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IMPROVED LIGHT-TIGHT AND PHYSICALLY PROTECTED PACKAGING FOR A ROLL OF PHOTOSENSITIVE WEB

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(57) Claim

1. Light-tight packaging for a roll of photosensitive web wound on a core, said roll having opposing annular faces and end peripheral edges surrounding said opposing annular faces, and a leading end portion extending from an outermost first convolution of said roll, said packaging comprising:

an opaque end member attachable to each of said opposing annular faces of said roll, said opaque end members being configured to cover a portion of said respective annular face;

an opaque flexible material portion detachably attached to said leading end portion of said roll, said flexible material portion having sequentially first, second and third stretchable segments, said first and third stretchable segments having a similar width (w_1) initially somewhat wider than the width (w_2) of said roll, and said second stretchable segment having a width (w_3) equal to or less than the width (w_2) of the roll (R);

said first stretchable segment of said flexible material portion being stretchably wrapped around said

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outermost first convolution of said roll for at least one convolution to form an outermost second convolution, said first stretchable segment being wrapped to overhang said end peripheral edges and overlap a portion of said annular face of said roll thereby forming a first overlap portion on said annular face;

said second stretchable segment being wrapped around at least a portion of said outermost second convolution; and,

said third stretchable segment being wrapped around said outermost second convolution to form an outermost third convolution, said third stretchable segment being wrapped to overhang said end peripheral edges and overlay said first overlap portion to form a second overlap portion on said respective annular face, said third stretchable segment further overlapping continuously at least a portion of each of said respective opaque end members, said opaque end members being attached to a respective opposing annular face of the roll, said overlap of said third stretchable segment about each of said opaque end members being sufficient to compressively seal said opaque end members to said respective annular face of said roll; and,

wherein said first and second overlap portions cooperate with said respective compressively sealed opaque end member to form a labyrinth-type seal on each of said annular faces for resisting the ingress of light thereto.

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IMPROVED LIGHT-TIGHT AND PHYSICALLY PROTECTED PACKAGING FOR A ROLL OF PHOTOSENSITIVE WEB

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The following statement is a full description of this invention, including the best method of performing it known to applicant(s):

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IMPROVED LIGHT-TIGHT AND PHYSICALLY PROTECTED PACKAGING FOR A ROLL OF PHOTOSENSITIVE WEB

FIELD OF THE INVENTION

The invention relates to packaging of web or other object. More particularly, the invention concerns light-tight and physically protected packaging for a roll of photosensitive web insertable in a cassette or similar device.

BACKGROUND OF THE INVENTION

As disclosed for example in the following patents, packaging for photosensitive material are well known, and specific embodiments thereof have been provided for solving various material packaging problems, or for meeting various materials packaging objectives.

In U. S. Patent No. 5,133,171 end disks or flanges are disclosed having dimensions larger than the dimensions of the roll. These large flanges, while satisfactory for solving the problem addressed in the patent, could complicate dispensing from some cassettes and prevent the film from being rewound back into the cassettes.

Other light-tight packaging, such as those described in Research Disclosure 22932, U.S. Patent No. 4,911,299, U.S. Patent No. 4,505,387, U. S. Patent No. 4,148,395, and U. S. Patent No. 4,733,777 require components to be torn to access product in the packaging, thereby producing dust and dirt. Moreover, these prior art packages are also difficult to manufacture because of the number of components and complicated sealing operations.

There also exist several packages, such those described in, for instance, U. S. Patent No. 0,191,417, U. S. Patent No. 4,911,299, and U. S. Patent No 5,222,601, that disclose a spiral wrapping technique to cover the ends of the roll. The resultant packaging adds multiple thicknesses of material to the ends of the roll and to the roll core thereby preventing its use in many types of processing equipment. Furthermore, these packages have the additional shortcoming of requiring tearing of components to access the contents, as well as complicated manufacturability.

Despite the various improvements represented by the above examples; an almost universal objective to be accomplished is to completely block the ingress of light to the physically protected roll while not making the roll incompatible with various types of processing equipment.

SUMMARY OF THE INVENTION

It is therefore a desired characteristic of the invention to provide packaging for photosensitive web roll that resists ingress of light.

Another desired characteristic of the invention is to provide packaging for photosensitive web roll that protects the web roll from shock and abrasion during handling.

Still another desired characteristic of the invention is to provide packaging that forms a labyrinth-type seal on opposing annular faces of the roll as a light lock means.

Yet another desired characteristic of the invention is to provide a cost effective and easily manufacturable light-tight protected packaging for photosensitive web roll.

Accordingly, for accomplishing one or more of the above desired characteristics of the invention, there is provided, in one aspect of the invention, light-tight packaging for a roll of photosensitive web wound on a core, the roll having opposing annular faces and end peripheral edges surrounding the opposing annular faces, and a leading end portion extending from an outermost first convolution of the roll, the packaging comprising:

an opaque end member attachable to the core of the roll, the opaque end members being configured to cover a portion of the respective annular face;

an opaque flexible material portion detachably attached to the leading end portion of the roll, the flexible material portion having sequential first, second and third stretchable segments, the first and third stretchable segments each having a similar width initially somewhat wider than the width of the roll, and the second stretchable segment having a width equal to or less than the width of the roll;

the first stretchable segment of the flexible material portion being stretchably wrapped around the outermost first convolution of the roll for at least one convolution to form an outermost second convolution, the first stretchable segment being wrapped to overhang the end peripheral edges and overlap a portion of the annular face of the roll thereby forming a first overlap portion on the annular face;

the second stretchable segment being wrapped around at least a portion of the outermost second convolution; and,

the third stretchable segment being wrapped around the outermost second convolution to form an outermost third convolution, the third stretchable segment being wrapped to overhang the end peripheral edges and overlay the first overlap portion to form a second overlap portion, the third stretchable segment further overlapping continuously at least a portion of the opaque end members, each of the opaque end members being attached to opposing ends of the core of the roll, the overlap of the third stretchable segment about each of the opaque end members being sufficient to compressively seal the opaque end members to the respective annular face of the roll; and

wherein the first and second overlap segments cooperate with each of the compressively sealed opaque end members to form a labyrinth-type seal on the annular faces for resisting the ingress of light to the roll.

In another aspect of the invention, there is provided a light-tight packaging for a roll of photosensitive web wound on a core, the core having opposing end openings surrounding an interior wall, the roll having opposing annular faces and end peripheral edges surrounding the opposing annular faces, and a leading end portion extending from an outermost first convolution of the roll, the packaging comprising:

an opaque end member attachable to each of the opposing ends of the core of the roll, the opaque end members being configured to cover a portion of the respective annular face;

an opaque flexible material portion detachably attached to the leading end portion of the roll,

the flexible material portion having sequential first, second, and third stretchable segments, the first and third stretchable segments having a similar width initially somewhat wider than the width of the roll, and the second stretchable segment having a width equal to or less than the width of the roll;

the first stretchable segment of the flexible material portion being stretchably wrapped around the outermost first convolution of the roll for at least one convolution to form an outermost second convolution, the first stretchable segment being wrapped to overhang the end peripheral edges and overlap a portion of the annular face of the roll thereby forming a first overlap portion on the annular face;

the second stretchable segment being wrapped around at least a portion of the outermost second convolution;

the third stretchable segment being wrapped around the outermost second convolution for at least two convolutions to form an outermost third and fourth convolution, the third stretchable segment being wrapped to overhang the end peripheral edges and overlay the end member attached to the core to form a second overlap portion, the third stretchable segment further overlapping continuously at least a portion of each of the respective opaque end members, each of the opaque members being attached to a respective opposing annular face of the roll, the overlap of the third stretchable segment about each of the opaque end members being sufficient to compressively seal the opaque end members to the respective annular face of the roll;

wherein the first and second overlap portions cooperate with each of the compressively sealed opaque end members to form a labyrinth-type seal on each the annular face for resisting the ingress of light to the roll; and,

wherein a cushioning layer is sandwiched between the third and fourth convolutions for protecting the roll from shock and abrasion.

In yet another aspect of the present invention, an article of manufacture comprises a web roll and a light-tight and physically protected packaging having a labyrinth-type seal formed on the annular faces of the roll for preventing the ingress of light thereto, as previously described, enclosing the web roll.

Accordingly, it has been found by the applicants that dimensionally sized opaque end members or flanges on the annular faces of the roll and overlapping stretchable opaque material around the circumference of the roll and end peripheral edges for several convolutions, provide significantly improved light-tight properties. Specifically, opaque end members having a radius somewhat less than the radius of the core of the roll are preferred. Further, by adding a cushioning layer to one of several stretchable segments, enhanced physical protection is provided for the roll against shock and abrasion during handling.

Advantageous effects of the improved lightight packaging of the present invention include: it is easily manufacturable and cost effective; it provides a simple mechanical lightlock that protects the roll from exposure to light while loading the roll into cooperating equipment under room light conditions;

and, it provides protection of the roll from shock and abrasion.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing as well as other objects, features and advantages of this invention will become more apparent from the appended Figures, wherein like reference numerals denote like elements, and wherein:

Figure 1 is a perspective view of the packaging showing the flexible material attached to the leading end portion of the roll;

Figure 2 is a perspective view of the partially assembled packaging, with end members exploded away;

Figure 3 is a perspective view of the packaging showing the wrapped second stretchable segment in the outermost second convolution;

Figure 4 is a perspective view of the partially assembled packaging showing the wrapped third stretchable segment in the outermost second convolution;

Figure 5a is a section view along line 5a-5a of Fig. 4;

Figure 5b is a top plan view of the packaging showing the unwrapped and fully extended sequential stretchable segments attached to the roll;

Figure 6 is a perspective view of an alternative embodiment showing a partially assembled package having a protective cushioning layer;

Figure 7 is the view of Fig. 6 showing partially assembled packaging having the cushioning layer partially sandwiched between successive convolutions;

Figure 8 is a perspective view of fully assembled packaging having optional core plugs exploded away from the core of the roll;

Figure 9 is a sectional view along the line 9-9 of Fig. 8;

Figure 10 is a top plan view of the alternative embodiment showing several sequential segments of the flexible material portion fully extended from the outermost first convolution of the roll; and,

Figure 11 is a schematic view of a spiral wrapping apparatus.

DETAILED DESCRIPTION OF THE INVENTION

While certain parts of packaging for web rolls are well known, the following description is directed in particular to those elements forming, cooperating directly with, or relating to, this invention. Elements not specifically shown or described herein are selectable from those known in the relevant art.

Turning now to the drawings, and more particularly to Figs. 1-6, light-tight packaging **10** of a roll of photosensitive web of the invention is illustrated. Shown clearly in Fig. 2, the photosensitive web roll (R), such as sensitized photographic paper or film material, comprises opposing annular faces **12,14** and end peripheral edges **16** surrounding the opposing annular faces **12,14**. According to Fig. 1, a leading end portion **18** extends from an outermost first convolution **20** of the roll (R) for cooperating with associated equipment (not shown), such as a cassette. Typically the roll (R) has a core **21** having a length w , opposed core openings **23** and an

interior wall **25** extending between the core openings **23**.

Broadly defined, the light-tight packaging **10** of the invention comprises a pair of opaque end members **22** attachable to the core **21** of roll (R), and several convolutions of a flexible material portion **24** wrapped around the outermost first convolution **20** of the roll (R), as described in details below. It is to be appreciated that rolls (R), having various width cores **21**, may be packaged in substantially the same way, although a spiral wrapping method (such as the type disclosed in U.S. Patent 5,203.139) of the flexible material portion **24** is deemed more efficacious for larger width cores **21**, i.e., cores **21** with a width greater than about 12 inches. In the preferred embodiment, each of the opaque end members **22** is configured to cover a portion of the respective annular face **12**,**14**. The opaque end members **22**, preferably similar, can be applied either prior to wrapping the flexible material portion **24** around the outermost first convolution **20** or during the wrapping of the flexible material portion **24**. The opaque end members **22** are preferably substantially disk-like shaped, although other geometric shapes, such as any polygon, would suffice. Further, opaque end member **22** may have a central opening **22c** which substantially corresponds to the core opening **23** for enabling easy access to the interior wall **25** of the core **21**. The opaque end members **22** are fastened to the interior wall **25** of the core **21** so as to provide a lighttight bond for the roll (R). Preferably, the opaque end members **22** are heat sealed to the interior wall **25** of the core **21**. In this manner, there is no appreciable decrease in the inside diameter of the core **21** nor appreciable increase of the width of the roll (R). Alternative methods of adhering the opaque end members **22** to the core **21** include: tape,

cold glue, hot melt, pressure sensitive adhesive, and staples. Optionally, core plugs **26** may also be inserted into the core opening **23** for imparting rigidity to the roll (R), as shown in Fig. 8.

Referring to Fig. 1, the opaque flexible material portion **24** is shown detachably attached, via tape strip **27** or comparable attachment means, to the leading end portion **18** of the roll (R). To initiate smooth wrapping, flexible material portion **24** has a tapered portion **24t** having a width preferable somewhat less than the length w of the roll (R). Tapered portion **24t**, attached to the leading end portion **18** of the roll (R), enables easy wrap initiation and promotes uniform wrapability of successive segments (discussed below) of flexible material portion **24**. Moreover, flexible material portion **24** may include any number of sequential stretchable segments (best seen in Fig. 5B): however, in this embodiment, the flexible material portion **24** comprises first, second and third stretchable segments **28,30,32** (Figs. 3 and 5). First and third stretchable segments **28,32** each has a similar width w_1 initially somewhat wider than the width w_2 of the roll (R) for reasons described fully below. Further, the second stretchable segment **30** has a width w_3 equal to or less than the length w of the roll (R). Stretching of the flexible material portion **24** is accomplished preferably manually, but a suitable apparatus capable of evenly extending an end portion and then relaxing the material **24** to achieve the desired width can also be used, as described in details below. The preferred flexible material portion **24** is a 0.002 inch thick black opaque material, sold by the name Mobil "K"®, and manufactured by the Mobil Chemical Co., Macedon, New York. Alternative materials which can be used in this embodiment include a 0.003 inch black opaque stretch wrap material; a 0.002 inch

or 0.003 inch black shrink wrap material; or any stretchable polyolefin, such as polyethylene film material.

Figure 2 depicts the first stretchable segment **28** of the flexible material portion **24** stretchably wrapped around the outermost first convolution **20** (Fig. 1) of the roll (R). The first stretchable segment **28** is wrapped around the outer most first convolution **20** of the roll (R) for at least one convolution to form an outermost second convolution **34** comprising the first stretchable segment **28**. Since the width w1 the first stretchable segment **28** is wider than the length w of the roll (R), the first stretchable segment **28** can be made to overhang the end peripheral edges **16** and fold snugly into and overlap a portion of the respective annular face **12,14** of the roll (R). This is achieved by applying a tensile force somewhat evenly along a traverse edge **24e** of the flexible material portion **24**. This force causes the first stretchable segment **28** overhanging the end peripheral edges **16** to fold snugly into the respective annular face **12,14** of the roll (R) thereby forming a first overlap portion **36** (Fig. 2) on the annular faces **12,14**.

As depicted in Figure 3, the second stretchable segment **30** is wrapped around at least a portion of the outermost second convolution **34**. Since the second stretchable segment **30**, as described above, has a width w3 equal to or less than the length w of the roll (R), the second stretchable segment **30** does not generally overhang the end peripheral edges **16** of the roll (R) and cannot overlap the annular faces **12,14** of the roll (R).

As shown in Figure 4, the third stretchable segment **32** is wrapped around the outermost second convolution **34** (Fig. 3) to form an outermost third

convolution **38** comprising the third stretchable segment **32**. The third stretchable segment **32** is wrapped to overhang the end peripheral edges **16** and fold snugly into and overlay the respective opaque end member **22** to form a second overlap portion **40**. Further, as depicted in Fig. 4, the third stretchable segment **32** overlaps continuously at least a portion of the respective opaque end members **22**. Moreover, the overlap of the third stretchable segment **32** about the respective opaque end members **22** is sufficient to compressively seal the opaque end member **22** to the respective annular face **12,14** of the roll (R).

In this embodiment, according to the cross sectional view of Fig. 5A, the first and second overlap portions **36,40** of the flexible material portion **24** cooperate with the respective compressively sealed opaque end member **22** to form a labyrinth-type seal **42**, i.e., a substantially non contacting seal, on the respective annular face **12,14** for resisting the ingress of light to the roll (R). The inventors test indicate that the labyrinth-type seal **42** provides superior light protection particularly during day light loading of the photosensitive product in cooperating equipment, such a cassette for a photoprocessor. In the preferred embodiment, the overlap portions **36,40** (which are folded snugly into the end members **22**) comprising the labyrinth-type seal **42** may extend across its respective end peripheral edge **16** of the roll (R) by about 0.250 inch (0.625 cm) to about 1.00 inch (2.54 cm) for effective sealing.

Figures 6-10 illustrate another aspect of the invention. In this embodiment, packaging **100** comprises a flexible material portion **102** having an initial tapered portion (not shown but similar to that depicted in Fig. 1) affixed to the leading end portion of the

roll for initiating the wrapping, and sequential first, second, and third stretchable segments **104,106,108** (shown clearly in Figs. 9 and 10). First and third stretchable segments **104,108** each has a similar width w_1 initially somewhat wider than the length w of the roll (R') for the reasons indicated above. The second stretchable segment **106** has a width w_3 equal to or less than the length w of the roll (R). Moreover, in this embodiment a cushioning material layer **112**, described fully below, is arranged atop the third convolution formed by the third stretchable segment **108** and overhangs the end peripheral edges **118**. In the preferred embodiment, the cushioning layer **112** comprises a plurality of cushioning portions arranged preferably along periphery edges of the third outermost convolutions. Another convolution formed by the third stretchable segment **108** is overwrapped over the cushioning layer thereby sandwiching the cushioning material layer **112** between the third and fourth convolutions

C hioning material layer **112** provides physical protection of the roll (R') against shock and abrasion. The preferred cushioning material is polyethylene foam. Other cushioning materials known to the inventors that could be used with similar success include polyurethane foam, bubble wrap, recycled tire material, cloth wool, paper, corrugated board, or woven straw. In this embodiment, the polyethylene foam has a thickness in the range of about 0.125 inches (0.318 cm) to about 0.250 inches (0.635 cm). Those skilled in the art will appreciate that a cushioning layer also be inserted between any successive convolutions or part thereof, or may be wrapped around the final convolution of the assembled packaging and then sealed so as to provide protection for the product enclosed therein.

Furthermore, light-tight indicator means, preferably an adhesive label strip **60**, may be affixed to an outermost convolution to signal the user that the roll (R) is protected against light ingress beyond the strip **60**. Adhesive label strip **60** may also be used to identify the product and to seal closed the packaging **10** if no additional layers are required beyond the label strip **60**. An extended portion **60g** of adhesive label strip **60** is easily graspable for accessing packaging **10** when it is desired to use the roll (R). Fig. 6 and 7 show the cushioning layer **112** positioned for sandwiching between the third and fourth convolutions formed by the third stretchable segments **108**. According to the invention, cushioning layer **112** is preferably simply mechanically trapped between sequential overwrap segments **108** of flexible material portion **102**. However, those skilled in the art will appreciate that cushioning layer **112** may be adhered (for instance glued or taped) to any one of the stretchable segments of the packaging **100** or be made a part of one of the segments.

As shown in the cross sectional view of Fig. 9, the first stretchable segment **104** of the flexible material portion **102** is stretchably wrapped around the outermost first convolution of the roll (R'' for at least one convolution to form an outermost second convolution comprising the first stretchable segment **104**. The first stretchable segment **104**, being wider than the width of the roll (R'), is wrapped so as to overhang the end peripheral edges **118** of the roll (R') and fold snugly into and overlap the respective annular face **12,14** to form a first overlap portion **119** on the respective annular face **12,14**.

Further, the second stretchable segment **106** is wrapped around at least a portion of the outermost

second convolution comprising the first stretchable segment **104**, as described above.

According to Figure 6, the third stretchable segment **108** is wrapped around the first stretchable segment **104** in the outermost second convolution to form an outermost third convolution. The outermost third convolution therefore comprises third stretchable segment **108**. As indicated above, the third stretchable segment **108** is wrapped to overhang the end peripheral edges **118** and overlay the first overlap portion **119** to form a second overlap portion **121** on each annular face **12,14**. Moreover, because the third stretchable segment **108** is wider than the width of the roll (R'), it is wrapped about the outermost convolution so as to overlap continuously at least a portion of the respective opaque end members **22**. As indicated, an opaque members **22** is attached to the core of the roll (R') so that the overlap of the third stretchable segment **108** is sufficient to compressively seal the opaque end members **22** to the respective annular face **12,14** of the roll (R').

In this embodiment, the third stretchable segments **108** is wrapped around the roll (R') for at least two convolutions to form a third and fourth outermost convolution. The first overwrap of the third stretchable segment **108** overhangs the end peripheral edges **118** and continuously overlay and contact at least a portion of the end member **22** to form a second overlap portion **121** on the respective annular face **12,14**. In this embodiment, labyrinth-type seal **124** is formed by the first and second overlap portions **119,121** which prevent the ingress of light to the roll (R'). In Figure 7, the third stretchable segment **110** is wrapped around the outermost third convolution to form an outermost fourth convolution comprising the third

stretchable segment **110**. Further in this embodiment, the cushioning material layer **112** is sandwiched between the third and fourth convolutions for providing protection of the roll (R') against shock and abrasion. Alternatively, skilled artisans will appreciate that only strips of cushioning material **112** (not shown) need be interposed along opposing transverse edges of a select stretchable segment between successive convolutions to provide protection of the roll against shock and abrasion.

Furthermore, in this embodiment, the first and second overlap portions **119,121** cooperate with each of the respective compressively sealed opaque end members **22** to form a labyrinth-type seal **124** on each of the annular faces **12,14** for resisting the ingress of light to the roll (R').

In yet another aspect of the present invention, an article of manufacture (Figs. 3 and 8) comprises a web roll (R,R') and a light-tight and physically protected packaging **10,100**, as previously described, enclosing the web roll (R,R'), as described.

To make the packaging **10** of the invention, the manufacturer would grasp the flexible material portion **24** attached to the leading end portion **18** of the roll (R) (Fig. 1). Noting that the flexible material portion **30** in its original relaxed state is wider than the roll (R) product, the manufacturer would then rotate the roll (R) to receive the flexible material portion **24**. Accordingly, the flexible material portion **24** is stretched around the circumference of the roll (R) and over the end peripheral edges **16** (Fig. 2). This is done for at least one convolution. Opaque end members **22** are then applied to the core **21** of the roll (R). The outside

diameter of the end member **22**, as indicated, is smaller than the roll (R) but large enough to cover the folded over edge of the flexible material portion **24**. Preferably, a center portion of the opaque end member **22** is attached by heat sealing to the interior wall of the core. The inventors experience indicates that a superior light tight seal results and the core opening **23** is not rendered unavailable for use.

Further, in Figs. 5A and 5B the flexible material portion **24** is necked down to approximate the length w of the roll (R). As the roll (R) is rotated to receive material **24**, the flexible material portion **24** is relaxed so as to approximate a width wider than the length w of the roll (R). The wider width material portion **24** therefore traps the outer edges of the end members **22** as the flexible material portion **24** conforms to the end peripheral edges **20** of the roll (R). At least one more convolution is applied to the roll (R), thereby forming a light protective package. If physical protection is not required, the flexible material portion **24** can be cut and held closed with tape or a label.

To integrally add physical protection and lighttight warnings in the packaging **10** of the invention, the flexible material portion **24** is allowed to relax again as the roll (R) is rotated to receive more of the flexible material **24**. A layer **112** of cushioning material preferably slightly wider than the roll (R) is inserted and sandwiched between the successive convolutions of stretchable segments thus providing physical protection (see Figs. 6, 7 and 9). After at least one revolution of cushioning layer **112** on the roll (R), the cushioning layer **112** is cut. The flexible material portion **24** is further stretched and then necked down to approximate a width less than or

equal to the length w of the roll (R). Thereafter, the material **24** is cut and a label or other sealing device is attached to the outside of the roll (R) for sealing, thus completing the packaging **10**. Alternatively, a lighttight indicator means (Fig. 7), preferably an adhesive strip **60**, can be applied to at least one convolution after the outermost first convolution, as described above. If no cushioning material layer **112** is needed, the light-tight indicator means or adhesive strip **60** can become the sole means for closing the packaging **10**. A similar method could be used for wider rolls (R) having a length w greater than 12 inches, as indicated above. The flexible material portion **24**, in this embodiment, can now be narrower than the rolls (R). The flexible material portion **24**, as described above, is detachably attached to the leading end portion **18** of the roll (R). As the roll (R) is rotated to receive the material **24**, it is wrapped about the outermost convolution of the roll (R) by stretching from one end peripheral edge **20** to the over opposite end peripheral edge **16**. This edge to edge wrapping of the flexible material **24** is repeated until the desired number of convolutions on the roll (R) is achieved.

As indicated above, opaque end members **22** are applied to the annular faces **12,14** in the same manner as described above for rolls (R) of narrower width, i.e., rolls having a width less than about 12 inches (30.48 cm). Wrapping the flexible material portion **24** from end to end alternatively traps the end members **22** against the respective annular face **12,14** thereby sealing the annular faces **12,14** of the roll (R), together with the labyrinth-type seal **42**, protects the annular faces **12,14** of the roll (R) from the ingress of light (Fig. 5a). Moreover, the outermost first convolution **20** of the roll (R) is protected from light

by the by the overlapping opaque flexible material portion **24** wrapped thereon.

The packaging **10** of the web roll (R) is then closed by a label or other fastening device (Fig. 8).

If desired, the core openings **23** (Fig. 3) can be closed by the application of labels on the end members **22** (not shown). The labels could be removed or perforated by the user to access the core opening. The same can be achieved by presizing and forming the end member **22** material inside the core while sealing a portion of the end member **22** on interior wall **25** of the core **21** or to core opening **23**. Using the latter technique, the end member **22** portion inside the core **21** can then be punched out by the user or perforated so that a shaft (not shown) is allowed to be inserted in the core **21**.

Those skilled artisans will appreciate that additional variations to this invention are possible. For instance, the opaque end members **22** can be part of the core **21** or made of the same material as the core **21** (not shown). Moreover, the flexible material portion **22** may be formed as part of the end member **22**, if additional sealing is required around the labyrinth-type seal **42** described above. Further, the cushioning material layer **112** could comprise strips of material arranged along the edges of the roll (R), the primary target of impact such as shock and abrasion.

A suitable means **200** for wrapping the packaging **10,100** of the invention is illustrated in Fig. 11. According to Fig. 11, a supply of flexible material **24,102** can be fed from a roll (R_f) and be caused to selectively wrap around the product roll (R_p). Means **202** for cutting the material after the wrapping has been completed may be provided. Pre-

stretch means, such as a plurality of rollers (R_C), engaging a transverse edge portion (not shown) of the flexible material **24** provides the sequential stretchable segments described above. Moreover, roller means (R_1) for providing various labels **60** and strips in select convolutions to the product roll (R_p) can also be provided on material **24**,**102** at position **60a**. Take up rollers R_t can be provided for relieving excess labeling material **60** being supplied to the packaging. As indicated above, a cushioning layer **112** (Figs. 6-7) for imparting physical protection to the product roll (R_p) can be provided in an alternative embodiment of the invention during the wrapping process by, for example, a supply roller ($R_{S'}$). Other apparatus having features that may be adapted to making the packaging 10 of the invention, particularly for wide rolls, include the devices disclosed in U. S. Patent Nos. 5,203,139, 1,870,399, 4,912,911, 4,909,880, 4,840,006.

The invention has therefore been described with reference to certain embodiments thereof, but it will be understood that variations and modifications can be effected within the scope of the invention.

Parts List

	Packaging	10,100
	Roll	R,R'
	Annular faces of Roll	12,14
	End Peripheral Edges	16,118
	Leading end Portion	18
	Outer First Convolution	20,114
	Opaque end member	22
	Flexible material portion	24,102
	Core	21
	Core Opening	23
	Interior Wall of Core	25
	Core Plug	26
	Tape Strip	27
	First, Second & Third Stretchable Segments	28,30,32
	First Overlap Portion	36,119
	Second Overlap Portion	40,121
	Labyrinth seal	42,124
	Lighttight indicating means	60
	First, Second, and Third Stretchable Segments	104,106,108
	Cushioning material layer	112

We claim

The claims defining the invention are as follows:

1. Light-tight packaging for a roll of photosensitive web wound on a core, said roll having opposing annular faces and end peripheral edges surrounding said opposing annular faces, and a leading end portion extending from an outermost first convolution of said roll, said packaging comprising:

an opaque end member attachable to each of said opposing annular faces of said roll, said opaque end members being configured to cover a portion of said respective annular face;

an opaque flexible material portion detachably attached to said leading end portion of said roll, said flexible material portion having sequentially first, second and third stretchable segments, said first and third stretchable segments having a similar width (w_1) initially somewhat wider than the width (w_2) of said roll, and said second stretchable segment having a width (w_3) equal to or less than the width (w_2) of the roll (R);

said first stretchable segment of said flexible material portion being stretchably wrapped around said outermost first convolution of said roll for at least one convolution to form an outermost second convolution, said first stretchable segment being wrapped to overhang said end peripheral edges and overlap a portion of said annular face of said roll thereby forming a first overlap portion on said annular face;

said second stretchable segment being wrapped around at least a portion of said outermost second convolution; and,

said third stretchable segment being wrapped around said outermost second convolution to form an outermost third convolution, said third stretchable segment being wrapped to overhang said end peripheral edges and overlay said first overlap portion to form a second overlap portion on said respective annular face, said third stretchable segment further overlapping continuously at least a portion of each of said respective opaque end members, said opaque end members being attached to a respective opposing annular face of the roll, said overlap of said third stretchable segment about each of said opaque end members being sufficient to compressively seal said opaque end members to said respective annular face of said roll; and,

wherein said first and second overlap portions cooperate with said respective compressively sealed opaque end member to form a labyrinth-type seal on each of said annular faces for resisting the ingress of light thereto.

2. A light-tight packaging recited in claim 1 wherein light-tight indicator means attachable to said opaque flexible material is provided for indicating to a user that said roll is protected against light ingression.

3. A light-tight packaging recited in claim 2 wherein said light-tight indicator means includes an adhesive layer attached to an end edge of said third stretchable segment.

4. A light-tight packaging recited in claim 2 wherein said indicator means includes an adhesive label is provided on the outermost third convolution for sealing closed said roll and identifying the roll therein, said label being provided with means for

graspably peeling said label from said outermost third convolution.

5. A light-tight packaging recited in any one of claims 1 to 4, wherein said third stretchable segment also forms a fourth outermost convolution and a cushioning layer is sandwiched between said third and fourth convolutions for protecting the roll from shock and abrasion.

6. A light-tight packaging recited in claim 5 wherein said cushioning layer includes at least two cushioning portions arranged along opposing transverse edges of said third stretchable segment.

7. A light-tight packaging recited in claim 1, substantially as hereinbefore described with reference to any one of the drawings.

DATED: 27th April, 1995

PHILLIPS ORMONDE & FITZPATRICK

Attorneys for:

EASTMAN KODAK COMPANY

David B Fitzpatrick

IMPROVED LIGHT-TIGHT AND PHYSICALLY PROTECTED PACKAGING FOR A ROLL OF PHOTOSENSITIVE WEB

ABSTRACT OF THE DISCLOSURE

Light-tight packaging (10) for photosensitive web roll (R) has a flexible material portion (24) detachably attached to a leading end portion (18) of the roll (R) that over wraps the outermost first convolution (20) of the roll (R). Opaque end members (22) are attached to annular faces (12,14) of the roll (R). First, second and third stretchable segments (28,30,32) of the flexible material portion (24) having respectively wider or equal widths as the roll overlap the outermost first convolution (20) of the roll (R) to form successive outermost convolutions comprising the respective stretchable segment. Alternate stretchable segments overhang the end peripheral edges (16) of the roll (R) and overlap and compressively seal the end members (22) to the annular faces (12,14) of the roll (R). Folded overlapped portions (36,40) on the annular faces (12,14) form a labyrinth-type seal (42) on the annular faces (12,14) which cooperate with the compressively sealed opaque end members (28) to resist the ingress of light to the roll (R). In an alternative embodiment, a cushioning layer (112) is provided on anyone of the sequentially stretchable segments for absorbing shock and abrasions during web roll handling.

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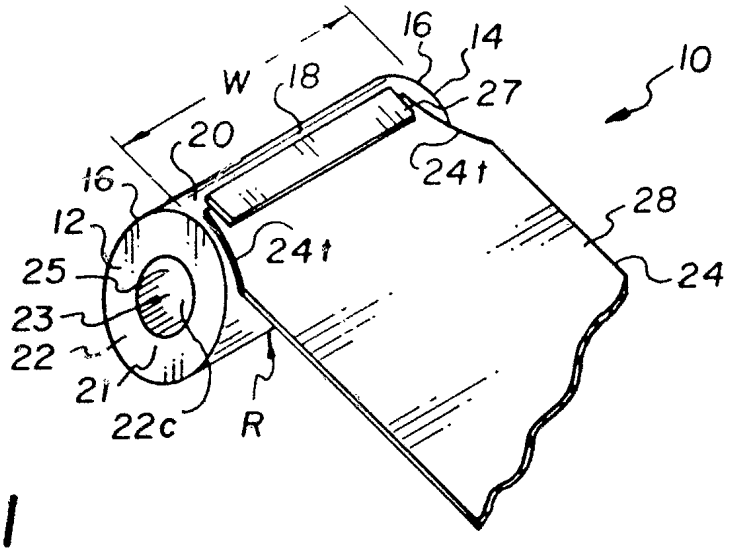


FIG. 1

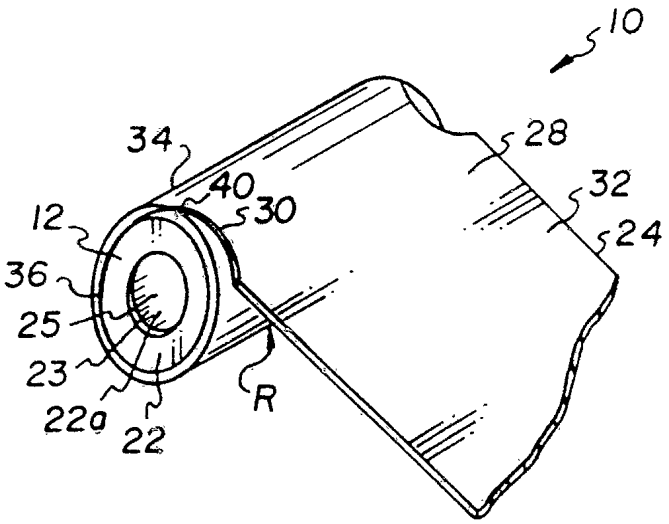


FIG. 3

FIG. 2

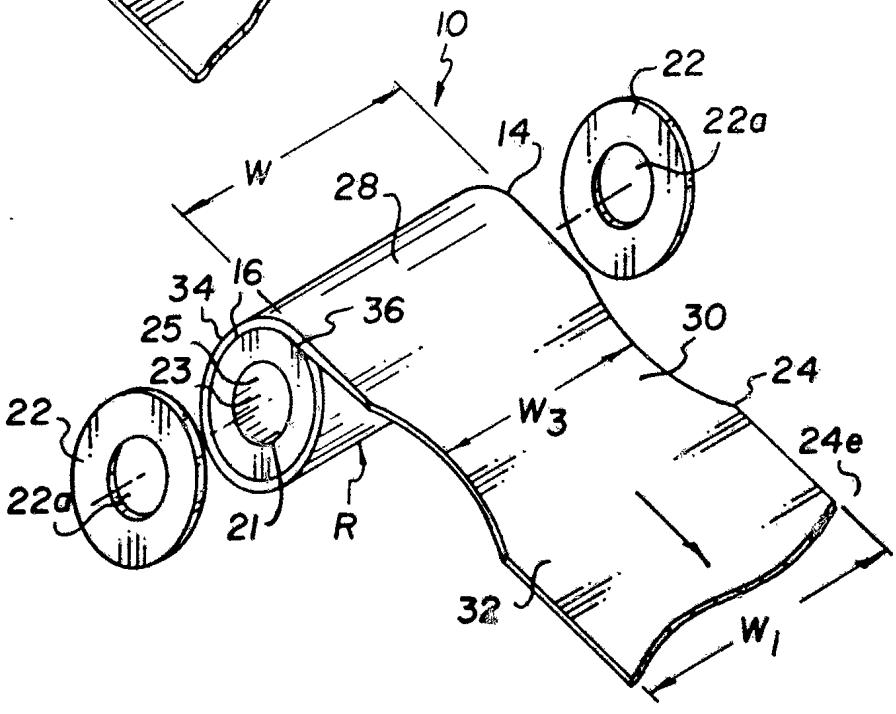


FIG. 4

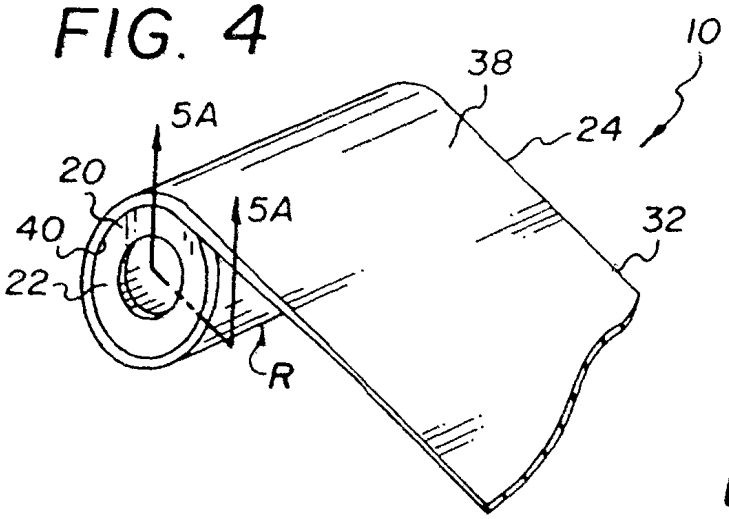
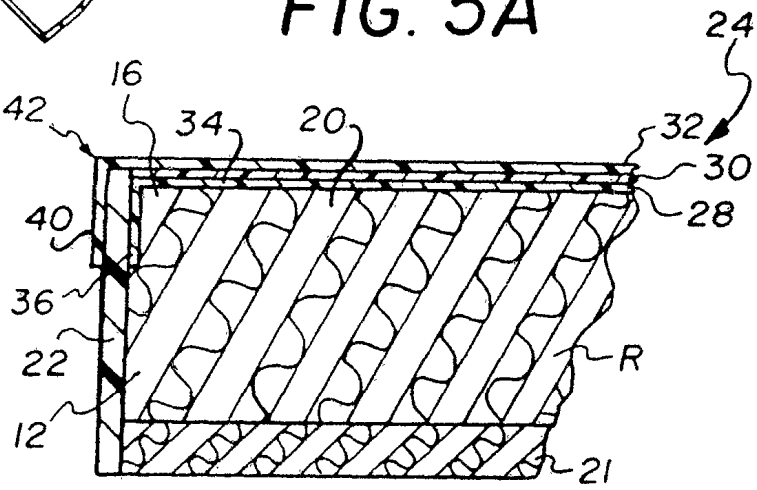


FIG. 5A



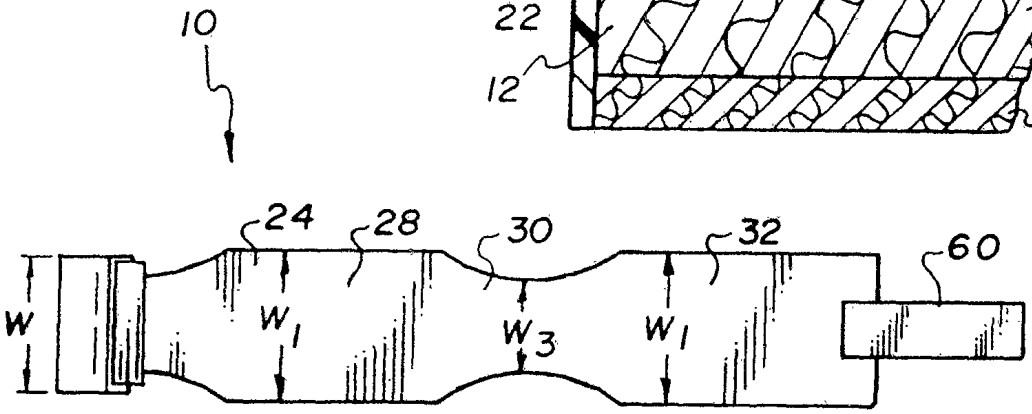


FIG. 5B

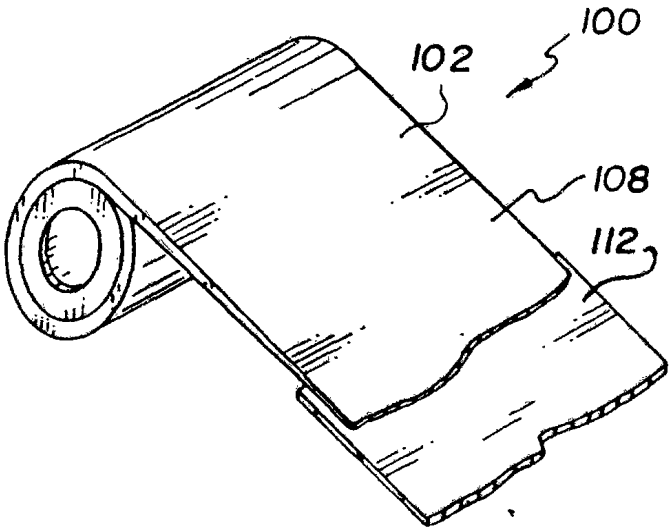


FIG. 6

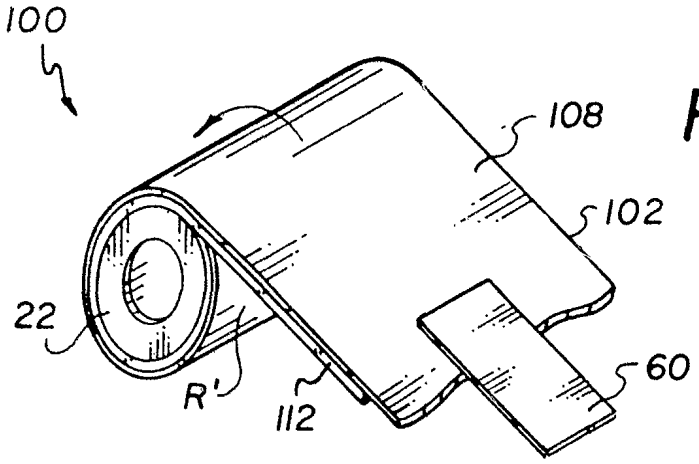
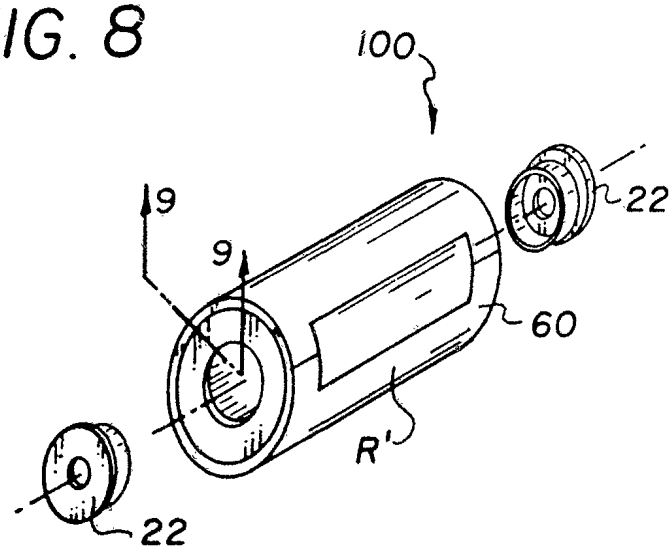


FIG. 7

FIG. 8



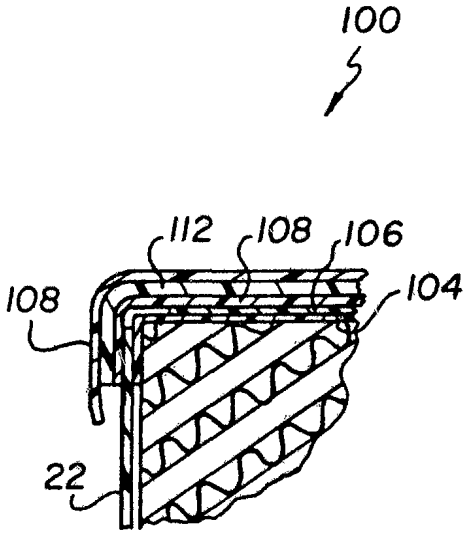
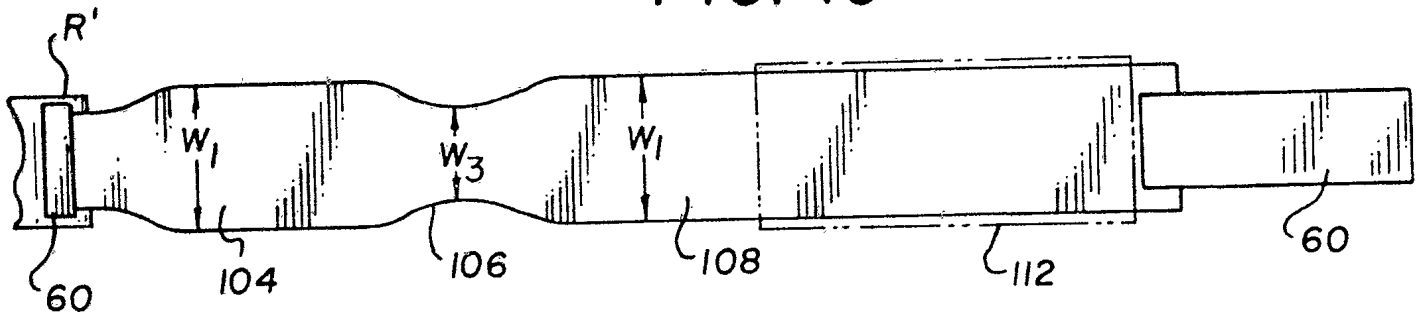


FIG. 9

FIG. 10



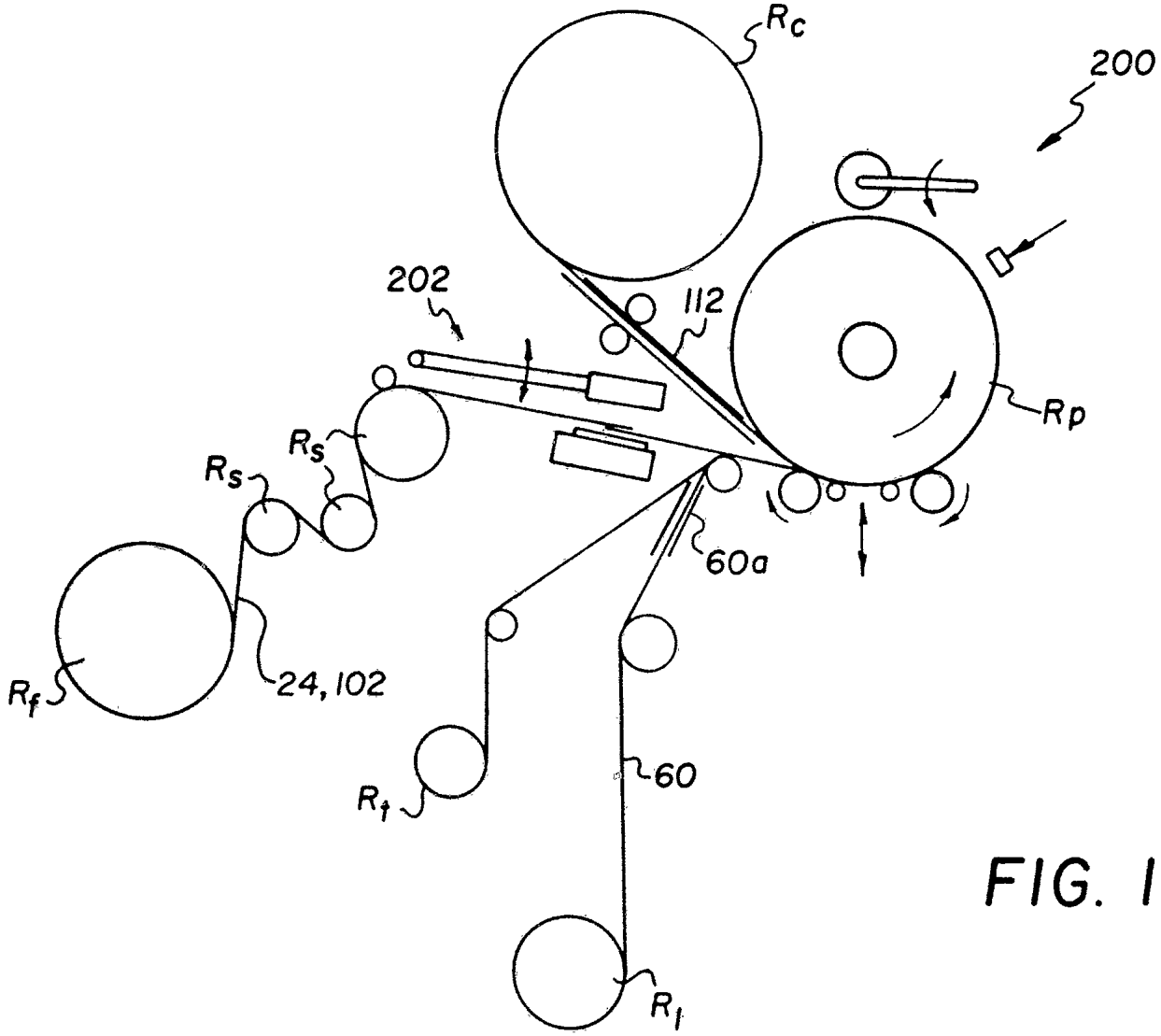


FIG. 11