultrasound energy is transmitted through the hydrogel which serves as a transmission path for the sonic energy passing to and from the body of the patient. The hydrogel sheet of the present invention is a flexible, self-supporting solid sheet which holds its form during storage and when placed on the body. The sheet contains water and a humectant such as triethylene glycol or glycerin and a network of long hydrophilic polymer molecules that hold the liquid in place and give solidity to the hydrogel sheet. The polymer can comprise polyacrylamide, karaya gum or a modified starch.

**23 Claims, 4 Drawing Sheets**



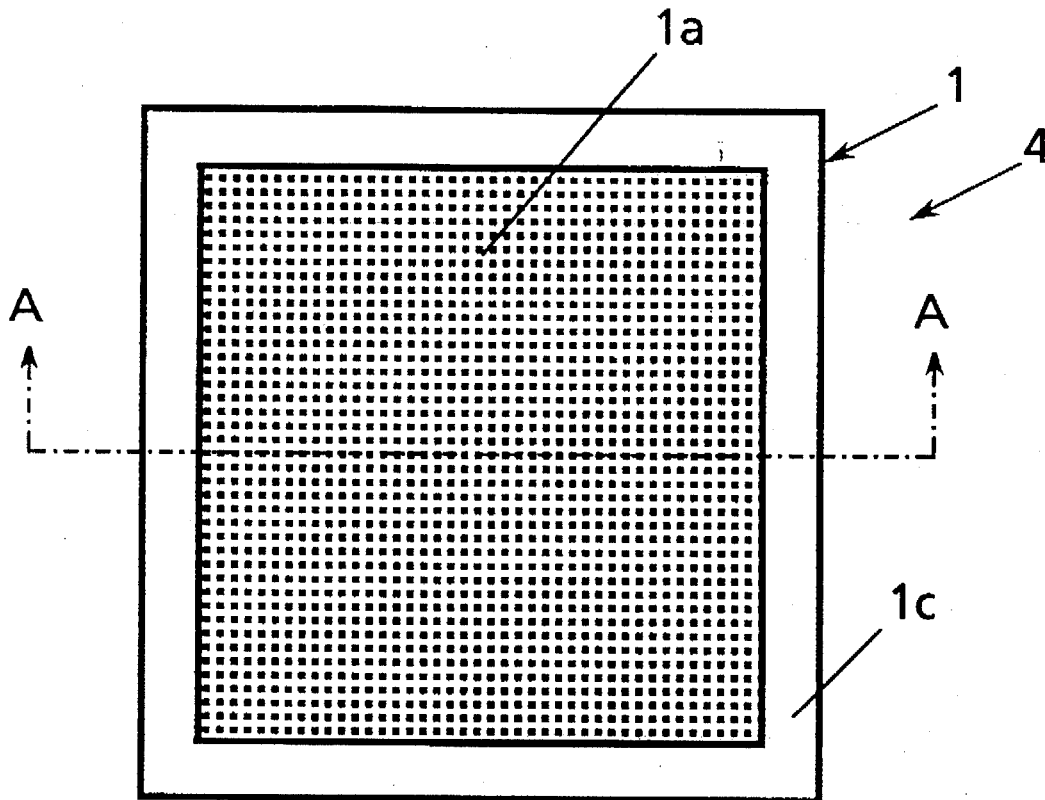
US005660909A

**United States Patent** [19][11] **Patent Number:** **5,660,909****Tachibana et al.**[45] **Date of Patent:** **\*Aug. 26, 1997**[54] **SHEET FOR MEASURING ULTRASONIC WAVES**[58] **Field of Search** ..... 428/76, 68, 69,  
428/323, 320.2, 321.1; 73/1 DV, 649; 367/13;  
181/139[75] **Inventors:** **Katsuro Tachibana; Shunro Tachibana**, both of Fukuoka-ken, Japan[56] **References Cited**[73] **Assignee:** **Ekos Corporation**, Bothell, Wash.**U.S. PATENT DOCUMENTS**[\*] **Notice:** The term of this patent shall not extend beyond the expiration date of Pat. No. 5,440,914.5,342,608 8/1994 Moriya ..... 424/9  
5,440,914 8/1995 Tachibana ..... 73/1 DV*Primary Examiner*—Nasser Ahmad  
*Attorney, Agent, or Firm*—Wilson Sonsini Goodrich & Rosati[21] **Appl. No.:** **530,671**[57] **ABSTRACT**[22] **Filed:** **Sep. 19, 1995**[30] **Foreign Application Priority Data**

Sep. 22, 1994 [JP] Japan ..... 6-228373

[51] **Int. Cl.<sup>6</sup>** ..... **B32B 3/02; G01N 29/00**[52] **U.S. Cl.** ..... **428/76; 73/649; 181/139;**  
367/13; 428/68; 428/69; 428/320.2; 428/321.1;  
428/323

A sheet for measuring ultrasonic waves with which it is possible to easily measure a 2-dimensional ultrasonic wave distribution comprises a fluid in which multiple bubbles, each consisting of a minute quantity of gas covered by an extremely thin covering, are dispersed and sealed in a transparent baglike sheet.

**4 Claims, 4 Drawing Sheets**





US005676159A

**United States Patent** [19]

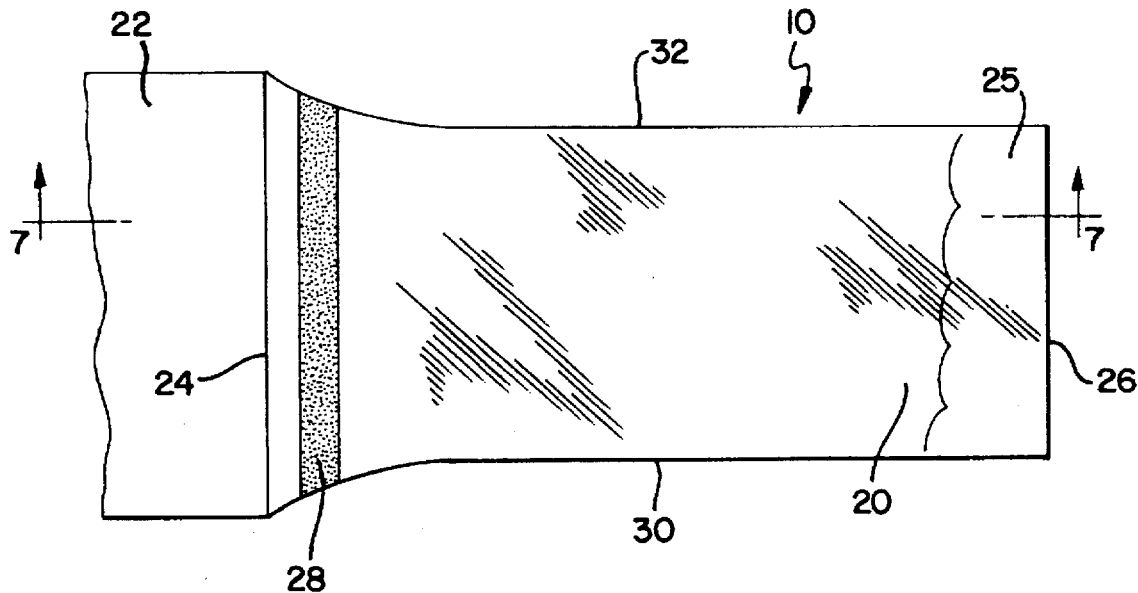
Navis

[11] **Patent Number:** 5,676,159[45] **Date of Patent:** Oct. 14, 1997[54] **ULTRASOUND COVER**[75] **Inventor:** John A. Navis, Naperville, Ill.[73] **Assignee:** Janin Group, Aurora, Ill.[21] **Appl. No.:** 743,304[22] **Filed:** Nov. 5, 1996[51] **Int. Cl.<sup>6</sup>** ..... A61F 5/37[52] **U.S. Cl.** ..... 128/846; 128/849; 128/856[58] **Field of Search** ..... 128/849-856,  
128/662.06[56] **References Cited****U.S. PATENT DOCUMENTS**

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A flexible polyurethane cover with a closed end that is contact clear for establishing sterility while using an ultrasound probe. The cover has gel prepositioned inside the contact clear polyurethane closed end. A drape can be attached to the contact clear cover. A method of making such a cover including folding a contact clear polyurethane sheet over itself and securing the side edges to form a compartment with a closed end, inverting the cover as necessary to position the seams inside the cover, applying a gel into the closed end portion of the cover, and sterilizing the cover without affecting the gel by applying a dry heat in a slow persistent manner after the gel is already in the cover.

**16 Claims, 1 Drawing Sheet**



US005919539A

**United States Patent** [19]

Bisbis et al.

[11] **Patent Number:** **5,919,539**[45] **Date of Patent:** **Jul. 6, 1999**[54] **ULTRASONIC SEAMING OF SPUNBONDED  
POLYOLEFIN SHEET MATERIAL**

5,492,753 2/1996 Levy ..... 428/219

**FOREIGN PATENT DOCUMENTS**[75] Inventors: **Benyoussef Y. Bisbis**, Echternach;  
**Ernst Johann Hauer**, Luxembourg,  
both of Luxembourg

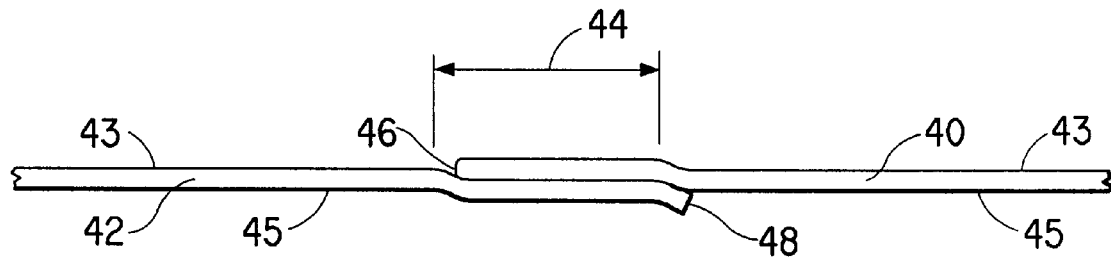
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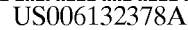
**OTHER PUBLICATIONS**[73] Assignee: **E. I. du Pont de Nemours and  
Company**, Wilmington, Del.Boggs, "Vibrate Your Parts Together", Design News (Aug.  
2, 1993).[21] Appl. No.: **08/599,766***Primary Examiner*—Nasser Ahmad[22] Filed: **Feb. 12, 1996**[57] **ABSTRACT**[51] **Int. Cl.<sup>6</sup>** ..... **B32B 3/00**[52] **U.S. Cl.** ..... **428/57**; 2/2; 2/77; 2/79;  
428/58; 428/61; 428/192; 428/903[58] **Field of Search** ..... 428/57, 58, 61,  
428/903, 192; 2/2, 77, 79

A method for ultrasonically joining flashspun bonded polyolefin sheets and a seam generated by the method is provided. The method includes the steps of overlapping at least two polyolefin sheet edges, and connecting the overlapped edges by feeding the overlapped portions between an ultrasonic horn and a patterned backup roll. The connected first and second sheet edge portions have a tensile strength across the overlapped and welded portion that is at least 75% of the tensile strength of the sheet material joined. The seam is generated with just one pass between the ultrasonic horn and the patterned backup roll.

[56] **References Cited****U.S. PATENT DOCUMENTS**

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**6 Claims, 2 Drawing Sheets**



[45] **Date of Patent:** **Oct. 17, 2000**

*Primary Examiner*—Marvin M. Lateef  
*Assistant Examiner*—Maulin Patel  
*Attorney, Agent, or Firm*—Buchanan Ingersoll, P.C.

[57] **ABSTRACT**

[22] Filed: **Aug. 10, 1998**

[51] **Int. Cl.**<sup>7</sup> ..... **A61B 8/00**

[52] U.S. Cl. .... 600/459

[58] **Field of Search** ..... 600/459, 437,  
600/458, 460, 461; 428/35.2

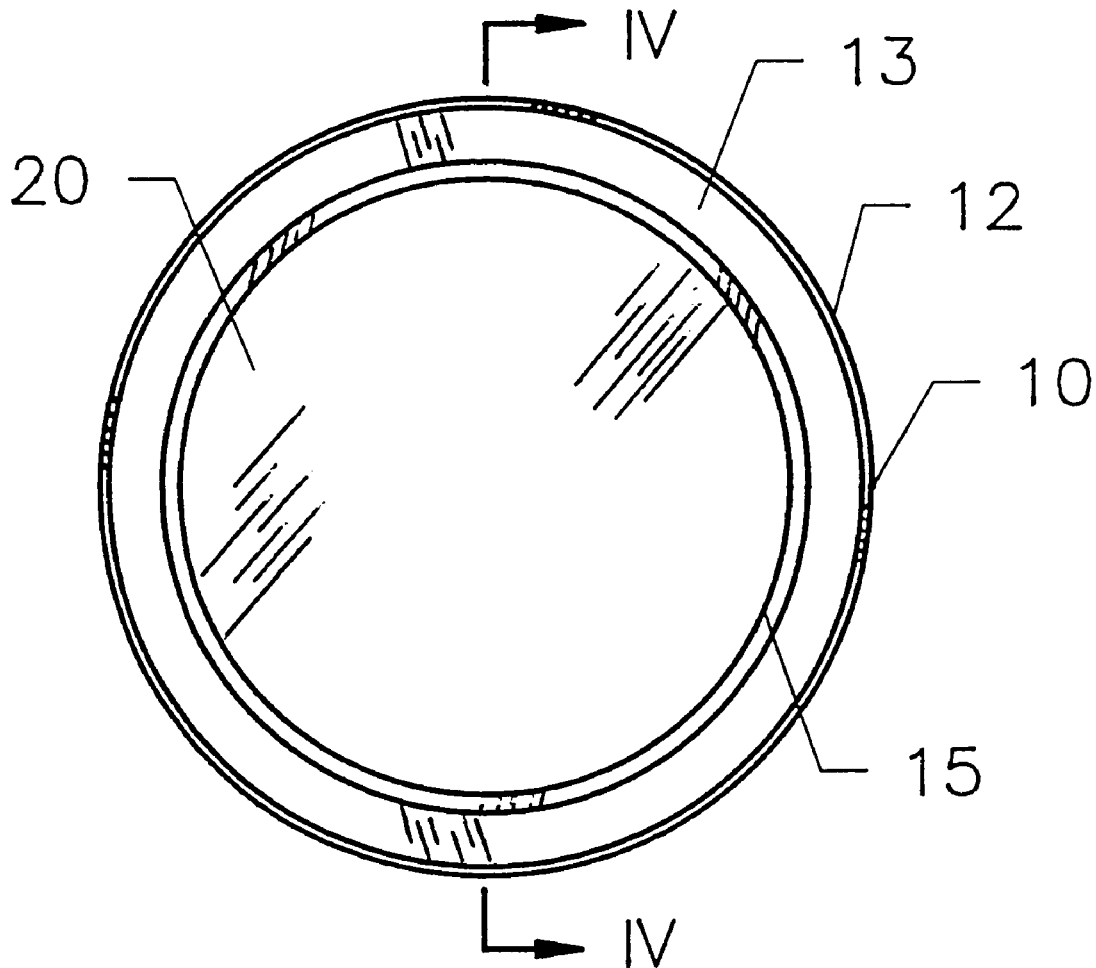
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**10 Claims, 2 Drawing Sheets**

A cover for an ultrasound probe is cup shaped and has an opening in the cup base. The cover is configured to fit onto the probe and maintain the cover on the probe with the cup base being a selected distance from the probe base to define a volume between the probe base and the cup base. A pliable, sound conductive membrane is attached to the cup adjacent the base and covers the opening. The membrane is sized to substantially fill the volume between the probe base and the cup base so that when the cup is attached to the ultrasound probe the probe base will be in contact with the membrane. The membrane is sufficiently pliable such that when placed on a portion of the human body the membrane will conform to that portion of a human body against which the membrane is placed.





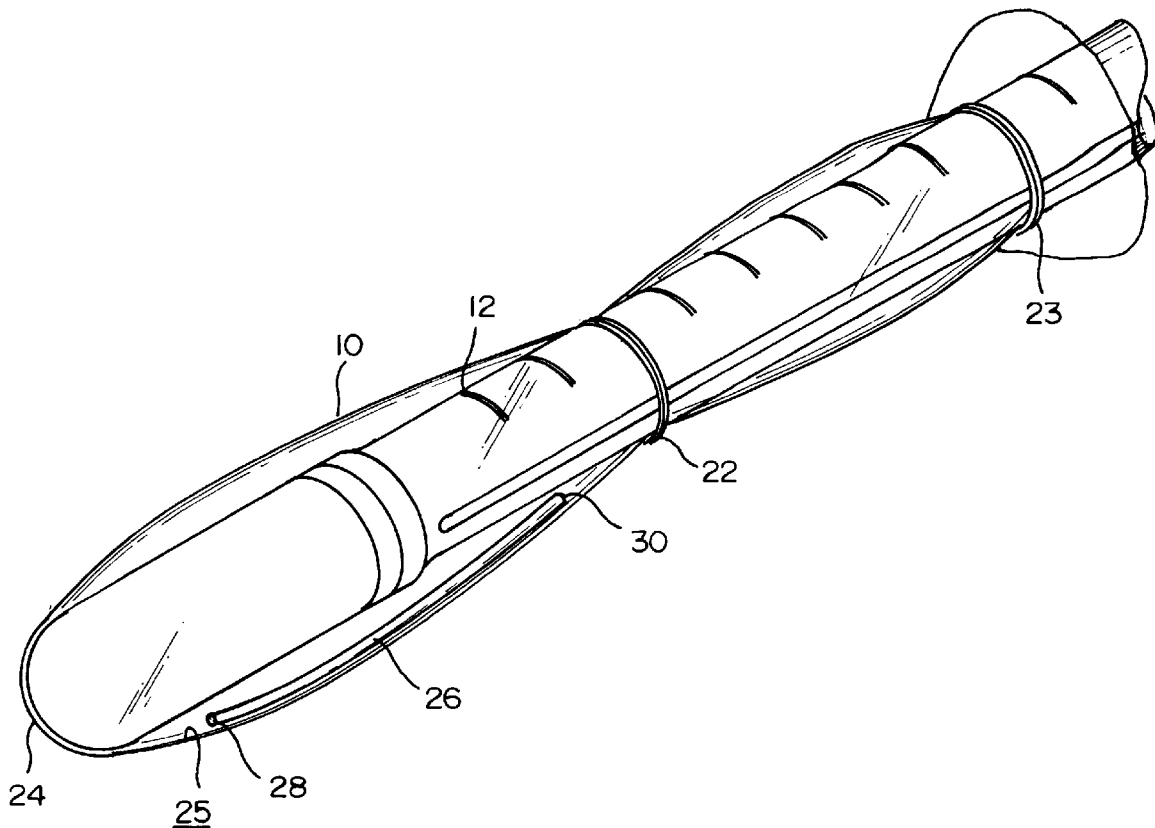
US006267726B1

(12) **United States Patent**  
**Grimm**(10) **Patent No.: US 6,267,726 B1**(45) **Date of Patent: Jul. 31, 2001**(54) **COVER FOR ULTRASOUND PROBE**(76) Inventor: **Peter D. Grimm**, 1211 E. Newton,  
Seattle, WA (US) 98102( \* ) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 0 days.(21) Appl. No.: **09/419,401**(22) Filed: **Oct. 14, 1999**(51) **Int. Cl.<sup>7</sup>** ..... **A61B 8/12**(52) **U.S. Cl.** ..... **600/459; 600/462**(58) **Field of Search** ..... 600/437, 459,  
600/462, 587, 372, 478, 439; 428/35.2;  
604/22(56) **References Cited****U.S. PATENT DOCUMENTS**4,281,648 8/1981 Rogers .  
4,817,616 \* 4/1989 Goldstein ..... 600/4624,899,737 2/1990 Lazarian .  
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6,126,607 \* 10/2000 Whitmore, III et al. .... 600/459

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*Primary Examiner*—Marvin M. Lateef*Assistant Examiner*—Ali M. Imam(74) *Attorney, Agent, or Firm*—Jensen & Puntigam, P.S.(57) **ABSTRACT**

The ultrasound probe cover includes a conventional condom which is adapted to fit over an ultrasound probe. The cover is secured to the probe in a water-tight arrangement at the proximal end of the cover by an elastic band. An elongated hollow tube is secured to the inner surface of the cover, which tends to result in an equalization of fluid pressure at both ends of the condom cover during insertion and retraction of the condom into and out of a bodily opening, such as the rectum, of a patient.

**6 Claims, 1 Drawing Sheet**



US006402695B1

(12) **United States Patent**  
**Grimm**

(10) **Patent No.:** **US 6,402,695 B1**  
(45) **Date of Patent:** **Jun. 11, 2002**

(54) **COVER FOR ULTRASOUND PROBE**

(76) Inventor: **Peter D. Grimm**, 1211 East Newton,  
Seattle, WA (US) 98102

(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/573,088**

(22) Filed: **May 17, 2000**

**Related U.S. Application Data**

(63) Continuation-in-part of application No. 09/419,401, filed on  
Oct. 14, 1999, now Pat. No. 6,267,726.

(51) Int. Cl.<sup>7</sup> ..... **A61B 8/14**

(52) U.S. Cl. .... **600/459; 600/462**

(58) Field of Search ..... 600/437, 459,  
600/462, 587, 372, 478, 439; 428/35.2;  
604/22

(56) **References Cited**

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*Primary Examiner*—Marvin M. Lateef

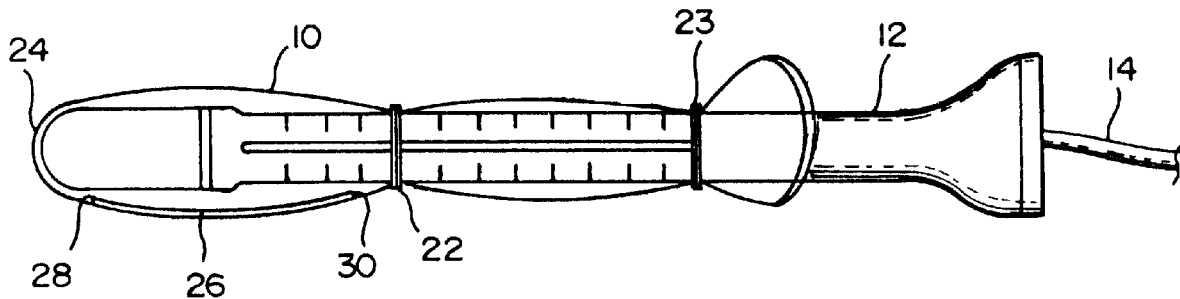
*Assistant Examiner*—Ali M. Imam

(74) *Attorney, Agent, or Firm*—Jensen & Pontigam, P.S.

(57) **ABSTRACT**

The ultrasound probe cover includes a conventional condom which is adapted to fit over an ultrasound probe. The cover is secured to the probe in a water-tight arrangement at the proximal end of the cover by an elastic band. An elongated hollow tube is secured to the surface of the ultrasound probe, which tends to result in an equalization of fluid pressure at both ends of the condom cover during insertion and retraction of the condom into and out of a bodily opening, such as the rectum, of a patient.

**6 Claims, 2 Drawing Sheets**





US006407964B1

(12) **United States Patent**  
**Hornung et al.**

(10) **Patent No.: US 6,407,964 B1**  
(45) **Date of Patent: Jun. 18, 2002**

(54) **DEVICE FOR EXAMINING SHEET-LIKE ARTICLES USING ULTRASOUND**

(75) Inventors: **Heinz Hornung**, Gilching; **Ulrich Schanda**, Holzkirchen, both of (DE)

(73) Assignee: **Giesecke & Devrient GmbH**, Munich (DE)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/554,104**

(22) PCT Filed: **Sep. 27, 1999**

(86) PCT No.: **PCT/EP99/07164**

§ 371 (c)(1),  
(2), (4) Date: **Jul. 28, 2000**

(87) PCT Pub. No.: **WO00/19191**

PCT Pub. Date: **Apr. 6, 2000**

(30) **Foreign Application Priority Data**

Sep. 28, 1998 (DE) ..... 198 44 447

(51) **Int. Cl.<sup>7</sup>** ..... **G01N 29/08**

(52) **U.S. Cl.** ..... **367/138**

(58) **Field of Search** ..... 367/138, 137,  
367/188; 73/597, 159

(56) **References Cited**

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*Primary Examiner*—Daniel T. Pihulic

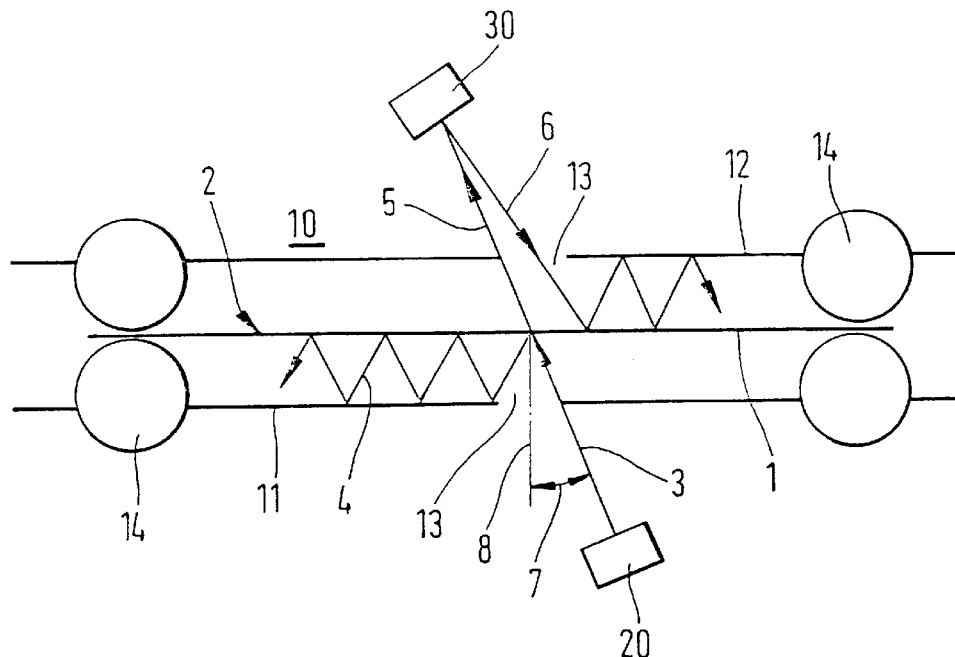
(74) *Attorney, Agent, or Firm*—Bacon & Thomas, PLLC

#### (57) **ABSTRACT**

The invention relates to an apparatus for testing sheet material, in particular bank notes, comprising a device for transporting the sheet material in a defined direction, at least one transducer pair with a transmitter which exposes the sheet material to soundwaves and a receiver which detects the sound fraction transmitted through the sheet material, transmitter and receiver being disposed obliquely to each other with respect to the transport plane.

The inventive apparatus is characterized in that the soundwaves emitted by a transducer are passed into a transport channel in which the sheet material to be tested is moved during irradiation, the sound fraction reflected by the sheet material being limited in its propagation by the transport channel such that said sound fraction cannot reach the receiver during irradiation of the sheet material.

**15 Claims, 2 Drawing Sheets**





US006543288B1

(12) **United States Patent**  
**Blouin et al.**

(10) **Patent No.:** **US 6,543,288 B1**  
(45) **Date of Patent:** **Apr. 8, 2003**

(54) **LASER-ULTRASONIC MEASUREMENT OF ELASTIC PROPERTIES OF A THIN SHEET AND OF TENSION APPLIED THEREON**

(75) Inventors: **Alain Blouin**, Montreal (CA); **Benoit Reid**, Montreal (CA); **Jean-Pierre Monchalin**, Montreal (CA)

(73) Assignee: **National Research Council of Canada**, Ottawa (CA)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/830,710**

(22) PCT Filed: **Nov. 3, 1999**

(86) PCT No.: **PCT/CA99/01025**

§ 371 (c)(1),  
(2), (4) Date: **Aug. 6, 2001**

(87) PCT Pub. No.: **WO00/26628**

PCT Pub. Date: **May 11, 2000**

#### Related U.S. Application Data

(60) Provisional application No. 60/107,069, filed on Nov. 4, 1998.

(51) Int. Cl.<sup>7</sup> ..... **G01N 29/08**; **G01N 29/24**

(52) U.S. Cl. .... **73/643**; **73/655**; **73/657**;  
**73/159**

(58) Field of Search ..... **73/643**, **645**, **646**,  
**73/655**, **657**, **159**

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Primary Examiner—Daniel S. Larkin

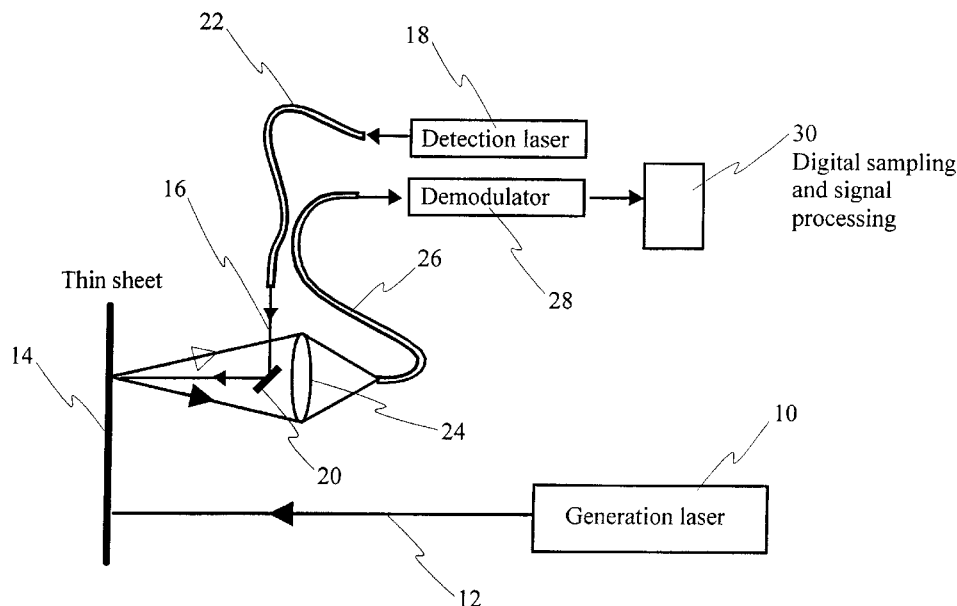
Assistant Examiner—Rose M. Miller

(74) Attorney, Agent, or Firm—Marks & Clerk

#### (57) ABSTRACT

A method and an apparatus for non-contact and non-invasive characterization of a moving thin sheet and in particular of a paper web on a production line. The method uses a laser for the generation of sonic and ultrasonic waves in the thin sheet and a speckle insensitive interferometric device for the detection of these waves. The generation is performed in conditions to avoid damage impeding further use of the sheet. When the generation and detection spots overlap, the method provides a measurement of the compression modulus. When the generation and detection spots are separated by a known distance and plate waves (Lamb waves) are generated and detected, the method provides a measurement of the in-plane modulus and of the tension applied to the sheet. By detecting waves propagating in various directions, either by rotating the detection sensor head or multiplexing the signals provided by several detection or generation locations, the anisotropy of the in-plane modulus is determined.

**43 Claims, 7 Drawing Sheets**





US007404559B2

(12) **United States Patent**  
**Yoshimura et al.**

(10) **Patent No.:** **US 7,404,559 B2**  
(45) **Date of Patent:** **Jul. 29, 2008**

(54) **SHEET FEEDING APPARATUS WITH  
ULTRASONIC SENSOR FOR DETECTING  
MULTIPLE FEED OF PAPERS**

6,739,591 B2 \* 5/2004 Chujo et al. .... 271/262  
2003/0006550 A1 \* 1/2003 Chujo et al. .... 271/262  
2004/0150155 A1 8/2004 Okitsu et al.

(75) Inventors: **Kazutoshi Yoshimura**, Hachioji (JP);  
**Kazumichi Yamauchi**, Hachioji (JP);  
**Akira Okamoto**, Hino (JP)

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(73) Assignee: **Konica Minolta Business Technologies,  
Inc.**, Tokyo (JP)

JP 5-56851 7/1993  
JP 2001-199595 7/2001

(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 445 days.

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*Primary Examiner*—David H Bollinger

(74) *Attorney, Agent, or Firm*—Finnegan, Henderson,  
Farabow, Garrett & Dunner, L.L.P.

(21) Appl. No.: **11/050,785**

(22) Filed: **Feb. 7, 2005**

(57) **ABSTRACT**

(65) **Prior Publication Data**

US 2005/0275159 A1 Dec. 15, 2005

(30) **Foreign Application Priority Data**

Jun. 14, 2004 (JP) ..... 2004-175611

(51) **Int. Cl.**  
**B65H 7/12** (2006.01)

(52) **U.S. Cl.** ..... 271/263; 271/262

(58) **Field of Classification Search** ..... 271/262,  
271/263, 258.04, 265.04

See application file for complete search history.

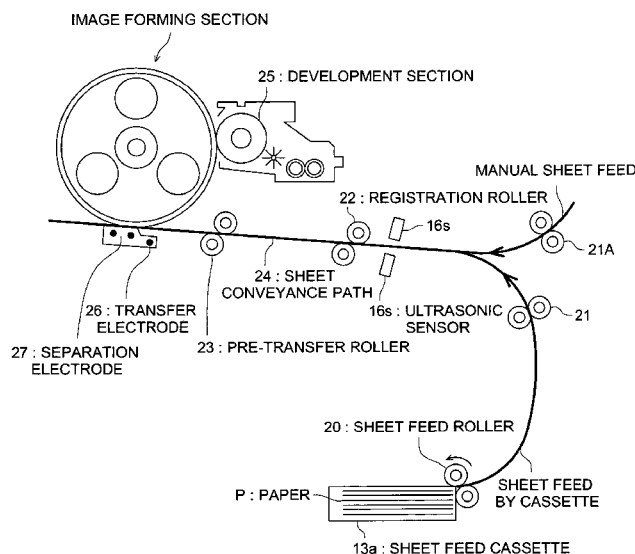
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6,397,671 B1 \* 6/2002 Nishio et al. .... 73/159

**20 Claims, 10 Drawing Sheets**

EXAMPLE OF THE LAYOUT POSITION OF ULTRASONIC SENSOR







US007654522B2

(12) **United States Patent**  
**Tonami**

(10) **Patent No.:** **US 7,654,522 B2**  
(45) **Date of Patent:** **Feb. 2, 2010**

(54) **SHEET FEEDER WITH ULTRASONIC  
DOUBLE FEED DETECTOR**

2005/0189707 A1\* 9/2005 Sano et al. .... 271/242

(75) Inventor: **Kazumasa Tonami**, Nara (JP)

(73) Assignee: **Sharp Kabushiki Kaisha**, Osaka-shi  
(JP)

(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 294 days.

(21) Appl. No.: **11/783,076**

(22) Filed: **Apr. 5, 2007**

(65) **Prior Publication Data**

US 2007/0235922 A1 Oct. 11, 2007

(30) **Foreign Application Priority Data**

Apr. 7, 2006 (JP) ..... 2006-106623

(51) **Int. Cl.**  
**B65H 7/12** (2006.01)

(52) **U.S. Cl.** ..... **271/262**; 271/265.04

(58) **Field of Classification Search** ..... 271/258.01,  
271/262, 265.04, 263

See application file for complete search history.

(56) **References Cited**

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*Primary Examiner*—Patrick H Mackey

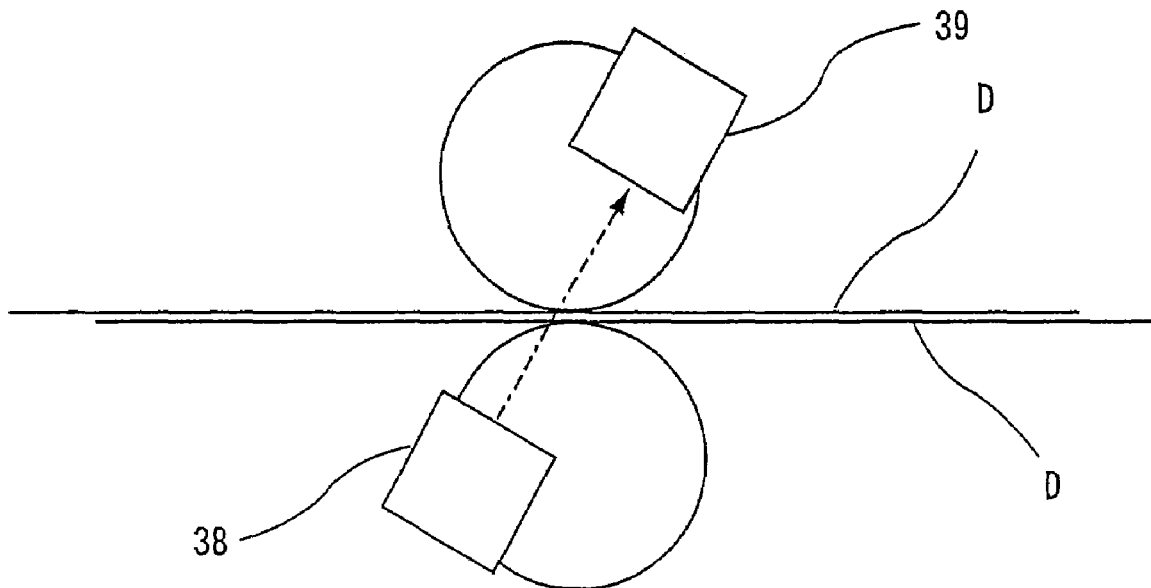
*Assistant Examiner*—Gerald W McClain

(74) *Attorney, Agent, or Firm*—Birch, Stewart, Kolasch &  
Birch, LLP

(57) **ABSTRACT**

A sheet feeder includes: a feeding roller for feeding a sheet; a press member for pressing the sheet against the feeding roller; and a double feed detector for detecting double feed of the sheets when the sheets are fed in superimposition; wherein the feeding roller and the press member are opposed each other at a sheet holding portion for holding the sheet to be fed therebetween, and the double feed detector is placed to be able to detect double feed of the sheets in a region being adjacent to the sheet holding portion, an amplitude of the sheet being suppressed in the region.

**3 Claims, 8 Drawing Sheets**





US007779710B2

(12) **United States Patent**  
**Allen**

(10) **Patent No.:** **US 7,779,710 B2**  
(45) **Date of Patent:** **Aug. 24, 2010**

(54) **CABLE COVER FOR AN ULTRASONIC FLOW METER**

(75) Inventor: **Charles Robert Allen**, Houston, TX (US)

(73) Assignee: **Daniel Measurement and Control, Inc.**, Houston, TX (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 232 days.

(21) Appl. No.: **11/763,783**

(22) Filed: **Jun. 15, 2007**

(65) **Prior Publication Data**

US 2008/0307911 A1 Dec. 18, 2008

(51) **Int. Cl.**  
**G01D 21/00** (2006.01)

(52) **U.S. Cl.** ..... **73/866.5**

(58) **Field of Classification Search** ..... None  
See application file for complete search history.

(56) **References Cited**

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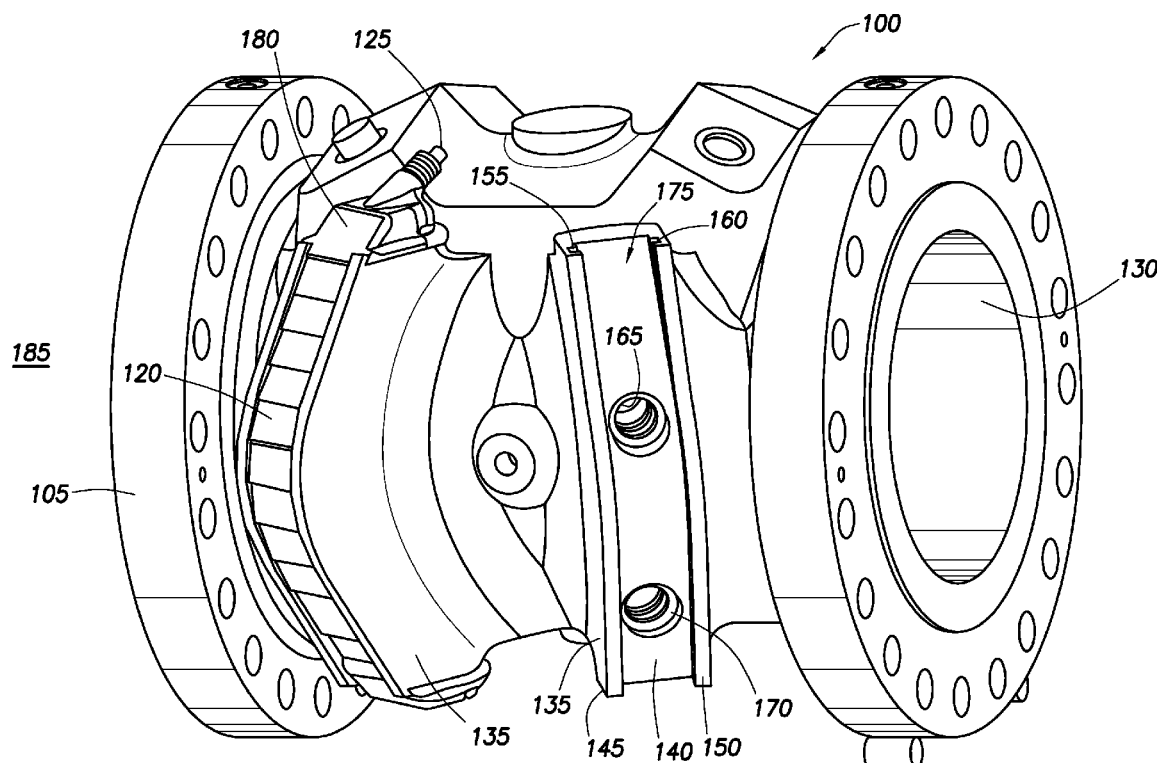
Primary Examiner—Robert R Raevis

(74) Attorney, Agent, or Firm—Conley Rose, P.C.

(57) **ABSTRACT**

A cable cover for an ultrasonic flow meter is disclosed. In some embodiments, the cable cover includes multiple interlockable pieces configured to couple to a spoolpiece of an ultrasonic flow meter. Each interlockable piece includes a body having a dowel and a slot. The interlockable pieces are assembled in a series with the dowel of each interlockable piece inserted into the slot of another interlockable piece.

**16 Claims, 9 Drawing Sheets**





(12) **United States Patent**  
**Reiche**

(10) **Patent No.:** **US 8,080,922 B2**  
(45) **Date of Patent:** **Dec. 20, 2011**

(54) **ULTRASONIC SENSOR HAVING A COVER INCLUDING A DAMPING ELEMENT**

(56) **References Cited**

(75) Inventor: **Martin Reiche**, Weil der Stadt (DE)

(73) Assignee: **Robert Bosch GmbH**, Stuttgart (DE)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 477 days.

(21) Appl. No.: **12/282,194**

(22) PCT Filed: **Jan. 25, 2007**

(86) PCT No.: **PCT/EP2007/050719**

§ 371 (c)(1),

(2), (4) Date: **Jan. 12, 2009**

(87) PCT Pub. No.: **WO2007/104594**

PCT Pub. Date: **Sep. 20, 2007**

(65) **Prior Publication Data**

US 2009/0301205 A1 Dec. 10, 2009

(30) **Foreign Application Priority Data**

Mar. 10, 2006 (DE) ..... 10 2006 011 155

(51) **Int. Cl.**  
**H01L 41/08** (2006.01)

(52) **U.S. Cl.** ..... 310/348; 310/323.21; 73/514.34

(58) **Field of Classification Search** ..... 310/348,  
310/323.21

See application file for complete search history.

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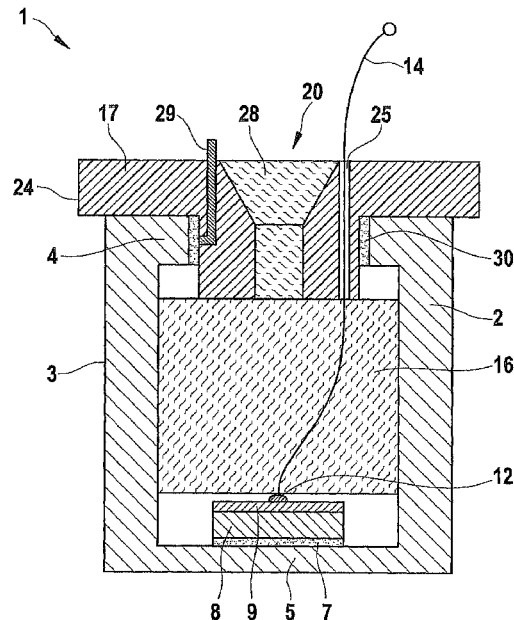
*Primary Examiner* — Jaydi San Martin

(74) *Attorney, Agent, or Firm* — Kenyon & Kenyon LLP

(57) **ABSTRACT**

An ultrasonic sensor, in particular for a vehicle, including a housing, includes the following: a transducer element which is attached to the bottom of the housing for generating ultrasonic oscillations; a first damping element situated in the housing for damping oscillations of the bottom; and a cover for sealing the housing, the cover being provided with a second damping element and having continuous tapering of the cover thickness in the region of the second damping element.

**11 Claims, 3 Drawing Sheets**





US008186229B2

(12) **United States Patent**  
**Allen**

(10) **Patent No.:** **US 8,186,229 B2**  
(45) **Date of Patent:** **\*May 29, 2012**

(54) **ULTRASONIC FLOW METER HAVING A  
PORT COVER ASSEMBLY**

2011/0162460 A1\* 7/2011 Allen et al. .... 73/861.18  
2011/0162461 A1\* 7/2011 Allen .... 73/861.18  
2011/0162463 A1\* 7/2011 Allen .... 73/861.18

(75) Inventor: **Charles R. Allen**, Houston, TX (US)

**FOREIGN PATENT DOCUMENTS**

(73) Assignee: **Daniel Measurement and Control,  
Inc.**, Houston, TX (US)

GB 2203546 A 10/1988

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(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 331 days.

International Application No. PCT/US2011/020026 Search Report  
and Written Opinion dated Aug. 18, 2011.

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This patent is subject to a terminal dis-  
claimer.

*Primary Examiner* — Harshad Patel

(74) *Attorney, Agent, or Firm* — Conley Rose, P.C.

(21) Appl. No.: **12/683,122**

(22) Filed: **Jan. 6, 2010**

(57) **ABSTRACT**

(65) **Prior Publication Data**

US 2011/0162463 A1 Jul. 7, 2011

An ultrasonic flow meter for measuring the flow of a fluid through a pipeline. In some embodiments, the ultrasonic flow meter includes a spool piece, a transducer assembly, and a port cover assembly. The spool piece has a throughbore and a transducer port extending between the throughbore and an outer surface of the spool piece. The transducer assembly is disposed within the transducer port and includes a transformer, a piezoelectric element, and an electrical coupling therebetween. The port cover assembly is coupled to the transducer assembly. The port cover assembly receives a cable coupled to the transducer assembly and is spring-loaded to bias the port cover assembly toward the transducer assembly to resist the cable from being electrically uncoupled from the transducer assembly.

(51) **Int. Cl.**

**G01F 1/20** (2006.01)

**G01F 1/66** (2006.01)

(52) **U.S. Cl.** ..... **73/861.18; 73/861.27**

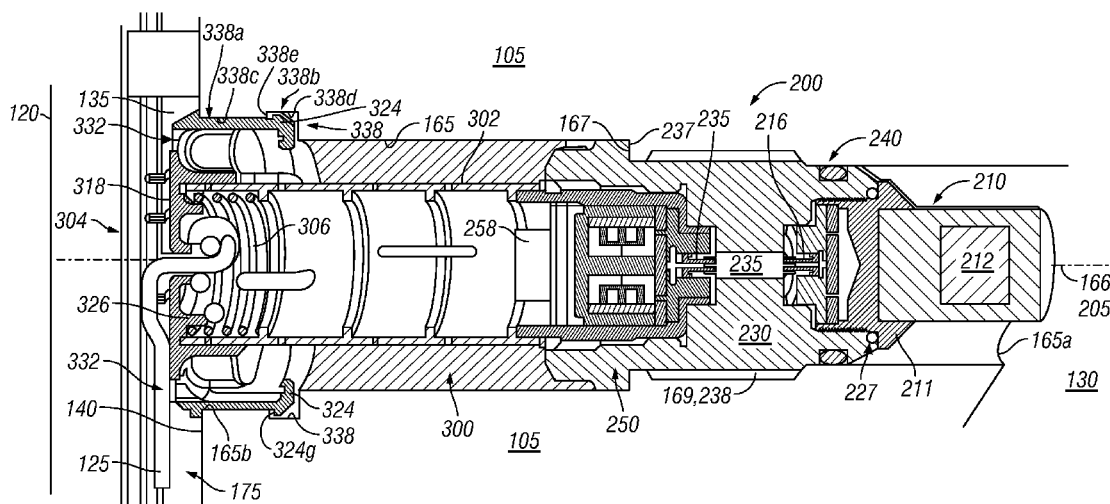
(58) **Field of Classification Search** ..... None  
See application file for complete search history.

(56) **References Cited**

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**33 Claims, 29 Drawing Sheets**





US008500642B2

(12) **United States Patent**  
**Virta**

(10) **Patent No.:** **US 8,500,642 B2**  
(45) **Date of Patent:** **Aug. 6, 2013**

(54) **ULTRASONIC TREATMENT APPARATUS  
WITH A PROTECTIVE COVER**

(75) Inventor: **Tero Jouko Valtter Virta**, Espoo (FI)

(73) Assignee: **Koninklijke Philips N.V.**, Eindhoven  
(NL)

(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/063,767**

(22) PCT Filed: **Sep. 11, 2009**

(86) PCT No.: **PCT/IB2009/053987**

§ 371 (c)(1),

(2), (4) Date: **Mar. 14, 2011**

(87) PCT Pub. No.: **WO2010/032186**

PCT Pub. Date: **Mar. 25, 2010**

(65) **Prior Publication Data**

US 2011/0166484 A1 Jul. 7, 2011

(30) **Foreign Application Priority Data**

Sep. 18, 2008 (EP) ..... 08164551

(51) **Int. Cl.**  
**A61B 8/00** (2006.01)

(52) **U.S. Cl.**  
USPC ..... 600/439; 600/459

(58) **Field of Classification Search**

USPC ..... 600/437-469; 601/1-3  
See application file for complete search history.

(56) **References Cited**

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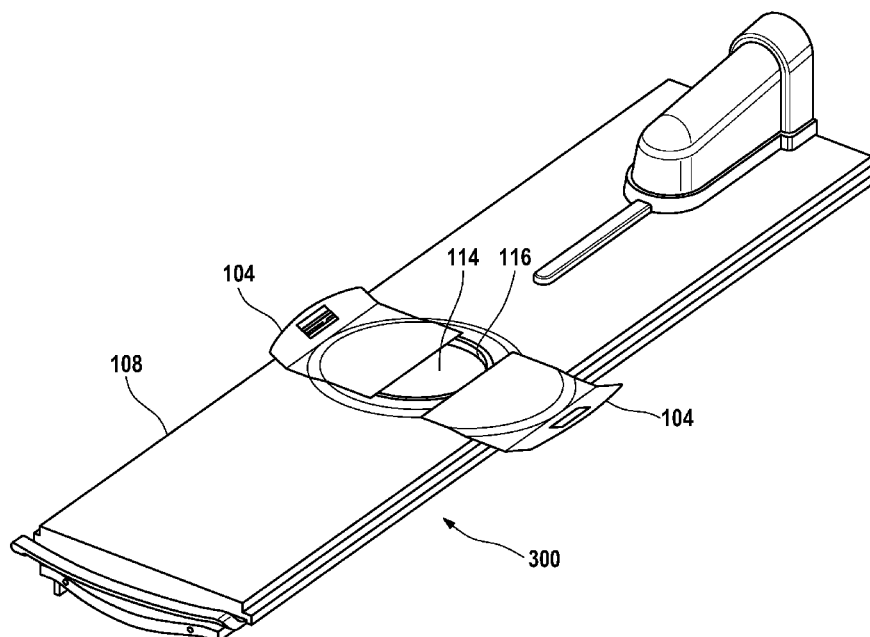
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*Primary Examiner* — Sanjay Cattungal

(57) **ABSTRACT**

An ultrasonic treatment apparatus comprised of: a patient support for supporting a patient, an ultrasound transducer system for ultrasonic treatment of the patient, a region formed in the patient support operable for transmitting ultrasound from the ultrasound transducer system to a treatment zone in the patient, a protective cover for covering the region, and wherein the protective cover is adapted to be removed from the region while the patient is positioned relative to the treatment zone such that the treatment zone is able to receive treatment from the ultrasound transducer system.

**16 Claims, 8 Drawing Sheets**





US008734597B2

(12) **United States Patent**  
**Kim et al.**

(10) **Patent No.:** **US 8,734,597 B2**  
(45) **Date of Patent:** **May 27, 2014**

(54) **SEGMENTAL ULTRASONIC CLEANING APPARATUS FOR REMOVING SCALES AND SLUDGE ON TOP OF TUBE SHEET IN HEAT EXCHANGER**

(75) Inventors: **Seok Tae Kim**, Daejeon (KR); **Woo Tae Jeong**, Daejeon (KR); **Hee Geun Kim**, Daejeon (KR); **Tae Young Kong**, Daejeon (KR)

(73) Assignee: **Korea Hydro & Nuclear Power Co., Ltd.**, Seoul (KR)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 821 days.

(21) Appl. No.: **12/891,683**

(22) Filed: **Sep. 27, 2010**

(65) **Prior Publication Data**

US 2012/0055521 A1 Mar. 8, 2012

(30) **Foreign Application Priority Data**

Sep. 6, 2010 (KR) ..... 10-2010-0086896

(51) **Int. Cl.**  
**F28G 7/00** (2006.01)

(52) **U.S. Cl.**  
USPC ..... **134/167 R**; 134/168 R; 134/184;  
134/201; 376/310; 376/316

(58) **Field of Classification Search**  
USPC ..... 134/172, 167 R, 168 R, 184; 376/310,  
376/316; 15/363, 379  
See application file for complete search history.

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*Primary Examiner* — Michael Barr

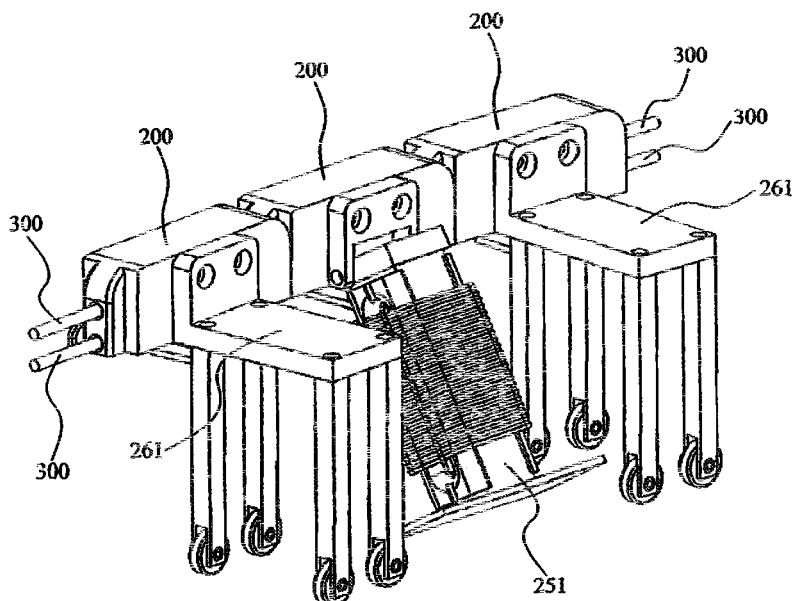
*Assistant Examiner* — Kevin G Lee

(74) *Attorney, Agent, or Firm* — Edwards Wildman Palmer LLP; Kongsik Kim; Stephen D. LeBarron

(57) **ABSTRACT**

Disclosed herein is a segmental ultrasonic cleaning apparatus configured to remove scales and/or sludge deposited on a tube sheet. The segmental ultrasonic cleaning apparatus includes a plurality of segment groups arranged in a ring shape on a top surface of a tube sheet along an inner wall of the steam generator, in which each of the segment groups includes an ultrasonic element segment and a guide rail support segment loosely connected to each other by metal wires through hand holes located at a lower portion of the steam generator, such that ultrasound waves radiated from an ultrasonic transducer in each of the ultrasonic element segments travels along the surface of the tube sheet, with the segment groups tightly connected in the ring shape by tightening the metal wires via wire pulleys of flange units.

**5 Claims, 14 Drawing Sheets**





US009131921B2

(12) **United States Patent**  
**Lackner**

(10) **Patent No.:** **US 9,131,921 B2**  
(45) **Date of Patent:** **Sep. 15, 2015**

(54) **COVER FOR AN ULTRASONIC HEAD**

(76) Inventor: **Leopold Lackner**, Ybbs (AT)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/988,290**

(22) PCT Filed: **Nov. 4, 2011**

(86) PCT No.: **PCT/EP2011/069413**

§ 371 (c)(1),

(2), (4) Date: **Jun. 14, 2013**

(87) PCT Pub. No.: **WO2012/065859**

PCT Pub. Date: **May 24, 2012**

(65) **Prior Publication Data**

US 2014/0042045 A1 Feb. 13, 2014

(30) **Foreign Application Priority Data**

Nov. 19, 2010 (AT) ..... GM707/2010

(51) **Int. Cl.**

**B65D 85/38** (2006.01)

**A61B 8/00** (2006.01)

**A61B 19/08** (2006.01)

(52) **U.S. Cl.**

CPC ..... **A61B 8/44** (2013.01); **A61B 19/081**  
(2013.01); **A61B 2019/083** (2013.01)

(58) **Field of Classification Search**

CPC ..... A61B 8/44; B65D 85/38

USPC ..... 350/61, 65, 67; 206/305

See application file for complete search history.

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*Primary Examiner* — Anthony Stashick

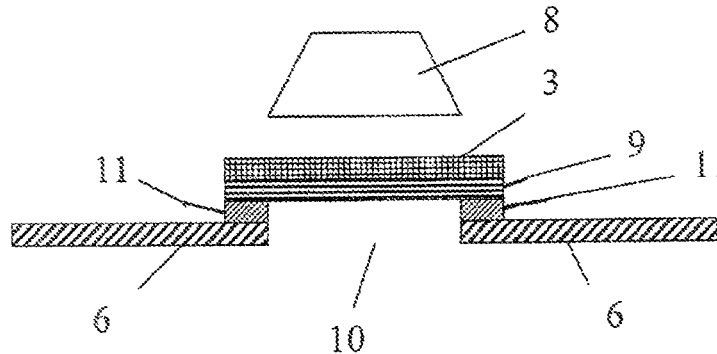
*Assistant Examiner* — Jennifer N Zettl

(74) *Attorney, Agent, or Firm* — McKee, Voorhees & Sease, PLC

(57) **ABSTRACT**

A film tube which is arranged in the manner of a bag for enclosing a hand-operated ultrasonic transducer (8) and the cable leads thereof, and in which an adhesive surface (3) is provided for attaching the film tube to the ultrasonic transducer (8). It is proposed in accordance with the invention that a support (9) for the adhesive surface (3) is provided and the film tube comprises a sound opening (10) in the region of the adhesive surface (3), with the support (9) covering the sound surface (10) and being tightly connected with the film tube. A film tube is therefore provided by means of the invention which protects the ultrasonic transducer (8), and especially its sound surface, in the best possible way and avoids the use of a gel between the ultrasonic transducer (8) and the film tube. Even frequent attachment and removal of the adhesive surface (3) does not impair the sound surface because the adhesive surface (3) can be detached from the ultrasonic transducer (8) without any residues.

**7 Claims, 2 Drawing Sheets**





US009207217B2

(12) **United States Patent**  
**Carbonell et al.**

(10) **Patent No.:** **US 9,207,217 B2**  
(45) **Date of Patent:** **Dec. 8, 2015**

(54) **ACCESS HOLE COVER ULTRASONIC INSPECTION TOOLING**

(56) **References Cited**

(71) Applicant: **WESTINGHOUSE ELECTRIC COMPANY LLC**, Cranberry Township, PA (US)

U.S. PATENT DOCUMENTS

(72) Inventors: **John R. Carbonell**, Ooltewah, TN (US); **Roy C. May**, Hixson, TN (US); **Charles R. Barrett**, Ooltewah, TN (US)

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(73) Assignee: **Westinghouse Electric Company LLC**, Cranberry Township, PA (US)

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 514 days.

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(21) Appl. No.: **13/832,251**

International Search Report and Written Opinion of the International Searching Authority for PCT/US2014/013810 dated May 16, 2014.

(22) Filed: **Mar. 15, 2013**

*Primary Examiner* — Helen Kwok

(65) **Prior Publication Data**

(74) *Attorney, Agent, or Firm* — Richard J. Coldren; Westinghouse Electric Company LLC

US 2014/0260631 A1 Sep. 18, 2014

(51) **Int. Cl.**

(57) **ABSTRACT**

**G01N 29/265** (2006.01)

**G21C 17/003** (2006.01)

**G01N 29/22** (2006.01)

(52) **U.S. Cl.**

CPC ..... **G01N 29/221** (2013.01); **G01N 29/227** (2013.01); **G01N 29/265** (2013.01); **G01N 2291/267** (2013.01)

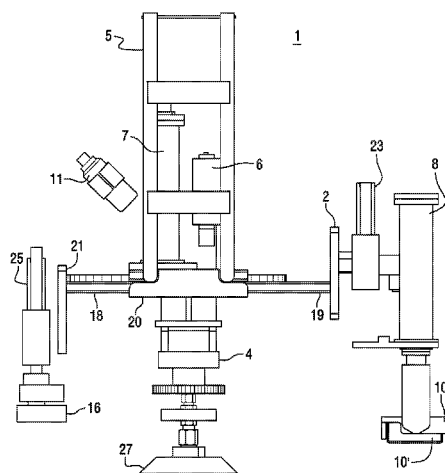
(58) **Field of Classification Search**

CPC ... G01N 29/11; G01N 29/07; G01N 29/4427; G01N 29/48; G01N 29/043; G01N 29/265; G01N 29/0609; G01N 29/262; G01N 29/225; G21C 17/003; G21C 17/01; G21C 17/013; G21C 17/017; G21C 19/207; G21C 19/00; C21C 17/007  
USPC ..... 73/618–627, 865.8, 866.5; 376/260, 376/392, 249

See application file for complete search history.

This invention relates generally to ultrasonic inspection of welds and more particularly, to apparatus and methods for ultrasonic inspection of welds on access hole covers found in boiling water reactors having jet pumps. The apparatus includes a base, a center frame coupled to the base and projecting vertically relative to the access hole cover, a radial arm structured to rotate on the center frame and having attached thereto a first pneumatic linear thruster and a second pneumatic linear thruster, and a skew motor assembly and transducer are attached to the first pneumatic linear thruster for scanning the access hole cover weld. The skew motor assembly is structured to control the angle of the transducer and the first pneumatic linear thruster is structured to raise and lower the transducer.

**12 Claims, 6 Drawing Sheets**







US009874842B2

(12) **United States Patent**  
**Ishida**

(10) **Patent No.:** **US 9,874,842 B2**  
(45) **Date of Patent:** **Jan. 23, 2018**

(54) **SHEET DETERMINATION APPARATUS  
USING ULTRASONIC WAVE  
TRANSMITTING UNIT OR RECEPTION  
UNIT**

(58) **Field of Classification Search**  
CPC ..... G03G 15/5029; G01N 29/11; G01N  
2291/0237; G01N 2291/044;  
(Continued)

(71) Applicant: **CANON KABUSHIKI KAISHA,**  
Tokyo (JP)

(56) **References Cited**

(72) Inventor: **Tsutomu Ishida,** Suntou-gun (JP)

U.S. PATENT DOCUMENTS

(73) Assignee: **CANON KABUSHIKI KAISHA,**  
Tokyo (JP)

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310/335  
4,238,963 A \* 12/1980 Ries ..... G01H 3/005  
73/1.86

(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 557 days.

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(21) Appl. No.: **14/449,833**

(22) Filed: **Aug. 1, 2014**

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JP 2010-018432 1/2010

(65) **Prior Publication Data**

US 2015/0037053 A1 Feb. 5, 2015

*Primary Examiner* — Laura Martin

*Assistant Examiner* — Rose M Miller

(74) *Attorney, Agent, or Firm* — Fitzpatrick, Cella,  
Harper & Scinto

(30) **Foreign Application Priority Data**

Aug. 5, 2013 (JP) ..... 2013-162796  
Jun. 27, 2014 (JP) ..... 2014-133248  
Jul. 31, 2014 (JP) ..... 2014-155778

(51) **Int. Cl.**

**G01N 29/24** (2006.01)

**G03G 15/02** (2006.01)

**G03G 15/00** (2006.01)

**G01N 29/11** (2006.01)

(52) **U.S. Cl.**

CPC ..... **G03G 15/5029** (2013.01); **G01N 29/11**  
(2013.01); **G01N 29/2462** (2013.01);

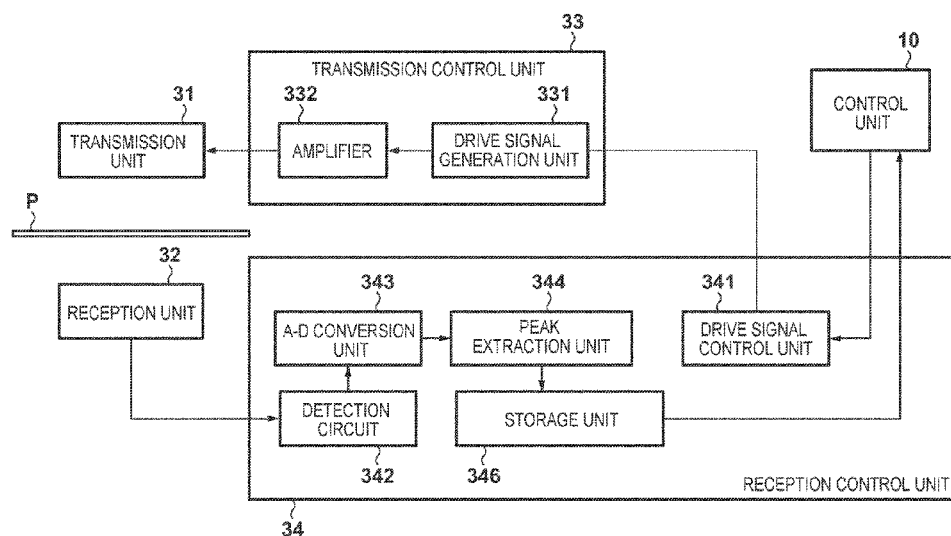
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(57)

**ABSTRACT**

A protection member is arranged such that the distance from an opening plane of a reception guide to the center of the protection member is half of the distance from the opening plane of the reception guide to the surface of a reception vibration member. In other words, the arrangement position of the protection member is in the center between the opening plane of the reception guide and the surface of the reception vibration member. Accordingly, even if a protection member is arranged, a transmission coefficient is obtained that is equal to a transmission coefficient in the case where no protection member is present.

**24 Claims, 12 Drawing Sheets**





(12) **United States Patent**  
**VanHyfte et al.**

(10) **Patent No.:** **US 9,937,659 B2**  
(45) **Date of Patent:** **Apr. 10, 2018**

(54) **ULTRASONIC EDGE SEALING OF SHEET MOLDING COMPOUND CARRIER FILM**

(71) Applicant: **Magna International Inc.**, Aurora, CO (US)

(72) Inventors: **Terry VanHyfte**, Fort Wayne, IN (US); **Phil Holjak**, Cornelius, NC (US); **Roy Potter**, Woodburn, IN (US); **Randy Stilwell**, Grabill, IN (US)

(73) Assignee: **Magna International Inc.**, Aurora (CA)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 152 days.

(21) Appl. No.: **14/699,738**

(22) Filed: **Apr. 29, 2015**

(65) **Prior Publication Data**

US 2015/0314524 A1 Nov. 5, 2015

**Related U.S. Application Data**

(60) Provisional application No. 61/987,094, filed on May 1, 2014.

(51) **Int. Cl.**

**B32B 37/00** (2006.01)  
**B29C 65/08** (2006.01)  
**B32B 27/34** (2006.01)  
**B29C 70/46** (2006.01)  
**B29C 65/00** (2006.01)  
**B29C 69/00** (2006.01)  
**B32B 7/04** (2006.01)  
**B32B 27/08** (2006.01)  
**B32B 27/20** (2006.01)

(Continued)

(52) **U.S. Cl.**

CPC ..... **B29C 65/086** (2013.01); **B29C 65/08** (2013.01); **B29C 66/1122** (2013.01); **B29C 66/21** (2013.01); **B29C 66/232** (2013.01);

**B29C 66/43** (2013.01); **B29C 66/816** (2013.01); **B29C 66/8221** (2013.01); **B29C 66/8223** (2013.01); **B29C 66/83411** (2013.01); **B29C 69/00** (2013.01); **B29C 70/46** (2013.01); **B32B 7/045** (2013.01); **B32B 27/08** (2013.01); **B32B 27/20** (2013.01); **B32B 27/34** (2013.01); **B29C 66/71** (2013.01); **B29C 66/721** (2013.01); **B29C 66/92613** (2013.01); **B29K 2509/08** (2013.01); **B29L 2009/00** (2013.01); **B32B 2250/24** (2013.01); **B32B 2262/101** (2013.01); **Y10T 428/24826** (2015.01)

(58) **Field of Classification Search**

CPC ... **B29C 65/08**; **B29C 65/086**; **B29C 66/1122**; **B29C 66/21**; **B29C 66/232**; **B29C 66/43**; **B29C 66/816**; **B29C 66/83411**; **B29C 69/00**; **B29C 70/46**; **B32B 7/045**; **B32B 27/08**; **B32B 27/20**; **B32B 27/34**  
USPC ..... **156/73.1**  
See application file for complete search history.

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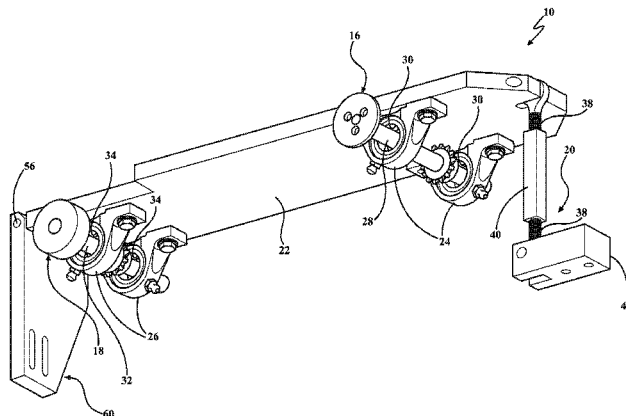
*Primary Examiner* — James D Sells

(74) *Attorney, Agent, or Firm* — Warn Partners, P.C.

(57) **ABSTRACT**

A process for manufacturing a sheet molding compound carrier film including a first layer of material and a second layer of material sealed with each other along an edge. The seal is formed using ultrasound transmitted by a weld horn as both layers of material move along an anvil portion. The seal on the edge is suitably formed to protect the edge and build a weld to ensure moldable sheet molding compound flows to the edges of the carrier sheet, while providing a homogeneous mixture of glass and resin and also allowing air to escape.

**15 Claims, 5 Drawing Sheets**





US009980700B2

(12) **United States Patent**  
**Gubbini et al.**

(10) **Patent No.:** **US 9,980,700 B2**  
(45) **Date of Patent:** **May 29, 2018**

(54) **ULTRASOUND APPARATUS COVER**

(56) **References Cited**

(75) Inventors: **Alessandro Gubbini**, State College, PA (US); **Bradley Nelson**, Boalsburg, PA (US)

(73) Assignee: **Sound Technology, Inc.**, State College, PA (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 348 days.

(21) Appl. No.: **14/234,063**

(22) PCT Filed: **Jul. 22, 2011**

(86) PCT No.: **PCT/US2011/044798**

§ 371 (c)(1),  
(2), (4) Date: **Jan. 21, 2014**

(87) PCT Pub. No.: **WO2013/015769**

PCT Pub. Date: **Jan. 31, 2013**

(65) **Prior Publication Data**

US 2014/0163382 A1 Jun. 12, 2014

(51) **Int. Cl.**  
**A61B 8/00** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **A61B 8/4422** (2013.01); **A61B 8/4281** (2013.01); **A61B 8/4455** (2013.01)

(58) **Field of Classification Search**  
CPC combination set(s) only.  
See application file for complete search history.

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*Primary Examiner* — Serkan Akar

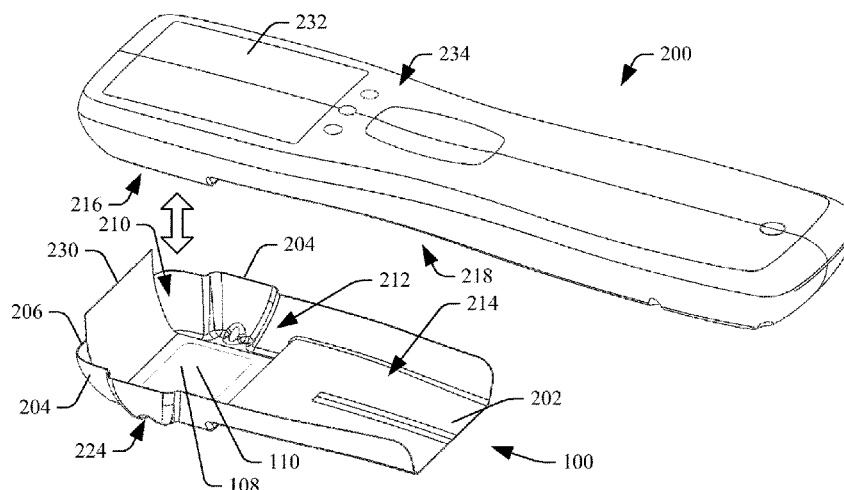
*Assistant Examiner* — Farshad Negarestan

(74) *Attorney, Agent, or Firm* — Anthony M. Del Zoppo, III; Driggs, Hogg, Daugherty & Del Zoppo, Co., LPA

(57) **ABSTRACT**

An ultrasound transducer cover (100) includes a base (202), including an acoustically transmissive membrane (110) with first and second opposing sides. The cover further includes walls (204, 206) protruding from the base in a same direction away from the first side of the base, forming a cavity about the acoustically transmissive membrane with a geometry that conforms to a geometry of a probe head of an ultrasound apparatus housing a transducer array and a corresponding acoustic window. The cover further includes an acoustically transmissive adhesive (108) disposed on the

(Continued)





US00D469877S

(12) **United States Design Patent** (10) **Patent No.:** **US D469,877 S**  
**Felix et al.** (45) **Date of Patent:** **\*\* Feb. 4, 2003**

(54) **HANDHELD ULTRASONIC DISPLAY  
DEVICE WITH COVER**

(75) Inventors: **Ian Felix**, Los Gatos, CA (US); **Gene Zierdt**, Saratoga, CA (US); **Derek Debusschere**, Stanford, CA (US); **Imraan Aziz**, Oakland, CA (US); **Neil Goldberg**, Berkeley, CA (US)

(73) Assignee: **Novasonics, Inc.**, Mountain View, CA (US)

(\*\*) Term: **14 Years**

(21) Appl. No.: **29/147,660**

(22) Filed: **Aug. 31, 2001**

(51) **LOC (7) Cl.** ..... **24-01**

(52) **U.S. Cl.** ..... **D24/187**

(58) **Field of Search** ..... D24/187; 600/437,  
600/441, 445, 446, 447, 453, 455, 456,  
457

(56) **References Cited**

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*Primary Examiner*—Stella Reid

(74) *Attorney, Agent, or Firm*—Carr & Ferrell LLP

(57) **CLAIM**

The ornamental design for a handheld ultrasonic display device with cover, as shown and described.

**DESCRIPTION**

FIG. 1 is a front, left side perspective view of a handheld ultrasonic display device with cover, showing our new design, with the cover in open position;

FIG. 2 is a front, left side perspective view thereof, in partially open condition;

FIG. 3 is a front, left side perspective view thereof, in fully closed position;

FIG. 4 is a front elevational view of FIG. 1;

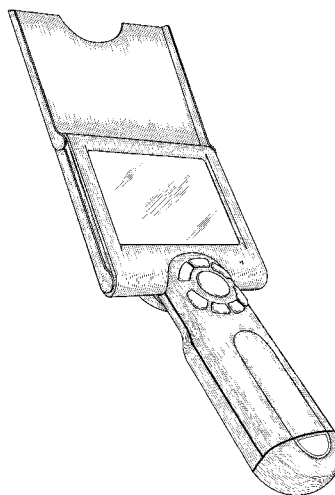
FIG. 5 is a rear elevational view of FIG. 1;

FIG. 6 is a left side elevational view of FIG. 1, the right side elevational view being a mirror image;

FIG. 7 is a top plan view of FIG. 3; and,

FIG. 8 is a bottom plan view of FIG. 3.

**1 Claim, 6 Drawing Sheets**





US00D585556S

(12) **United States Design Patent**  
**Kosaku**

(10) **Patent No.:** **US D585,556 S**

(45) **Date of Patent:** **\*\* Jan. 27, 2009**

(54) **PROBE CONNECTOR COVER FOR AN  
ULTRASONIC DIAGNOSIS APPARATUS**

(75) Inventor: **Hideki Kosaku**, Nasushiobara (JP)

(73) Assignees: **Kabushiki Kaisha Toshiba**, Tokyo (JP);  
**Toshiba Medical Systems Corporation**,  
Tochigi-ken (JP)

(\*\*) Term: **14 Years**

(21) Appl. No.: **29/278,115**

(22) Filed: **Mar. 20, 2007**

(30) **Foreign Application Priority Data**

Jan. 10, 2007 (JP) ..... 2007-000197

(51) **LOC (9) Cl.** ..... **24-02**

(52) **U.S. Cl.** ..... **D24/186**

(58) **Field of Classification Search** ..... D24/112,  
D24/129, 138, 186; D3/203.1, 291, 318;  
206/3; 224/216; 348/65, 75; 600/131-132,  
600/134, 142, 160, 174, 453, 461-462

See application file for complete search history.

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D498,533 S \* 11/2004 Hayamizu ..... D24/138  
D564,659 S \* 3/2008 Hayashi ..... D24/129  
D564,660 S \* 3/2008 Hayashi ..... D24/138

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*Primary Examiner*—Robert A. Delehanty

*Assistant Examiner*—Mark Cavanna

(74) *Attorney, Agent, or Firm*—Banner & Witcoff, Ltd.

(57) **CLAIM**

The ornamental design for a probe connector cover for an ultrasonic diagnosis apparatus, as shown and described.

**DESCRIPTION**

FIG. 1 is a front, top and right side perspective view of a probe connector cover for an ultrasonic diagnosis apparatus, showing my new design;

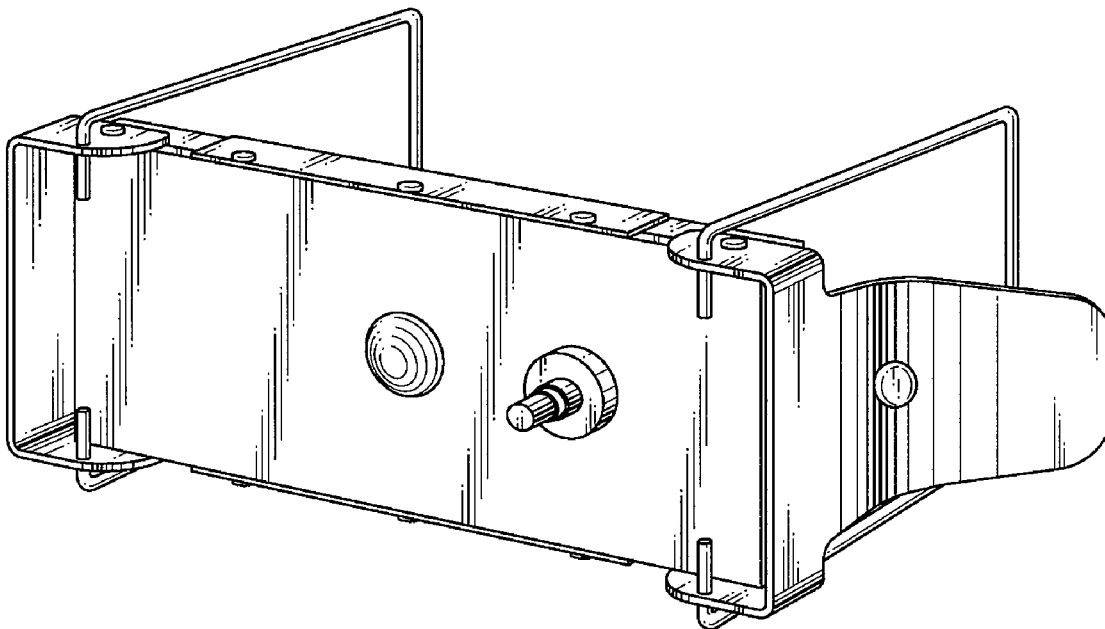
FIG. 2 is a front elevational view thereof;

FIG. 3 is a top plan view thereof; the opposite side being a mirror image thereof; and,

FIG. 4 is a right side elevational view thereof; the opposite side being a mirror image thereof.

The portions of the probe connector cover for an ultrasonic diagnosis apparatus not shown form no part of the claimed design.

**1 Claim, 2 Drawing Sheets**





US00D639466S

(12) **United States Design Patent**  
**Feuerstein**

(10) **Patent No.:** **US D639,466 S**

(45) **Date of Patent:** **\*\* Jun. 7, 2011**

(54) **ULTRASONIC PEST REPELLER WITH LED  
NIGHT LIGHT AND EXTRA OUTLET  
SAFETY COVER**

(76) Inventor: **Debbie Feuerstein**, Riverdale, NY (US)

(\*\*) Term: **14 Years**

(21) Appl. No.: **29/367,533**

(22) Filed: **Aug. 10, 2010**

(51) **LOC (9) Cl.** ..... **26-05**

(52) **U.S. Cl.** ..... **D26/26; D22/120**

(58) **Field of Classification Search** ..... D26/24,  
D26/26, 37, 46, 72, 85, 87, 88, 89, 93, 104,  
D26/113, 118, 1, 2, 3, 28, 38, 60, 74, 75,  
D26/77, 78; D10/111, 114; D23/366, 367,  
D23/368; D13/107, 108, 180, 182, 137.2;  
362/640, 641, 642, 643, 644, 652, 653, 655,  
362/657, 249.02, 311.02, 800, 806, 555,  
362/567, 116, 122, 123, 145, 147, 157, 183,  
362/194, 195, 200, 565; D22/120, 122, 123;  
43/113, 132.1

See application file for complete search history.

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*Primary Examiner* — Angela J Lee

(74) *Attorney, Agent, or Firm* — Law Offices of Edward Langer; Edward Langer

(57)

**CLAIM**

The ornamental design for an ultrasonic pest repeller with LED night light and extra outlet safety cover, as shown and described.

**DESCRIPTION**

FIG. 1 is a front view of an ultrasonic pest repeller with LED night light and extra outlet safety cover showing our new design;

FIG. 2 is a rear view of the design of FIG. 1;

FIG. 3 is a right side view of the design of FIG. 1;

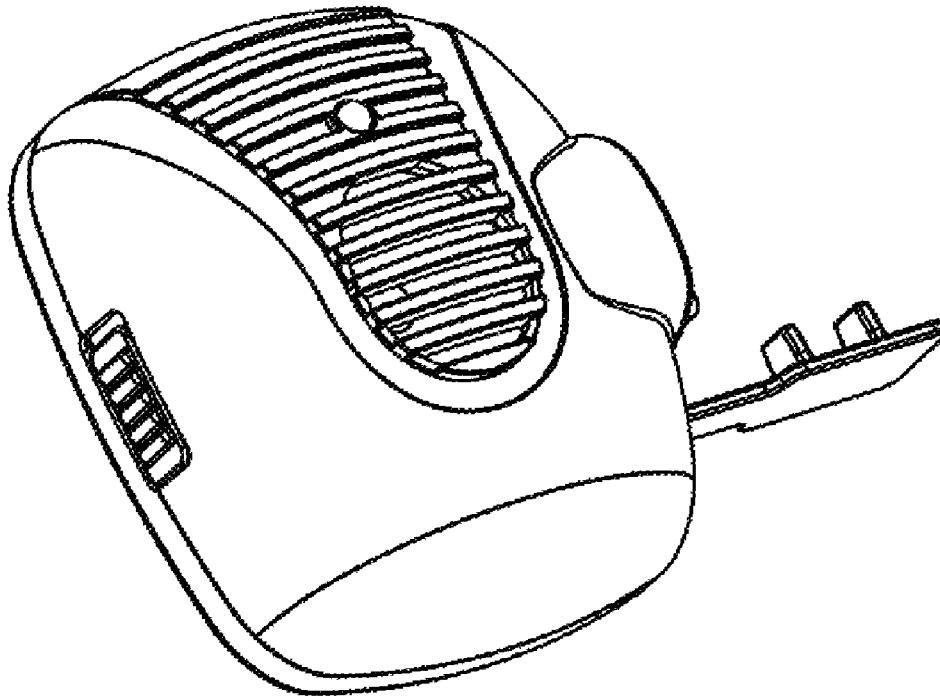
FIG. 4 is a left side view of the design of FIG. 1;

FIG. 5 is a top view of the design of FIG. 1;

FIG. 6 is a right side perspective view of the design of FIG. 1; and,

FIG. 7 is a left side perspective view of the design of FIG. 1.

**1 Claim, 4 Drawing Sheets**





US00D678500S

(12) **United States Design Patent**  
**Osepaishvili**

(10) **Patent No.:** **US D678,500 S**

(45) **Date of Patent:** **\*\* Mar. 19, 2013**

(54) **DISPOSABLE AND FLEXIBLE COVER FOR A SURFACE ULTRASOUND PROBE**

(76) Inventor: **Maka Nugzarovna Osepaishvili**, St. Petersburg (RU)

(\*\*) Term: **14 Years**

(21) Appl. No.: **29/400,254**

(22) Filed: **Aug. 25, 2011**

(51) **LOC (9) Cl.** ..... **28-01**

(52) **U.S. Cl.** ..... **D24/105**

(58) **Field of Classification Search** ..... 600/203, 600/457, 459, 101, 121; 607/90; 374/158, 374/209, E1.011; D24/105, 135; 128/846  
See application file for complete search history.

(56) **References Cited**

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*Primary Examiner* — Ian Simmons

*Assistant Examiner* — Eleni H Aldridge

(74) *Attorney, Agent, or Firm* — Defillo & Associates, Inc; Evelyn A. Defillo

(57) **CLAIM**

The ornamental design for a disposable and flexible cover for a surface ultrasound probe, as shown and described.

**DESCRIPTION**

FIG. 1 illustrates a perspective front view of a disposable and flexible cover for a surface ultrasound probe according to an exemplary embodiment of the present invention showing the disposable and flexible cover in an inflated state;

FIG. 2 illustrates a front view of the disposable and flexible cover of FIG. 1;

FIG. 3 illustrates a side view of the disposable and flexible cover of FIG. 1;

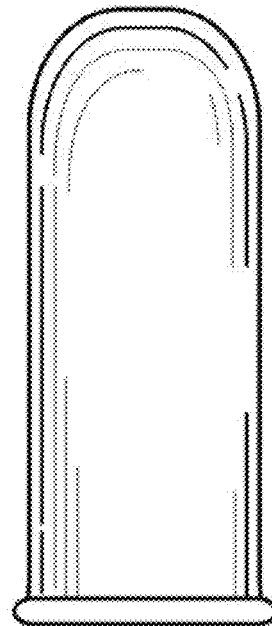
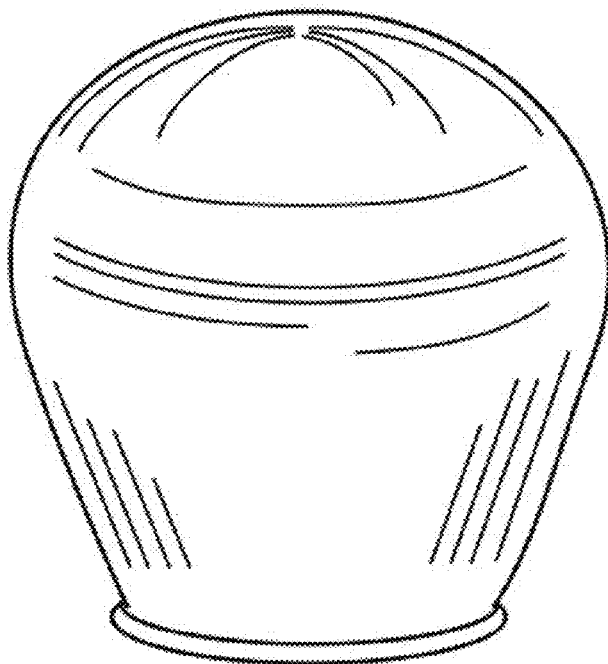
FIG. 4 illustrates a top view of the disposable and flexible cover of FIG. 1;

FIG. 5 illustrates a bottom view of the disposable and flexible cover of FIG. 1; and,

FIG. 6 illustrates a front view of the disposable and flexible cover of FIG. 1 showing the disposable and flexible cover placed on an ultrasound probe.

The broken lines are included for the purpose of illustrating environment and do not form part of the claimed design.

**1 Claim, 1 Drawing Sheet**





US010149661B2

(12) **United States Patent**  
**Matsumura et al.**

(10) **Patent No.:** **US 10,149,661 B2**  
(45) **Date of Patent:** **Dec. 11, 2018**

(54) **PROBE COVER, ULTRASONIC PROBE, AND  
ULTRASONIC IMAGE DISPLAY APPARATUS**

(71) Applicant: **GE MEDICAL SYSTEMS GLOBAL  
TECHNOLOGY COMPANY, LLC,**  
Waukesha, WI (US)

(72) Inventors: **Kiyoshi Matsumura**, Tokyo (JP);  
**Mitsuhiro Nozaki**, Tokyo (JP)

(73) Assignee: **GE Medical Systems Global  
Technology**, Waukesha, WI (US)

(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 367 days.

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(21) Appl. No.: **13/629,352**

(22) Filed: **Sep. 27, 2012**

(65) **Prior Publication Data**

US 2013/0085391 A1 Apr. 4, 2013

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JP	2001135192	5/2001
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(30) **Foreign Application Priority Data**

Sep. 29, 2011 (JP) ..... 2011-214191

JPO Office Action for related application JP2011-214191 dated  
Aug. 25, 2014.

(51) **Int. Cl.**  
**A61B 8/00** (2006.01)

\* cited by examiner

(52) **U.S. Cl.**  
CPC ..... **A61B 8/4455** (2013.01); **A61B 8/4411**  
(2013.01)

*Primary Examiner* — Tse Chen  
*Assistant Examiner* — Jason Ip

(58) **Field of Classification Search**  
USPC ..... 600/407, 437, 446, 459, 462  
See application file for complete search history.

(57) **ABSTRACT**

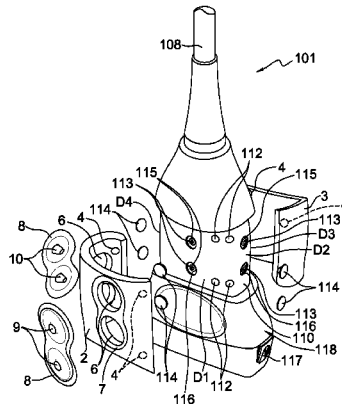
A probe cover is provided. The probe cover is configured to  
be detachably attached to an ultrasonic probe and cover  
plural switches on a surface of the ultrasonic probe, the  
probe cover including a depression portion by which an  
operator can depress at least some of the plural switches  
when the probe cover is attached to the ultrasonic probe.

(56) **References Cited**

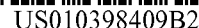
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**16 Claims, 18 Drawing Sheets**







(45) **Date of Patent:** Sep. 3, 2019

- USPC ..... 601/2-4; 604/20, 22; 438/6, 15, 22, 23,  
438/24, 25, 26, 48, 51, 55, 106, 112;  
257/787-798, 678, 629, 632, 634, 635,  
257/636, 637, 638, 646, 254, 416, 433;  
600/459

See application file for complete search history.

- (73) Assignee: **Nakanishi Inc.**, Kanuma-shi (JP)

- (56)
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- (21) Appl. No.: 12/954,853

- (22) Filed: **Nov. 27, 2010**

- (65) **Prior Publication Data**

- US 2011/0130664 A1 Jun. 2, 2011

- (30) **Foreign Application Priority Data**

- Nov. 27, 2009 (JP) ..... 2009-269978

- (51) **Int. Cl.**  
*A61B 8/00* (2006.01)  
*A61N 7/00* (2006.01)  
*A61C 1/07* (2006.01)  
*A61B 17/32* (2006.01)  
*A61C 17/20* (2006.01)

(Continued)

- (52) **U.S. CI.**  
CPC ..... ***A61B 8/44*** (2013.01); ***A61B 17/320068***  
(2013.01); ***A61C 1/07*** (2013.01); ***A61C 17/20***  
(2013.01); ***A61N 7/00*** (2013.01); ***A61B 8/4444***  
(2013.01); ***A61B 8/4455*** (2013.01); ***A61B 8/46***  
(2013.01); ***A61B 8/546*** (2013.01);  
(Continued)

- (58) **Field of Classification Search**

- CPC .. A61C 17/20; A61C 1/07; A61C 1/00; A61C  
1/08; A61N 7/00; A61N 2007/0004;  
A61B 8/44; A61B 17/320068; A61B  
8/46; A61B 8/546; A61B 8/4444; A61B  
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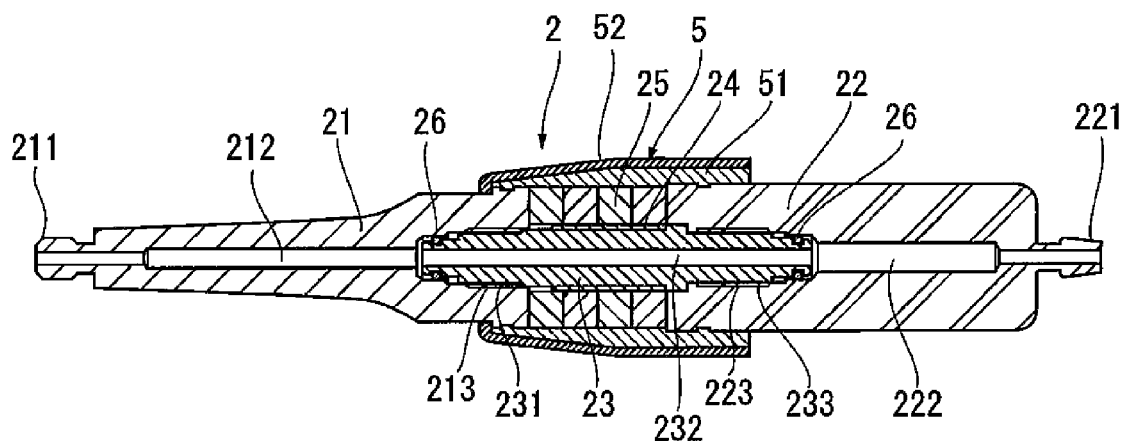
(Continued)

- Primary Examiner — Amanda Lauritzen Moher  
(74) Attorney, Agent, or Firm — Jason D. Voight

- (57) **ABSTRACT**

A transducer cover for use in an ultrasonic medical instrument having a transducer is disclosed. The transducer cover includes a vibration absorbing layer of a generally cylindrical form made of a synthetic resin having a vibration absorbing property, and a chemical blocking layer of a generally cylindrical form made of a synthetic resin which is impermeable to water and chemicals. The vibration absorbing layer and the chemical blocking layer are coaxially laminated, and capable of sealing arrangement over and around the transducer. Also disclosed is an ultrasonic medical instrument having an ultrasonic transducer and the transducer cover, and a method for forming the transducer cover over and around an ultrasonic transducer of an ultrasonic medical instrument.

**4 Claims, 8 Drawing Sheets**





(12) **United States Patent**  
**Dickerson et al.**

(10) **Patent No.:** **US 10,413,314 B2**  
(45) **Date of Patent:** **Sep. 17, 2019**

(54) **ULTRASONIC SURGICAL INSTRUMENT  
WITH ACTIVATION MEMBER PAIR AND  
SLIDABLE COVER**

(71) Applicant: **Ethicon Endo-Surgery, LLC**,  
Guaynabo, PR (US)

(72) Inventors: **Benjamin D. Dickerson**, Cincinnati,  
OH (US); **Brendan J. Oberkircher**,  
Cincinnati, OH (US)

(73) Assignee: **Ethicon LLC**, Guaynabo, PR (US)

(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 818 days.

(21) Appl. No.: **14/836,207**

(22) Filed: **Aug. 26, 2015**

(65) **Prior Publication Data**

US 2017/0056052 A1 Mar. 2, 2017

(51) **Int. Cl.**  
**A61B 17/32** (2006.01)  
**A61B 17/00** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **A61B 17/320068** (2013.01); **A61B**  
**2017/00017** (2013.01); **A61B 2017/00367**  
(2013.01); **A61B 2017/00424** (2013.01)

(58) **Field of Classification Search**  
CPC .. **A61B 17/320068**; **A61B 2017/00017**; **A61B**  
**2017/00367**; **A61B 2017/00393**; **A61B**  
**2017/00916**; **A61B 2017/00946**; **A61B**  
**2017/00958**; **A61B 2017/2918**  
See application file for complete search history.

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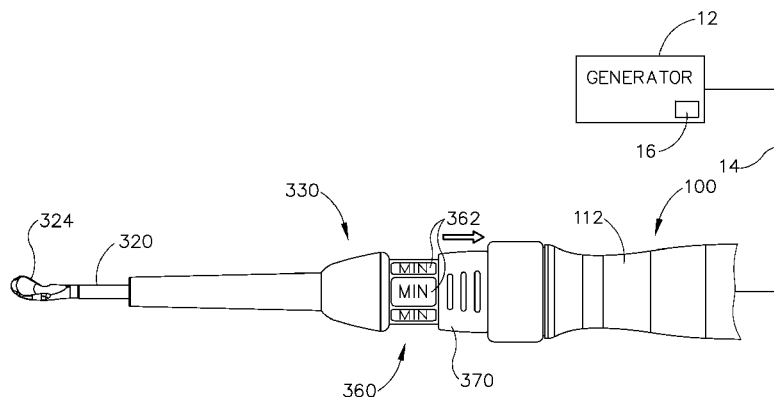
*Primary Examiner* — Diane D Yabut

(74) *Attorney, Agent, or Firm* — Frost Brown Todd LLC

(57) **ABSTRACT**

An ultrasonic instrument includes a body, an actuation assembly, a shaft assembly, an ultrasonic blade, and a movable member. The body is configured to receive an ultrasonic transducer. The actuation assembly includes a first activation member and a second activation member. The first activation member is operable to trigger activation of the ultrasonic blade in a first power mode. The second activation member is operable to trigger activation of the ultrasonic blade in a second power mode. The movable member is configured to move between a first position and a second position. In the first position, the movable member is configured to permit access to the first activation member and prevent access to the second activation member. In the second position, the movable member is configured to permit access to the second activation member and prevent access to the first activation member.

**20 Claims, 8 Drawing Sheets**





US010639008B2

(12) **United States Patent**  
**Lindekugel et al.**

(10) **Patent No.:** **US 10,639,008 B2**

(45) **Date of Patent:** **May 5, 2020**

(54) **SUPPORT AND COVER STRUCTURES FOR AN ULTRASOUND PROBE HEAD**

(75) Inventors: **Eric W. Lindekugel**, Salt Lake City, UT (US); **Jeremy B. Cox**, Salt Lake City, UT (US); **Daniel B. Blanchard**, North Salt Lake, UT (US); **Christian W. Crook**, West Jordan, UT (US); **Eddie K. Burnside**, Bountiful, UT (US); **Jeanette E. Southard**, Park City, UT (US); **Kevin W. Stinger**, Kaysville, UT (US); **Amir Orome**, Sandy, UT (US)

(73) Assignee: **C. R. Bard, Inc.**, Franklin Lakes, NJ (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2383 days.

(21) Appl. No.: **13/206,396**

(22) Filed: **Aug. 9, 2011**

(65) **Prior Publication Data**

US 2011/0313293 A1 Dec. 22, 2011

**Related U.S. Application Data**

(63) Continuation-in-part of application No. 12/900,750, filed on Oct. 8, 2010.

(Continued)

(51) **Int. Cl.**

**A61B 8/00** (2006.01)

**A61B 17/34** (2006.01)

(Continued)

(52) **U.S. Cl.**

CPC ..... **A61B 8/44** (2013.01); **A61B 8/42** (2013.01); **A61B 8/4209** (2013.01);

(Continued)

(58) **Field of Classification Search**

CPC ... **A61B 8/4281**; **A61B 8/4455**; **A61B 8/4472**; **A61B 10/00**; **A61B 17/3403**; **A61B 8/44**;

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*Primary Examiner* — Amanda Lauritzen Moher

(74) *Attorney, Agent, or Firm* — Rutan & Tucker LLP

(57) **ABSTRACT**

A probe cap for use with an ultrasound probe including a head portion and an acoustic surface is disclosed. In one embodiment, the probe cap includes a body that defines a cavity sized for releasably receiving the head portion of the probe therein. The probe cap body further defines a hole that is proximate the acoustic surface of the head portion. A compliant spacer component is disposed in the hole. The spacer component can include a hydrogel and provides an acoustic path between the acoustic surface and a tissue surface of a patient. The spacer component includes a skin contact surface that defines a concavity and is deformable against the tissue surface. Additional embodiments disclose various probe cap and accompanying needle guide designs

(Continued)

