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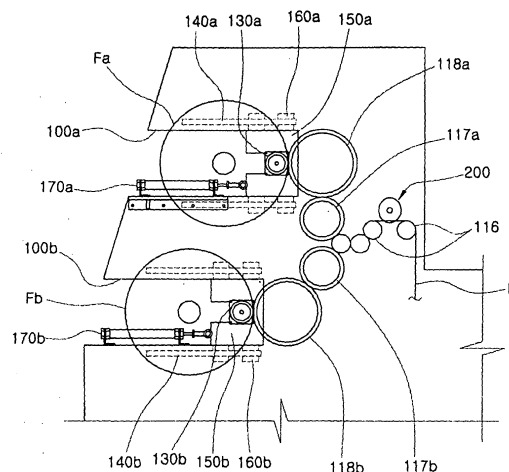
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(54) **Cutting device of a slitter to make a line of cut with a wave shape**

(57) The present invention discloses a slitter subdividing, cutting and rewinding a wide roll stock, such as a plastic film or a metal deposition film for a metalized plastic film capacitor, and more particularly a cutting device of a slitter making a section area of a plastic film have a constant wave shape during the process of cutting the plastic roll stock, to increase surface area of a metal contact area formed in the section area of the constant wave shape in the following manufacturing process of a capacitor, and to enhance capability of the produced capacitor greatly, as a result, while the slitter makes a film roll stock rewound to an unwinder installed in the one side of the slitter run through multiple rollers, cuts the film roll stock into a predetermined interval by a pair of a cutting roller and a cutting device installed on the top of the pair of the cutting roller, makes the films cut from the film roll stock by the pair of the cutting roller and the cutting device run again through another multiple rollers, and rewinds the films cut from the film roll stock to a first and a second rewinding axes moving horizontally to the slitter according to the rewinding amount, wherein the cutting device comprises multiple rounded cutter arranged and fixed into a fixing shaft in predetermined intervals through a fixing hole, curved in a predetermined angle θ by the standard of a main line of the cutter; and the cutting device is connected with a motor controlling a rotation speed to form a wave shape, such as a sine wave, to a section area of the film roll stock in the case of cutting the film roll stock.

FIG.4



Description

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] The present invention relates to a slitter subdividing, cutting and rewinding a wide roll stock, such as a plastic film or a metal deposition film for a metalized plastic film capacitor, and more particularly a cutting device of a slitter making a section area of a plastic film have a constant wave shape during the process of cutting the plastic roll stock, to increase surface area of a metal contact area formed in the section area of the constant wave shape in the following manufacturing process of a capacitor, and to enhance capability of the produced capacitor greatly, as a result.

DESCRIPTION OF THE RELATED ART

[0002] The configuration of the conventional slitter will be illustrated in more detail by referencing the accompanied drawings.

[0003] Fig. 1 is a schematic diagram illustrating the conventional slitter 100. A plastic roll stock F rewound in an unwinder 110 formed largely in the one side of the slitter 100 runs through multiple rollers, and is cut off into subdivided films in predetermined intervals by a cutting device 120. In more, the subdivided films moves again through another multiple rollers, and are rewound to a first and a second rewinding axes 130a and 130b moving horizontally according to rewinding amount of the subdivided films.

[0004] In more detail, the film of the roll stock F supplied from the unwinder 110 is derived into a rewinding induction roller 111, and moved into a line following control LFC sensing roller 112 installed in the one side of the rewinding induction roller 111.

[0005] A LFC sensor 112a installed in the top of the LFC sensing roller 112 detects the edge of the film from the roll stock F, and the LFC sensing roller 112 drives an oil pressure or motor actuator (not shown) to compensate left or right movements of the edge of the plastic roll stock F, and to make the film of the plastic roll stock F move straightly from the position of a tension detection roller 113.

[0006] After the tension detection roller 113 establishes the tension force to the film of the roll stock F moving from the unwinder 100, the film of the roll stock F passes through an expander roller 114 compensating shrinking of the direction of the width, an induction roller 115, and a pair of a cutting roller 116.

[0007] Sequentially, a cutting device 120 installed in the top of the cutting rollers 116 cuts the film of the roll stock F into predetermined sizes. In more, the half of the film of the roll stock F is moved into a top transfer roller 118a and a top contact roller 118b, and wound into a first rewriter 130a moving horizontally. Additionally, the

other half of the film of the roll stock F is moved into a bottom transfer roller 118a and a bottom contact roller 118b, and wound into a second rewriter 130b moving horizontally.

5 [0008] As shown in Fig. 2, the first and the second rewriters 130a and 130b rewinding the film Fa and Fb cut by the cutting device 120 moves horizontally through a first and a second guides 100a and 100b installed in the other side of the slitter 100. In other words, the first rewinding axis 130a is installed to a fixing bracket 150a fixed in a guide material 160a, while the guide material 160a moves reciprocally to a guide bar 140a installed in the top and the bottom of the first guide 100a.

10 [0009] In more, the second rewinding axis 130b is also installed to a fixing bracket 150b fixed in a guide material 160b, while the guide material 160b moves reciprocally to a guide bar 140b installed in the top and the bottom of the second guide 100b.

15 [0010] Additionally, the respective fixing brackets 150a and 150b fixing the corresponding first and the second rewinding axis 130a and 130b is fixed into the corresponding rods of cylinders 170a and 170b fixed into the corresponding floors of the first and the second guide 100a and 100b, and move forward by operations of the cylinders 170a and 170b.

20 [0011] In other words, while rewinding the film Fa and Fb, the first and the second rewinding axes 130a and 130b move into one side of the slitter 100. When the film Fa and Fb are wound into a predetermined length of diameter, an operator separates the film Fa and Fb from the first and the second rewinding axes 130a and 130b, and drives the cylinders 170a and 170b to move the first and the second rewinding axes 130a and 130b forward to the original position.

25 [0012] The configuration and operation of the cutting device 120 of the conventional slitter 100 is described in detail in Fig. 3.

30 [0013] As shown in Fig. 3, the conventional cutting device 120 comprises multiple cutters 122 fixed into the fixing shaft 121 in predetermined intervals. The interval among the cutters 122 is changed arbitrarily to fit into the width of the cutting film. In more, the cutting device 120 placed in the top of the pair of cutting rollers 116 cuts the film of the roll stock F moving into the top space between the cutting rollers 116. The cutting device 120 is moved by an elevator (not shown). Therefore, the cutting device 120 contacts into or separates from the film of the roll stock F moving between the cutting rollers 116.

35 [0014] As described in the above statements, the section area of the film of the roll stock F should be a linear shape always, while applying the film cutting method by the conventional cutting device 120.

40 [0015] Therefore, the present invention improves the film cutting method by the conventional cutting device 120, and eventually uniform production of a deposition film for manufacturing a capacitor.

45 [0016] Generally, a metalized plastic film capacitor is produces by depositing a metal like aluminum A1 or zinc

into a very thin film, rewinding the thin film by the tens or hundreds times, performing the metal spraying process to make electrodes, putting into a case of a synthetic resin, and enclosing the case by epoxies, finally. Therefore, the both sides of the electrodes applying the metal spraying process to manufacture a capacitor play important roles in capability of the capacitor.

[0017] When reviewing the rewinding structure of the film in manufacturing the capacitor, the section area by the cutting device 120 always has a linear shape. Therefore, the contact area of both sides of the electrodes is confined, and capability of the capacitor is not improved.

SUMMARY OF THE INVENTION

[0018] To overcome the above described problems, preferred embodiments of the present invention provide a cutting device of a slitter cutting a section area of a film roll stock to have a constant wave shape to increase surface area of metal contact parts formed in the section area of the wave shape in manufacturing a capacitor hereafter to improve capability of the capacitor.

[0019] Other purpose of the present invention is to provide a cutting device of a slitter cutting a section area of a film roll stock to have a constant wave shape, and changing the wave shape arbitrarily.

[0020] To embody the purpose of the present invention, the slitter makes a film roll stock rewound to an unwinder installed in the one side of the slitter run through multiple rollers, cuts the film roll stock into a predetermined interval by a pair of a cutting roller and a cutting device installed on the top of the pair of the cutting roller, makes the films cut from the film roll stock by the pair of the cutting roller and the cutting device run again through another multiple rollers, and rewinds the films cut from the film roll stock to a first and a second rewinding axes moving horizontally to the slitter according to the rewinding amount, wherein: the cutting device comprises multiple rounded cutter arranged and fixed into a fixing shaft in predetermined intervals through a fixing hole, curved in a predetermined angle θ by the standard of a main line of the cutter; and the cutting device is connected with a motor controlling a rotation speed to form a wave shape, such as a sine wave, to a section area of the film roll stock in the case of cutting the film roll stock.

[0021] In more, the cutter of the cutting device of the slitter of the present invention is curved in a predetermined angle θ to a first main line of the cutter at first, and curved in a predetermined angle θ to the opposite of the first curved direction by the standard of a second main line orthogonal to the first main line of the cutter.

[0022] In more, the cutter of the cutting device of the slitter of the present invention the cutter is curved in predetermined angles θ by the standard of various main lines of the cutter to generate a shape of multiple sine waves to the section area of the film roll stock in the case of one rotation of the cutter 220.

[0023] In more, the cutting device and the motor are connected by coupling or by respective pulleys and a belt.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] For a more complete understanding of the present invention and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which like reference numerals denote like parts, and in which:

Fig. 1 is a schematic diagram of the conventional slitter;

Fig. 2 is an enlarged diagram of the main part of Fig. 1;

Fig. 3 is a perspective view illustrating a cutting device of Fig. 1 in detail;

Fig. 4 is a schematic diagram of a slitter applying a cutting device according to the present invention;

Fig. 5 is a concrete perspective view of the cutting device of the slitter according to the present invention;

Fig. 6 is a side view presenting operation states of the cutting device of the slitter according to the present invention; and

Fig. 7a to 7c are examples of various types of cutters of the cutting device according to the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0025] Reference will now be made in detail to preferred embodiments of the present invention, example of which is illustrated in the accompanying drawings.

[0026] Fig. 4 is a schematic diagram of a slitter applying a cutting device and Fig. 5 is a concrete perspective view of the cutting device of the slitter according to the present invention.

[0027] As shown in Fig. 4 and 5, the film roll stock F rewound to the unwinder 110 installed in the one side of the slitter 100 runs toward multiple rollers, is subdivided into predetermined intervals by a pair of cutting rollers 116 and a cutting device 200, and runs again toward other multiple rollers. Continuously, the film Fa and Fb cut by the pair of cutting rollers 116 and the cutting device 120 is rewound into a first a second rewinding axes 130a and 130b moving horizontally in the slitter 100 according to the cutting amount of the film.

The cutting device 200 of the present invention arranges and fixes multiple rounded cutters 220 into a fixing shaft 210 through a fixing hole 221 in predetermined intervals, and the cutters 220 are curved in a predetermined angle to a main shaft.

[0028] The cutting device 200 installed in the top of the pair of the cutting roller 116 to maintain predetermined intervals, cuts the film of the roll stock F moving

to the top space between the pair of the cutting roller 116.

[0029] As shown in Fig. 6, the cutting device 200 contacts into or separates from the film roll stock F by an elevator (not shown). In more, the cutting device 200 is connected with a motor 260 and a coupling (not shown) controlling speed of the cutting device 200, or connected with respective pulleys 230 and 250 and a belt 240. In more, the cutting device 200 is rotated by receiving the power of the motor 260, and the rotation speed of the cutting device 200 is adjusted by controlling the rotation speed RPM of the motor 260.

[0030] Fig. 7a to 7b illustrates the cutting device 200 of the present invention in more detail. As shown in Fig. 7a, the rounded cutter 220 makes a predetermined angle θ to the one of a main line C1. This configuration of the cutter 220 produces a sine wave to make the section area of the film roll stock F to have a sine wave shape, while the cutter 220 rotates to cut the film roll stock F. In Addition, when the cutter 220 rotates once, the section area of the film roll stock F forms a shape of a sine wave.

[0031] Fig. 7b is another embodiment of the cutter 220 of the present invention. At first, the cutter 220 is curved in a predetermined angle θ to the one of a main line C1 at first. Secondary, the cutter 220 is curved in a predetermined angle θ to the opposite of the first curved direction by the standard of another main line C2 orthogonal to the first main line C1.

[0032] Therefore, when the cutter 220 of such a structure rotates once, 2 sine waves are generated to the section area of the film roll stock F.

[0033] Fig. 7c is still another embodiment of the cutter 220 of the present invention. The cutter 220 is curved in predetermined angles θ by the standard of various main lines C1, C2, C3... Therefore, when the cutter 220 of such a structure rotates once, multiple sine waves are generated to the section area of the film roll stock F.

[0034] Even though the above explanation is given in the case of the constant rotation speed of the cutting device 200, it is natural to change the rotation speed of the cutting device 200. Therefore, when the rotation speed of the cutting device 200 is up or down, it is possible to predict whether the number of the sine waves (the degree of density) formed into the section area of the film roll stock F are increased or not.

[0035] As described in the above statements, when the section area of the film roll stock F has a curved shape in rewinding deposition films to manufacture a capacitor hereafter, the metal contact area (curved area) is widen to lower the contact resistance and to enhance capability of the capacitor, as a result.

[0036] The cutting device of the present invention generates a constant wave shape to the section area of the film roll stock F. As a result, when rewinding the deposition film to manufacture the deposition film capacitor hereafter, the metal contact area formed in the section area of the wave shape of the film roll stock F is widen to lower contact resistance and to enhance capability of

the capacitor.

[0037] In more, the present invention generates a constant wave shape to the section area of the film roll stock F, while the wave shape can be changed.

[0038] While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention.

Claims

1. A cutting device of a slitter, the slitter making a film roll stock rewound to an unwinder installed in the one side of the slitter run through multiple rollers, cutting the film roll stock into a predetermined interval by a pair of a cutting roller and a cutting device installed on the top of the pair of the cutting roller, making the films cut from the film roll stock by the pair of the cutting roller and the cutting device run again through another multiple rollers, and rewinding the films cut from the film roll stock to a first and a second rewinding axes moving horizontally to the slitter according to the rewinding amount, wherein:

the cutting device comprises multiple rounded cutter arranged and fixed into a fixing shaft in predetermined intervals through a fixing hole, curved in a predetermined angle θ by the standard of a main line of the cutter; and the cutting device is connected with a motor controlling a rotation speed to form a wave shape, such as a sine wave, to a section area of the film roll stock in the case of cutting the film roll stock.

2. The cutting device of the slitter according to claim 1, wherein the cutter is curved in a predetermined angle θ to a first main line of the cutter at first, and curved in a predetermined angle θ to the opposite of the first curved direction by the standard of a second main line orthogonal to the first main line of the cutter.
3. The cutting device of the slitter according to claim 1, wherein the cutter is curved in predetermined angles θ by the standard of various main lines of the cutter to generate a shape of multiple sine waves to the section area of the film roll stock in the case of one rotation of the cutter 220.
4. The cutting device of the slitter according to claim 1, wherein the cutting device and the motor are connected by coupling or by respective pulleys and a belt.

FIG.1

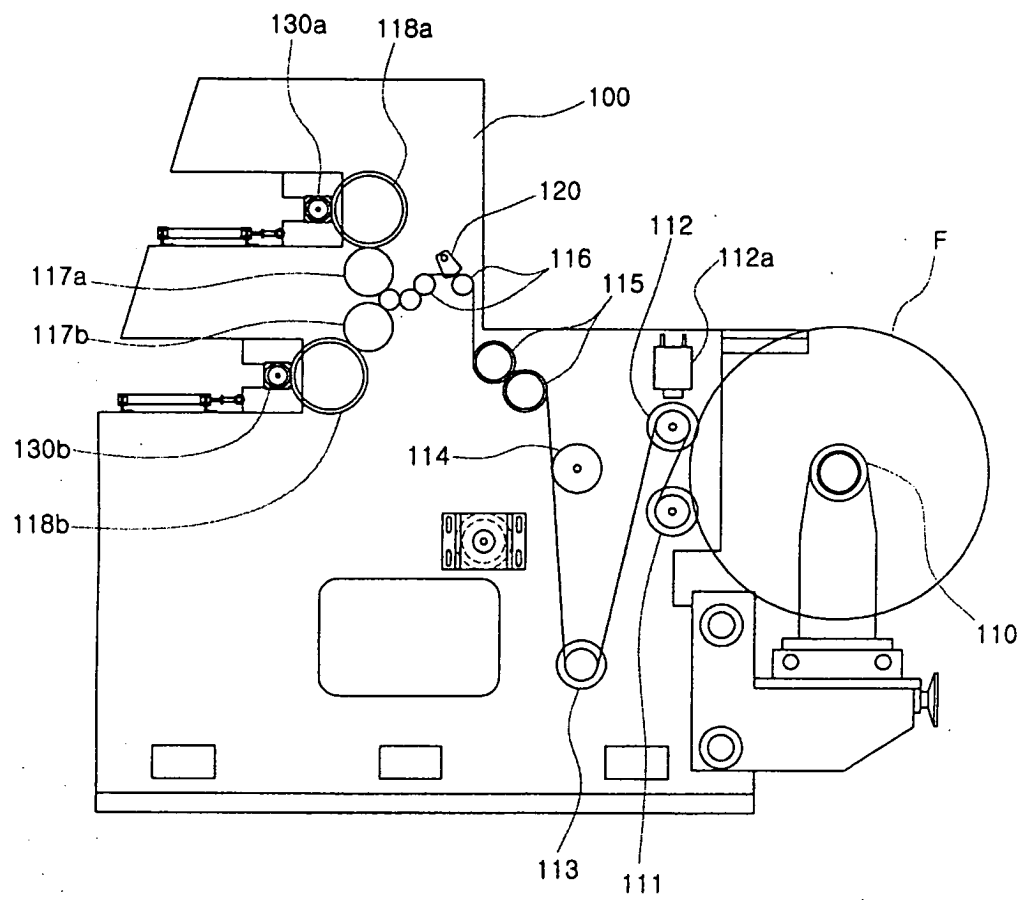


FIG.2

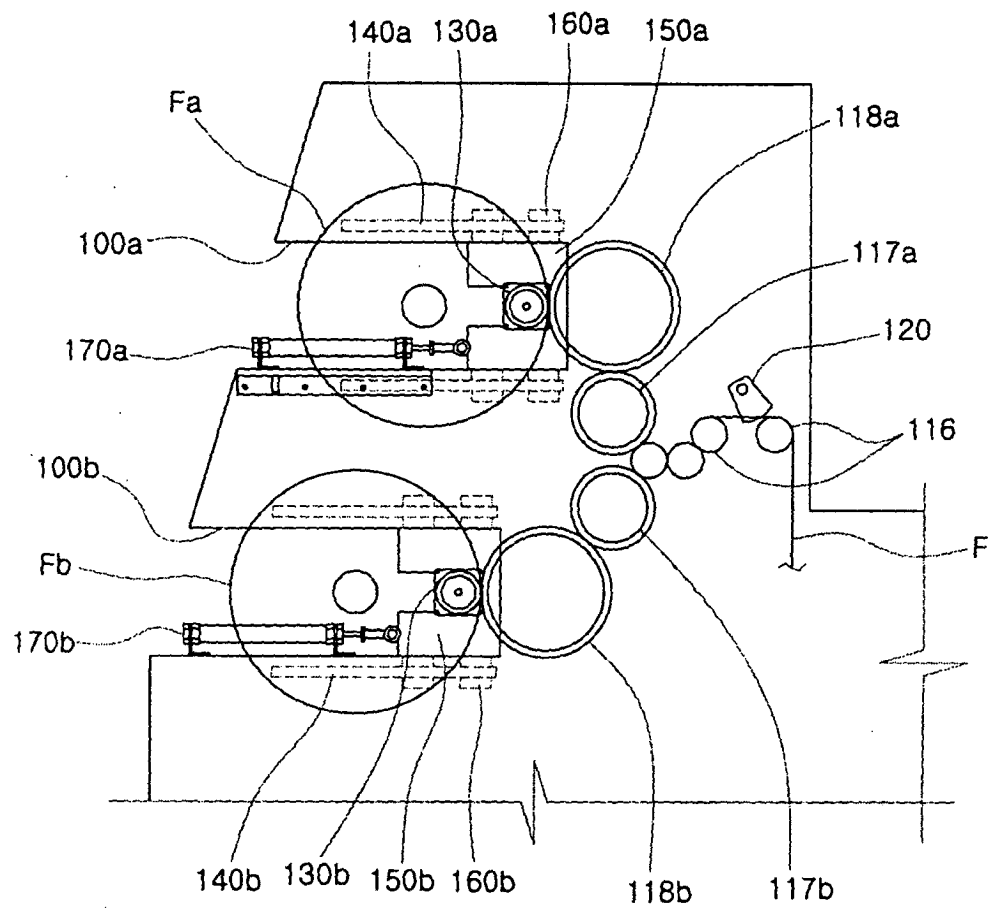


FIG.3

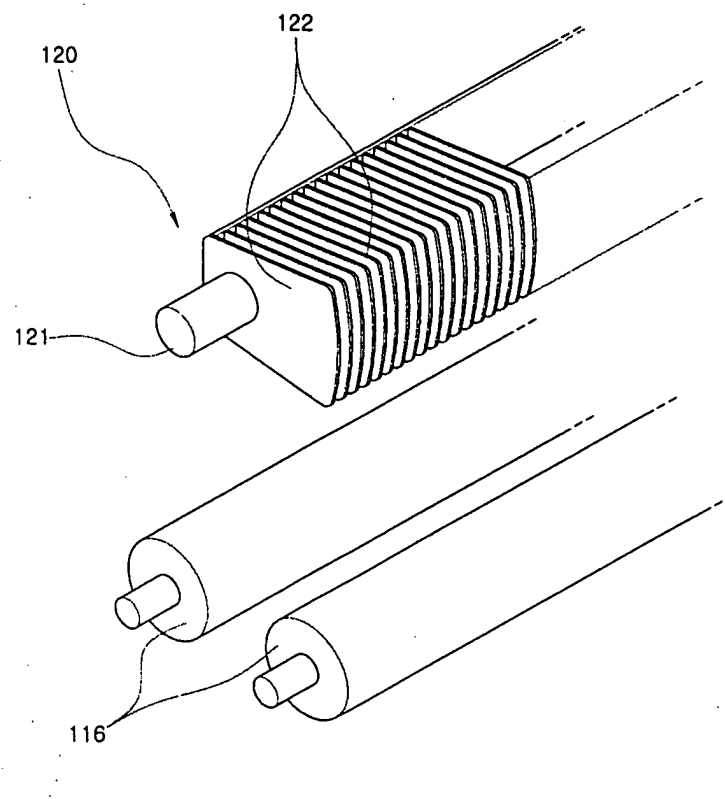


FIG.4

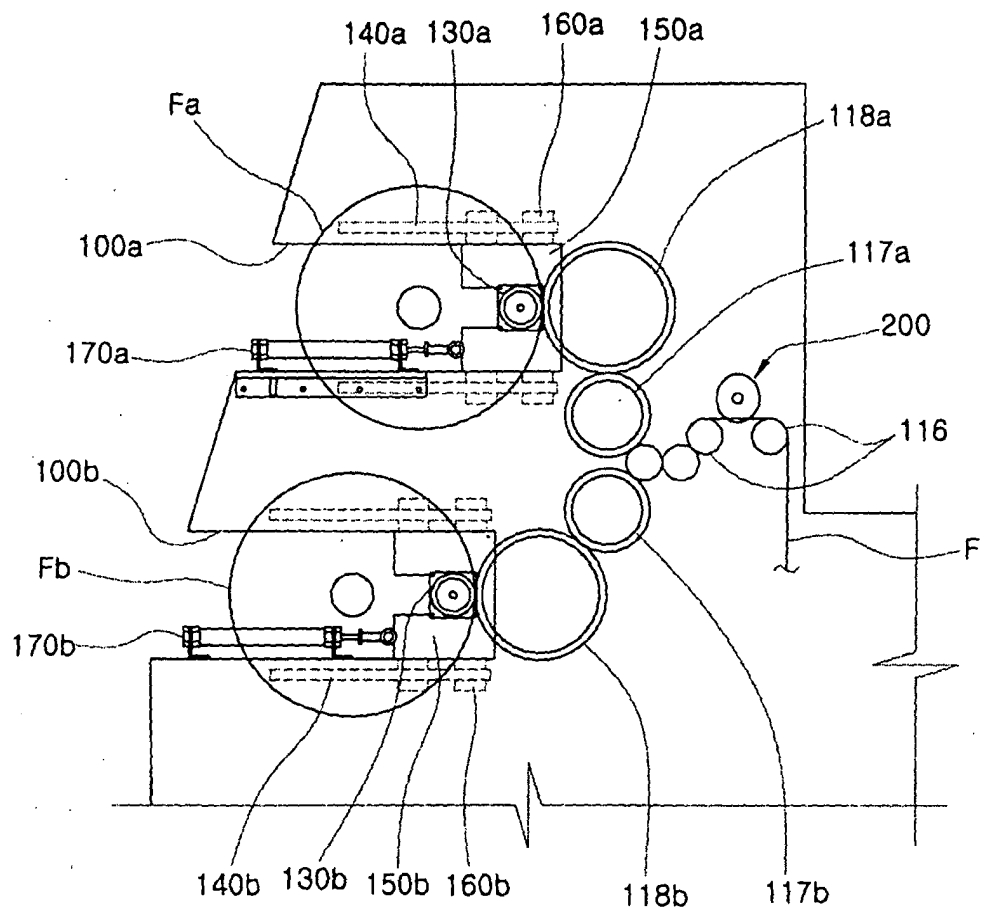


FIG.5

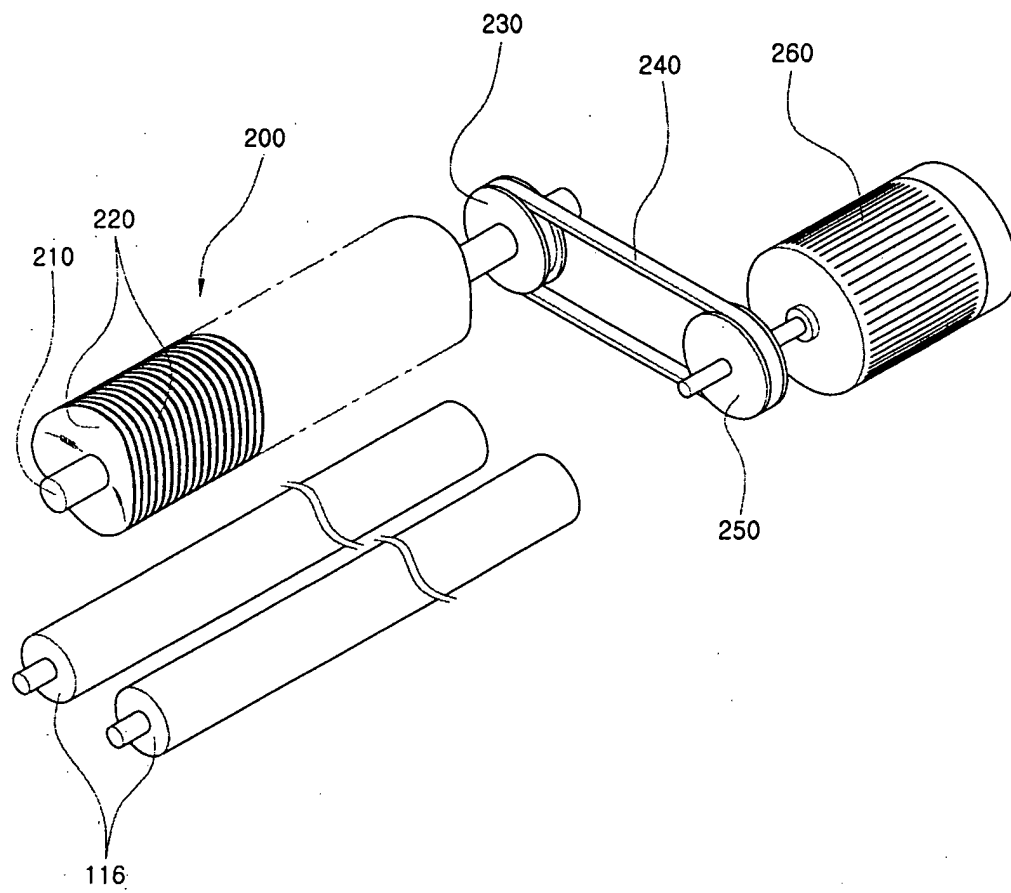


FIG.6

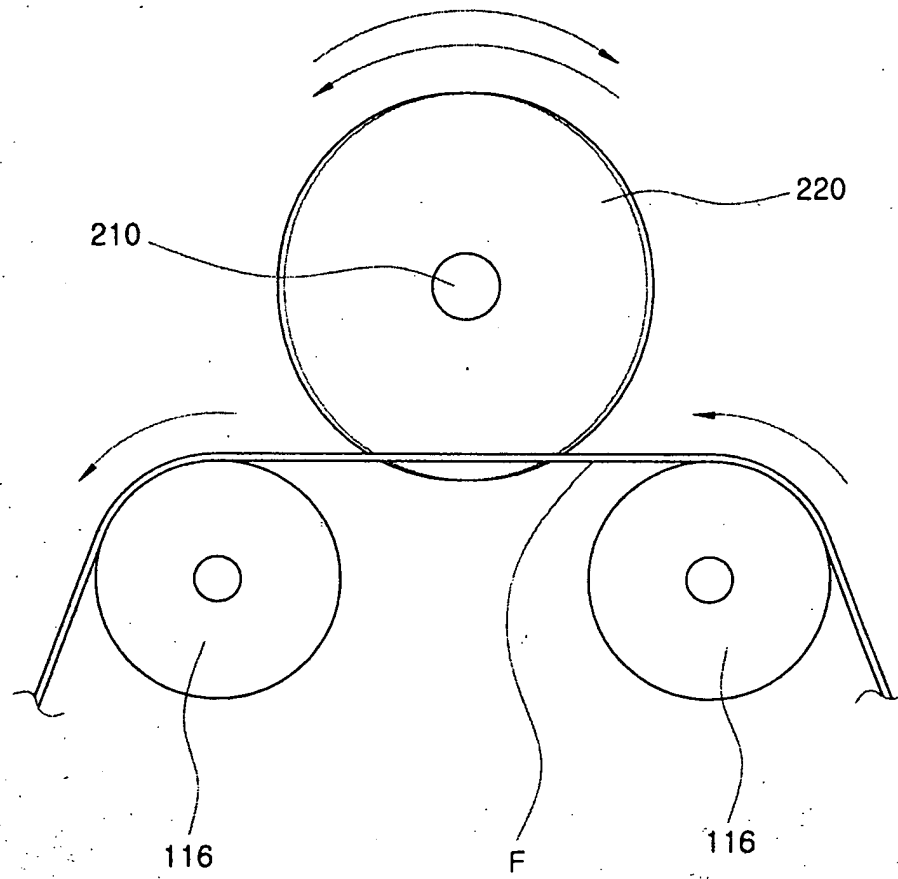


FIG.7a

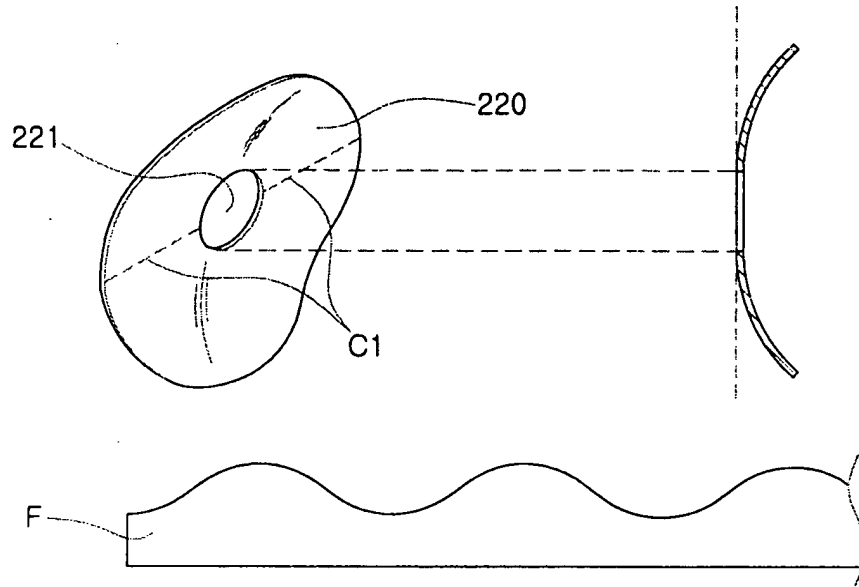


FIG.7b

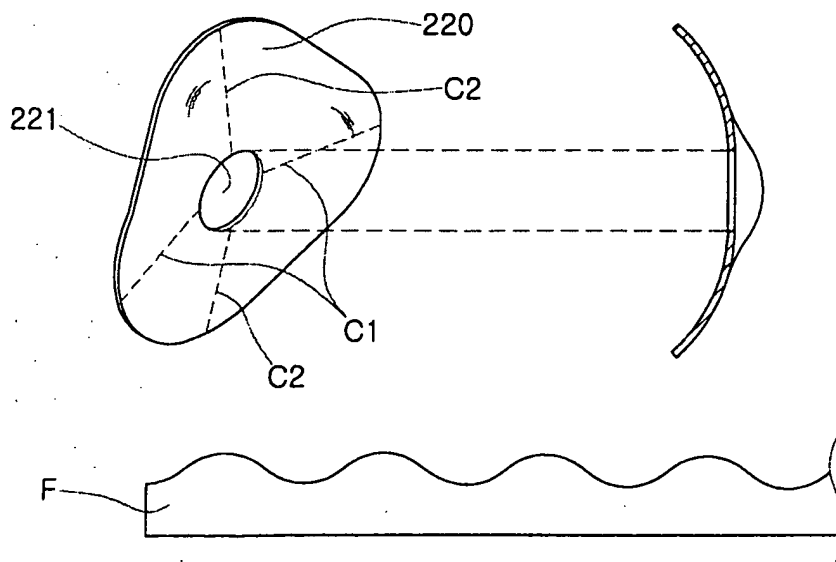
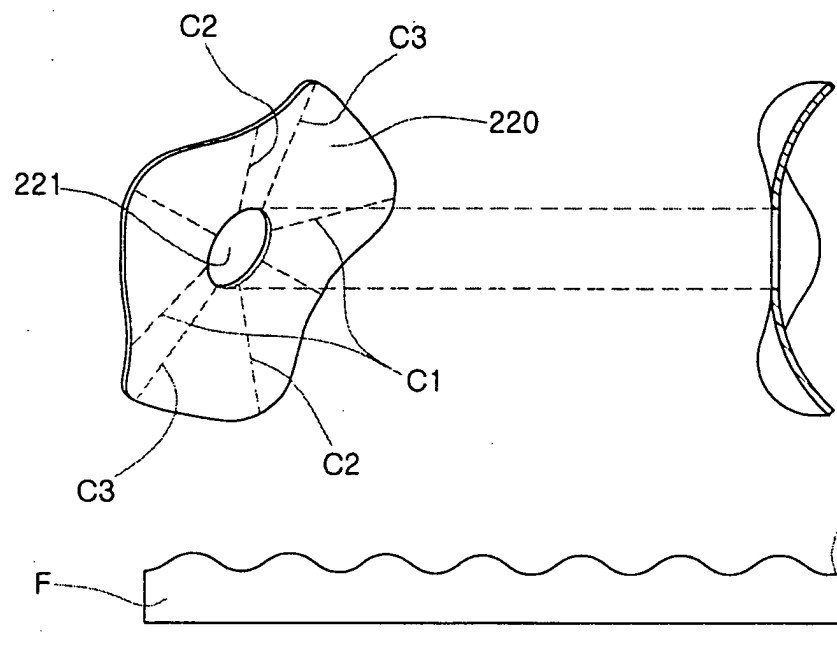


FIG.7c





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EUROPEAN SEARCH REPORT

Application Number
EP 04 03 0951

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		14 March 2005	Canelas, R.F.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 04 03 0951

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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