about 90%, optionally wherein the entire recyclable shrink label contracts of shrinks by about 1% to 90% in a transverse direction" in claim 10 are method limitations and do not determine the patentability of the product, unless the method produces a structural feature of the product. The method of using the product is not germane to the issue of patentability of the product itself, unless Applicant presents evidence from which the Examiner could reasonably conclude that the claimed product differs in kind from those of the prior art. See MPEP § 2113. Furthermore, there does not appear to be a difference between the prior art structure and the structure resulting from the claimed method because '934 in view of '879 discloses the structure of claim 1 as described above.

72. The limitations reciting "optionally wherein the heat shrink film contracts of shrinks by about 1% to 90% in a transverse direction" in claim 9 and "optionally wherein the entire recyclable shrink label contracts of shrinks by about 1% to 90% in a transverse direction" are indefinite for the reasons expressed above, and are interpreted as being an optional limitation that is not required.

73. **Regarding claims 14 and 15,** '934 in view of '879 teach all the limitations of claim 1 above.

74. As stated above, '879 teaches that the light blockers are included in an amount between 0.1 and 30 wt.% of the layer ([0176]).

75. While '934 in view of '879 do not expressly teach that the third layer/skin (7; light blocking layer) comprising light blocking additives is present in an amount of 0.5 ppr to 25 ppr as recited by claim 14, or that the light blocking additives are present in the third layer/skin (7; light blocking layer) in an amount from 0.1 ppr to 10 ppr, such a

modification would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention to provide desired properties to the film in terms of the desired amount of reduction of chemical reactions and photo-oxidation, as well as opacity and whiteness.

76. Regarding claims 16, 17 and 18, '934 in view of '879 teach all the limitations of claim 1 above and '934 further teaches that the container to which the heat shrink label is applied can be comprised of glass, plastic, ceramic, metal, wherein the plastic can be polyethylene terephthalate ([0152]).

77. The limitations reciting "optionally wherein the first surface of the heat shrink film faces the external surface of the container" in claim 16 and "optionally wherein the container consists of polyethylene terephthalate (PET), optionally wherein the container comprises clear polyethylene terephthalate (PET)" in claim 18 are indefinite for the reasons expressed above, and are interpreted as being an optional limitation that is not required.

78. Claim 12 is rejected under 35 U.S.C. 103 as being unpatentable over Mitchell et al. (US 2016/0136934, hereafter referred to as '934) in view of Mitchell et al. (US 2017/0223879, hereafter referred to as '879) and further in view of Hashimoto et al. (JP 2004114498, machine translation via EPO provided).

79. Regarding claim 12, '934 in view of '879 teach all the limitations of claim 1 above, and while the combination of reference teach heat shrink labels with light blockers, the references do not expressly teach that the light blockers are metal particles.

80. Hashimoto et al. teaches a heat shrink film having light blocking properties, wherein inert fine particles such as inorganic fine particles or organic fine particles are added to the polymer resin to impart light blocking properties (pg. 4 Ln. 148-pg 5 Ln.175). Hashimoto et al. teaches inorganic fine particles such as titanium oxide and organic fine particles such as alkaline earth metal compounds can be used to form the inorganic fine particles providing the light blocking properties (pg. 4 Ln. 148-pg 5 Ln.175).

81. It would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention to modify the light blocker additive of '934 in view of '879 with the alkaline earth metal compounds taught by Hashimoto et al. by simple substitution, as Hashimoto et al. teaches that titanium dioxide and alkaline earth metal compounds provide the same light blocking properties to the films.

82. The limitation "optionally wherein the metal particulate has a particle size of 0.1μm to 100μm" is indefinite for the reasons expressed above, and are interpreted as being an optional limitation that is not required.

Conclusion

83. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. JP 2007-15747 teaches a heat shrink label and PET bottle which is easy to recycle (Figure 1-4; [0001, 0005, 0011, 0014-0025]).

84. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAURA POWERS whose telephone number is

(571)270-5624. The examiner can normally be reached Monday-Friday, 10:00AM-3:00PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Ruthkosky can be reached on 571-272-1291. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LAURA POWERS
Examiner
Art Unit 1785

/LAURA C POWERS/
Primary Examiner, Art Unit 1785

Notice of References Cited	Application/Control No. 18/103,234	Applicant(s)/Patent Under Reexamination Sharp et al.	
	Examiner LAURA POWERS	Art Unit 1785	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20170223879-A1	08-2017	Mitchell; Noel	B65D85/80	1/1
*	B	US-20160136934-A1	05-2016	Mitchell; Noel	C08L45/00	525/216
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N	WO-2006076327-A1	07-2006	WO	DOORNHEIM M	B32B15/08
	O	JP-2004114498-A	04-2004	JP	EINO H	B29C55/12
	P	JP-2007015747-A	01-2007	JP	KOBAYASHI J	
	Q					
	R					
	S					
	T					

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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	JP2004114498A Machine Translation via EPO (Year: 2004)
	V	JP2007015747A Machine Translation via EPO (Year: 2007)
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/103,234	Sharp et al.
	Examiner	Art Unit
	LAURA POWERS	1785

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Assignee and Inventor Name Search	07/27/2023	LCP
CPC search limited by keyword	07/27/2023	LCP
Keyword search	07/27/2023	LCP
Keyword search	07/31/2023	LCP
Keyword search	08/01/2023	LCP
Keyword search	08/02/2023	LCP
STIC search	07/31/2023	LCP

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/103,234	Sharp et al.
	Examiner	Art Unit
	LAURA POWERS	1785

Interference Search			
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	Filing Date:	Herewith
	First Named Inventor:	Andrew Sharp
	Art Unit:	Unassigned
	Examiner Name:	Unassigned
	Attorney Docket No.:	0644.000001US01
Sheet 1 of 2	**IDS filed on:**	

U.S. PATENTS

Examiner Initial	Patent Number (Number - Kind Code)	Issue Date (MM-DD-YYYY)	Name of Patentee or Applicant	Comments
	None			

U.S. PATENT APPLICATION PUBLICATIONS

Examiner Initial	Publication Number (Number - Kind Code)	Publication Date (MM-DD-YYYY)	Name of Patentee or Applicant	Comments
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	2009/0233067	09/17/2009	Doornheim	
	2013/0126462	05/23/2013	Georgeson	

U.S. PATENT APPLICATIONS BY SERIAL NUMBER

Examiner Initial	Copy Enclosed	Document Number (Number - Kind Code)	Filing Date (MM-DD-YYYY)	Name of Patentee or Applicant	Comments
		None			

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Examiner Initial	Copy Enclosed	Country Code	Foreign Document Number	Kind Code	Publication Date (MM-DD-YYYY)	Name of Patentee or Applicant	Comments	translation	
								yes	no
	X	EP	2298665		03/23/2011	Okura Industrial Co. Ltd.			
	X	WO	2015/026479		02/26/2015	Sun Chemical Corporation			
	X	EP	03854839		07/28/2021	SKC Co., Ltd.			

NON-PATENT LITERATURE DOCUMENTS

Examiner Initial	Copy Enclosed	Document Description (Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.)
	X	PCT Search Report and Written Opinion for PCT/US2022/029280 dated August 11, 2022 (9 pages).
	X	Shrink Sleeve Labels on PET Containers APR Resource Document, The Association of Plastic Recyclers, 1/4/2021, 10 pages.
	X	Benchmark Evaluation for Clear PET Articles with Labels and Closures, The Association of Plastic Recyclers, 04/11/2019 (7 pages).
	X	Critical Guidance Protocol for Clear PET Articles with Labels and Closures, The Association of Plastic Recyclers, 08/17/2021 (11 pages).

Examiner Signature	/LAURA C POWERS/	Date Considered	08/02/2023

***EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /L.C.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number:	Unassigned
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	First Named Inventor:	Andrew Sharp
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Sheet _2_ of _2_	**IDS filed on:**	

Examiner Initial	Copy Enclosed	Document Description (Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.)
	X	Evaluation of the Near Infrared (NIR) Sorting Potential of a Whole Plastic Article, The Association of Plastic Recyclers, 05/15/2018 (15 pages).
	X	Evaluation of Sorting Potential for Plastic Articles Utilizing Metal, Metalized, or Metallic Printed Components, The Association of Plastic Recyclers, 05/15/2018 (10 pages).

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /L.C.P/

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最終頁に続く

(54)【発明の名称】熱収縮性ポリエステル系フィルム

(57)【要約】
【課題】収縮仕上がり性が好適で、ボトルの胴部等に装着する表示用のラベルにしたときに端部に歪みがなく、また、印刷加工を施さなくとも光線遮断性を有する熱収縮性ポリエステル系フィルムを提供すること。
【解決手段】主としてポリエステル樹脂からなるフィルムであって、フィルムの全光線透過率が４０％以下、かつ、８０℃における最大収縮方向の温湯収縮率が６５％以上、８０℃における最大収縮方向と直交する方向の温湯収縮率が２％以下であることを特徴とする。
【選択図】　なし

【特許請求の範囲】
【請求項１】
主としてポリエステル樹脂からなるフィルムであって、フィルムの全光線透過率が４０％以下、かつ、８０℃における最大収縮方向の温湯収縮率が６５％以上、８０℃における最大収縮方向と直交する方向の温湯収縮率が２％以下であることを特徴とする熱収縮性ポリエステル系フィルム。
【請求項２】
８０℃における最大収縮方向と直交する方向の破断伸度が、３０℃、湿度８５％ＲＨ雰囲気下で２８日間保持後、５％以上であることを特徴とする請求項１記載の熱収縮ポリエステル系フィルム。
【請求項３】
溶剤接着性を有することを特徴とする請求項１又は２記載の熱収縮性ポリエステル系フィルム。
【請求項４】
不活性微粒子及び非相溶性樹脂を含有するポリエステル樹脂からなる空洞含有層を少なくとも１層有する多層フィルムであることを特徴とする請求項１、２又は３記載の熱収縮性ポリエステル系フィルム。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】
本発明は、熱収縮性ポリエステル系フィルムに関し、特に、飲料用ボトル等の胴部に装着する表示用のラベル（環状のラベルを意味する、以下同じ）にしたときに収縮仕上がり性が好適で、印刷加工を施さなくとも光線遮断性を有する熱収縮性ポリエステル系フィルムに関するものである。
【０００２】
【従来の技術】
最近、ボトルの内容物を紫外線から保護することを目的として収縮ラベルを使用するケースが増えている。従来は、紫外線を遮断することができるポリ塩化ビニル製の収縮フィルムが用いられてきたが、他素材により紫外線を遮断することができる収縮フィルムに対する要求が強まっている。具体的な光線遮断性に対する要求品質は内容物によって異なるが、内容物が食品・飲料等の場合、長波長領域の紫外線である３６０～４００ｎｍの波長で変質や着色等が起こるため長波長領域、特に３８０～４００ｎｍにおける光線遮断性が重要視されている。
【０００３】
このようなラベルとしては、ポリ塩化ビニル、ポリスチレン等からなる熱収縮性フィルムが主として用いられてきたが（特開平１１－１８８８１７号公報等）、ポリ塩化ビニルについては、近年、廃棄時に焼却する際の塩素系ガス発生が問題となり、またポリスチレンについては印刷が困難である等の問題があり、最近は熱収縮性ポリエステル系フィルムの利用が注目を集めている。しかしながら、従来の熱収縮性ポリエステル系フィルムでは上記の長波長領域の紫外線を遮断する実用的なフィルムは知られていなかった。
【０００４】
また、ペットボトルにおいては、内容物保護のために樹脂に染料や顔料を添加した着色ボトルが用いられていることがある。しかしながら、着色ボトルは回収してリサイクルするときに全回収物に広がって着色するため、再利用に不向きであることからその代替案が検討されて来ている。その１つの方法として無着色ボトルを利用し、熱収縮性の着色ラベルをボトル全体に装着することで、ボトルを着色したのと同じ効果を出すことが検討されてきた。
【０００５】
さらに、従来、ボトルに装着する着色ラベルとして熱収縮性フィルムを使用する場合は、通常、ラベルの内側に図柄印刷した後に白色印刷を施しているが、印刷インキの厚みは通

常３μｍ程度であり紫外線を遮断をするには十分でなかった。さらに、白色印刷を２回実施することで紫外線を遮断することを試みているが、品質的な要因（インキ層の厚みによる収縮特性の変化等）のほかにラベル製造工程の複雑さ、納期の長期化等の不利があった。

【０００６】

【発明が解決しようとする課題】

本発明は、上記従来の熱収縮性ポリエステル系フィルムの有する問題点を解決し、収縮仕上がり性が好適で、ボトルの胴部等に装着する表示用のラベルにしたときに端部に歪みがなく、また、印刷加工を施さなくとも光線遮断性を有する熱収縮性ポリエステル系フィルムを提供することにある。

【０００７】

【課題を解決するための手段】

上記目的を達成するため、本発明の熱収縮性ポリエステル系フィルムは、主としてポリエステル樹脂からなるフィルムであって、フィルムの全光線透過率が４０％以下、かつ、８０℃における最大収縮方向の温湯収縮率が６５％以上、８０℃における最大収縮方向と直交する方向の温湯収縮率が２％以下であることを特徴とする。

【０００８】

ここで、８０℃における最大収縮方向の温湯収縮率とは、試料を８０℃の温湯中に１０秒間浸漬後２５℃の水中に１０秒浸漬した後の最大収縮方向の温湯収縮率をいい、最大収縮方向とは、主収縮方向とその直交方向のそれぞれの８０℃における温湯収縮率のうち、大きい収縮率を示す方の収縮方向をいう。

温湯収縮率＝（（収縮前の長さ－収縮後の長さ）／収縮前の長さ）×１００（％）

【０００９】

上記の構成からなる本発明の熱収縮性ポリエステル系フィルムは、収縮仕上がり性が好適で、ボトル等の胴部に装着する表示用のラベルにしたときに端部に歪みがなく、また、印刷加工を施さなくとも光線遮断性を有する。

【００１０】

この場合、８０℃における最大収縮方向と直交する方向の破断伸度を、３０℃、湿度８５％ＲＨ雰囲気下で２８日間保持後５％以上とすることができる。

【００１１】

またこの場合、熱収縮性ポリエステル系フィルムを溶剤接着性を有するものとすることができる。

【００１２】

さらに、またこの場合、熱収縮性ポリエステル系フィルムを、不活性微粒子及び非相溶性樹脂を含有するポリエステル樹脂からなる空洞含有層層を少なくとも１層有する多層フィルムとすることができる。

【００１３】

【発明の実施の形態】

以下、本発明の熱収縮性ポリエステル系フィルムの実施の形態を説明する。

【００１４】

本発明の熱収縮性ポリエステル系フィルムは、フィルムの全光線透過率が４０％以下、かつ、８０℃における最大収縮方向の温湯収縮率が６５％以上、８０℃における最大収縮方向と直交する方向の温湯収縮率が２％以下であり、そのことにより上記目標が達成される。

【００１５】

また、本発明の熱収縮性ポリエステル系フィルムは、主にポリエステル樹脂からなり、実質的にポリエステル樹脂又は不活性微粒子及び非相溶性樹脂を含有するポリエステル樹脂から構成する。上記ポリエステル樹脂としては、例えば、芳香族ジカルボン酸成分とグリコール成分とを構成成分とするポリエステル又はポリエステルとポリエステル系エラストマーとからなるポリエステル組成物を示すことができる。なかでも、ポリエステルとポリ

エステル系エラストマーとからなるポリエステル組成物を用いるのが好ましい。この場合、ポリエステル組成物において、ポリエステルとポリエステル系エラストマーとの配合割合は、両者合計量に対して、通常、前者が５０～９９重量％程度、特に７０～９７重量％で、後者が１～５０重量％程度、特に３～３０重量％程度であるのが好適である。

【００１６】

上記ポリエステルを製造するのに用いる芳香族ジカルボン酸としては、例えばテレフタル酸、イソフタル酸、ナフタレン－１，４－ジカルボン酸、ナフタレン－２，６－ジカルボン酸、５－ナトリウムスルホイソフタル酸等が挙げられる。また、脂肪族ジカルボン酸としては、ダイマー酸、グルタル酸、アジピン酸、セバシン酸、アゼライン酸、シュウ酸、コハク酸等が挙げられる。また、ｐ－オキシ安息香酸等のオキシカルボン酸、無水トリメリット酸、無水ピロメリット酸等の多価のカルボン酸を必要に応じて併用してもよい。

【００１７】

上記ポリエステルを製造するのに用いるグリコールとしては、エチレングリコール、ジエチレングリコール、ダイマージオール、プロピレングリコール、トリエチレングリコール、１，４－ブタンジオール、ネオペンチルグリコール、１，４－シクロヘキサンジメタノール、１，６－ヘキサンジオール、３－メチル－１，５－ペンタンジオール、２－メチル－１，５－ペンタンジオール、２，２－ジエチル－１，３－プロパンジオール、１，９－ノナンジオール、１，１０－デカンジオール等のアルキレングリコール等が挙げられる。また、ビスフェノール化合物又はその誘導体のアルキレンオキサイド付加物、トリメチロールプロパン、グリセリン、ペンタエリスリトール等を必要に応じて併用してもよい。

【００１８】

本発明において用いるポリエステルは、１種類でもよいし、２種以上を混合して用いてもよい。熱収縮特性の点からは、ガラス転移温度（Ｔｇ）の異なる２種以上のポリエステルを混合して使用することが好ましい。ポリエチレンテレフタレートと共重合ポリエステル（２種以上の共重合ポリエステルであってもよい）を混合して使用することが好ましいが、共重合ポリエステル同士の組み合わせであってもよい。また、ポリブチレンテレフタレート、ポリシクロヘキシレンジメチルテレフタレート、ポリエチレンナフタレート等を組み合わせたり、これらと他の共重合ポリエステルを組み合わせて用いることもできる。本発明において用いるポリエステルの極限粘度は、好ましくは０．５０以上、さらに好ましくは０．６０以上、特に好ましくは０．６５以上である。ポリエステルの極限粘度が０．５０未満であると結晶性が高くなり、十分な収縮率が得られなくなり、好ましくない。

【００１９】

ポリエステルは常法により溶融重合することによって製造できるが、ジカルボン酸とグリコールとを直接反応させ得られたオリゴマーを重縮合する、いわゆる直接重合法、ジカルボン酸のジメチルエステル体とグリコールとをエステル交換反応させたのちに重縮合する、いわゆるエステル交換法等が挙げられ、任意の製造法を適用することができる。また、その他の重合方法によって得られるポリエステルであってもよい。ポリエステルの重合度は、固有粘度にして０．３～１．３ｄＬ／ｇのものが好ましい。

【００２０】

ポリエステルには、着色やゲル発生等の不都合を起こさないようにするため、酸化アンチモン、酸化ゲルマニウム、チタン化合物等の重合触媒以外に、酢酸マグネシウム、塩化マグネシウム等のＭｇ塩、酢酸カルシウム、塩化カルシウム等のＣａ塩、酢酸マンガン、塩化マンガン等のＭｎ塩、塩化亜鉛、酢酸亜鉛等のＺｎ塩、塩化コバルト、酢酸コバルト等のＣｏ塩を、ポリエステルに対して、各々金属イオンとして３００ｐｐｍ以下、リン酸又はリン酸トリメチルエステル、リン酸トリエチルエステル等のリン酸エステル誘導体を燐（Ｐ）換算で２００ｐｐｍ以下、添加してもよい。

【００２１】

また、本発明において用いるポリエステル系エラストマーは、例えば、高融点結晶性ポリエステルセグメントと低融点軟質重合体セグメントとからなるポリエステル系ブロック共重合体である。

【００２２】
ここで、ポリエステル系ブロック共重合体の高融点結晶性ポリエステルセグメントとしては、主としてエステル結合又はエステル結合とエーテル結合とからなるポリエステル単位が好ましいものとして挙げられ、少なくとも１種の芳香族核を有する基を主たる繰り返し単位とし、かつ、分子末端に主として水酸基を有するものが用いられる。この高融点結晶性ポリエステルセグメントは、通常、融点が２００℃以上のものが好ましく、その好ましい具体例としては、エチレンテレフタレート、テトラメチレンテレフタレート、１，４－シクロヘキシレンジメチレンテレフタレート、エチレン－２，６－ナフタレートなどのエステル単位；エチレンオキシベンゾエート、ｐ－フェニレンビスオキシエトキシテレフタレートなどのエステルエーテル単位；主としてテトラメチレンテレフタレート又はエチレンテレフタレートからなり、他にテトラメチレンイソフタレート又はエチレンイソフタレート、テトラメチレンアジペート又はエチレンアジペート、テトラメチレンセバケート又はエチレンセバケート、１，４－シクロヘキシレンジメチレンテレフタレート、テトラメチレン－ｐ－オキシベンゾエート又はエチレン－ｐ－オキシベンゾエートなどの共重合成分を有する共重合エステル単位又は共重合エステルエーテル単位などである。なお、共重合の場合にはテトラメチレンテレフタレート又はエチレンテレフタレート単位が６０モル％以上含まれることが好ましい。

【００２３】
また、ポリエステル系ブロック共重合体の低融点軟質重合体セグメントは、通常、融点が８０℃以下のものが好ましく、分子量は４００以上、好ましくは４００～８０００であって、その好ましい具体例としては、ポリエーテルグリコール類及びポリラクトン類を挙げることができる。ポリエーテルグリコール類としては、ポリオキシテトラメチレングリコール、ポリオキシエチレングリコール、ポリオキシ－１，２－プロピレングリコール等を挙げることができ、これらの２種以上を併用することもできる。また、ポリラクトン類としては、ポリカプロラクトン、ポリエナントラクトン、ポリカプリロラクトン等を挙げることでき、これらの２種以上を併用することもできる。なかでも、ポリ－ε－カプロラクトン等のポリラクトンを低融点軟質重合体セグメントに用いたポリエステル系エラストマーが特に好ましい。

【００２４】
上記高融点結晶性ポリエステルセグメントと低融点軟質重合体セグメントとの共重合割合は、適宜変えることができる。一般に、高融点結晶性ポリエステルセグメントの割合が増大すると、得られるポリエステル系エラストマーは硬くなり、機械的特性が向上する。低融点軟質重合体セグメントの割合が増大すると、得られるポリエステル系エラストマーは軟質化し、低温特性が向上する。従って、機械的強度、低温特性などのバランスを考慮しながら、両者の共重合割合を選定することができる。標準的な配合比率としては、重量比で高融点結晶性ポリエステルセグメントと低融点軟質重合体セグメントが９７／３～５／９５、より一般的には９５／５～３０／７０の程度の範囲である。

【００２５】
フィルムが全光線透過率４０％以下となって、フィルムに光線遮断性を付与するためには、例えば、フィルムを構成するポリエステル樹脂中に、無機微粒子又は有機微粒子等の不活性微粒子をフィルム重量に対して０．１～２０重量％、好ましくは０．５～１０重量％含有させることが好適である。不活性微粒子を０．１重量％以上含有させることが光線遮断性を得るために好ましく、一方、２０重量％を超えるとフィルム強度が低下して製膜が困難になる傾向にある。

【００２６】
熱収縮性ポリエステル系フィルムを形成するポリエステル樹脂中に不活性微粒子を含有させる場合には、不活性微粒子はポリエステル重合前に添加してもよいが、通常は、ポリエステル重合後に添加する。不活性微粒子としては、例えば、カオリン、クレー、炭酸カルシウム、酸化ケイ素、テレフタル酸カルシウム、酸化アルミニウム、酸化チタン、リン酸カルシウム、カーボンブラック等の公知の不活性無機微粒子、ポリエステル樹脂の溶融製

膜に際して不溶な高融点有機化合物微粒子、架橋ポリマー微粒子及びポリエステル合成時に使用する金属化合物触媒、例えばアルカリ金属化合物、アルカリ土類金属化合物などによってポリエステル製造時に、ポリマー内部に形成される内部粒子などを挙げることができる。

【００２７】

ポリエステル樹脂中に含有させるのに好ましい不活性微粒子の平均粒径は、通常、０．００１～３．５μｍの範囲である。ここで、微粒子の平均粒径は、コールターカウンター法により測定したものである。

【００２８】

ポリエステル樹脂中に含有させるのに好ましい非相溶性樹脂は、ポリエステルに非相溶性の樹脂であれば特に限定されるものではないが、好ましくは非相溶性の熱可塑性樹脂であって、具体的には、ポリスチレン系樹脂、ポリオレフィン系樹脂、ポリアクリル系樹脂、ポリカーボネート系樹脂、ポリスルホン系樹脂、セルロース系樹脂などが挙げられる。特に、全光線透過率を４０％以下にするためにフィルムに空洞を形成するには、空洞形成性が優れていることからポリスチレン系樹脂あるいはポリメチルペンテン、ポリプロピレンなどのポリオレフィン系樹脂を用いるのが好ましい。

【００２９】

上記非相溶性樹脂としてのポリスチレン系樹脂としては、ポリスチレン構造を基本構成要素として含む熱可塑性樹脂を指し、アタクティックポリスチレン、シンジオタクティックポリスチレン、アイソタクティックポリスチレン等のホモポリマーのほか、その他の成分をグラフトあるいはブロック共重合した改質樹脂、例えば耐衝撃性ポリスチレン樹脂や変性ポリフェニレンエーテル樹脂等、さらにはこれらのポリスチレン系樹脂と相溶性を有する熱可塑性樹脂、例えばポリフェニレンエーテルとの混合物等を例示することができる。

【００３０】

ポリエステル樹脂と非相溶性樹脂を混合調整するにあたっては、例えば、各樹脂のチップを混合し押出機内で溶融混練して押出してもよいし、予め混練機によって両樹脂を混練したものをさらに押出機より溶融押出ししてもよい。また、ポリエステルの重合工程においてポリスチレン系樹脂を添加し、撹拌分散して得たチップを溶融押出ししてもよい。

【００３１】

本発明の熱収縮性ポリエステル系フィルムは、主としてポリエステル樹脂から形成してなる単層又は多層のフィルムであるが、不活性微粒子及び非相溶性樹脂を含有するポリエステル樹脂からなる空洞含有層を少なくとも１層有する多層フィルムであることが好ましい。

【００３２】

本発明の熱収縮性ポリエステル系フィルムは内部に多数の空洞を含有する空洞含有層から構成される単層フィルムであるほか、内部に多数の空洞を含有する空洞含有層の少なくとも一方の面に、上記空洞含有層よりも空洞の少ない又は空洞を含有しないフィルム層を設けた、多層フィルムとすることができる。多層フィルムの構成にするためには、異なる原料をＡ、Ｂそれぞれ異なる押出機に投入、溶融し、Ｔ－ダイの前又はダイ内部にて溶融状態で貼り合わせ、冷却ロール上で密着固化させた後、少なくとも１方向に延伸することが好ましい。このとき、原料として空洞の少ない又は空洞を含有しないフィルム層には非相溶性樹脂は空洞含有層への配合量より少なくするか、または配合しないことが好ましい。このようにすることにより、得られるフィルム層は空洞が少ないか、または空洞を含有しないため、表面の荒れが少なくなる。空洞の少ない又は空洞を含有しないフィルム層を表面に位置することにより印刷の美観を損なわない空洞含有フィルムとすることができる。また、フィルム全体としての空洞含有率が低いため、フィルムの腰が弱くならずラベルとしたときに装着性に優れるフィルムとなる。

【００３３】

さらに、本発明の熱収縮性ポリエステル系フィルムは内部に多数の空洞を含有する空洞含有層を中間層とし、両表層に空洞の少ない又は空洞を含有しないフィルム層を設けること

が特に好ましい。ポリエステル樹脂中に含有させるのに用いる熱可塑性樹脂は、ポリエステルに非相溶性の樹脂であれば特に限定されるものではないが、空洞を発現させるのに好ましい熱可塑性樹脂を添加することで溶融押出時に煙が発生し、工程を汚して操業性悪化を引き起こすことがあり、このような場合、空洞含有層を中間層にすることにより溶融押出時にダイリップに接触して発煙するという問題が解消され、長時間の安定生産が実施可能となる。特に、空洞を発現させるのに好ましい熱可塑性樹脂としてポリスチレン系樹脂を用いる場合には発煙が問題視されるので、空洞含有層を中間層にすることが推奨される。

【００３４】

また、本発明のフィルムは、必要に応じて、安定剤、着色剤、酸化防止剤、帯電防止剤等の添加剤を含有するものであってもよい。

【００３５】

本発明の熱収縮性ポリエステル系フィルムは、ＪＩＳ－Ｋ－７１３６に準じて測定されたフィルムの全光線透過率が４０％以下であることが必要である。全光線透過率が４０％を越えると、ラベルとして装着時に内容物が透けて見えたり、紫外線を遮断できずに内容物が劣化したりしていずれも好ましくない。全光線透過率は３０％以下であることが、特に好ましい。

【００３６】

本発明のフィルムは、８０℃における最大収縮方向の温湯収縮率が６５％以上であり、好ましくは６５～９５％である。本発明のフィルムをボトルのラベルとして用いる場合には、フィルムの８０℃における最大収縮方向を、環状のラベルの周方向にあわせてラベルとするが、最大収縮方向の温湯収縮率が６５％未満であるとペットボトル等の筒状容器の細い口部分で、環状のラベルの収縮不足が発生する。一方、最大収縮方向の温湯収縮率が９５％を越えると、収縮率が大きいために、筒状容器に未収縮ラベルを装着して収縮トンネルを通過させる間に大きく収縮して、ラベルの飛び上がりが発生する場合があるので、収縮工程の管理を慎重に行う必要がある。

【００３７】

また、８０℃における最大収縮方向と直交する方向の温湯収縮率が２％以下、好ましくは０～２％であり、さらに好ましくは０～１％である。環状のラベルの周方向と直角の方向、言い換えれば、環状のラベルの幅方向にあわせて温湯収縮率が０％未満（収縮率がマイナス）であるとフィルムが伸びることになり許容できるのは約－２％程度までであり、それ以上大きくなると、最大収縮方向に収縮するときに生じたラベルの横シワが消えにくくなる傾向にある。一方、最大収縮方向と直交する方向の温湯収縮率が２％を超えるとラベルの縦収縮が大きくなり、使用するフィルム量が多くなり経済的に問題が生ずるので、好ましくない。

【００３８】

本発明のフィルムは、処理温度３０℃、処理湿度８５％ＲＨにおける雰囲気下で２８日間保持した後に、最大収縮方向と直交する方向の破断伸度が５％以上であり、好ましくは１０％以上である。破断伸度が５％未満の場合は印刷加工時のフィルム張力で切れが発生し、生産性が悪くなり好ましくない。また、製造直後の熱収縮性ポリエステル系フィルムの、最大収縮方向と直交する方向の破断伸度も、５％以上である。

【００３９】

本発明の熱収縮性ポリエステル系フィルムのガラス転移温度（Ｔｇ）は５０～９０℃程度、好ましくは５５～８５℃、さらに好ましくは５５～８０℃の範囲である。ガラス転移温度（Ｔｇ）がこの範囲内にあれば、低温収縮性は十分でかつ自然収縮が大きすぎることがなく、ラベルの仕上がりが良好である。

【００４０】

本発明のフィルムは、ベンゼン、トルエン、キシレン、トリメチルベンゼン等の芳香族炭化水素、塩化メチレン、クロロホルム等のハロゲン化炭化水素、フェノール等のフェノール類、テトラヒドロフラン等のフラン類、１，３－ジオキソラン等のオキソラン類等の有

機溶剤による溶剤接着性を有することが好ましい。特に、有機溶剤による溶剤接着性としては、１，３－ジオキソランによる溶剤接着性で典型的に示すことができる。１，３－ジオキソランを用いることは、安全性の点からも好ましい。ここで、フィルムを表裏面接着したフィルムの溶剤接着強度が４Ｎ／１５ｍｍ以上であることが好ましい。４Ｎ／１５ｍｍ未満では、ラベルを容器に収縮させる際に接合部が剥がれ、好ましくない。溶剤接着強度が４Ｎ／１５ｍｍ以上である場合には剥離抵抗力があると評価できる。

【００４１】

本発明のフィルムの溶剤接着性をさらに向上させるためには、例えば、ポリエステルに、そのガラス転移温度（Ｔｇ）を低下させる成分を共重合することが有効である。

【００４２】

以上の特性を満足するために、本発明の熱収縮性ポリエステル系フィルムは空洞含有層からなる単一の層でもよいが、好ましい層構成は内部に多数の空洞を含有する空洞含有層（以下、単にＢ層ということがある）の少なくとも一方の面に、上記空洞含有層よりも空洞の少ない又は空洞を含有しないフィルム層（以下、単にＡ層ということがある）を設けた多層フィルム、即ち、Ａ層／Ｂ層又はＡ層／Ｂ層／Ａ層からなる多層フィルムである。Ａ層／Ｂ層からなる２層体である場合、Ａ層とＢ層の厚み比率はＡ層／Ｂ層＝５０／５０から２０／８０が好ましい。Ｂ層の厚み比率が５０％未満では、光線遮断性が不足し、内容物が透けて見えたり、紫外線を遮断できずに内容物が劣化したりしていずれも好ましくない。また、Ａ層／Ｂ層／Ａ層からなる３層体である場合、Ａ層とＢ層の厚み比率はＡ層／Ｂ層／Ａ層＝２５／５０／２５から１０／８０／１０が好ましい。Ｂ層の厚み比率が５０％未満では、光線遮断性が不足し、内容物が透けて見えたり、紫外線を遮断できずに内容物が劣化したりしていずれも好ましくない。

【００４３】

以下、本発明フィルムの製造方法を具体的に説明する。本発明の熱収縮性ポリエステル系フィルムを製造するのに用いるポリエステル樹脂は、単独でもよいし、２種以上を混合して用いてもよいが熱収縮特性を容易に得るためには、ガラス転移温度（Ｔｇ）の異なる２種以上のポリエステル樹脂を混合して使用することが好ましく、また、不活性微粒子及び非相溶性樹脂を含有するポリエステル樹脂、さらに好ましくは不活性微粒子及び非相溶性樹脂を含有しガラス転移温度（Ｔｇ）の異なる２種以上のポリエステル樹脂をを通常のホッパードライヤー、パドルドライヤー、真空乾燥機等を用いて乾燥した後、２００～３２０℃の温度で溶融し、押出しを行う。押出しに際しては、Ｔダイ法、チューブラー法等、既存の方法を使用し、単層であるほか同一又は異なる組成の二層、三層で共押出しすることができる。

【００４４】

溶融押出し後、急冷して未延伸フィルムを得るが、Ｔダイ法の場合、急冷時にいわゆる静電印加密着法を用いることにより、厚み斑の少ないフィルムを得ることができる。

【００４５】

得られた未延伸フィルムを、最終的に得られるフィルムが本発明の構成要件を満たすように、１軸延伸又は２軸延伸する。延伸方法としては、ロール法で縦１軸のみに延伸したり、テンター法で横１軸にのみ延伸する方法の外、公知の２軸延伸に際し縦又は横のいずれか一方向に強く延伸し、他方を極力小さく延伸することも可能であり、必要に応じて再延伸を施してもよい。

【００４６】

上記延伸において、主収縮方向には少なくとも２．０倍以上、好ましくは２．５倍以上延伸し、必要に応じて主収縮方向と直交する方向に延伸し、次いで熱処理を行い、本発明のフィルムを得ることができる。

【００４７】

熱処理は通常、緊張下で実施されるが、同時に２０％以下の弛緩又は幅出しを行うことも可能である。熱処理方法としては加熱ロールに接触させる方法やテンター内でクリップに把持して行う方法等の既存の方法を行うことも可能である。

【００４８】
前記延伸工程中、延伸前又は延伸後にフィルムの一方の面又は両方の面にコロナ放電処理を施し、フィルムの印刷層及び／又は接着剤層に対する接着剤層等に対する接着性を向上させることも可能である。
【００４９】
また、上記延伸工程中、延伸前又は延伸後にフィルムの一方の面又は両方の面に塗布を施し、フィルムの接着性、離型性、帯電防止性、易滑性、遮光性等を向上させることも可能である。
【００５０】
得られるフィルムを空洞含有フィルムとする場合、あるいは空洞含有層を一層以上有する多層フィルムとする場合は、８０℃における最大収縮方向の温湯収縮率が６５％以上、８０℃における最大収縮方向と直交する方向の温湯収縮率が２％以下という本発明フィルムの収縮特性を満足するフィルムを容易に得ることができる。特に、不活性微粒子及び非相溶性樹脂を含有するポリエステル樹脂からなる空洞含有層をフィルム構成成分を少なくとも一層とする場合は、特に、上記収縮特性を満足するフィルムを容易に得ることができる。
【００５１】
本発明の熱収縮性ポリエステル系フィルムを空洞含有フィルムとする場合、あるいは空洞含有層を一層以上有する多層フィルムとする場合は、最大収縮方向と直交する方向の温湯収縮率が２％以下という低い値を容易に得ることができる。その理由は明らかではないが、延伸方向の収縮は延伸前に戻ろうとして問題にはならないが、延伸方向と直交する方向は空洞がクッション材となり収縮を阻害するためではないかと推測することができる。
【００５２】
本発明の熱収縮性ポリエステル系フィルムの厚みは特に限定するものではないが、ラベル用熱収縮性フィルムとして好ましくは１０～２００μｍ、さらに好ましくは２０～１００μｍの範囲である。
【００５３】
【実施例】
以下、実施例により本発明をさらに具体的に説明するが、本発明はその要旨を越えない限り、これらの実施例に限定されるものではない。
【００５４】
（１）全光線透過率
日本電飾工業社製ＮＤＨ－２０００Ｔを用い、ＪＩＳ－Ｋ－７１３６に準じ測定した。
【００５５】
（２）温湯収縮率
試料を主収縮方向及びその直交方向に沿うように１０ｃｍ×１０ｃｍの正方形に裁断し、８０℃±０．５℃の温湯中に、無荷重状態で１０秒間浸漬して熱収縮させた後、２５℃±０．５℃の水中に１０秒浸漬し、その後、試料の縦（主収縮）方向及び横（直交）方向の長さを測定し、下記式に従って試料の縦（主収縮）方向及び横（直交）方向についてそれぞれ求めた値である。
温湯収縮率＝（（収縮前の長さ－収縮後の長さ）／収縮前の長さ）×１００（％）
試料の主収縮方向及びその直交方向のうち、最も収縮率の大きい方向を最大収縮方向とし、最大収縮方向の温湯収縮率を「８０℃における最大収縮方向の温湯収縮率」とした。
【００５６】
（３）破断伸度
主収縮方向において１５ｍｍ幅のフィルムを、東洋ボールドウィン社製のテンシロン（型式：ＳＴＭ－Ｔ－５０ＢＰ）でチャック間距離５０ｍｍ、引張速度２００ｍｍ／分で測定した。
【００５７】
（４）収縮仕上がり性

Ｆｕｊｉ Ａｓｔｅｃ Ｉｎｃ社製スチームトンネル（型式：ＳＨ－１５００－Ｌ）を用い、通過時間２．５秒、ゾーン温度８０℃で５００ｍＬの角型ペットボトル（高さ２１０ｍｍ、底部の長径６０ｍｍ：吉野工業社製でサントリー社の烏龍茶に使用されているボトル）を用いてテストした（測定数＝２０）。

【００５８】

評価は目視で行い、基準は下記の通りとした。

シワ、飛び上がり、収縮不足のいずれもの発生なし ：○

シワ、飛び上がり、または収縮不足が発生する ：×

【００５９】

（５）溶剤接着性

フィルムを２３０ｍｍ幅にスリットし、続いて、センターシールマシンを用いて１，３－ジオキソランで長さ方向に表裏面接着しながら連続してチューブを作り、二つ折り状態で巻き取った。次いで、該チューブ状体を加工時の接合加工方向と直交方向に１５ｍｍ幅に切断して環状のサンプルを作り、環状のサンプルを切開して東洋精機社製のテンシロン（型式：ＵＴＬ－４Ｌ）を用いてチャック間を２０ｍｍにして引っ張り、溶剤接着部分が剥離したときの溶剤接着強度を測定した。測定値が４Ｎ／１５ｍｍ以上であれば、剥離抵抗力あり「○」とし、４Ｎ／１５ｍｍ未満であれば、剥離抵抗力なし「×」として表した。

【００６０】

（６）ガラス転移温度（Ｔｇ）

セイコー電子工業社製のＤＳＣ（型式：ＤＳＣ２２０）を用いて、未延伸フィルム１０ｍｇを、－４０℃から１２０℃まで昇温速度２０℃／分で昇温し、得られた吸熱曲線より求めた。吸熱曲線の変曲点の前後に接線を引き、その交点をガラス転移温度（Ｔｇ）とした。

【００６１】

実施例、比較例に用いたポリエステルは以下の通りである。

ポリエステルａ：ポリエチレンテレフタレート（ＩＶ：０．７５）

ポリエステルｂ：テレフタル酸１００モル％と、エチレングリコール７０モル％、ネオペンチルグリコール３０モル％とからなるポリエステル（ＩＶ：０．７２）

ポリエステルｃ：ポリブチレンテレフタレート７０重量％とε－カプロラクトン３０重量％とからなるポリエステルエラストマー（還元粘度（ηｓｐ／ｃ）１．３０）

ポリエステルｄ：ポリブチレンテレフタレート（ＩＶ：１．２０）

【００６２】

（実施例１）

内部に多数の空洞を含有する空洞含有層（Ｂ層）の両方の面に、上記空洞含有層よりも空洞の少ない又は空洞を含有しないフィルム層（Ａ層）を設けた多層フィルムからなる熱収縮性ポリエステル系フィルムを製造した。

【００６３】

表１に示すように、Ａ層の原料して、ポリエステルａを３０重量％、ポリエステルｂを６７重量％、ポリエステルｃを３重量％混合したポリエステル組成物を、Ｂ層の原料して、ポリエステルａを１０重量％、ポリエステルｂを６５重量％、ポリエステルｃを５重量％と結晶性ポリスチレン樹脂（Ｇ７９７Ｎ 日本ポリスチレン社製）１０重量％及び二酸化チタン（ＴＡ-３００富士チタン社製）１０重量％をそれぞれ別々の押出機に投入、混合、溶融したものをフィードブロックで接合し、２８０℃でＴダイから延伸後のＡ層／Ｂ層／Ａ層の厚み比率が１０μｍ／２０μｍ／１０μｍとなるように積層しながら溶融押出しし、チルロールで急冷して未延伸フィルムを得た。得られた未延伸フィルムを、テンターでフィルム温度７０℃で横方向に４．０倍延伸し、厚み４０μｍの熱収縮性ポリエステル系フィルムを得た。

【００６４】

（実施例２及び比較例１～３）

表１に示すように、ポリエステル、ポリスチレン及び二酸化チタン配合割合、製膜条件を

変えたこと以外は、実施例１と同様にして厚み４０μｍの熱収縮性ポリエステル系フィルムを得た。

【００６５】

実施例１～２及び比較例１～３で得られたフィルムの評価結果を表１に示す。

【００６６】

【表１】

		原料処方(重量%)						製膜条件		全光線	温湯収縮率(%) (80℃・10秒)		破断伸度 (%)		収縮	剥離
		ポリエステル				添加剤		延伸温度	延伸倍率	透過率					仕上り性	抵抗力
	層	a	b	c	d	ポリスチレン	二酸化チタン	(℃)	(倍)	(%)	最大収縮方向	直交方向	直後	28日後		
実施例1	A	30	67	3	0	0	0	70	4.0	31	69.0	0.0	500以上	100以上	○	○
	B	10	65	5	0	10	10									
	A	30	67	3	0	0	0									
実施例2	A	30	65	5	0	0	0	69	4.0	30	70.0	0.0	500以上	100以上	○	○
	B	10	65	5	0	10	10									
	A	30	65	5	0	0	0									
比較例1	A	10	67	3	0	10	10	74	4.0	25	68.0	1.0	500以上	100以上	○	×
	B	10	67	3	0	10	10									
	A	10	67	3	0	10	10									
比較例2	A	30	65	5	0	0	0	74	4.0	85	71.0	1.0	500以上	4	○	○
	B	30	65	5	0	0	0									
	A	30	65	5	0	0	0									
比較例3	A	15	60	0	25	0	0	78	5.0	80	62.0	4.0	500以上	3	×	○
	B	15	60	0	25	0	0									
	A	15	60	0	25	0	0									

ポリエステルa：TPA//EG=100//100(モル%)

ポリエステルb：TPA//EG/NPG=100//70/30(モル%)

ポリエステルc：(TPA//BD=100//100)(モル%)/ε-カプロラクトン=70/30(重量%)の共重合ポリエステル

ポリエステルd：TPA//BD=100//100(モル%)

TPA：テレフタル酸

EG　：エチレングリコール

NPG：ネオペンチルグリコール

BD　：ブタンジオール

【0067】

表1から明らかなように、実施例1～2で得られた熱収縮性ポリエステル系フィルムは、いずれもペットボトルのフルラベル用に好適な熱収縮性ポリエステル系フィルムであって、かつ、良好な光線遮断性を有するものであった。

【００６８】
本発明の熱収縮性ポリエステル系フィルムは、高品質で実用性が高く、特に紫外線で劣化しやすい内容物の包装収縮ラベル用として好適である。
【００６９】
一方、比較例１で得られた熱収縮性ポリエステル系フィルムは、光線遮断性を有するものの溶剤接着性が劣っており、比較例２～３で得られた熱収縮性ポリエステル系フィルムは、光線遮断性が劣っていた。このように比較例の熱収縮性ポリエステル系フィルムは、品質が劣り、実用性の低いものであった。
【００７０】
【発明の効果】
本発明の熱収縮性ポリエステル系フィルムによれば、収縮仕上がり性が好適で、ボトル等の胴部に装着する表示用のラベルにしたときに端部に歪みがなく、また、印刷加工を施さなくとも光線遮断性を有する。

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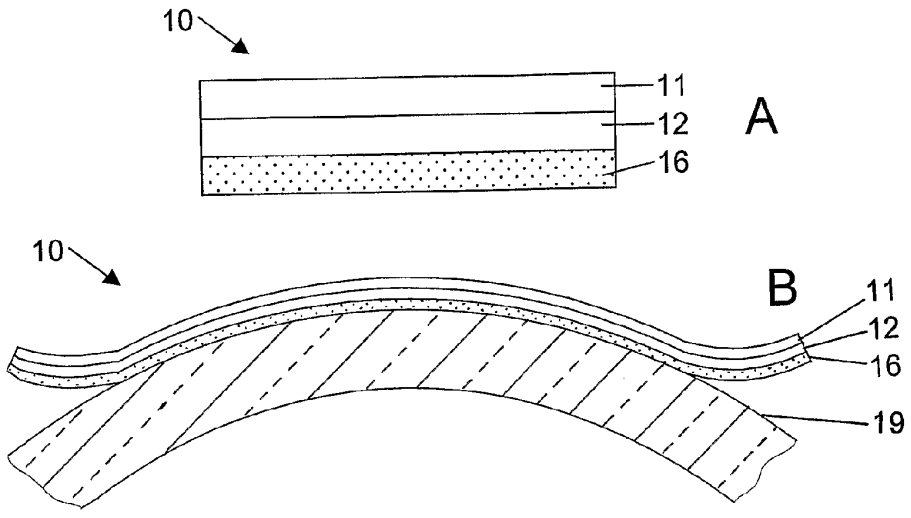
(54) **Title:** REMOVABLE CURL LABELS



(57) **Abstract:** This invention relates to labels, particularly removable polymeric labels for use on reusable containers. The labels contain at least two polymeric layers having different coefficients of linear thermal expansion, such that, upon exposure to elevated temperatures, the label is reversibly curled.

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

REMOVABLE CURL LABELS

This application claims the benefit of provisional application Serial No. 60/642,935 filed on January 10, 2005, which is hereby incorporated herein by reference in its entirety.

TECHNICAL FIELD OF THE INVENTION

This invention relates to labels, and more particularly to removable polymeric film labels for use on reuseable containers, such as beverage bottles.

BACKGROUND OF THE INVENTION

It is common practice to apply labels to containers or bottles formed from polymers or glass. Such containers and bottles are available in a wide variety of shapes and sizes for holding many different types of materials such as detergents, chemicals, motor oil, beverages, including juices, soft drinks, alcoholic beverages, etc. The labels provide information such as the supplier of the container or the contents of the container.

Polymeric film materials and film facestocks have been described for use as labels in various fields. Polymeric labels are increasingly desired for many applications, particularly clear polymeric labels since they provide a no-label look to decorated glass and plastic containers. Paper labels block the visibility of the container and/or the contents in the container. Clear polymeric labels enhance the visual aesthetics of the container, and therefore the product, and are growing much faster than paper labels in the package decoration market as consumer product companies are continuously trying to upgrade the appearance of their products. Polymeric film labels also have superior mechanical properties, such as tensile strength and abrasion resistance.

In the bottled beverage industry, particularly the bottled beer industry, the standards to which the labels are held can be quite stringent. For example, the labeled bottles must withstand the pasteurization process. The labels must be abrasion resistant because of the demands of the bottling,

packing, shipping and storage processes. The labels must also survive being immersed in ice water for extended periods of time.

In addition, the bottles used in the beverage industry are generally reused many times. The bottles must be cleaned and the labels removed prior to refilling and relabeling the bottles. Paper labels, while being generally less aesthetically desirable, are easily removed during the washing process in which the bottles are subjected to hot washing liquid such as dilute caustic soda that has been heated to 50-90°C. Because polymeric labels do not possess the water permeability of the paper labels, the polymeric labels have been found to be more difficult to completely remove with the existing washing process.

Accordingly, it would be desirable to produce polymeric film labels that can be completely removed from the bottles during the washing process, yet maintain their superior aesthetic and mechanical properties.

SUMMARY OF THE INVENTION

In one embodiment, this invention relates to a label that comprises (a) a first polymeric layer having a first coefficient of thermal expansion; (b) a second polymeric layer having a second coefficient of thermal expansion underlying the first polymeric layer, wherein the first coefficient of thermal expansion is less than the second coefficient of thermal expansion; and (c) an adhesive layer underlying the second polymeric layer, wherein the label is reversibly curled toward the first polymeric layer at a temperature at or above 50°C.

The invention further is directed to a method of detaching a label from an article, wherein the label comprises: (a) a first polymeric layer having a first coefficient of thermal expansion; (b) a second polymeric layer having a second coefficient of thermal expansion underlying the first polymeric layer, wherein the first coefficient of thermal expansion is less than the second coefficient of thermal expansion; and (c) an adhesive layer underlying the second polymeric layer; wherein the method comprises heating a washing liquid to form a hot washing liquid; and gradually detaching the label from the article, wherein the step of gradually detaching the label from the article comprises the step of exposing the label to the hot washing liquid for at least

a predetermined amount of time so that the label is reversibly curled toward the first polymeric layer thereby overcoming the adhesive force of the adhesive layer.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1A is a cross section of a label construction of the present invention.

FIG. 1B is a cross section of the label of FIG. 1A as applied to a cylindrical container.

FIGS. 2-9 are cross sections of embodiments of label constructions of the present invention.

DESCRIPTION OF THE INVENTION

The term "overlies" and cognate terms such a overlying and the like, when referring to the relationship of one or a first layer relative to another or a second layer, refer to the fact that the first layer partially or completely overlies the second layer. The first layer overlying the second layer may or may not be in contact with the second layer. For example, one or more additional layers may be positioned between the first and the second layer. The term "underlies" and cognate terms such as "underlying" and the like have similar meanings except that the first layer partially or completely lies under, rather than over the second layer.

The term "transparent" when referring to one or more layers of the label means any material beneath such layers can be seen through such layers. In reference to the use of the "transparent" or "clear" labels applied to clear containers, such as beer bottles, the bottle and the beer within the bottle are visible through the label.

The term "clear" when referring to one or more layers of the label or to the label itself means the opacity of the layers or label is less than about 5%, and the layers or the label has a haze of less than about 10%. Opacity is measured in accordance with TAPPI Test T425 os, and haze is measured in accordance with ASTM Test Method D-1003.

A label of a first embodiment comprises (a) a first polymeric layer having a first coefficient of thermal expansion; (b) a second polymeric layer

having a second coefficient of thermal expansion underlying the first polymeric layer, wherein the first coefficient of thermal expansion is less than the second coefficient of thermal expansion; and (c) an adhesive layer underlying the second polymeric layer, wherein the label is reversibly curled toward the first polymeric layer at a temperature at or above 50°C.

As illustrated in FIG. 1A, label 10 comprises a first polymeric layer 11, a second polymeric layer 12 underlying polymeric layer 11, and adhesive layer 16 underlying the second polymeric layer 12. At high temperatures, e.g., at or above 50°C, the second polymeric layer 12 with the higher coefficient of thermal expansion will expand to a greater degree than the first polymeric layer 11 having the lower coefficient of thermal expansion. The greater expansion of the layer 12 causes the label to curl toward layer 11. The deformation or curl of the label is reversible and the label will revert to its original shape at room temperature. The degree of curl is a function of the film thickness, Youngs modulus and coefficient of linear thermal expansion of the polymeric layers.

FIG. 1B shows the label of FIG. 1A bonded to the curved surface of a cylindrical container 19. In this embodiment, the main curl direction of the label extends in the circumferential direction of the container. As the container is exposed to heat, such as the hot washing liquid used in the bottling industry, the label curls toward the upper layer 11. In one embodiment, the adhesive of adhesive layer 16 possesses a lower peel adhesion at higher temperatures than at ambient or room temperature and will pull away from the surface of the container. In one embodiment, the washing liquid, particularly caustic washing liquid, acts to dissolve or chemically attack the adhesive, allowing the label to pull away from the container. As the label curls, the adhesive is exposed to a greater extent to the hot washing liquid and will eventually be completely removed from the container. The label of the present invention may also be applied to articles or containers that are flat, rather than cylindrical in shape.

Polymeric layers 11 and 12 may be coextruded films. Alternatively, as shown in FIG. 2, the label 20 may comprise a laminated structure wherein polymeric layer 11 is bonded to polymeric layer 12 by lamination adhesive 18. In one embodiment, polymeric layers 11 and 12 are heat sealed together.

The adhesive labels of the invention may, and generally do contain other layers. For example, as shown in FIG. 3, the label 30 may contain a metal layer 13 which overlies and is in contact with first polymeric layer 11. Alternatively, a print layer 14 can be on the upper surface of polymeric layer 11 as illustrated in FIG. 4.

In one embodiment, one of polymeric layers of the label comprises a polymeric ink layer. For example, the first polymeric layer 11 may comprise a crosslinked ink that has been screen printed onto the second polymeric layer 12. Alternatively, the second polymeric layer 12 may comprise an ink layer that has been printed onto the first polymeric layer 11.

FIG. 5 illustrates label 50 which comprises first polymeric layer 11, second polymeric layer 12 underlying first polymeric layer 11, adhesive layer 16 underlying second polymeric layer 12, print layer 14 overlying first polymeric layer 11 and transparent protective layer 15 which overlies and is in contact with the upper surface of the print layer 14.

FIG. 6 illustrates label 60 which is similar to the label of FIG. 5, except that label 60 contains an additional antistatic polymer layer 17 between the print layer 14 and the first polymeric layer 11.

The labels of the invention may also contain adhesion promoting layers between one or more of the layers shown. For example, an adhesion promoting layer can be inserted between the second polymeric layer 12 and the adhesive layer 16; between the first polymeric layer 11 and the metal layer 13 or the print layer 14; etc.

In another embodiment, the label of the present invention comprises: (a) a first polymeric layer having a first coefficient of thermal expansion; (b) a second polymeric layer having a second coefficient of thermal expansion underlying the first polymeric layer, wherein the first coefficient of thermal expansion is less than the second coefficient of thermal expansion; (c) an adhesive layer underlying the second polymeric layer; (d) a metal layer overlying the first polymeric layer; and (e) a print layer overlying the metal layer; wherein the label is reversibly curled toward the first polymeric layer at a temperature at or above 50°C. Labels of this embodiment are illustrated in FIGS. 7 and 8. In FIG. 7, label 70 comprises first polymeric layer 11, second polymeric layer 12 underlying first polymeric layer 11 and adhesive layer 16

underlying second polymeric layer 12. Metal layer 13 overlies first polymeric layer 11 and print layer 14 overlies metal layer 13. In FIG. 8, label 80 is similar to the label of FIG. 7 with the addition of transparent protective layer 15 overlying and in contact with print layer 14.

In another embodiment, illustrated in FIG. 9, the label 90 comprises a first polymeric layer 11 having an upper surface and a lower surface, a print layer 14 on the lower surface of the first polymeric layer 11. The first polymeric layer 11 with print layer 14 thereon is bonded to the second polymeric layer 12 by a lamination adhesive 18. An adhesive layer 16 is adhered to the lower surface of the second polymeric layer 12.

Polymeric layers 11 and 12 have different coefficients of thermal expansion. In an expanded state at high temperature, the layer having the higher coefficient of thermal expansion expands to curl the multilayer structure toward the layer having the lower coefficient of thermal expansion. The curl is reversible as the temperature is lowered to room or ambient temperature.

The coefficient of thermal expansion is determined by the equation:

$$\text{Coefficient of Linear Thermal Expansion (\%)} = [(B-A)/A]x\ 100 \qquad (1)$$

where A and B represent the measured length (cm) of a specimen of a resin after standing at 0°C and 50°C, respectively, for 2 minutes, the specimen being 1 cm in width, 4.5 cm in length, and not more than 0.5 cm in thickness as prepared at room temperature.

When subjected to the higher temperature, such as that of the wash liquid, the label will curl and be removed from the underlying substrate to which it is adhered provided the curl force of the label (F_{Label}) is greater than the peel adhesion of the label to the underlying substrate (F_{PA}):

$$F_{Label} > F_{PA}$$

The curl force of the label, F_{Label}, can be determined using the following equation:

$$F_{Label} = (\alpha_2 - \alpha_1)(T - T_0)\ (1/8\ t)(E_1E_2/(E_1 + E_2)) \qquad (2)$$

wherein α_2 is the coefficient of linear thermal expansion of the bottom layer (polymeric layer 12); α_1 is the coefficient of linear thermal expansion of the top layer (polymeric layer 11); T is the temperature of the washing liquid, T_0 is the temperature at which the label is made, typically, room temperature (23°C); t is the total thickness of the label; E_1 is the modulus of elasticity of the top layer (polymeric layer 11) and E_2 is the modulus of elasticity of the bottom layer (polymeric layer 12).

In one embodiment, the difference between the coefficient of linear thermal expansion of the bottom layer and that of the top layer, $(\alpha_2 - \alpha_1)$, is greater than or equal to about 3×10^{-5} (1/°C). In one embodiment, $\alpha_2 - \alpha_1$ is about 7×10^{-5} (1/°C).

The polymeric layers useful in the present invention do not exhibit heat shrinkage beyond the typically accepted limits of heat stable pressure sensitive adhesive films, e.g., <1% at 70° and <2% at 100°C. In one embodiment, the polymeric layer 11 has a heat shrinkage of less than 4% at 80°C.

Each of the polymeric layers 11 and 12 may be a monolayer film or a multilayer film. The multilayer film may comprise from two to ten or more layers. Depending on the end use of the label, the polymeric layers may be transparent or opaque. Opaque polymeric layers generally comprise a polymer as described below and one or more pigments to provide the polymeric layer, or one layer of a multilayer polymeric film with the desired color. Pigments useful for this purpose are well known in the art. For example, white films can be prepared by introducing titanium dioxide and other white pigments into the polymer. Carbon black may be introduced to provide a black or grey film.

In one embodiment, polymeric layer 11 and polymeric layer 12 are laminated together. Polymeric layer 12 may comprise a coextruded film or may comprise a monolayer film. Polymeric layer 11 may comprise a coextruded film or may comprise a monolayer film. Polymeric layers 11 and 12 typically have a different coefficient of linear thermal expansion in the machine direction (MD) and have a very low coefficient of linear thermal expansion in the cross direction (CD) when the curl is in the machine direction of the label. Alternatively, when the curl is in the cross direction of the label,

the polymeric layers 11 and 12 have different coefficient of linear thermal expansion in the CD and have a very low coefficient of linear thermal expansion in the MD. The difference in the coefficient of thermal expansion can be obtained by using different polymeric materials, for example polyethylene for polymeric layer 12 and polyethylene terephthalate for polymeric layer 11. Alternatively, the difference in coefficient of thermal expansion can be obtained by differences in molecular orientation. For example, a cross direction (trans direction) oriented film for polymer layer 11 and a machine direction oriented film for polymer layer 12.

In one embodiment, polymeric layers 11 and 12 are coextruded. For example polymeric layers 11 and 12 may comprise a polypropylene/ethylene vinyl acetate coextrudate; a polyacrylate/polyethylene coextrudate; or a polyacrylate/ethylene vinyl alcohol coextrudate. Many other coextruded combinations are possible, including coextrudates comprising more than two layers.

A wide variety of polymer film materials are useful in preparing the polymeric layers useful in the present invention. For example, the polymer film material may include polymers and copolymers such as at least one polyolefin, polyacrylate, polystyrene, polyamide, polyvinyl alcohol, poly(alkylene acrylate), poly(ethylene vinyl alcohol), poly(alkylene vinyl acetate), polyurethane, polyacrylonitrile, polyester, polyester copolymer, fluoropolymer, polysulfone, polycarbonate, styrene-maleic anhydride copolymer, styrene-acrylonitrile copolymer, ionomers based on sodium or zinc salts of ethylene methacrylic acid, cellulosics, polyacrylonitrile, alkylene-vinyl acetate copolymer, or mixtures of two or more thereof.

The polyolefins which can be utilized as the polymer film material include polymers and copolymers of olefin monomers containing 2 to about 12 carbon atoms such as ethylene, propylene, 1-butene, etc., or blends of mixtures of such polymers and copolymers. In one embodiment the polyolefins comprise polymers and copolymers of ethylene and propylene. In another embodiment, the polyolefins comprise propylene homopolymers, and copolymers such as propylene-ethylene and propylene-1-butene copolymers. Blends of polypropylene and polyethylene with each other, or blends of either or both of them with polypropylene-polyethylene copolymer also are useful. In

another embodiment, the polyolefin film materials are those with a very high propylenic content, either polypropylene homopolymer or propylene-ethylene copolymers or blends of polypropylene and polyethylene with low ethylene content, or propylene-1-butene copolymers or blend of polypropylene and poly-1-butene with low butene content. Useful propylene homopolymers and copolymers are described in U.S. Patent 5,709,937 (Adams et al). The copolymers include propylene-ethylene copolymers containing up to about 10% by weight of ethylene, and propylene-1-butene copolymers containing up to about 15% by weight of 1-butene. Oriented films described in the '937 patent are clear films useful as the polymeric layers in the labels of the present invention. The disclosure of U.S. Patent 5,709,937 is hereby incorporated by reference.

Various polyethylenes can be utilized as the polymer film material including low, medium, and high density polyethylenes, and mixtures thereof. An example of a useful low density polyethylene (LDPE) is Rexene 1017 available from Huntsman. An example of a useful high density polyethylene (HDPE) is Formoline LH5206 available from Formosa Plastics. In one embodiment the polymer film material comprises a blend of 80 to 90% HDPE and 10-20% of LDPE.

The propylene homopolymers which can be utilized as the polymer film material in the invention, either alone, or in combination with a propylene copolymer as described herein, include a variety of propylene homopolymers such as those having melt flow rates (MFR) from about 0.5 to about 20 as determined by ASTM Test D 1238. In one embodiment, propylene homopolymers having MFR's of less than 10, and more often from about 4 to about 10 are particularly useful. Useful propylene homopolymers also may be characterized as having densities in the range of from about 0.88 to about 0.92 g/cm^3. A number of useful propylene homopolymers are available commercially from a variety of sources, and some useful polymers include: 5A97, available from Dow Chemical and having a melt flow of 12.0 g/10 min and a density of 0.90 g/cm^3; DX5E66, also available from Dow Chemical and having an MFI of 8.8 g/10 min and a density of 0.90 g/cm^3; and WRD5-1057 from Dow Chemical having an MFI of 3.9 g/10 min and a density of 0.90

g/cm^3. Useful commercial propylene homopolymers are also available from Fina and Montel.

Examples of useful polyamide resins include resins available from EMS American Grilon Inc., Sumter, SC. under the general tradename Grivory such as CF6S, CR-9, XE3303 and G-21. Grivory G-21 is an amorphous nylon copolymer having a glass transition temperature of 125°C, a melt flow index (DIN 53735) of 90 ml/10 min and an elongation at break (ASTM D638) of 15. Grivory CF65 is a nylon 6/12 film grade resin having a melting point of 135□C, a melt flow index of 50 ml/10 min, and an elongation at break in excess of 350%. Grilon CR9 is another nylon 6/12 film grade resin having a melting point of 200°C, a melt flow index of 200 ml/ 10 min, and an elongation at break at 250%. Grilon XE 3303 is a nylon 6.6/6.10 film grade resin having a melting point of 200°C, a melt flow index of 60 ml/ 10 min, and an elongation at break of 100%. Other useful polyamide resins include those commercially available from, for example, International Paper of Wayne, New Jersey under the Uni-Rez product line, and dimer-based polyamide resins available from Bostik, International Paper, Fuller, Henkel (under the Versamid product line). Other suitable polyamides include those produced by condensing dimerized vegetable acids with hexamethylene diamine. Examples of polyamides available from International Paper include Uni-Rez 2665; Uni-Rez 2620; Uni-Rez 2623; and Uni-Rez 2695.

Polystyrenes can also be utilized as the polymeric film material and these include homopolymers as well as copolymers of styrene and substituted styrene such as alpha-methyl styrene. Examples of styrene copolymers and terpolymers include: acrylonitrile-butene-styrene (ABS); styrene-acrylonitrile copolymers (SAN); styrene butadiene (SB); styrene-maleic anhydride (SMA); and styrene-methyl methacrylate (SMMA); etc. An example of a useful styrene copolymer is KR-10 from Phillips Petroleum Co. KR-10 is believed to be a copolymer of styrene with 1,3-butadiene.

Polyurethanes also can be utilized as the polymer film material, and the polyurethanes may include aliphatic as well as aromatic polyurethanes.

The polyurethanes are typically the reaction products of (A) a polyisocyanate having at least two isocyanate (--NCO) functionalities per molecule with (B) at least one isocyanate reactive group such as a polyol

having at least two hydroxy groups or an amine. Suitable polyisocyanates include diisocyanate monomers, and oligomers.

Useful polyurethanes include aromatic polyether polyurethanes, aliphatic polyether polyurethanes, aromatic polyester polyurethanes, aliphatic polyester polyurethanes, aromatic polycaprolactam polyurethanes, and aliphatic polycaprolactam polyurethanes. Particularly useful polyurethanes include aromatic polyether polyurethanes, aliphatic polyether polyurethanes, aromatic polyester polyurethanes, and aliphatic polyester polyurethanes.

Examples of commercial polyurethanes include Sancure 2710® and/or Avalure UR 445® (which are equivalent copolymers of polypropylene glycol, isophorone diisocyanate, and 2,2-dimethylolpropionic acid, having the International Nomenclature Cosmetic Ingredient name "PPG-17/PPG-34/IPDI/DMPA Copolymer"), Sancure 878®, Sancure 815®, Sancure 1301®, Sancure 2715®, Sancure 1828®, Sancure 2026®, and Sancure 12471® (all of which are commercially available from Noveon, Cleveland, Ohio), Bayhydrol DLN (commercially available from Bayer Corp., McMurray, Pa.), Bayhydrol LS-2033 (Bayer Corp.), Bayhydrol 123 (Bayer Corp.), Bayhydrol PU402A (Bayer Corp.), Bayhydrol 110 (Bayer Corp.), Witcobond W-320 (commercially available from Witco Performance Chemicals), Witcobond W-242 (Witco Performance Chemicals), Witcobond W-160 (Witco Performance Chemicals), Witcobond W-612 (Witco Performance Chemicals), Witcobond W-506 (Witco Performance Chemicals), NeoRez R-600 (a polytetramethylene ether urethane extended with isophorone diamine commercially available from Avecia, formerly Avecia Resins), NeoRez R-940 (Avecia), and NeoRez R-960 (Avecia).

Examples of such aliphatic polyether polyurethanes include Sancure 2710® and/or Avalure UR 445®, Sancure 878®, NeoRez R-600, NeoRez R-966, NeoRez R-967, and Witcobond W-320.

In one embodiment, one of the polymeric layers comprises at least one polyester polyurethane. Examples of these urethanes include those sold under the names "Sancure 2060" (polyester-polyurethane), "Sancure 2255" (polyester-polyurethane), "Sancure 815" (polyester-polyurethane), "Sancure 878" (polyether-polyurethane) and "Sancure 861" (polyether-polyurethane) by the company Sanncor, under the names "Neorez R-974" (polyester-

polyurethane), "Neorez R-981" (polyester-polyurethane) and "Neorez R-970" (polyether-polyurethane) by the company Avecia, and the acrylic copolymer dispersion sold under the name "Neocryl XK-90" by the company Avecia.

Polyesters prepared from various glycols or polyols and one or more aliphatic or aromatic carboxylic acids also are useful film materials. Polyethylene terephthalate (PET) and PETG (PET modified with cyclohexanedimethanol) are useful film forming materials which are available from a variety of commercial sources including Eastman. For example, Kodar 6763 is a PETG available from Eastman Chemical. Another useful polyester from duPont is Selar PT-8307 which is polyethylene terephthalate.

Acrylate polymers and copolymers and alkylene vinyl acetate resins (e.g., EVA polymers) also are useful as the film forming materials in the preparation of the constructions of the invention. Commercial examples of available polymers include Escorene UL-7520 (Exxon), a copolymer of ethylene with 19.3% vinyl acetate; Nucrell 699 (duPont), an ethylene copolymer containing 11% of methacrylic acid, etc.

Ionomers (polyolefins containing ionic bonding of molecular chains) also are useful. Examples of ionomers include ionomeric ethylene copolymers such as Surlyn 1706 (duPont) which is believed to contain interchain ionic bonds based on a zinc salt of ethylene methacrylic acid copolymer. Surlyn 1702 from duPont also is a useful ionomer.

Polycarbonates also are useful, and these are available from the Dow Chemical Co. (Calibre) G.E. Plastics (Lexan) and Bayer (Makrolon). Most commercial polycarbonates are obtained by the reaction of bisphenol A and carbonyl chloride in an interfacial process. Molecular weights of the typical commercial polycarbonates vary from about 22,000 to about 35,000, and the melt flow rates generally are in the range of from 4 to 22 g/10 min.

In one embodiment, one of the polymeric layers may comprise fluorinated polymer. The fluorinated polymer includes a thermoplastic fluorocarbon such as polyvinylidene fluoride (PVDF). The fluorinated polymer also can include copolymers and terpolymers of vinylidene fluoride. A useful thermoplastic fluorocarbon is the polyvinylidene fluoride known as Kynar, a trademark of Pennwalt Corp. This polymer is a high molecular weight (400,000) polymer which provides a useful blend of durability and chemical

resistance properties. Generally, a high molecular weight PVDF resin, with a weight average molecular weight of about 200,000 to about 600,000 is used.

The polymeric film material may be free of inorganic fillers and/or pigments for clear films and clear labels, or the polymeric film material may be cavitated and/or contain inorganic fillers and other organic or inorganic additives to provide desired properties such as appearance properties (opaque or colored films), durability and processing characteristics. Nucleating agents can be added to increase crystallinity and thereby increase stiffness. Examples of useful materials include calcium carbonate, titanium dioxide, metal particles, fibers, flame retardants, antioxidant compounds, heat stabilizers, light stabilizers, ultraviolet light stabilizers, antiblocking agents, processing aids, acid acceptors, etc. Opaque and/or white polymeric films are often utilized when the labels described herein do not contain a metal layer overlying the outer polymeric layer.

The polymer film material is chosen to provide a continuous polymer film in the film structures of this invention with the desired properties such as improved tensile strength, elongation, impact strength, tear resistance, and optics (haze and gloss). The choice of polymeric film forming material also is determined by its physical properties such as melt viscosity, high speed tensile strength, percent elongation etc. In one embodiment, clear or transparent polymeric films are used in the label construction when clear or transparent labels are desired.

The thickness of the each polymeric layer is at least 5 microns, or at least 15 microns. The total thickness of the label film is from about 2.5 microns to about 250 microns, or from about 25 to about 125 microns. In one embodiment the total thickness of the label film is from about 25 to about 75 microns. Each polymeric layer may comprise a single layer, or can be a multilayer film of two or more adjacent layers. For example the polymeric layer can comprise one layer of a polyolefin and one layer of a blend of a polyolefin and a copolymer of ethylene and vinyl acetate (EVA). In another embodiment the polymeric layer comprises three layers, a base or core layer of, for example, a polyolefin, and skin layers in both sides of the base or core layer which may be comprised of the same or different polymer blends. The

individual layers of a multilayer film may be selected to provide desirable properties.

The polymeric films useful in the labels herein can be manufactured by those processes known to those skilled in the art such as by casting or extrusion. In one embodiment, the films are manufactured by polymer extrusion or coextrusion processes. The extrudate or coextrudate of polymeric film materials is formed by simultaneous extrusion from a suitable known type of extrusion or co-extrusion die, and in the case of a coextrudate, the layers are adhered to each other in a permanently combined state to provide a unitary coextrudate.

In addition to coextrusion, the multilayer films useful in the present invention may be prepared by extrusion of a continuous film to form one layer followed by the application of one or more additional layers on the extruded layer by extrusion of one or more additional layers; by lamination of a preformed polymer film to a preformed functional film; or by deposition of additional layers on the preformed film from an emulsion or solution of a polymeric film forming material.

In one embodiment, the polymeric films used in the present invention are not oriented. That is, the films are not subjected to a hot-stretching and annealing step. In other embodiments, the films contained in the labels used in the present invention may be oriented in the machine direction (uniaxially) or in both the machine and cross directions (biaxially) by hot-stretching and annealing by techniques well known to those skilled in the art. For example, the films may be hot-stretched in the machine direction only at a ratio of at least 2:1 and more often, at a ratio of between about 2:1 to about 9:1. After the film has been hot stretched, it is generally passed over annealing rolls where the film is annealed or heat-set at temperatures in the range of from about 50°C, more often 100°C to about 150°C, followed by cooling. In another embodiment, the polymeric film is a biaxially oriented.

It is desirable that the films exhibit a degree of stiffness in the machine direction and the cross direction to facilitate handling, printing and dispensing. Thus, in one embodiment, the stiffness in the machine direction, and the cross direction should be at least about 14 Gurley (mg), as determined using TAPPI Test T543 pm and in a further embodiment the Gurley stiffnesses in both

directions are within about 5 Gurley units (sometimes referred to as a balanced stiffness).

Polymer films useful in the labels of the present invention are available commercially from a variety of sources such as Avery Dennison Corp., Painesville, Ohio; AMTOPP, a division of Interplast Group LTD, Livingston, New Jersey 07039, Exxon Mobil Chemical Co., Macdon, New York 14502; AET Films, New Castle, Delaware 19720; and UCB Films Inc., Smyrna, Georgia 30080. Clear films and white films are available.

The surface energy of the surfaces of the polymeric films can be enhanced by treatments such as corona discharge, flame, plasma, etc. to provide the surfaces with desirable properties such as improved adhesion to subsequently applied layers. Procedures for corona treating and flame treating of polymer films are well known to those skilled in the art. In one embodiment, a polymeric film is corona discharge treated on the upper surface and flame treated on the lower surface.

In one embodiment of the invention, polymeric layer 11 comprises a polyethylene terephthalate (PET) film laminated to polymeric layer 12 which comprises a biaxially oriented polypropylene (BOPP) film.

As noted above, the labels of the invention may also comprise a metal layer 13 overlying the first polymeric layer 11. In one embodiment, the metal layer is in contact with and is adhered to the upper surface of the first polymeric layer 11 which may have been previously corona treated or flame treated. The metal may be applied to the polymeric layer by any known methods such as electroplating, sputtering, vacuum metalizing, printing, etc. Chemical primers or other adhesion promoting compositions may in some instances, be applied to the surface of the polymeric layer to increase the adhesion of the metal to the polymeric layer.

The metal of the metal layer may be any of a number of metals, including tin, chromium, nickel, stainless steel, copper, aluminum, indium, gold, silver, and alloys of one or more thereof. Useful metallized films are available commercially.

Although not shown in FIGS. 1-9, the labels of the present invention may also contain a layer of an ink-receptive composition on the polymeric layer 11 or the metal layer 13 that enhances the printability of the polymeric

layer or metal layer, and the quality of the print layer thus obtained. A variety of such compositions are known in the art, and these compositions generally include a binder and a pigment, such as silica or talc, dispersed in the binder. The presence of the pigment decreases the drying time of some inks. Such ink-receptive compositions are described in U.S. Pat. No. 6,153,288 (Shih et al) and the disclosure of this patent is hereby incorporated by reference.

The labels the present invention may, and generally do, comprise one or more print layers. In one embodiment, illustrated in FIGS. 7 and 8, a print layer 14 is adhered to the upper surface of the metal layer 13. In the embodiment illustrated in FIGS. 4 and 5, the print layer 14 is in contact with the upper surface of the first polymeric layer 11.

The print layer may be an ink or graphics layer, and the print layer may be a mono-colored or multi-colored print layer depending on the printed message and/or the intended pictorial design. These include, variable imprinted data such as serial numbers, bar codes, trademarks, etc. The thickness of the print layer is typically in the range of about 0.5 to about 10 microns, and in one embodiment about 1 to about 5 microns, and in another embodiment about 3 microns. The inks used in the print layer include commercially available water-based, solvent-based or radiation-curable inks. Examples of these inks include Sun Sheen (a product of Sun Chemical identified as an alcohol dilutable polyamide ink), Suntex MP (a product of Sun Chemical identified as a solvent-based ink formulated for surface printing acrylic coated substrates, PVDC coated substrates and polyolefin films), X-Cel (a product of Water Ink Technologies identified as a water-based film ink for printing film substrates), Uvilith AR-109 Rubine Red (a product of Daw Ink identified as a UV ink) and CLA91598F (a product of Sun Chemical identified as a multibond black solvent-based ink).

In one embodiment, the print layer comprises a polyester/vinyl ink, a polyamide ink, an acrylic ink and/or a polyester ink. The print layer is formed in the conventional manner by depositing, by gravure printing or the like, an ink composition comprising a resin of the type described above, a suitable pigment or dye and one or more suitable volatile solvents onto one or more desired areas of the metal layer. After application of the ink composition, the volatile solvent component(s) of the ink composition evaporate(s), leaving

only the non-volatile ink components to form the print layer. An example of a suitable resin for use in forming a polyester ink is ViTEL® 2700 (Bostik-Findley)--a copolyester resin having a high tensile strength (7000 psi) and a low elongation (4% elongation). A ViTEL® 2700-based polyester ink composition may comprise 18% ViTEL® 2700, 6% pigment, 30.4% n-propyl acetate (NP Ac) and 45.6% toluene. As can readily be appreciated, ViTEL® 2700 is, by no means, the only polyester resin that may be used to formulate a polyester ink, and solvent systems, other than an NP Ac/toluene system, may be suitable for use with ViTEL® 2700, as well as with other polyester resins. An example of a polyester adhesive composition comprises 10.70%, by weight, ViTEL® 2300 polyester resin; 10.70%, by weight, ViTEL® 2700 polyester resin; 1.1%, by weight, BENZOFLEX S404 plasticizer; 1.1%, by weight, HULS 512 adhesion promoter; 19.20%, by weight, toluene; and 57.10%, by weight, methyl ethyl ketone.

The adhesion of the ink to the surface of the metal layer can be improved, if necessary, by techniques well known to those skilled in the art. For example, as mentioned above, an ink primer or other ink adhesion promoter can be applied to the metal layer or the polymeric film layer before application of the ink. Alternatively the surface of the polymeric film can be corona treated or flame treated to improve the adhesion of the ink to the polymeric film layer.

Useful ink primers may be transparent or opaque and the primers may be solvent based or water-based. In one embodiment, the primers are radiation curable (e.g., UV). The ink primer is typically comprised of a lacquer and a diluent. The lacquer is typically comprised of one or more polyolefins, polyamides, polyesters, polyester copolymers, polyurethanes, polysulfones, polyvinylidine chloride, styrene-maleic anhydride copolymers, styrene-acrylonitrile copolymers, ionomers based on sodium or zinc salts or ethylene methacrylic acid, polymethyl methacrylates, acrylic polymers and copolymers, polycarbonates, polyacrylonitriles, ethylene-vinyl acetate copolymers, and mixtures of two or more thereof. Examples of the diluents that can be used include alcohols such as ethanol, isopropanol and butanol; esters such as ethyl acetate, propyl acetate and butyl acetate; aromatic hydrocarbons such as toluene and xylene; ketones such as acetone and methyl ethyl ketone;

aliphatic hydrocarbons such as heptane; and mixtures thereof. The ratio of lacquer to diluent is dependent on the viscosity required for application of the ink primer, the selection of such viscosity being within the skill of the art. An example of a ink primer material that can be used is CLB04275F-Prokote Primer (a product of Sun Chemical Corporation identified as a solvent based primer useful with inks and coatings). The ink primer layer may have a thickness of from about 1 to about 4 microns or from about 1.5 to about 3 microns.

A transparent polymer protective topcoat or overcoat layer may be present in the labels of the invention. In the embodiments illustrated in FIGS. 5, 6 and 8, a transparent topcoat or overcoat layer 15 overlies the print layer 14. The protective topcoat or overcoat layer provide desirable properties to the label before and after the label is affixed to a substrate such as a container. The presence of a transparent topcoat layer over the print layer may, in some embodiments provide additional properties such as antistatic properties stiffness and/or weatherability, and the topcoat may protect the print layer from, e.g., weather, sun, abrasion, moisture, water, etc. The transparent topcoat layer can enhance the properties of the underlying print layer to provide a glossier and richer image. The protective transparent protective layer may also be designed to be abrasion resistant, radiation resistant (e.g, UV), chemically resistant, thermally resistant thereby protecting the label and, particularly the print layer from degradation from such causes. The protective overcoat may also contain antistatic agents, or anti-block agents to provide for easier handling when the labels are being applied to containers at high speeds. The protective topcoat constructions of the labels used in the invention may also be selected to provide labels useful on containers subjected to subsequent liquid processing such as bottle washing/rinsing, filling and pasteurization, or liquid immersion (e.g., ice bath) without displaying adverse consequences such as label lifting or hazing. The protective layer may be applied to the print layer by techniques known to those skilled in the art. The polymer film may be deposited from a solution, applied as a preformed film (laminated to the print layer), etc.

When a transparent topcoat or overcoat layer is present, it may have a single layer or a multilayered structure. The thickness of the protective layer is

generally in the range of about 12.5 to about 125 microns, and in one embodiment about 25 to about 75 microns. Examples of the topcoat layers are described in U.S. Pat. No. 6,106,982 which is incorporated herein by reference.

The protective layer may comprise polyolefins, thermoplastic polymers of ethylene and propylene, polyesters, polyurethanes, polyacryls, polymethacryls, vinyl acetate homopolymers, co- or terpolymers, ionomers, and mixtures thereof.

The transparent protective layer may contain UV light absorbers and/or other light stabilizers. Among the UV light absorbers that are useful are the hindered amine absorbers available from Ciba Specialty Chemical under the trade designations "Tinuvin". The light stabilizers that can be used include the hindered amine light stabilizers available from Ciba Specialty Chemical under the trade designations Tinuvin 111, Tinuvin 123, (bis-(1-octyloxy-2,2,6,6-tetramethyl-4-piperidinyl) sebacate; Tinuvin 622, (a dimethyl succinate polymer with 4-hydroxy-2,2,6,6-tetramethyl-1-piperidniethanol); Tinuvin 770 (bis-(2,2,6,6-tetramethyl-4-piperidinyl)-sebacate); and Tinuvin 783. Also useful light stabilizers are the hindered amine light stabilizers available from Ciba Specialty Chemical under the trade designation "Chemassorb", especially Chemassorb 119 and Chemassorb 944. The concentration of the UV light absorber and/or light stabilizer is in the range of up to about 2.5% by weight, and in one embodiment about 0.05% to about 1% by weight.

The transparent protective layer may contain an antioxidant. Any antioxidant useful in making thermoplastic films can be used. These include the hindered phenols and the organo phosphites. Examples include those available from Ciba Specialty Chemical under the trade designations Irganox 1010, Irganox 1076 or Irgafos 168. The concentration of the antioxidant in the thermoplastic film composition may be in the range of up to about 2.5% by weight, and in one embodiment about 0.05% to about 1% by weight.

The adhesive layer 16 of the label may comprise a pressure sensitive adhesive (PSA). The PSA may comprise an adhesive that exhibits a drop in peel adhesion at elevated temperatures. In one embodiment, the adhesive comprises an emulsion based adhesive that exhibits a significant reduction in peel adhesion from room temperature to 50°C.

A description of useful pressure sensitive adhesives may be found in *Encyclopedia of Polymer Science and Engineering,* Vol. 13. Wiley-Interscience Publishers (New York, 1988). Additional description of useful PSAs may be found in *Polymer Science and Technology,* Vol. 1, Interscience Publishers (New York, 1964). Conventional PSAs, including acrylic-based PSAs, rubber-based PSAs and silicone-based PSAs are useful. The PSA may be a solvent based or may be a water based adhesive. Hot melt adhesives may also be used. In one embodiment, the PSA comprises an acrylic emulsion adhesive.

The labels of the present invention have particular utility in the beverage industry, wherein the beverage containers are subjected to relatively rough handling. The processes the labeled containers have to withstand may include filling, packing, shipping and storage, as well as pasteurization and recycling operations. The labels may be applied to glass, polymeric and metal containers. Clear labels may be used to achieve a "no look" label where the presence of the label is not very apparent to the consumer.

A release liner may be adhered to the adhesive layer to protect the adhesive layer during transport, storage and handling prior to application of the label to a substrate.

While the invention has been explained in relation to its preferred embodiments, it is to be understood that various modifications thereof will become apparent to those skilled in the art upon reading the specification. Therefore, it is to be under stood that the invention disclosed herein is intended to cover such modifications as fall within the scope of the appended claims.

What is claimed is:

1. A label comprising:

a first polymeric layer having a first coefficient of thermal expansion;

a second polymeric layer having a second coefficient of linear thermal expansion underlying the first polymeric layer, wherein the first coefficient of linear thermal expansion is less than the second coefficient of linear thermal expansion; and

an adhesive layer underlying the second polymeric layer;

wherein the label is reversibly curled toward the first polymeric layer at a temperature at or above 50°C.

2. The label of claim 1 wherein the adhesive has a lower peel adhesion at temperatures at or above 50°C than at room temperature.

3. The label of claim 1 wherein the label is bondable to a cylindrically curved surface of an article and the main expansion direction of the label extends in the circumferential direction of the article.

4. The label of claim 1 wherein the first polymeric layer and the second polymeric layer are coextruded.

5. The label of claim 1 wherein the first polymeric layer and the second polymeric layer are bonded to each other by a lamination adhesive.

6. The label of claim 1 wherein the first polymeric layer comprises a multilayer film.

7. The label of claim 1 wherein the second polymeric layer comprises a multilayer film.

8. The label of claim 1 wherein the first polymeric layer is transparent.

9. The label of claim 1 further comprising a metal layer.

10. The label of claim 9 wherein the metal layer overlies the first polymeric layer.

11. The label of claim 1 further comprising a print layer.

12. The label of claim 11 wherein the print layer overlies the first polymeric layer.

13. The label of claim 9 further comprising a print layer overlying the metal layer.

14. The label of claim 11 further comprising a transparent protective layer overlying the print layer.

15. The label of claim 1 wherein the adhesive comprises an emulsion based adhesive.

16. The label of claim 1 wherein the difference in coefficients of linear thermal expansion is greater than or equal to about 3×10^{-5} (1/°C).

17. A label that can be adhesively attached to an article and detached again in a hot washing liquid, comprising:

a first polymeric layer having a first coefficient of linear thermal expansion;

a second polymeric layer having a second coefficient of linear thermal expansion underlying the first polymeric layer, wherein the first coefficient of linear thermal expansion is less than the second coefficient of linear thermal expansion; and

an adhesive layer underlying the second polymeric layer;

wherein the label is reversibly curled toward the first polymeric layer at a temperature at or above 50°C.

18. A method of detaching a label from an article, wherein the label comprises:

a first polymeric layer having a first coefficient of linear thermal expansion;

a second polymeric layer having a second coefficient of linear thermal expansion underlying the first polymeric layer, wherein the first coefficient of linear thermal expansion is less than the second coefficient of linear thermal expansion; and

an adhesive layer underlying the second polymeric layer;

the method comprising heating a washing liquid to form a hot washing liquid; and

gradually detaching the label from the article, wherein the step of gradually detaching the label from the article comprises the step of exposing the label to the hot washing liquid for at least a predetermined amount of time so that the label is reversibly curled toward the first polymeric layer thereby overcoming the adhesive force of the adhesive layer.

19. The method of claim 18 wherein the liquid comprises caustic soda.

20. The method of claim 18 wherein the hot washing liquid has a temperature in the range of about 50°C to about 90°C.

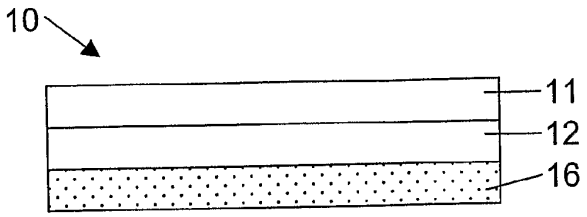

FIG. 1A

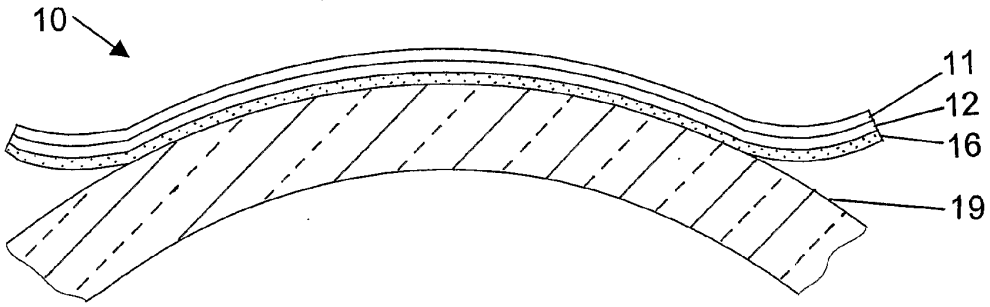

FIG. 1B

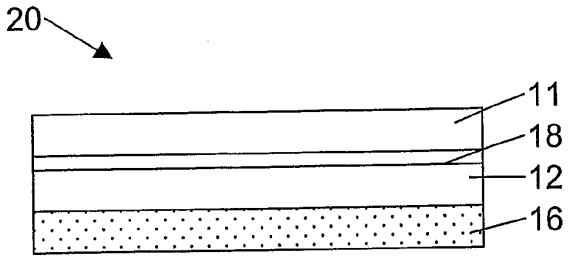

FIG. 2

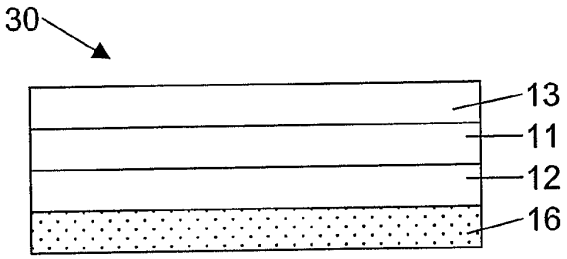

FIG. 3

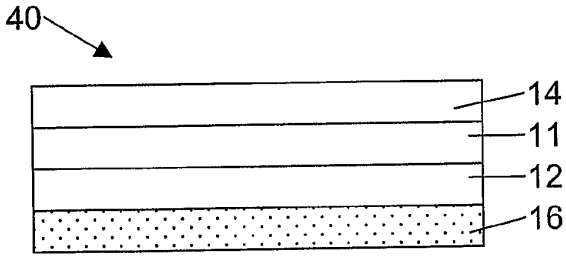

FIG. 4

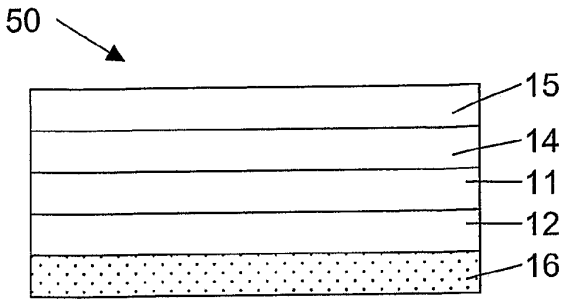

FIG. 5

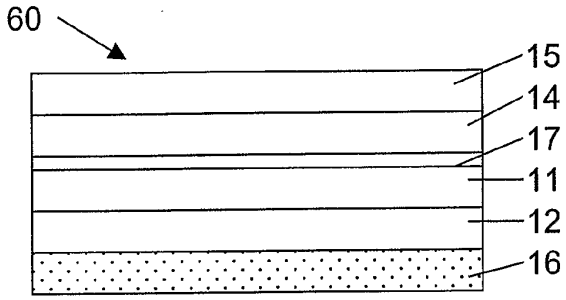

FIG. 6

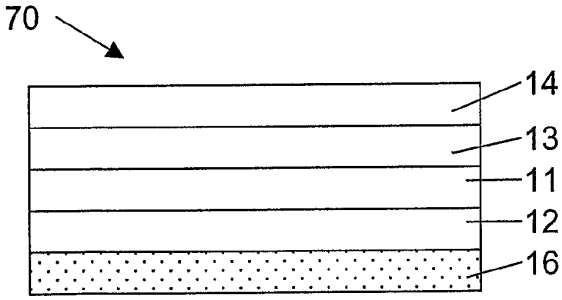

FIG. 7

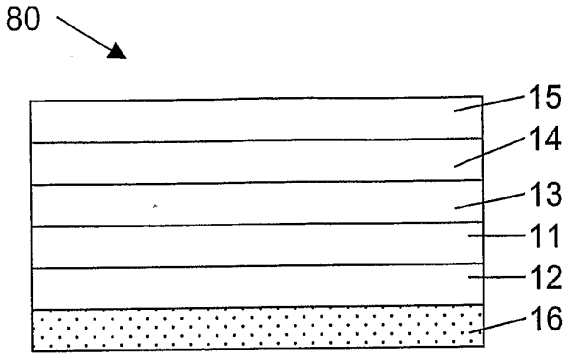

FIG. 8

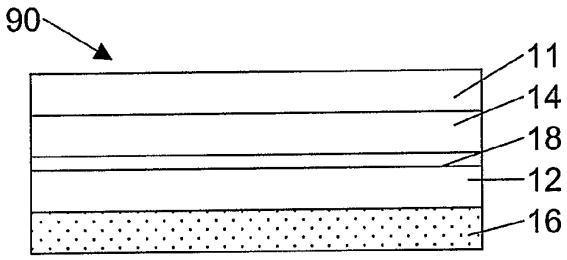

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/000758

A. CLASSIFICATION OF SUBJECT MATTER
B32B7/02 G09F3/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B32B G09F

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 951 004 A (STEINBEIS PPL GMBH; STEIBEIS PPL GMBH) 20 October 1999 (1999-10-20) paragraphs [0032] - [0037] figures 1,1a,1b,1c	1-20
X	DE 39 09 089 A1 (AN HAACK, KARL WERNER, 4600 DORTMUND, DE) 27 September 1990 (1990-09-27) claims 1-6 column 1, line 26 - column 2, line 48	1-20
P,X	WO 2005/085381 A (SPEAR GROUP HOLDINGS LIMITED; HAMMOND, DARREN; HAMMONDS, DARREN) 15 September 2005 (2005-09-15) page 10, line 14 - page 15, line 3; claim 1	1-20

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
3 April 2006	03/05/2006

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Schweissguth, M

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/000758

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 259 291 A (* ULTRAMARK ADHESIVE PRODUCTS LIMITED) 10 March 1993 (1993-03-10) claims 1-8	1,3,17, 20
A	DE 197 16 875 A1 (FUJI JUKOGYO K.K., TOKIO/TOKYO, JP; KANSAI PAINT CO., LTD., AMAGASAKI,) 6 November 1997 (1997-11-06) column 2, lines 39-64; example 1	1,17
P,X	GB 2 411 877 A (* SPEAR EUROPE LIMITED; * SPEAR GROUP HOLDINGS LIMITED) 14 September 2005 (2005-09-14) page 1, line 27 - page 21, line 21	1,17

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2006/000758

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0951004 A	20-10-1999	AT 256326 T	15-12-2003
		DE 29806781 U1	02-09-1999
		DK 951004 T3	29-03-2004
		ES 2212410 T3	16-07-2004
DE 3909089 A1	27-09-1990	NONE	
WO 2005085381 A	15-09-2005	NONE	
GB 2259291 A	10-03-1993	NONE	
DE 19716875 A1	06-11-1997	GB 2312385 A	29-10-1997
		JP 10005684 A	13-01-1998
		TW 396061 B	01-07-2000
		US 5891261 A	06-04-1999
GB 2411877 A	14-09-2005	GB 2411878 A	14-09-2005

Form PCT/ISA/210 (patent family annex) (April 2005)

(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2007-15747
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(43)公開日　平成19年1月25日(2007.1.25)

(51)Int.Cl.		F I		テーマコード（参考）
B65D 23/08	(2006.01)	B65D 23/08	Z	3E062

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(22)出願日　平成17年7月8日 (2005.7.8)

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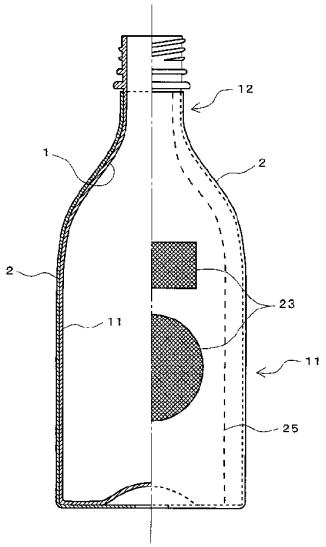
コーパックインターナショナル株式会社内

Fターム(参考)　3E062 AA09 AB02 AC02 JA01 JA08
JB05 JC02 JD05

(54)【発明の名称】シュリンクラベル及びビール用ペットボトル

(57)【要約】
【課題】リサイクルが容易な一般の透明ペットボトルをビール容器として使用することのできるシュリンクラベル及びこれを用いたリサイクル可能で安価なビール用ペットボトルを提供すること。
【解決手段】ビールを収容する透明ペットボトルの表面に密着されるシュリンクラベル２であって、フィルム基材２１の少なくとも一面全面に、遮光性を有する着色印刷層２２を有していることを特徴とするシュリンクラベル。着色印刷層２２は、茶褐色、緑色、青色又は黒色であることが好ましい。
【選択図】　図１



【特許請求の範囲】
【請求項１】
ビールを収容する透明ペットボトルの表面に密着されるシュリンクラベルであって、フィルム基材の少なくとも一面全面に、遮光性を有する着色印刷層を有していることを特徴とするシュリンクラベル。
【請求項２】
前記着色印刷層は、茶褐色、緑色、青色又は黒色であることを特徴とする請求項１記載のシュリンクラベル。
【請求項３】
請求項１又は２記載のシュリンクラベルを、透明ペットボトルの少なくとも胴部外表面に密着させてなることを特徴とするビール用ペットボトル。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、シュリンクラベル及びビール用ペットボトルに関し、詳しくは、リサイクルが容易な一般の透明ペットボトルをビール容器として使用することのできるシュリンクラベル及びこれを用いたビール用ペットボトルに関する。
【背景技術】
【０００２】
近年、特に清涼飲料水等の飲用食品の分野では、軽量で耐衝撃性、耐食性、透明性に優れ、安価であるといった数々の利点を有することから、従来のガラス瓶や缶に代わってＰＥＴ（ポリエチレンテレフタレート）製のペットボトルの使用が主流になってきており、これに伴ってペットボトルのリサイクル化事業も盛んに進められている。
【０００３】
このような背景から、それまではガラス瓶や缶が一般的であったビール容器にもペットボトルを使用しようとする試みがなされている。例えば、通常のペットボトルは高い透明性を有していることから太陽光の透過率が高く、ビールが化学変化を起こしてビールの最大の特徴でもある香味を損なうおそれがあるため、ＰＥＴ樹脂中に顔料等の充填剤を混入することでペットボトル自体を着色して不透明化することが考えられている（特許文献１の段落００３０）。
【０００４】
しかし、樹脂中に顔料等を混入することにより不透明化されたペットボトルは、通常の透明ペットボトルのようなリサイクル化が不可能であり、廃棄品として処分せざるを得ないことから環境対策上問題となる。
【特許文献１】特開２００１－４８１８２号公報の段落００３０
【発明の開示】
【発明が解決しようとする課題】
【０００５】
そこで、本発明は、リサイクルが容易な一般の透明ペットボトルをビール容器として使用することのできるシュリンクラベル及びこれを用いたリサイクル可能で安価なビール用ペットボトルを提供することを課題とする。
【０００６】
本発明の他の課題は、以下の記載により明らかとなる。
【課題を解決するための手段】
【０００７】
上記課題は、以下の各発明によって解決される。
【０００８】
（請求項１）
ビールを収容する透明ペットボトルの表面に密着されるシュリンクラベルであって、フィルム基材の少なくとも一面全面に、遮光性を有する着色印刷層を有していることを特徴

とするシュリンクラベル。

【０００９】

（請求項２）

前記着色印刷層は、茶褐色、緑色、青色又は黒色であることを特徴とする請求項１記載のシュリンクラベル。

【００１０】

（請求項３）

請求項１又は２記載のシュリンクラベルを、透明ペットボトルの少なくとも胴部外表面に密着させてなることを特徴とするビール用ペットボトル。

【発明の効果】

【００１１】

本発明によれば、リサイクルが容易な一般の透明ペットボトルをビール容器として使用することのできるシュリンクラベル及びこれを用いたリサイクル可能で安価なビール用ペットボトルを提供することができる。

【発明を実施するための最良の形態】

【００１２】

以下、本発明の実施の形態について図面を用いて説明する。

【００１３】

図１は本発明に係るビール用ペットボトルの一部断面で示す正面図である。図中、１はペットボトル本体、２は該ペットボトル本体１の外表面に密着されたシュリンクラベルである。

【００１４】

ペットボトル本体１は、飲料用ペットボトルとして一般的に使用されている透明ペットボトルからなり、通常のリサイクル手段によってリサイクル可能とされるものが使用できる。

【００１５】

シュリンクラベル２は、通常、ペットボトル本体１の胴部１１の最大径よりも大径に形成された円筒状の熱収縮性プラスチックフィルムからなり、ペットボトル本体１に被せた後、加熱して熱収縮させることによりペットボトル本体１の外表面に密着されている。

【００１６】

シュリンクラベル２に使用できるプラスチックフィルムとしては、ポリエチレンテレフタレートやポリブチレンテレフタレート等のポリエステルフィルム、ポリエチレンやポリプロピレン等のポリオレフィンフィルム等を基材とする延伸加工された熱収縮性を有するプラスチックフィルムが挙げられる。

【００１７】

シュリンクラベル２には、図２に示すように、シュリンクラベル２を構成するフィルム基材２１の少なくとも一面全面に着色印刷層２２が形成されている。着色印刷層２２は、フレキソ印刷、グラビア印刷等の適宜の印刷手段によって、フィルム基材２１の少なくとも一面全面に遮光性を有するインキが塗工されることにより形成されている。シュリンクラベル２は、この着色印刷層２２が印刷されていることにより遮光性を有しており、ペットボトル本体１に収容されるビールを光から保護して品質維持を図るようになっている。

【００１８】

着色印刷層２２の色は、シュリンクラベル２に遮光性を付与することができるものであれば特に限定されないが、一般のビール瓶と同様の茶褐色とすれば、ビール容器としてのイメージを損なわないために好ましい。例えばマンセル値で９ＹＲ５．２／２．０のインキを用いて印刷すると、ビール瓶に類似したアンバー色とすることができる。その他、緑色、青色、黒色とすることも好ましい。

【００１９】

本発明において、シュリンクラベルにより遮光性が付与されたと言えるためには、好ましくは５４０ｎｍ以下の光線を実質的にカットすることである。

【００２０】
フィルム基材２１は、透明フィルム、半透明フィルム、不透明フィルムのいずれを用いることもできるが、半透明フィルムや不透明フィルムを用いる場合、シュリンクフィルム２をペットボトル本体１の外表面に密着させた際に着色印刷層２２が外側になるようにすることが好ましい。
【００２１】
透明フィルムを用いる場合、着色印刷層２２は表裏どちらでもよいが、一般には裏側、すなわち、シュリンクフィルム２をペットボトル本体１の外表面に密着させた際に着色印刷層２２がペットボトル本体１に接する内側になるようにする。
【００２２】
シュリンクラベル２には、ビールの酸化劣化及び炭酸ガスの逃散を防止するため、ガスバリヤー性が付与されていることが好ましい。一般にＰＥＴはガス透過性を有しているため、ペットボトル本体１のガス透過をシュリンクラベル２によって阻止することができる。
【００２３】
また、シュリンクラベル２には、着色印刷層２２以外に文字、図柄等の適宜の印刷層２３を設けることができる。図２に示す印刷層２３は、フィルム基材２１の着色印刷層２２とは反対面に形成されているが、フィルム基材２１が透明又は半透明フィルムであり、着色印刷層２２側がペットボトル本体１に接するようにシュリンクラベル２を密着させる場合は、図３に示すように、フィルム基材２１の一面に印刷層２３を形成した後、更にその印刷層２３の上から全面に着色印刷層２２を形成することも好ましい。
【００２４】
更に、図４に示すように、着色印刷層２２の更に上から別の印刷層２４を設けることで、シュリンクラベル２の両面に印刷層２３、２４がそれぞれ視認可能な構成にすることも好ましい。この場合は、例えば印刷層２４側がペットボトル本体１に接するようにシュリンクラベル２を密着させるようにすれば、印刷層２４が外部から視認できなくなるので、この印刷層２４をクーポン券やスピードくじ等の消費者にとって有用な情報面とすることで、消費者が楽しみながら自発的にシュリンクラベル２をペットボトル本体１から剥離できるようにしてゴミの分別を自然と促すことができる。
【００２５】
シュリンクラベル２は、ペットボトル本体１の少なくとも胴部１１の外表面に密着されることが必要であるが、ペットボトル本体１のネック部１２の外表面をも被覆するように密着されることが、ビールの品質保持の観点から好ましい。
【００２６】
また、本発明に係るシュリンクラベル２には、廃棄時のペットボトル本体１からの剥離を容易にするため、適宜の位置に、ペットボトル本体１の高さ方向に沿ってミシン目２５が形成されていることが好ましい。ミシン目２５は、フィルム２１に極く細い切線状に形成されるため、孔状に形成されるものと異なり、光をほとんど透過させないので、ビールの品質を低下させるおそれがない。
【００２７】
シュリンクラベル２は、図５に示すように、ペットボトル本体１の底部に対応するシュリンクラベル２の底部２６が閉塞されていることも好ましい。底部からの光の侵入も阻止できるため、ビールの品質保持機能を向上させることができる。この場合、シュリンクラベル２は、底部２６を有する袋状に形成した後、ペットボトル本体１を該底部２６を有する袋状のシュリンクラベル２に挿入し、加熱収縮させることによってペットボトル本体１の外表面に密着させる。
【００２８】
また、図５に示すように、ペットボトル本体１にビールを収容し、キャップ３によって閉栓した後に、キャップ３の外表面にもシュリンク包装４を密着させるようにしてもよい。このシュリンク包装４も、シュリンクラベル２と同様に少なくとも一面全面が遮光性を

有する着色印刷層とすれば、よりビールの品質保持機能を向上させることができる。

【００２９】

一般に、透明ペットボトルは、光透過性が高いためにビール容器としては全く不向きな存在であるが、本発明のシュリンクラベル２及びこれを用いたビール用ペットボトルによれば、シュリンクラベル２によってビール用容器に必要な機能を付与することができるため、リサイクル可能な通常のペットボトルをそのまま使用することができ、シュリンクラベル２を剥離してしまえばペットボトルのリサイクル性を全く損なうことがなく、また、ビール専用のペットボトルの製造ラインを構築する必要もないので、安価で環境にやさしいビール用ペットボトルとすることができる。

【００３０】

また、シュリンクラベル２に商品名や商標等を直接印刷できるので、これらを紙等のラベルに別途印刷したもの貼着する必要がなく、シュリンクラベル２をペットボトル本体１から剥離してしまえばペットボトル本体１には何も残らないため、リサイクル時に従来のガラス製ビール瓶の場合のようなラベルを剥離するための工程を必要とせず、リサイクル化も容易である。

【図面の簡単な説明】

【００３１】

【図１】本発明に係るビール用ペットボトルの一部断面で示す正面図

【図２】シュリンクラベルの断面図

【図３】シュリンクラベルの断面図

【図４】シュリンクラベルの断面図

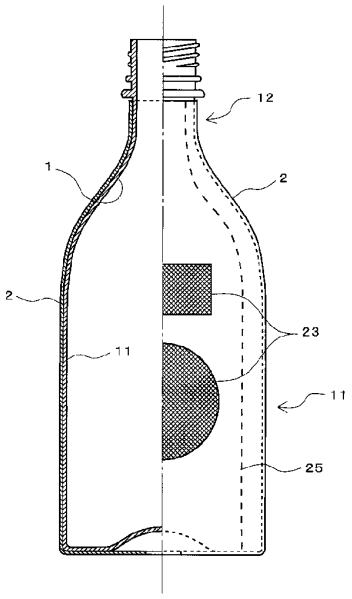
【図５】本発明に係るビール用ペットボトルの他の態様を一部断面で示す正面図

【符号の説明】

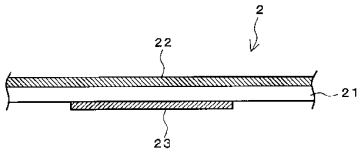
【００３２】

１：ペットボトル本体
１１：胴部
１２：ネック部
２：シュリンクラベル
２１：フィルム基材
２２：着色層
２３、２４：印刷層
２５：ミシン目
２６：底部
３：キャップ
４：シュリンク包装

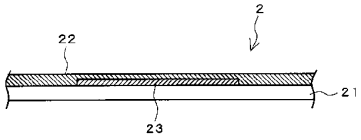
【図１】


12
1
2
2
23
11
11
25

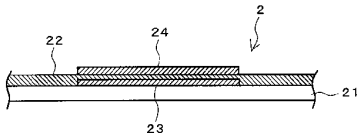
【図２】


2
22
21
23

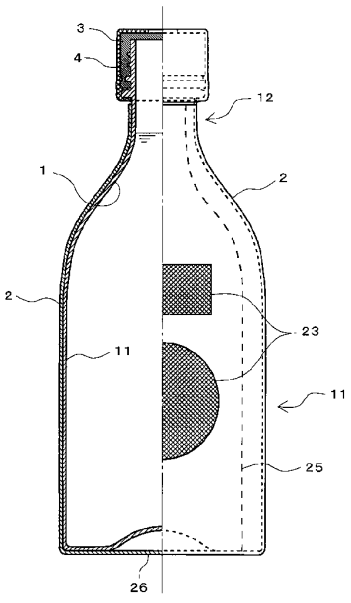
【図３】


2
22
21
23

【図４】


2
24
22
21
23

【図５】


3
4
12
1
2
2
23
11
11
25
26

PE2E SEARCH - Search History (Prior Art)

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L2	120	((("SHARP") near3 ("Andrew")) OR (("MORGAN") near3 ("Mitchell"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/27 12:46 PM
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			WO); FPRS; EPO; JPO; DERWENT)				
L7	301	(B65B7/167).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/27 12:47 PM
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			PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L14	0	(shrink NEAR label) AND (recyclable) AND ((titanium NEAR dioxide) NEAR layer)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/31 02:39 PM
L15	20	(shrink NEAR label) AND (recyclable) AND ((titanium NEAR dioxide) SAME layer)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/31 02:39 PM
L16	6	(shrink NEAR label) AND (recyclable) AND ((light NEAR blocking) SAME layer)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/31 02:40 PM
L17	19	((US-20230203349-A1 OR US-20180215127-A1 OR US-20170283116-A1 OR US-20170223879-A1 OR US-20170213484-A1 OR US-	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS,	OR	ON	ON	2023/08/01 10:27 AM

		20170174379-A1 OR US-20160193815-A1 OR US-20160152010-A1 OR US-20160136934-A1 OR US-20160136935-A1 OR US-20140151258-A1 OR US-20140053509-A1 OR US-20090291284-A1 OR US-20030203166-A1 OR US-20090301636-A1).did. AND PGPB.dbnm.) OR ((WO-2021165081-A1).did. AND DWPI.dbnm.) OR ((WO-2018187203-A1 OR CN-104364035-A OR KR-100910406-B1).did. AND FTDB.dbnm.)	IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L18	5913	label AND (anti NEAR blocking NEAR agent)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 10:30 AM
L19	356	label AND ((anti NEAR blocking NEAR agent) SAME (titanium NEAR dioxide))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 10:30 AM
L20	1	label AND ((anti NEAR blocking NEAR agent) SAME (titanium NEAR dioxide) AND (light NEAR block))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2023/08/01 10:31 AM

			EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L21	356	label AND ((anti NEAR blocking NEAR agent) SAME (titanium NEAR dioxide))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 10:31 AM
L22	107	"6821592"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 10:58 AM
L23	88	"7217463"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 10:59 AM
L24	6	((heat NEAR shrink) SAME label) AND (light	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2023/08/01 11:03 AM

		NEAR blocking NEAR (additive OR agent))	AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L25	1407	(light NEAR blocking NEAR (additive OR agent)) SAME ((titanium NEAR dioxide) OR zinc OR aluminum OR copper OR silver OR mica OR (carbon NEAR black) OR (reflective NEAR pigment))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 11:06 AM
L26	2	L25 AND (heat NEAR shrink NEAR label)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 11:06 AM
L27	368328	(blocking NEAR agent) OR (light NEAR blocker) OR (light NEAR blocking NEAR agent)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2023/08/01 11:07 AM

			JPO; DERWENT)				
L28	176	((blocking NEAR agent) OR (light NEAR blocker) OR (light NEAR blocking NEAR agent)) AND (heat NEAR shrink NEAR label)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 11:07 AM
L29	2	"20230177980"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 01:19 PM
L30	6	"201216296"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 01:20 PM
L31	15	"2012162696"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE,	OR	ON	ON	2023/08/01 01:20 PM

			SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L32	8	"2010284941"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 01:43 PM
L33	23	"2007015747"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 01:44 PM
L34	441	((blocking NEAR agent) OR (light NEAR blocker) OR (light NEAR blocking NEAR agent)) AND (metal NEAR particulate)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:24 AM
L35	272	((blocking NEAR agent) OR (light NEAR blocker) OR (light NEAR blocking NEAR agent)) AND ((metal NEAR particulate) SAME (particle size))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV,	OR	ON	ON	2023/08/02 06:25 AM

			MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L36	7	((light NEAR blocker) OR (light NEAR blocking NEAR agent)) SAME ((metal NEAR particulate) SAME (particle size))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:25 AM
L37	10	((light NEAR blocker) OR (light NEAR blocking NEAR agent)) SAME ((metal NEAR particle) SAME (particle size))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:27 AM
L38	5	(light NEAR blocking NEAR agent) SAME ((metal NEAR particle) SAME (particle size))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:27 AM
L39	408199	(light NEAR block) OR (UV NEAR block) OR (ultraviolet NEAR block) OR (visible NEAR light NEAR block)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2023/08/02 06:28 AM

			EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L40	0	((light NEAR block) OR (UV NEAR block) OR (ultraviolet NEAR block) OR (visible NEAR light NEAR block)) same3 (metal NEAR paticle) SAME (particle NEAR size)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:29 AM
L41	0	((light NEAR block) OR (UV NEAR block) OR (ultraviolet NEAR block) OR (visible NEAR light NEAR block)) same3 (metal NEAR paticle) same3 (particle NEAR size)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:29 AM
L42	289	(light NEAR blocking) SAME (metal NEAR pigment)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:30 AM
L43	1	(light NEAR blocking) SAME (metal NEAR	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2023/08/02 06:30 AM

		pigment) SAME (pigment NEAR size)	AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L44	39	(light NEAR blocking) SAME (metal NEAR particle) SAME (particle NEAR size)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:04 AM
L45	32430	(metal NEAR (particulate OR particle)) SAME (zinc OR aluminum OR copper OR silver) SAME (particle NEAR size)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:07 AM
L46	63	(metal NEAR (particulate OR particle)) SAME (zinc OR aluminum OR copper OR silver) SAME (particle NEAR size) SAME (light NEAR block$3)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2023/08/02 10:08 AM

			JPO; DERWENT)				
L47	131	(metal NEAR (particulate OR particle)) SAME (zinc OR aluminum OR copper OR silver) SAME (particle NEAR size) same3 (light NEAR block$3)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:12 AM
L48	10	"2008138282"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:15 AM
L49	17	"2008138287"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:15 AM
L50	16	"2008203841"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE,	OR	ON	ON	2023/08/02 10:16 AM

			SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L51	3148	(light NEAR blocking) SAME (particle NEAR size)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:17 AM
L52	816	(light NEAR blocking) SAME (particle NEAR size) SAME metal	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:17 AM
L53	37	((light NEAR blocking) SAME (particle NEAR size) SAME metal) AND label	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:53 AM
L54	12	(US-0068453-$ | US-0126462-$ | US-0233067-$ | US-20030068453-$ | US-20090233067-$ | US-20130126462-$).DID.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV,	OR	ON	ON	2023/08/02 11:15 AM

			MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L55	24	((US-20230203349-A1 OR US-20180215127-A1 OR US-20170283116-A1 OR US-20170223879-A1 OR US-20170213484-A1 OR US-20170174379-A1 OR US-20160193815-A1 OR US-20160152010-A1 OR US-20160136934-A1 OR US-20160136935-A1 OR US-20140151258-A1 OR US-20140053509-A1 OR US-20090291284-A1 OR US-20030203166-A1 OR US-20090301636-A1 OR US-20200298541-A1 OR US-20170368811-A1).did. AND PGPB.dbnm.) OR ((WO-2021165081-A1).did. AND DWPI.dbnm.) OR ((WO-2018187203-A1 OR CN-104364035-A OR KR-100910406-B1 OR JP-2012162696-A OR JP-2010284941-A OR JP-2004114498-A).did. AND FTDB.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/02 01:05 PM
L56	3	"20090233067"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 02:46 PM

L57	31	"2006076327"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/03 01:19 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Bibliographic Data

Application No: 18/103,234

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☐ No ☐ Met After Allowance

Verified and Acknowledged: /LAURA C POWERS/ (Examiner's Signature) | (Initials)

Title: RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
01/30/2023	428	1785	0644.000001US01
RULE			

APPLICANTS

BROOK & WHITTLE LIMITED,

INVENTORS

Andrew Sharp, Orchard Park, NY,

Mitchell J. Morgan, Buffalo, NY, UNITED STATES

CONTINUING DATA

This application is a CON of PCT/US2022/029280 05/13/2022

PCT/US2022/029280 has PRO of 63188794 05/14/2021

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

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$6,360

UNITED STATES PATENT AND TRADEMARK OFFICE

USPTO Automated Interview Request (AIR)

Sep 27 2023

This paper requesting to schedule and/or conduct an interview is appropriate because:

This submission is requested to be accepted as an authorization for this interview to communicate via the internet. Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned concerning scheduling of the interview via video conference, instant messaging, or electronic mail, and to conduct the interview in accordance with office practice including video conferencing.

Name(s):
Lotta Kiuru-Ribar

S-signature:
/Lotta KiuruRibar/

Registration Number:
66979

U.S. Application Number:
18103234

Confirmation Number:
8140

E-mail Address:
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Phone Number:
+1 6127675005

Proposed Time of Interview:
10-12-2023 3:00 PM ET

Alternative Proposed Time(s) of Interview:
10-12-2023 2:00 PM ET

Alternative Proposed Time(s) of Interview:
10-12-2023 1:00 PM ET

Prefered Interview Type:
Telephonic

I am the applicant or applicant's representative for this application.

Topic for Discussion:
103 rejections

UNITED STATES
PATENT AND TRADEMARK OFFICE

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 18/103,234	Filing Date 01/30/2023	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $480 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

AMENDMENT	10/16/2023	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 22	Minus	** 22	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/SUSAN A HAY-DAVIS/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	18/103,234	Attorney Docket No.:	0644.000001US01
Confirmation No.:	8140	Customer No.:	26813
Filing Date:	January 30, 2023	Examiner Name:	Laura C. Powers
First Named Inventor:	Andrew Sharp	Group Art Unit:	1785
Title of Invention:	RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER		

AMENDMENT AND RESPONSE

Commissioner for Patents
Mail Stop Amendment
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

In response to the non-final Office Action of August 9, 2023, please consider the following.

Amendments to the Claims begin on the page entitled "Amendments to the Claims."

Remarks begin on the page entitled "Remarks."

Authorization is given to charge Deposit Account No. 13-4895 any necessary fees for this filing and all required extension of time fees.

Amendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

Listing of Claims

1. (**Currently Amended**) A recyclable shrink label comprising:

a heat shrink film comprising polyethylene terephthalate (PET) and having a first surface and a second surface opposite of the first surface, the heat shrink film having a thickness from 15 μm to 100 μm; and

a light blocking layer disposed adjacent the first surface and comprising a light blocking component, the light blocking layer being constructed for the recyclable shrink label to block at least 80 % of incident light having wavelengths in a range of 200 nm to 900 nm,

wherein the recyclable shrink label is recyclable with a PET container.

2. (**Currently Amended**) The recyclable shrink label of claim 1 further comprising an indicia layer~~, optionally wherein the indicia layer is disposed on the first surface~~.

3. (**Currently Amended**) The recyclable shrink label of claim 1 further comprising a high opacity layer~~, the high opacity layer optionally~~ comprising a white pigment.

4. (Original) The recyclable shrink label of claim 3, wherein the recyclable shrink label comprises an indicia layer and wherein the high opacity layer is disposed between the indicia layer and the light blocking layer.

5. (**Cancelled**)

6. (**Currently Amended**) The recyclable shrink label of claim 1, wherein the heat shrink film ~~comprises~~ consists of polyethylene terephthalate (PET)~~, polyethylene terephthalate glycol-modified (PETG or PET-G), polyvinyl chloride (PVC), polystyrene or oriented polystyrene (OPS), polylactic acid (PLA), polypropylene (PP), polyethylene (PE), or a combination thereof~~.

7. (**Currently Amended**) The recyclable shrink label according to claim [[1]]8, wherein the heat shrink film comprises a seam.

8. (**Currently Amended**) The recyclable shrink label according to claim 1, wherein the ~~heat shrink film~~ recyclable shrink label is in a form of a sleeve or tube.

9. (**Currently Amended**) The recyclable shrink label according to claim 1, wherein when heated to 100 °C, the heat shrink film contracts or shrinks by about 1 % to about 90 %~~, optionally wherein the heat shrink film contracts of shrinks by about 1 % to 90 % in a transverse direction~~.

10. (**Currently Amended**) The recyclable shrink label according to claim 1, wherein when heated to 100 °C, the entire recyclable shrink label contracts or shrinks by about 1 % to about 90 %~~, optionally wherein the entire recyclable shrink label contracts of shrinks by about 1 % to 90 % in a transverse direction~~.

11. (Previously Presented) The recyclable shrink label according to claim 3, wherein the high opacity layer comprises a pigment selected from titanium dioxide (TiO_2), precipitated calcium carbonate (PCC), aluminum silicate, aluminum oxide (alumina), mica-based pigments coated with thin layer(s) of white pigment, or a combination thereof.

12. (**Currently Amended**) The recyclable shrink label according to claim 1, wherein the light blocking component comprises a metal particulate~~, optionally wherein the metal particulate has~~ having a particle size of 0.1 μm to 100 μm.

13. (Previously Presented) The recyclable shrink label according to claim 1, wherein the light blocking component comprises zinc, aluminum, copper, silver, or an alloy thereof, titanium dioxide, carbon black, mica, a reflective pigment, a polymer capable of blocking light, a mineral capable of blocking light, or a combination thereof.

14. (**Currently Amended**) The recyclable shrink label according to claim 1, wherein the light blocking layer is present in an amount of 0.5 ppr to 25 ppr relative to the recyclable shrink label.

15. (**Currently Amended**) The recyclable shrink label according to claim 1, wherein the light blocking layer comprises from 0.1 ppr to 10 ppr[[,]] of the light blocking component.

16. (**Currently Amended**) An article comprising:

a container comprising polyethylene terephthalate (PET) and defining an external surface; and

the recyclable shrink label of claim 1 disposed on the container~~, optionally wherein the first surface of the heat shrink film faces the external surface of the container~~.

17. (**Cancelled**)

18. (**Cancelled**)

19. (**Cancelled**)

20. (Withdrawn) A method of making a label for a container, the method comprising:

depositing an indicia layer on a heat shrinkable film;

optionally depositing a high opacity layer on the indicia layer; and

depositing a light blocking composition on the indicia layer, on the heat shrinkable film, or on the high opacity layer,

wherein the light blocking layer comprises one or more light blocking components, and wherein the label is capable of blocking at least 80 % of incident light having wavelengths in a range of 200 nm to 900 nm.

21. (Withdrawn) A method of recycling an article comprising a container defining an external surface; and the recyclable shrink label of claim 1 disposed on the container, optionally with the first surface facing the external surface of the container, the method comprising:

determining that the container and recyclable shrink label comprise polyethylene terephthalate (PET);

directing the article into a polyethylene terephthalate (PET) recycling stream; and

washing the article to remove inks and pigments from the recyclable shrink label.

22. (Withdrawn) The method of claim 21, wherein the washed article is clear and is not stained by the light blocking component or other pigments or inks.

23. **(New)** The recyclable shrink label according to claim 16, wherein the first surface of the heat shrink film faces the external surface of the container.

24. **(New)** The recyclable shrink label according to claim 2, wherein the indicia layer is disposed on the first surface.

25. **(New)** The recyclable shrink label according to claim 9, wherein the heat shrink film contracts of shrinks by about 1 % to 90 % in a transverse direction.

26. **(New)** The recyclable shrink label according to claim 1, wherein the heat shrink film comprises crystallizable polyethylene terephthalate (PET).

Remarks

The non-final Office Action of August 9, 2023 has been received and reviewed. In this Response, claims 1, 2, 3, 6-10, 12, and 14-16 are amended, new claims 23-26 are added, and claims 5 and 17-19 are cancelled, without prejudice. Therefore, claims 1-4, 6-16, and 20-26 are pending. Claims 20-22 are withdrawn from consideration. Applicant requests that the Examiner reconsider and withdraw the rejections.

Interview Summary

Applicant thanks the Examiner for the courtesy extended during the Examiner Interview on October 13, 2023, with Applicant's representatives Andrey Sharp, Mitchell Morgan, Tyler Matusevich, and attorney Lotta Kiuru-Ribar. Potential claim amendments and differences between the claims and the prior art were discussed. The amendments and arguments presented here reflect those discussed during the Interview.

Support for Claim Amendments

Support for amended claim 1 can be found, for example, in claims 18 and 19 and at page 11, line 31 to page 12, line 1 of the specification.

Support for amended claim 14 can be found, for example, at page 2, lines 22-24 of the specification.

Support for new claims 23-25 can be found, for example, in the claims as filed.

Support for new claim 26 can be found, for example, at page 8, lines 28-30 of the specification.

The 35 U.S.C. § 112(b) Rejection

Claims 2, 3, 7, 8, 9, 10, 12, 14, 16, 18, and 19 are rejected under 35 U.S.C. § 112(b) as being indefinite. Applicant respectfully traverses this rejection.

Claims 2, 3, 7, 8, 9, 10, 12, 16, 18, and 19 are rejected because the use of the word "optionally" allegedly renders the claims indefinite. Applicant respectfully disagrees. The MPEP states that "Another alternative format which requires some analysis before concluding whether

or not the language is indefinite involves the use of the term 'optionally.' *In Ex parte Cordova*, 10 USPQ2d 1949 (Bd. Pat. App. & Inter. 1989) the language 'containing A, B, and optionally C' was considered acceptable alternative language because there was no ambiguity as to which alternatives are covered by the claim." *See* MPEP § 2173.05(h)II.

However, without acquiescing to the rejection and solely for the purpose of advancing prosecution, claims 2, 3, 5, 7, 9, 10, 12, and 16 are amended to remove optional limitations. Withdrawal of the rejection is respectfully requested.

Claim 7 is rejected because allegedly it is unclear what structural requirements are necessary for a seam to be present. Without acquiescing to the rejection and solely for the purpose of advancing prosecution, claim 7 is amended to depend from claim 8.

Claim 8 is rejected because allegedly it is not clear how only one of the components, the heat shrink film, can be claimed to be in the form of a sleeve or tube. Without acquiescing to the rejection and solely for the purpose of advancing prosecution, claim 8 is amended to recite wherein the recyclable shrink label is in a form of a sleeve or tube.

Claim 14 is rejected because allegedly it is not clear what the context of "in an amount" is regarding the light blocking layer and the heat shrink film. Without acquiescing to the rejection and solely for the purpose of advancing prosecution, claim 14 is amended to recite wherein the light blocking layer is present in an amount of 0.5 ppr to 25 ppr relative to the recyclable shrink label.

Withdrawal of the rejection is respectfully requested.

The 35 U.S.C. § 103 Rejection

1. Claims 1-11 and 13-18 are rejected under 35 U.S.C. § 103 as being unpatentable over Mitchell (U.S. Patent Publication No. 2017/0223879, hereinafter "Mitchell '879"). Applicant respectfully traverses this rejection.

The Office Action asserts that Mitchell '879 teaches an electromagnetic radiation blocking label arrangement and a container comprising the radiation blocking label arrangement

thereon. The radiation blocking label arrangement is comprised of a first skin layer (interpreted as heat shrink film) comprised of a shrinkable film, a core layer (interpreted as high opacity layer), a second skin layer and a metallization layer (interpreted as light blocking layer), wherein the metallization layer is disposed adjacent to a first surface of the first skin layer.

Regarding recyclability, the Examiner asserts that "[t]he term 'recyclable' is considered functional language related to the intended use of the product and is accorded limited weight as **the language does not further limit the structure** or the process. Mitchell et al. teaches all the structural features of claim 1 and therefore **would be capable of performing in the manner claimed**. Furthermore, Mitchell et al. teaches that the shrinkable labels provide **easy separate during recycling processes** ([0235-0252])." Office Action page 8, emphasis added.

Applicant respectfully disagrees with the interpretation of the claims and Mitchell '879.

Mitchell '879 does not teach or suggest a recyclable label.

Mitchell '879 states in the Background section that "it would be desirable that the labels are **removable** from the surface of the container but also **separable** in the normal sink-float washing process thus *promoting recycling* ***of the container***." *See* Mitchell '879 ¶ [0002]. This is again repeated as an aim of the invention in the Summary. *See* Mitchell '879 ¶ [0003].

The term "recyclable" does further limit the claim in that the claimed label **must be capable of being recycled**. Not all combinations of shrink films and light blocking materials are capable of being recycled, as further discussed below. It should also be noted that removing the label before or during the recycling process is not evidence of the recyclability of the label. If anything, the desire to provide a removable label implies that the label may not be recyclable and must be removed before the container itself can be recycled. Removing the label during the recycling process is not equivalent to actually recycling the label.

The Examiner asserts that Mitchell '879 teaches all the structural features of claim 1 and therefore would be capable of performing in the manner claimed. However, Mitchell '879 fails to teach a recyclable label and for at least this reason fails to teach all of the features of claim 1.

Mitchell '879 teaches an electromagnetic radiation blocking shrinkable label that comprises a multilayer shrinkable film. *See* Mitchell '879 ¶ [0109]. The electromagnetic radiation blocking shrinkable film 5 includes a multilayer plastic film comprising a first skin layer 2, a core layer 4, a second skin layer 6 and a metallization layer 7 on the second skin layer. *Id.* Mitchell '879 teaches that the core and skin layers of the shrinkable film may comprise propylene terpolymer or propylene random copolymer. *See, e.g.*, Mitchell '879 ¶¶ [0112] and [0114].

Claim 1 is amended to recite a recyclable shrink label comprising: a heat shrink film comprising **polyethylene terephthalate (PET)** and having a first surface and a second surface opposite of the first surface, the heat shrink film having a thickness from 15 μm to 100 μm; and a light blocking layer disposed adjacent the first surface and comprising a light blocking component, the light blocking layer being constructed for the recyclable shrink label to block at least 80 % of incident light having wavelengths in a range of 200 nm to 900 nm, **wherein the recyclable shrink label is recyclable with a PET container**.

The shrink labels taught by Mitchell '879 are not made of PET and would not be recyclable with a PET container. Labels made of other materials, including polypropylene, polyethylene, and paper, are considered contaminants in a PET recycling stream and need to be removed for the PET container to be recycled. This is supported by a Resource Document by the Association of Plastic Recyclers (APR), provided herewith. The APR document states:

"APR recommends films that are compatible with PET recycling such as:

1. Films that float in water and that can be **separated from PET** that sinks in water, or,
2. **PET based films** that crystallize and **can be recovered *with the PET stream***."

See APR document page 2, emphasis added.

The Mitchell '879 film does not fall into the second category and is not recyclable with the PET stream. If the film floats (despite its metal content), it may fall into the first category because it can be separated from PET.

In addition to the polymer that is not compatible with PET recycling, the Mitchell '879 film includes a core that includes titanium dioxide (when used as a high opacity layer, as interpreted by the Examiner). *See, e.g.,* Mitchell '879 ¶ [0176]. When titanium dioxide or other similar pigments are incorporated into the polymer layer, which in Mitchell '879 are additionally sandwiched between the skin layers, the label becomes unrecyclable. Again, the APR document provides:

> An important consideration for inks on shrink sleeve labels is that the ink **not contaminate or discolor PET flake** when mixed in hot caustic wash water used in the recycling process. If the ink separates from the label film in the wash step, it is desirable that the ink be readily filtered from the PET flake as well as the wash water. If the sleeve label floats, it is desirable that the ink remain adhered to the floating label, and that the ink density not cause a floating label to sink.
>
> *See* APR document page 2.

Even if the label in Mitchell '879 was otherwise capable of being recycled, the pigments being incorporated into the core layer polymer would contaminate the polymer flake during the recycling process.

In contrast, the present application teaches that the inks and pigments used in the recyclable shrink label may be removed by washing, leaving behind a label that can be recycled with the article. *See, e.g.,* page 26, lines 6-10.

Mitchell '879 does not provide any guidance for how to actually make a recyclable label, rather than merely a label that can be removed so that the container can be recycled. A person of ordinary skill in the art would not have had a reasonable expectation of success in preparing recyclable label based on the teachings of Mitchell '879.

Mitchell '879 does not teach or suggest all of the features of the present claims. A person of ordinary skill in the art would not have had a reasonable expectation of success in modifying Mitchell '879 to arrive at the claimed recyclable label. Withdrawal of the rejection is respectfully requested.

2. Claims 1, 2, 3, 4, 5, 6, 9, 10 ,12, 13, 14, 15, 16, 17, and 19 are rejected under 35 U.S.C. § 103 as being unpatentable over Doornheim (WO 2006/076327, citation to US equivalent US 2009/0233067). Applicant respectfully traverses this rejection.

For similar reasons as discussed above, Doornheim does not teach or suggest a recyclable label and fails to teach or suggest the features of claim 1.

The Examiner asserts that Doornheim discloses a removable curl label that can withstand recycling operations comprised of a transparent topcoat or overcoat layer, a print layer (interpreted as indicia layer), a metal layer (interpreted as high opacity layer), a first polymeric layer (interpreted as heat shrink layer), a second polymeric layer (interpreted as light blocking layer) and an adhesive. The Examiner asserts that it would have been obvious to include titanium dioxide in the second polymeric layer (alleged light blocking layer) to provide desired properties to the film in terms of appearance, durability, and processing characteristics. The Examiner further asserts that titanium dioxide is disclosed by the instant application and therefore, the second polymer layer (light blocking layer) comprising titanium dioxide would block at least 80% of incident light having wavelengths in a range of 200 nm to 900 nm. Again, the Examiner considers the term "recyclable" functional language accorded limited weight as the language allegedly does not further limit the structure, and that Doornheim teaches all the structural features of claim 1 and would be capable of performing in the manner claimed.

As noted above, the term "recyclable" does further limit the claim in that the claimed label **must be capable of being recycled**. Not all combinations of shrink films and light blocking materials are capable of being recycled, as discussed above.

Doornheim teaches adding the pigment (white titanium dioxide or black carbon) ***into*** the polymer to provide opacity. As noted in the present application, **such films are *not* recyclable**. *See, e.g.,* page 9, lines 2-3 ("White PET cannot be recycled with clear PET bottles or containers.") This is also evidenced by the APR document which provides that inks should not "contaminate or discolor PET flake." *See* APR document page 2. Mixing the pigment into the polymer layer as taught by Doornheim would not result in a recyclable label.

Doornheim teaches that "the bottles used in the beverage industry are generally reused many times. The **bottles must be cleaned and the labels removed** prior to refilling and relabeling the bottles." Doornheim ¶ [0006], emphasis added. "Accordingly, it would be desirable to produce polymeric film **labels that can be completely removed** from the bottles during the washing process." Doornheim ¶ [0007]. Doornheim teaches that the label is curls during a hot washing liquid used in the bottling industry, causing the adhesive to "be completely removed from the container." *See* Doornheim ¶ [0018]. This will also cause the label to be removed. *See* Doornheim ¶ [0029].

Doornheim does not provide any guidance for how to actually make a recyclable label, rather than merely a label that can be removed so that the container can be recycled. A person of ordinary skill in the art would not have had a reasonable expectation of success in preparing recyclable label based on the teachings of Doornheim.

Doornheim does not teach or suggest all of the features of the present claims. A person of ordinary skill in the art would not have had a reasonable expectation of success in modifying Doornheim to arrive at the claimed recyclable label. Withdrawal of the rejection is respectfully requested.

3. Claim 18 is rejected under 35 U.S.C. § 103 as being unpatentable over Doornheim (WO 2006/076327) in view of Mitchell (U.S. 2017/0223879). Applicant respectfully traverses this rejection.

Claim 18 is cancelled and the subject matter is added to amended claim 1. To the extent that the rejection would be applied to amended claim 1, Applicant submits that for at least some of the same reasons as discussed above, the cited references do not teach or suggest all of the limitations of the claims. Mitchell '879 fails to cure the shortcomings of Doornheim. As discussed above, neither reference teaches or suggests a recyclable label. Withdrawal of the rejection is respectfully requested.

4. Claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, and 18 are rejected under 35 U.S.C. § 103 as being unpatentable over Mitchell (U.S. 2016/0136934, hereinafter "Mitchell '934") in

view of Mitchell (U.S. 2017/0223879, "Mitchell '879"). Applicant respectfully traverses this rejection.

For at least some of the same reasons as discussed above, the cited references do not teach or suggest all of the limitations of the claims. Mitchell '879 fails to cure the shortcomings of Mitchell '934.

With regard to the materials of the label, Mitchell '934 teaches polymers that are not compatible with being recycled with a PET article (polyolefin plastomer or polyolefin elastomer such as polypropylene/ethylene plastomer, ethylene/octane elastomer or ethylene/butene elastomer). *See* Mitchell '934 ¶ [0016]. Regarding the alleged light blocking layer (skin layer), Mitchell '934 teaches that the skin layer(s) may comprise cyclic olefin copolymers and LLDPE. *See* Mitchell '934 ¶¶ [0074]-[0078]. In addition, the "skin layer(s) may contain additives, such as inorganic fillers, pigments, antioxidants, ultraviolet absorbers, anti-blocking agents, slip additives, antistatic additives, cavitating agents." *See* Mitchell '934 ¶ [0080]. That is, Mitchell '934 discloses a mixture of non-recyclable polymer and filler or pigment. As discussed above, this would not result in a recyclable label. *See, e.g.,* APR document page 2.

The references, alone or in combination, fail to teach or suggest all of the features of the present claims. A person of ordinary skill in the art would not have had a reasonable expectation of success in modifying the references to arrive at the claimed recyclable label. Withdrawal of the rejection is respectfully requested.

5. Claim 12 is rejected under 35 U.S.C. § 103 as being unpatentable over Mitchell (U.S. 2016/0136934) in view of Mitchell (U.S. 2017/0223879), and further in view of Hashimoto (JP 2004114498). Applicant respectfully traverses this rejection.

For at least some of the same reasons as discussed above, the cited references do not teach or suggest all of the limitations of the claims. Hashimoto is cited for teaching adding inorganic and organic fine particles to a polymer resin to impart light blocking properties. However, for similar reasons as discussed above, mixing the pigment into a resin does not yield a

recyclable film. Hashimoto and Mitchell '879 fail to cure the shortcomings of Mitchell '934. Withdrawal of the rejection is respectfully requested.

Summary

Applicant submits that the claims are in condition for allowance and requests notification to that effect. Applicant invites the Examiner to contact the undersigned Applicant's Representative at the telephone number listed below if doing so may advance prosecution of this application.

Respectfully submitted by

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/103,234	**10/16/2023 03:28:21 PM ET**	**0644.000001US01**

Title of Invention

RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	8140	FILED BY	Margaret Rausch
PATENT CENTER #	63004876	FILING DATE	01/30/2023
CUSTOMER #	26813	FIRST NAMED INVENTOR	Andrew Sharp
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Lotta Kiuru-Ribar

Documents

TOTAL DOCUMENTS: 4

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
2023-10-16-Amendment and Response.pdf		14	-	195 KB
2023-10-16-Amendment and Response-A....pdf	(1-1)	1	Amendment/Request for Reconsideration-After Non-Final Rejection	86 KB
2023-10-16-Amendment and Response-CLM.pdf	(2-5)	4	Claims	141 KB
2023-10-16-Amendment and Response-REM.pdf	(6-14)	9	Applicant Arguments/Remarks Made in an Amendment	166 KB
APR Resource Document		10	Applicant Arguments/Remarks	4931 KB

2021.pdf Made in an Amendment

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2023-10-16-Amendment and Response.pdf	3697A83430AE5A264100A66345331DDB70197CB06CE683BFD AE30DE801564639CF445BE44ADAA42F488CF5CFD4B6379AD EE475441DBA837EF4275FC2F3C321E6
2023-10-16-Amendment and Response-A....pdf	7F01BFCF240506768D870CB705D82FEAAA33FF05878CC1266 7695E66E831A74C759E57A6C94D0FE43CB1D1C811A8625287 CCFB06EBCA14C0D903410E953136A5
2023-10-16-Amendment and Response-CLM.pdf	FE34DABAABFA912ABF6F142379D2E57B0B67780F7E56D348D DCE9DBE35F3D714E8F55D21AB7BA7A467130CCBD61C28618 9066D95337805F6BEB71406F319972F
2023-10-16-Amendment and Response-REM.pdf	8A124A6111C7DCB292BB4FB3C3162C57E4C2F23CACB244498 A1D4367A750C2592DF9D2C955DE98D34E02A3D2356038662F 751E58A657B994B382442868F04B76
APR Resource Document 2021.pdf	B997E7C85D36DB7B165D6FBF985B35BAA3DBBF24C03C94D2 A73FFC680C47111D3F1A80E22D82983E40904C160C9216623D 20494E0E850F076DFD36DD4D8FF038

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an

international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

The Association of Plastic Recyclers

Document Number RES-LBL-2 **Publication or Revision Date: 1/4/2021**

Shrink Sleeve Labels on PET Containers
APR Resource Document

Introduction

This Resource Document presents APR Guidance for characteristics of shrink sleeve labels for PET packaging that will have the most benefit for today's PET container recycling processes, and that will have the most positive environmental impact in support of the plastics circular economy.

Shrink sleeve labels have been developed that allow the label film and inks to have negligible impact on the quality or productivity of PET recycling. Such shrink sleeve labels are in commercial use today, but not yet used widely or routinely. The quality of recycled PET can be improved—to the benefit of all recycling and sustainability stakeholders—when recycling compatible labels become the standard for the PET packaging industry.

The resources described herein can be helpful to each segment of the package supply chain:

- Consumer brands can learn what comprises a recycling compatible shrink sleeve label and inform their label suppliers that they expect such technologies be offered to them;
- Label suppliers can assure brands that PET packages using their products meet recyclability guidance by performing APR Test Methods to demonstrate this;
- Converters and manufacturers who want to lead the industry in sustainability can use APR shrink sleeve label design guidance to develop and commercialize innovations that will benefit the entire packaging industry.

This document is written to complement the APR Design® Guide for Plastics Recyclability by consolidating key shrink label guidance:
https://plasticsrecycling.org/apr-design-guide/apr-design-guide-home

The APR offers programs, such as Critical Guidance Recognition, that distinguish innovations that are demonstrated to be compatible with recycling: https://plasticsrecycling.org/recognition/programs

This document contains four sections:

1. A brief review of shrink sleeve label selection criteria and potential impacts on PET recycling.
2. A listing of companies and trade associations with experience in labels and PET recycling that can help source shrink sleeve labels that are compatible with PET recycling.
3. A model specification that may be used as a starting point for buyers and sellers to specify a shrink sleeve label that is compatible with PET recycling.
4. Frequently asked questions concerning shrink sleeve labels and PET recycling.

The Association of Plastic Recyclers

Brief Review of Shrink Sleeve Label Selection Criteria and Potential Impacts on PET Container Recycling

Auto-Sortation Potential (Most important)

The near infrared (NIR) auto-sorters used at Materials Recovery Facilities (MRFs) must be able to identify the PET bottle beneath a shrink sleeve label, or else the PET bottle is lost to the waste stream and is not recycled. When a label is highly opaque, covers the majority of the bottle surface area, contains metal film layers, or is dark in color, the PET container is at risk of not being correctly identified by the NIR unit.

Selection of a film substrate

APR recommends films that are compatible with PET recycling such as:

1. Films that float in water and that can be separated from PET that sinks in water, or,
2. PET based films that crystallize and can be recovered with the PET stream.

PVC has been used for shrink label films, however the impact of PVC on recycled PET color and black speck contamination is very severe. A PVC label renders the PET container non-recyclable.

PETG has been a widely used shrink label film substrate, but PETG is not compatible when PET containers are recycled and so should be avoided. Films based on polystyrene or PLA are also not compatible with PET and should be avoided. PETG, PLA and OPS shrink films are detrimental to PET recycling.

Selection of printing inks

APR offers tests that can be used to identify inks that have negligible, if any, impact on PET recycling. An important consideration for inks on shrink sleeve labels is that the ink not contaminate or discolor PET flake when mixed in hot caustic wash water used in the recycling process. If the ink separates from the label film in the wash step, it is desirable that the ink be readily filtered from the PET flake as well as the wash water. If the sleeve label floats, it is desirable that the ink remain adhered to the floating label, and that the ink density not cause a floating label to sink.

Additional label design considerations

APR encourages labels that:

- Do not cover the entire bottle surface areas; exposed PET provides the opportunity for color sorters to most accurately identify clear PET beneath the label. Small surface area labels can also result in lower label waste and bale yield loss when bottles are recycled. Transparent areas designed into labels can potentially allow for better sorting of clear PET. An APR Working Group is currently conducting new work in this area; results will be reported when available.

- Employ a de-seaming adhesive so that the label can be removed from the PET container at those PET reclaimers that employ a hot whole bottle wash step.

APR has not yet developed guidance with respect to labels that:

- Employ perforations on a label, either as a tear-strip so that consumers have an opportunity to easily remove the label before recycling the bottle, or to help improve label removal efficiency in recycling operations. The consumer tear-strip option requires on-package instruction to encourage effective label removal; removed labels have the potential to become mismanaged waste. Labels not removed by consumers will enter the recycling stream and be subject to the label recycling compatibility guidance detailed in this document. Also, in states with container deposit laws, labels can be important for reverse vending deposit redemption, or other system verification purposes. For these reasons, this is not a complete solution, and there is no industry consensus on the value of these tear strips.

The industry is evolving

In the last few years:

- Label film suppliers have innovated and there are new label films available for shrink labels.
- A de-seaming adhesive has been developed that allows shrink labels to be removed in a process step used by several PET reclaimers known as a whole bottle wash step.
- Ink suppliers and label converters have developed ink formulations that do not impact PET recycling; there is no impact on PET color, and any separating inks can be filtered from wash water.
- PET process equipment designers and suppliers have developed new equipment to help manage the impact of shrink sleeve labels – an example is that machines known as "de-labelers" that mechanically remove labels from bottles early in the PET recycling process are beginning to find use.
- Some PET reclaimers now employ a float-sink step after bottle granulation to allow floating labels to be separated from PET flake prior to a hot PET flake wash so that there is reduced risk of label inks contaminating PET flake.

Because of these innovations, there is not one single best recommendation for shrink sleeve label design and performance. However, shrink labels and inks that meet the Criteria of APR Critical Guidance or Benchmark Tests, along with the innovations listed above, clearly move the industry forward and are encouraged.

The APR offers a range of tests that can be used to confirm that labels are designed to be compatible with PET recycling. Those that supply labels and are familiar with PET recycling will already have test data and experience to demonstrate the recycling compatibility of label products. Those that have received APR Critical Guidance Recognition have employed a rigorous laboratory procedure to demonstrate that their label product is compatible with recycling.

Following are resources that can be contacted to help supply labels with good recycling compatibility for all PET packaging applications.

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APR Design® Guide Label Supply Resources

The companies listed below are APR member companies and/or companies that have engaged in the APR Critical Guidance Recognition Program to demonstrate a product that is compatible with PET recycling. The contact information given below is current as of the publication date of this document: October 2019. Additional information for those APR member companies may be found in the APR Member Directory: https://plasticsrecycling.org/membership/members-profiles. The APR encourages the use of any label supplier that offers test data to support the recycling compatibility of its labels.

Shrink sleeve film label converters – These are member companies and those that supply finished printed labels that have employed APR's Critical Guidance Protocol for Clear PET Articles with Labels and Closures, PET-CG-02, to demonstrate that their printed labels are compatible with PET recycling, or can supply labels using APR Recognized unprinted labels:

- American Fuji Seal – Scott Giffels; sgiffels@afseal.com; (502) 203-4678
- Brook & Whittle – Andy Sharp; asharp@bwhittle.com; (716) 830-9402
- CCL – Daniel Webb; dwebb@cclind.com; (651) 341-1510
- Multi-Color Corp – Matthew Thomas; Matthew.Thomas@mcclabel.com; (402) 973-8018
- Sleever International – Laurent Lamotte; laurent.lamotte@sleever.com; (647) 201-0940

Suppliers of un-printed shrink sleeve substrate films that offer APR Recognized labels – These un-printed labels have employed APR's *Critical Guidance Protocol for Clear PET Articles with Labels and Closures* to demonstrate that the unprinted labels are compatible with PET recycling:

- Eastman Chemical – Carl Williams; jcarlw@eastman.com; (423) 229-6821
- Klöckner Pentaplast – Ravi Kalkunte; ravi.kalkunte@kpfilms.com; (540) 832-8037
- Polysack – sales@polysack.com
- SKC Inc. – Eugene Jung; ejung@skcfilms.com; (678) 342-1137
- Taghleef Industries – Duncan Henshall; duncan.henshall@ti-films.com; (843) 862 2032
- UPM Raflatac – Kyle Strenski; kyle.strenski@upmraflatac.com; (513) 313-4782

Independent consultant companies that can conduct testing – The independent consultants and laboratories listed below are experts in PET recycling and testing; they can help evaluate new innovations:

- Plastic Forming Enterprises – Kristi Hansen; khansen@plasticsforming.com; (603) 668-7551
- Plastic Technologies Inc – Wei Zhang; w.zhang@pti-usa.com; (419) 867-5402

Trade association contacts

- The Association of Plastic Recyclers – Please refer first to the APR Design® Guide for Plastics Recycling: https://plasticsrecycling.org/apr-design-guide/apr-design-guide-home
- TLMI – Many label converters in North America belong to this organization; TLMI can help communicate steps its members can take to supply recycle compatible labels for PET packaging. Primary contact: Rosalyn Bandy, Rosalyn.Bandy@tlmi.com; (513) 401-9578

Model Specification - Shrink Sleeve Labels on PET Containers

Introduction

The APR has prepared this Model Specification to promote awareness and discussion of the characteristics of shrink sleeve labels that are expected to be compatible with PET recycling. This Model is not intended to replace detailed specifications agreed to between individual buyers and sellers of labels, and which may include requirements that extend beyond the guidance provided in this Model.

The Model Specifications present:

1. A guidance table describing the most important characteristics that must be demonstrated for the labeled container to provide a preferred level of performance with negligible impact on the quality and productivity of PET recycling. Those committed to a plastics circular economy will want to consider this level of performance.
2. Minimum guidance for a labeled container. (If a labeled PET container meets minimum guidance, it is likely to pass into the PET recycling stream, however the label, adhesive or inks may contribute detrimental impacts on the recycled PET.)
3. Alternate next best steps that can be taken should the preferred level not yet be possible.

APR Guidance for a shrink sleeve label to be "APR Preferred"

With today's emphasis on developing the circular economy for plastics, packages that are compatible with widely used recycling processes and have negligible impact, if any, on the quality and productivity of PET recycling are considered APR Preferred. The following table presents the characteristics of a preferred shrink sleeve label that is expected to be compatible with most PET reclaiming processes:

Performance element	Test	APR Guidance	Impact
NIR optical sortation for polymer type	Evaluation of the Near Infrared (NIR) Sorting Potential of a Whole Plastic Article, Sort-B-01	Meets preferred criteria	Provides support that labeled bottles can be positively identified as PET at a Materials Recovery Facility (MRF).
Impact of the label film on recycling	Critical Guidance Protocol for Clear PET Articles with Labels and Closures, PET-CG-02	Meets guidance criteria, and/or is an APR Recognized innovation	Label can be separated from PET in a float/sink step, or is compatible with PET flake
Table continues on next page			

Performance element	Test	APR Guidance	Impact
Impact of printed ink and label film on recycling	Critical Guidance Protocol for Clear PET Articles with Labels and Closures, PET-CG-02 OR Benchmark Test for Clear PET Articles with Labels and Closures, PET-B-02	Meets guidance criteria, and/or is an APR recognized innovation Ink meets guidance criteria	Testing confirms that ink from printed labels does not impact PET color and that the label film does not negatively impact PET recycling. In the case of floating labels, it is desirable that the ink and any adhesive used remain adhered to the label so that ink does not contaminate wash water, and adhesive does not cause flake discoloration or haze.
Color sortation at a PET reclaimer	None available today; see additional information immediately below	Surface area coverage with closure on container allows detection of clear PET containers	Label coverage expected to regularly allow a container to be identified as clear PET and included in the clear stream.
Note: metal film and foils are not expected to be used with shrink sleeve labels. A label with metal content would need to be evaluated for impact on NIR sortation and metals detection, including Evaluation of the Near Infrared (NIR) Sorting Potential of a Whole Plastic Article, Sort-B-01			

Additional information on color sortation

When clear PET bottles with shrink sleeve labels that employ (a) APR Recognized film substrates and (b) APR tested inks pass through a color sorter, it is desirable that the color sorter be able to detect the clear PET bottle beneath the film and properly sort the shrink-labeled bottle with the clear PET bottles. For this to happen, there generally must be some level of clear PET exposed that is not covered by a printed label or an attached closure or tamper band.

It is not possible for the APR to give quantitative guidance, nor a standard test method, on this color sort topic today. The reasons include:

- There are several different suppliers of color sortation equipment that each have different designs and capabilities.
- The performance characteristics of color sortation equipment can be adjusted by individual PET reclaimers depending upon their objective and preferences.
- Sortation equipment performance can be influenced by the ink colors used on the label.
- The evaluation can be influenced by factors such as the size of the bottle, its orientation on a conveyor belt, and whether the bottle is flattened or folded over.

That said, here are steps that can be taken to confirm a label has the potential to allow detection of a clear PET bottle in the color sort step:

- Label converters that are engaged in providing recycling solutions either have prior experience, or the network that can be used to obtain evaluations.
- Companies that make color sortation equipment have demonstration laboratories where containers with labels can be tested.
- Work done by an APR Working Group on demonstration equipment with a single serve container size, developed data indicating that color sorters can be effective when about 20% of the PET bottle side wall and shoulder surface area is not covered with label. The area of the base and finish above the neck ring is not included in the area evaluation.
- PET reclaimers that are APR members are often able to help do evaluations of new container designs using their production equipment and provide feedback to package and label developers.
- If there is prior experience indicating good color sorting performance, that prior experience can be used to inform label coverage in a new application.

An APR Working Group is currently conducting new work in this area, the results of which will be reported when available.

Interim actions if APR Preferred label performance is not yet achievable in a specific application

APR acknowledges that companies may need time to change their specifications or develop innovations to allow the use of APR Preferred label technology. In the meantime, suggested below are alternate, next best, actions can reduce the risk of a shrink sleeve label impacting recycling.

APR recommends that minimum requirements are:

1. A PET container with sleeve label move correctly through the NIR sortation steps at the front of the process so that the container does not enter a waste stream. The labeled container should pass the Evaluation of the Near Infrared (NIR) Sorting Potential of a Whole Plastic Article, Sort-B-01, to confirm that containers with labels have the potential to be positively sorted at a MRF into PET bales for recycling.
2. The label film is one that is APR Recognized, or that meets criteria of the Critical Guidance Protocol for Clear PET Articles with Labels and Closures, PET-CG-02, or which is the subject of a Responsible Innovation Program.
3. The Critical Guidance Protocol for Clear PET Articles with Labels and Closures, PET-CG-02, or the Benchmark Test for Clear PET Articles with Labels and Closures, PET-B-02, is employed to show that the ink does not discolor flake in cases where the ink is removed from the label in the wash step.

If for any reason, the Guidance immediately above cannot be satisfied, APR recommends:

1. Employ a label film that is APR Recognized, or which is the subject of a Responsible Innovation Program. These credentials provide support that the label film will be compatible with PET recycling or with a significant segment of recycling processes.
2. When using a label intended to float in water, employ the PET Packaging Component Sink or Float Evaluation, PET-S-05, to confirm that the intended commercially printed label floats and that the presence of inks used in the commercial graphics do not cause the label to sink.

Another interim step that can be taken is to employ a label film substrate that utilizes a de-seaming adhesive.

The Association of Plastic Recyclers

Frequently Asked Questions addressing testing and selection of shrink sleeve labels for PET containers

1. ***What factors impact the ability of a container with a shrink sleeve label to be sorted by near infrared optical sorters for polymer type?***
   Cases where a label might interfere with NIR sortation include:
   - Complete coverage of the bottle side wall and shoulder where the label film attenuates the NIR spectrum for the PET container.
   - Complete coverage of the side wall when very opaque or dark colored inks are used that attenuate the NIR spectrum and prevent detection of the PET container.
   - Use of metalized films which are highly reflective of NIR light and may prevent detection of the PET container.

2. ***Why don't all PET reclaimers use a de-labeling unit?***
   De-labelers are a relatively new piece of equipment available to PET reclaimers. While the equipment can be effective in removing shrink sleeve and wrap-around labels from containers early in the recycling process and can provide process benefits, there is not wide agreement on their value. For example:
   - De-labelers require additional capital, floor space, power, maintenance, labor and process down-time.
   - De-labelers are not 100% efficient in removing labels.
   - De-labelers can create process yield loss by creating what are known as "broken necks" when the finish of a bottle is torn from the side-wall.

3. ***What happens to containers with shrink labels that are identified as colored bottles in a color sorter?***
   The outcome depends upon the process equipment and sorting procedures used at a given PET reclaimer. Some possible outcomes are:
   - Bottles are included in the color stream and recycled with the colored bottle stream (limited, lower-value markets).
   - Colored bottles are diverted to a de-label unit that is designed to mechanically remove shrink labels from bottles. After the de-label unit, bottles are re-evaluated in a second pass through a color sorter.
   - Some reclaimers pass all PET containers through a de-labeler to minimize the chance that a sleeve label is still on a bottle at the color sorter.
   - Bottles are sent to the landfill or for incineration.

4. ***Can the tests recommended in this document rely on labels printed with "generic ink" test data, or should the actual intended printed commercial label be tested?***
   Least risk of a label causing a problem in commercial use will result when actual commercial labels are tested. Some specific concerns known from industry experience that need to be managed:
   a. Substantially black or dark colored labels interfere with NIR sortation. APR recommends the Evaluation of the Near Infrared (NIR) Sorting Potential of a Whole Plastic Article, SORT-B-01, to confirm label performance.
   b. Labels printed with layers of white ink may cause a label, intended to float in water, to sink instead. APR recommends PET Packaging Component Sink or Float Evaluation, PET-S-05.
   c. The Benchmark Test for Clear PET Articles with Labels and Closures, PET-B-02 can be used to confirm overall label performance.

   That said, prior successful experience with defined inks can eliminate the need for testing of all label designs.

5. ***What happens to printing ink on labels when PET is recycled?***
   Shrink sleeve labels are likely to introduce printing ink into the wash water. The tests listed above are intended to confirm that the inks do not have an impact on discoloring the washed PET flake. Those specifying shrink sleeve labels should be aware that inks in wash water can create the need for more make-up water, wash water heat energy, filtration maintenance, detergent, and waste water treatment costs. For floating labels, inks that adhere to the floating label and that do not wash off into wash water are the most desirable option.

6. ***Are the shrink sleeve labels by themselves able to be recycled, or do they become waste?***
   This is an important question with the circular economy in mind. Shrink sleeve labels can be on the order of 7 to 12% of the total package weight and so an appreciable source of waste if not recovered. There is no single answer, but here is some general guidance that can be given:
   - If a floating label is removed from PET flake in the float sink step, the label is recovered along with HDPE and PP closure material. Most PET recyclers today report that they elutriate this float stream to remove label residue from the closure granulate. Because the removed label fraction has especially low bulk density, it is difficult to find recycling applications for this material so this is most likely to become a waste stream.
   - If a PET recycler employs a mechanical de-labeler or a whole bottle wash – the mixture of labels generally does not have recycling value and so will be a waste stream. In the case of dry labels recovered from a de-labeler, labels may become a waste to energy stream.
   - A crystallizable PET based label film that sinks with PET may be recovered with the PET flake and have recycled value included in the PET stream. Some fraction of this label residue might be lost as waste from the PET flake during a recycling step known as elutriation.
   - Inks removed from labels in the PET wash process become waste.

Disclaimer: *This document has been prepared by the Association of Plastic Recyclers as a service to the plastic industry to promote the most efficient use of the nation's plastic recycling infrastructure and to enhance the quality and quantity of recycled postconsumer plastic. The information in this document is offered without warranty of any kind, either expressed or implied, including WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, which are expressly disclaimed. APR and its members accept no responsibility for any harm or damages arising from the use of or reliance upon this information by any party. Participation in the Recognition Program is purely voluntary and does not guarantee compliance with any U.S. law or regulation or that a package or plastic article incorporating the innovation is recyclable or will be recycled.*

DOCUMENT VERSION HISTORY

Version	Publication Date	Revision Note
1	October 24, 2019	
2	April 10, 2020	04.09.20 – update to Resource section company listing
3	January 4, 2021	Update to Resource section company listing

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/103,234	01/30/2023	Andrew Sharp	0644.000001US01	8140

26813 7590 10/18/2023

MUETING RAASCH GROUP
111 WASHINGTON AVE. S., SUITE 700
MINNEAPOLIS, MN 55401

EXAMINER	
POWERS, LAURA C	

ART UNIT	PAPER NUMBER
1785	

NOTIFICATION DATE	DELIVERY MODE
10/18/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptodocketing@mrgs.com

Applicant-Initiated Interview Summary	**Application No.** 18/103,234	**Applicant(s)** Sharp et al.		
	Examiner LAURA POWERS	**Art Unit** 1785	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
LAURA POWERS	Primary Examiner	Telephonic
Lotta Kiuru-Ribar	Attorney of Record	
Andrew Sharp	Inventor	
Mitchell Morgan	Inventor	
Tyler Matusevich	Inventor	

Date of Interview: 13 October 2023

Issues Discussed:

Proposed Amendment(s)

During the interview, proposed amendments to claim 1 to further clarify and differentiate the claimed invention from the prior art were discussed. Conventional labels for recycled bottles and recycling processes were discussed, along with how the instant application addresses the shortcomings of conventional labels in the recycling process. No agreement regarding allowability was reached during the interview.

/LAURA C POWERS/ Primary Examiner, Art Unit 1785	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

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EXAMINER	
POWERS, LAURA C	

ART UNIT	PAPER NUMBER
1785	

NOTIFICATION DATE	DELIVERY MODE
11/13/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 18/103,234	Applicant(s) Sharp et al.	
	Examiner LAURA POWERS	Art Unit 1785	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 16 October 2023.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-4,6-16 and 20-26 is/are pending in the application.

5a) Of the above claim(s) 20-22 is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-4,6-16 and 23-26 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Summary

2. The Applicants arguments and claim amendments received in the response filed October 16, 2023 are entered into the file. Currently, claims 1, 2, 3, 6, 7, 8, 9 10, 12, 14, 15 and 16 are amended; claims 5 and 17-19 are cancelled; claims 20-22 are withdrawn; claims 23-26 are new; resulting in claims 1-4, 6-16 and 23-26 pending for examination.

Claim Objections

3. **Claim 25 is objected to because of the following informalities:**

   a. Line 2 of the claim recites “contracts of shrinks” and should read “contracts or shrinks”.

4. Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis (i.e., changing from AIA to pre-AIA) for the rejection will

not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.

7. Claims 1 and 6 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Sasaki et al. (JP2009-214535A, machine translation via EPO provided).

8. Regarding claims 1 and 6, Sasaki et al. teaches a light shielding shrink film (recyclable shrink label) with light shielding and heat insulating properties having a simple structure and can be easily recycled ([0005]). The light shielding shrink film is comprised of a heat shrinkable synthetic resin film (heat shrink film) and a crystalline polymer film (light blocking layer) ([0011-0016, 0020, 0032-0035, 0048-0052, 0073-0074]). The heat shrinkable synthetic resin film (heat shrink film) may be colored transparently or opaquely with a coloring agent, and is stretched in either a uniaxial or biaxial direction ([0011]). The crystalline polymeric film contains a polymer (light blocking component), cavities and has a transmittance for light of a wavelength selected from 300nm to 780nm of 5% or less ([0013-0016, 0032-0033, 0049-0052]), meaning that 95% or more of the light is blocked or absorbed. In Example 1, the heat shrinkable film is said to be 30mm thick ([0073-0074]), falling squarely within the claimed range.

9. Both the heat shrinkable synthetic resin film (heat shrink film) and a crystalline polymer film (light blocking layer) can be appropriately selected based upon the desired

purpose, wherein PET is listed as a potential material used in both layers, and Example 1 uses PET as the heat shrinkable synthetic film ([0011, 0015, 0074]).

10. The limitation reciting "wherein the recyclable shrink label is recyclable with a PET container" is considered functional language related to the intended use of the product and is accorded limited weight as the language does not further limit the structure or the process. As Sasaki et al. teaches a light shielding shrink film (recyclable shrink label) that can be easily recycled ([0005]), it is capable of performing in the manner claimed.

Claim Rejections - 35 USC § 103

11. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis (i.e., changing from AIA to pre-AIA) for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

12. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

13. The factual inquiries for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. Claims 2, 7, 8, 9, 10, 14, 15, 24, 25 and 26 are rejected under 35 U.S.C. 103 as being unpatentable over Sasaki et al. (JP2009-214535A, machine translation via EPO provided).

15. Regarding claims 2 and 24, Sasaki et al. teaches all the limitations of claim 1 above, and further teaches that the surface of the heat shrinkable synthetic resin film (heat shrink film) can be surface treated to improve printability ([0012]). Therefore, it would have been obvious to one of ordinary skill in the art to surface treat the heat shrinkable synthetic resin film (heat shrink film) and provide an indicia layer thereon. Furthermore, it would have been obvious to one of ordinary skill in the art to surface treat either surface of the heat shrinkable synthetic resin film (heat shrink film) based upon whether the printing was desired to be on the outer surface if the heat shrinkable synthetic resin film (heat shrink film) is opaque or the inner surface (first surface) if the heat shrinkable synthetic resin film (heat shrink film) is transparent.

16. Regarding claim 7 and 8, Sasaki et al. teaches all the limitations of claim 1 above, and further teaches that known methods of using shrink film are when a cylindrical or bag shaped film is wrapped with little margin and then shrunk to the outer circumferential surface of the container, wherein shrink films are known to fit containers

of all shapes ([0002]). Furthermore, the Examples of Sasaki et al. are evaluated by being wrapped around a glass tube ([0093]).

17. It would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention, to utilize the light shielding shrink film (recyclable shrink label) taught by Sasaki et al. in the form of a sleeve or tube comprising a seam, as shrink labels are known in the art to be used to wrap around and fit containers of all shapes.

18. Regarding claims 9, 10 and 25, Sasaki et al. teaches all the limitations of claim 1 above and further teaches that the crystalline polymer film (light blocking layer) can be stretched, resulting in a heat shrinkage rate of 10% or more in the first direction and 5% in the second direction perpendicular to the first direction ([0006]). Sasaki et al. further teaches that the heat shrinkable synthetic resin film (heat shrink film) and the crystalline polymer film (light blocking layer) have a difference in heat shrink rate of 5% or less, wherein the overall light shielding shrink film (recyclable shrink label) was evaluated for heat shrinkage rate at 150°C and 100°C ([0007, 0048, 0090]), which would result in a shrinkage for both the heat shrinkable synthetic resin film (heat shrink film) and the overall light shielding shrink film (recyclable shrink label) overlapping the ranges recited by instant claims 9, 10 and 25 of the application.

19. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exits.

20. Regarding claims 14 and 15, Sasaki et al. teaches all the limitations of claim 1 above, however, the reference does not expressly teach that the crystalline polymer film (light blocking layer) is present in an amount of 0.5ppr to 25ppr relative to the recyclable

shrink label or that the light blocking layer comprises 0.1ppr to 10ppr of the light blocking component. Such a modification would have been obvious to one of ordinary skill in the art based upon the desired amount of light shielding property present in the final structure of the label.

21. Regarding claim 26, Sasaki et al. teaches all the limitations of claim 1 above. Sasaki et al. further teaches that the crystalline polymer film (light blocking layer) can be stretched, resulting in a heat shrinkage rate of 10% or more in the first direction and 5% in the second direction perpendicular to the first direction ([0006]). Sasaki et al. further teaches that both the heat shrinkable synthetic resin film (heat shrink film) and a crystalline polymer film (light blocking layer) can be appropriately selected based upon the purposed, wherein PET is listed as a potential material used in both layers, wherein Example 1 uses PET as the heat shrinkable synthetic film ([0011, 0015, 0074]).

22. The reference does not expressly teach that the heat shrinkable synthetic resin film (heat shrink film) comprises crystallizable PET. However, since Sasaki et al. teaches PET can be used in both the heat shrinkable synthetic resin film (heat shrink film) and a crystalline polymer film (light blocking layer), it would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention to utilize the same PET that is crystallizable for both the heat shrinkable synthetic resin film (heat shrink film) and a crystalline polymer film (light blocking layer) based upon the desired properties of the resultant light shielding shrink film (recyclable shrink label).

23. Claims 3, 4, 11, 16 and 23 are rejected under 35 U.S.C. 103 as being unpatentable over Sasaki et al. (JP2009-214535A, machine translation via EPO provided) in view of Mitchell et al. (US 2017/0223879; previously cited).

24. Regarding claims 3, 4 and 11, Sasaki et al. teaches all the limitations of claim 1 above, however, the reference does not expressly teach the presence of a high opacity layer comprising a white pigment.

25. Mitchell et al. teaches an electromagnetic radiation blocking label arrangement and a container comprising the radiation blocking label arrangement thereon (Figure 3-7, [0003-0018]). The radiation blocking label arrangement is comprised of a first skin layer (2; heat shrink film) comprised of a shrinkable film, a core layer (4; high opacity layer), a second skin layer (6) and a metallization layer (7; light blocking layer), wherein the metallization layer (7; light blocking layer) is disposed adjacent to a first surface of the first skin layer (2; heat shrink film) (Figure 3-7; [0004-0014, 0091-0109, 0112, 0138, 0149, 0176-0177, 0179, 0185-0187]). The core layer (4; high opacity layer) can comprise a pigment, such as titanium dioxide, which provides opacity as well as light scattering to the film ([0177]).

26. It would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention, to modify the light shielding shrink film (recyclable shrink label) taught by Sasaki et al. to further include the core layer comprising a titanium dioxide pigment between the indicia layer and the crystalline polymer film (light blocking layer) to provide opacity to the overall light shielding shrink film (recyclable shrink label).

27. **Regarding claims 16 and 23,** Sasaki et al. teaches all the limitations of claim 1 above, and while Sasaki et al. teaches that the light shielding shrink film (recyclable shrink label) is disposed on a container having a variety of shapes ([0011-0016, 0020, 0032-0035, 0048-0052, 0073-0074]), the reference does not expressly teach that the container is comprised of PET.

28. Mitchell et al. teaches an electromagnetic radiation blocking label arrangement and a container comprising the radiation blocking label arrangement thereon (Figure 3-7, [0003-0018]). The radiation blocking label arrangement is comprised of a first skin layer (2; heat shrink film) comprised of a shrinkable film, a core layer (4; high opacity layer), a second skin layer (6) and a metallization layer (7; light blocking layer), wherein the metallization layer (7; light blocking layer) is disposed adjacent to a first surface of the first skin layer (2; heat shrink film) (Figure 3-7; [0004-0014, 0091-0109, 0112, 0138, 0149, 0176-0177, 0179, 0185-0187]). Mitchell et al. further teaches that the shrinkable film is used for labeling a wide range of products, including bottles comprised of polyethylene terephthalate ([0205]).

29. While Sasaki et al. and Mitchell et al. are both in the field of shrink film labels, it would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention, to utilize the light shielding shrink film (recyclable shrink label) taught by Sasaki et al. with the bottles comprised of PET taught by Mitchell et al., as Sasaki et al. teaches the light shielding shrink film (recyclable shrink label) is disposed on a container having a variety of shapes, such that the first surface of the heat shrinkable synthetic resin film (heat shrink film) faces the external surface of the container.

30. Claims 12 and 13 are rejected under 35 U.S.C. 103 as being unpatentable over Sasaki et al. (JP2009-214535A, machine translation via EPO provided) in view of Hashimoto et al. (JP2004-114498A, Machine translation via EPO provided).

31. Regarding claims 12 and 13, Sasaki et al. teaches all the limitations of claim 1 above, however, the reference does not expressly teach that the crystalline polymer film (light blocking layer) comprises metal particles having a particle size of 0.1μm to 100μm.

32. Hashimoto et al. teaches a heat shrinkable polyester film for attachment to a beverage bottle or the like, wherein the film comprises inert fine particles, such as titanium oxide, carbon black, etc. to impart light blocking properties, wherein the inert fine particles have an average particle size of 0.001 to 3.5 micrometer (pg. 4-5 Ln. 157-187).

33. As both Sasaki et al. and Hashimoto et al. teach heat shrinkable films, it would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention to modify the crystalline polymer film (light blocking layer) of Sasaki et al. to comprise inert fine particles such as those taught by Hashimoto, to further enhance the light blocking properties of the crystalline polymer film (light blocking layer).

Response to Arguments

Response-Claim Rejections - 35 USC § 112

34. The previous rejection of claims 2, 3, 7, 8, 9, 10, 12, 14, 18 and 19 under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor

or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention are overcome by Applicants amendments to claims 2, 3, 7, 8, 9, 10, 12, 14 and 16, as well as the cancellation of claims 18 and 19 in the response filed October 16, 2023.

35. ***Response-Claim Rejections - 35 USC § 103***

36. Applicant's arguments with respect to claims 1-4,6-16 and 23-26 have been considered but are moot because the new ground of rejection does not rely on any reference applied in the prior rejection of record for any teaching or matter specifically challenged in the argument.

37. In light of the Applicants amendments to claim 1, Sasaki et al. (JP2009-214535A, machine translation via EPO provided) is now used as the primary reference in the rejections above.

Conclusion

38. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

39. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAURA POWERS whose telephone number is (571)270-5624. The examiner can normally be reached Monday-Friday, 10:00AM-3:00PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Ruthkosky can be reached on 571-272-1291. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197

(toll-free). If you would like assistance from a USPTO Customer Service

Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LAURA POWERS
Examiner
Art Unit 1785

/LAURA C POWERS/
Primary Examiner, Art Unit 1785

Notice of References Cited	Application/Control No. 18/103,234	Applicant(s)/Patent Under Reexamination Sharp et al.	
	Examiner LAURA POWERS	Art Unit 1785	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
	A					
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N	JP-2009214535-A	09-2009	JP	ARIOKA D	
	O	JP-2004114498-A	04-2004	JP	EINO H	B29C55/12
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	JP2009-214535A Machine Translation via EPO (Year: 2009)
	V	JP 2004-114498A Machine Translation via EPO (Year: 2004)
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/103,234	Sharp et al.
	Examiner	Art Unit
	LAURA POWERS	1785

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Assignee and Inventor Name Search	07/27/2023	LCP
CPC search limited by keyword	07/27/2023	LCP
Keyword search	07/27/2023	LCP
Keyword search	07/31/2023	LCP
Keyword search	08/01/2023	LCP
Keyword search	08/02/2023	LCP
STIC search	07/31/2023	LCP
STIC search	10/29/2023	LCP
Updated keyword search	11/03/2023	LCP

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/103,234	Sharp et al.
	Examiner	Art Unit
	LAURA POWERS	1785

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

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(P2004-114498A)
(43)公開日　平成16年4月15日(2004.4.15)

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B32B 27/36	B32B 27/36		4F100
C08J 5/18	C08J 5/18	CFD	4F210
// B29K 67:00	B29K 67:00		
B29K 105:02	B29K 105:02		

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(21)出願番号　特願2002-280868(P2002-280868)
(22)出願日　平成14年9月26日(2002.9.26)

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最終頁に続く

(54)【発明の名称】熱収縮性ポリエステル系フィルム

(57)【要約】
【課題】収縮仕上がり性が好適で、ボトルの胴部等に装着する表示用のラベルにしたときに端部に歪みがなく、また、印刷加工を施さなくとも光線遮断性を有する熱収縮性ポリエステル系フィルムを提供すること。
【解決手段】主としてポリエステル樹脂からなるフィルムであって、フィルムの全光線透過率が４０％以下、かつ、８０℃における最大収縮方向の温湯収縮率が６５％以上、８０℃における最大収縮方向と直交する方向の温湯収縮率が２％以下であることを特徴とする。
【選択図】　なし

【特許請求の範囲】
【請求項１】
主としてポリエステル樹脂からなるフィルムであって、フィルムの全光線透過率が４０％以下、かつ、８０℃における最大収縮方向の温湯収縮率が６５％以上、８０℃における最大収縮方向と直交する方向の温湯収縮率が２％以下であることを特徴とする熱収縮性ポリエステル系フィルム。
【請求項２】
８０℃における最大収縮方向と直交する方向の破断伸度が、３０℃、湿度８５％ＲＨ雰囲気下で２８日間保持後、５％以上であることを特徴とする請求項１記載の熱収縮ポリエステル系フィルム。
【請求項３】
溶剤接着性を有することを特徴とする請求項１又は２記載の熱収縮性ポリエステル系フィルム。
【請求項４】
不活性微粒子及び非相溶性樹脂を含有するポリエステル樹脂からなる空洞含有層を少なくとも１層有する多層フィルムであることを特徴とする請求項１、２又は３記載の熱収縮性ポリエステル系フィルム。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】
本発明は、熱収縮性ポリエステル系フィルムに関し、特に、飲料用ボトル等の胴部に装着する表示用のラベル（環状のラベルを意味する、以下同じ）にしたときに収縮仕上がり性が好適で、印刷加工を施さなくとも光線遮断性を有する熱収縮性ポリエステル系フィルムに関するものである。
【０００２】
【従来の技術】
最近、ボトルの内容物を紫外線から保護することを目的として収縮ラベルを使用するケースが増えている。従来は、紫外線を遮断することができるポリ塩化ビニル製の収縮フィルムが用いられてきたが、他素材により紫外線を遮断することができる収縮フィルムに対する要求が強まっている。具体的な光線遮断性に対する要求品質は内容物によって異なるが、内容物が食品・飲料等の場合、長波長領域の紫外線である３６０～４００ｎｍの波長で変質や着色等が起こるため長波長領域、特に３８０～４００ｎｍにおける光線遮断性が重要視されている。
【０００３】
このようなラベルとしては、ポリ塩化ビニル、ポリスチレン等からなる熱収縮性フィルムが主として用いられてきたが（特開平１１－１８８８１７号公報等）、ポリ塩化ビニルについては、近年、廃棄時に焼却する際の塩素系ガス発生が問題となり、またポリスチレンについては印刷が困難である等の問題があり、最近は熱収縮性ポリエステル系フィルムの利用が注目を集めている。しかしながら、従来の熱収縮性ポリエステル系フィルムでは上記の長波長領域の紫外線を遮断する実用的なフィルムは知られていなかった。
【０００４】
また、ペットボトルにおいては、内容物保護のために樹脂に染料や顔料を添加した着色ボトルが用いられていることがある。しかしながら、着色ボトルは回収してリサイクルするときに全回収物に広がって着色するため、再利用に不向きであることからその代替案が検討されて来ている。その１つの方法として無着色ボトルを利用し、熱収縮性の着色ラベルをボトル全体に装着することで、ボトルを着色したのと同じ効果を出すことが検討されてきた。
【０００５】
さらに、従来、ボトルに装着する着色ラベルとして熱収縮性フィルムを使用する場合は、通常、ラベルの内側に図柄印刷した後に白色印刷を施しているが、印刷インキの厚みは通

常３μｍ程度であり紫外線を遮断をするには十分でなかった。さらに、白色印刷を２回実施することで紫外線を遮断することを試みているが、品質的な要因（インキ層の厚みによる収縮特性の変化等）のほかにラベル製造工程の複雑さ、納期の長期化等の不利があった。

【０００６】

【発明が解決しようとする課題】

本発明は、上記従来の熱収縮性ポリエステル系フィルムの有する問題点を解決し、収縮仕上がり性が好適で、ボトルの胴部等に装着する表示用のラベルにしたときに端部に歪みがなく、また、印刷加工を施さなくとも光線遮断性を有する熱収縮性ポリエステル系フィルムを提供することにある。

【０００７】

【課題を解決するための手段】

上記目的を達成するため、本発明の熱収縮性ポリエステル系フィルムは、主としてポリエステル樹脂からなるフィルムであって、フィルムの全光線透過率が４０％以下、かつ、８０℃における最大収縮方向の温湯収縮率が６５％以上、８０℃における最大収縮方向と直交する方向の温湯収縮率が２％以下であることを特徴とする。

【０００８】

ここで、８０℃における最大収縮方向の温湯収縮率とは、試料を８０℃の温湯中に１０秒間浸漬後２５℃の水中に１０秒浸漬した後の最大収縮方向の温湯収縮率をいい、最大収縮方向とは、主収縮方向とその直交方向のそれぞれの８０℃における温湯収縮率のうち、大きい収縮率を示す方の収縮方向をいう。

温湯収縮率＝（（収縮前の長さ－収縮後の長さ）／収縮前の長さ）×１００（％）

【０００９】

上記の構成からなる本発明の熱収縮性ポリエステル系フィルムは、収縮仕上がり性が好適で、ボトル等の胴部に装着する表示用のラベルにしたときに端部に歪みがなく、また、印刷加工を施さなくとも光線遮断性を有する。

【００１０】

この場合、８０℃における最大収縮方向と直交する方向の破断伸度を、３０℃、湿度８５％ＲＨ雰囲気下で２８日間保持後５％以上とすることができる。

【００１１】

またこの場合、熱収縮性ポリエステル系フィルムを溶剤接着性を有するものとすることができる。

【００１２】

さらに、またこの場合、熱収縮性ポリエステル系フィルムを、不活性微粒子及び非相溶性樹脂を含有するポリエステル樹脂からなる空洞含有層層を少なくとも１層有する多層フィルムとすることができる。

【００１３】

【発明の実施の形態】

以下、本発明の熱収縮性ポリエステル系フィルムの実施の形態を説明する。

【００１４】

本発明の熱収縮性ポリエステル系フィルムは、フィルムの全光線透過率が４０％以下、かつ、８０℃における最大収縮方向の温湯収縮率が６５％以上、８０℃における最大収縮方向と直交する方向の温湯収縮率が２％以下であり、そのことにより上記目標が達成される。

【００１５】

また、本発明の熱収縮性ポリエステル系フィルムは、主にポリエステル樹脂からなり、実質的にポリエステル樹脂又は不活性微粒子及び非相溶性樹脂を含有するポリエステル樹脂から構成する。上記ポリエステル樹脂としては、例えば、芳香族ジカルボン酸成分とグリコール成分とを構成成分とするポリエステル又はポリエステルとポリエステル系エラストマーとからなるポリエステル組成物を示すことができる。なかでも、ポリエステルとポリ

エステル系エラストマーとからなるポリエステル組成物を用いるのが好ましい。この場合、ポリエステル組成物において、ポリエステルとポリエステル系エラストマーとの配合割合は、両者合計量に対して、通常、前者が５０～９９重量％程度、特に７０～９７重量％で、後者が１～５０重量％程度、特に３～３０重量％程度であるのが好適である。

【００１６】

上記ポリエステルを製造するのに用いる芳香族ジカルボン酸としては、例えばテレフタル酸、イソフタル酸、ナフタレン－１，４－ジカルボン酸、ナフタレン－２，６－ジカルボン酸、５－ナトリウムスルホイソフタル酸等が挙げられる。また、脂肪族ジカルボン酸としては、ダイマー酸、グルタル酸、アジピン酸、セバシン酸、アゼライン酸、シュウ酸、コハク酸等が挙げられる。また、Ｐ－オキシ安息香酸等のオキシカルボン酸、無水トリメリット酸、無水ピロメリット酸等の多価のカルボン酸を必要に応じて併用してもよい。

【００１７】

上記ポリエステルを製造するのに用いるグリコールとしては、エチレングリコール、ジエチレングリコール、ダイマージオール、プロピレングリコール、トリエチレングリコール、１，４－ブタンジオール、ネオペンチルグリコール、１，４－シクロヘキサンジメタノール、１，６－ヘキサンジオール、３－メチル－１，５－ペンタンジオール、２－メチル－１，５－ペンタンジオール、２，２－ジエチル－１，３－プロパンジオール、１，９－ノナンジオール、１，１０－デカンジオール等のアルキレングリコール等が挙げられる。また、ビスフェノール化合物又はその誘導体のアルキレンオキサイド付加物、トリメチロールプロパン、グリセリン、ペンタエリスリトール等を必要に応じて併用してもよい。

【００１８】

本発明において用いるポリエステルは、１種類でもよいし、２種以上を混合して用いてもよい。熱収縮特性の点からは、ガラス転移温度（Ｔｇ）の異なる２種以上のポリエステルを混合して使用することが好ましい。ポリエチレンテレフタレートと共重合ポリエステル（２種以上の共重合ポリエステルであってもよい）を混合して使用することが好ましいが、共重合ポリエステル同士の組み合わせであってもよい。また、ポリブチレンテレフタレート、ポリシクロヘキシレンジメチルテレフタレート、ポリエチレンナフタレート等を組み合わせたり、これらと他の共重合ポリエステルを組み合わせて用いることもできる。本発明において用いるポリエステルの極限粘度は、好ましくは０．５０以上、さらに好ましくは０．６０以上、特に好ましくは０．６５以上である。ポリエステルの極限粘度が０．５０未満であると結晶性が高くなり、十分な収縮率が得られなくなり、好ましくない。

【００１９】

ポリエステルは常法により溶融重合することによって製造できるが、ジカルボン酸とグリコールとを直接反応させ得られたオリゴマーを重縮合する、いわゆる直接重合法、ジカルボン酸のジメチルエステル体とグリコールとをエステル交換反応させたのちに重縮合する、いわゆるエステル交換法等が挙げられ、任意の製造法を適用することができる。また、その他の重合方法によって得られるポリエステルであってもよい。ポリエステルの重合度は、固有粘度にして０．３～１．３ｄＬ／ｇのものが好ましい。

【００２０】

ポリエステルには、着色やゲル発生等の不都合を起こさないようにするため、酸化アンチモン、酸化ゲルマニウム、チタン化合物等の重合触媒以外に、酢酸マグネシウム、塩化マグネシウム等のＭｇ塩、酢酸カルシウム、塩化カルシウム等のＣａ塩、酢酸マンガン、塩化マンガン等のＭｎ塩、塩化亜鉛、酢酸亜鉛等のＺｎ塩、塩化コバルト、酢酸コバルト等のＣｏ塩を、ポリエステルに対して、各々金属イオンとして３００ＰＰｍ以下、リン酸又はリン酸トリメチルエステル、リン酸トリエチルエステル等のリン酸エステル誘導体を燐（Ｐ）換算で２００ＰＰｍ以下、添加してもよい。

【００２１】

また、本発明において用いるポリエステル系エラストマーは、例えば、高融点結晶性ポリエステルセグメントと低融点軟質重合体セグメントとからなるポリエステル系ブロック共重合体である。

【００２２】
ここで、ポリエステル系ブロック共重合体の高融点結晶性ポリエステルセグメントとしては、主としてエステル結合又はエステル結合とエーテル結合とからなるポリエステル単位が好ましいものとして挙げられ、少なくとも１種の芳香族核を有する基を主たる繰り返し単位とし、かつ、分子末端に主として水酸基を有するものが用いられる。この高融点結晶性ポリエステルセグメントは、通常、融点が２００℃以上のものが好ましく、その好ましい具体例としては、エチレンテレフタレート、テトラメチレンテレフタレート、１，４－シクロヘキシレンジメチレンテレフタレート、エチレン－２，６－ナフタレートなどのエステル単位；エチレンオキシベンゾエート、Ｐ－フェニレンビスオキシエトキシテレフタレートなどのエステルエーテル単位；主としてテトラメチレンテレフタレート又はエチレンテレフタレートからなり、他にテトラメチレンイソフタレート又はエチレンイソフタレート、テトラメチレンアジペート又はエチレンアジペート、テトラメチレンセバケート又はエチレンセバケート、１，４－シクロヘキシレンジメチレンテレフタレート、テトラメチレン－Ｐ－オキシベンゾエート又はエチレン－Ｐ－オキシベンゾエートなどの共重合成分を有する共重合エステル単位又は共重合エステルエーテル単位などである。なお、共重合の場合にはテトラメチレンテレフタレート又はエチレンテレフタレート単位が６０モル％以上含まれることが好ましい。

【００２３】
また、ポリエステル系ブロック共重合体の低融点軟質重合体セグメントは、通常、融点が８０℃以下のものが好ましく、分子量は４００以上、好ましくは４００～８０００であって、その好ましい具体例としては、ポリエーテルグリコール類及びポリラクトン類を挙げることができる。ポリエーテルグリコール類としては、ポリオキシテトラメチレングリコール、ポリオキシエチレングリコール、ポリオキシ－１，２－プロピレングリコール等を挙げることができ、これらの２種以上を併用することもできる。また、ポリラクトン類としては、ポリカプロラクトン、ポリエナントラクトン、ポリカプリロラクトン等を挙げることでき、これらの２種以上を併用することもできる。なかでも、ポリ－ε－カプロラクトン等のポリラクトンを低融点軟質重合体セグメントに用いたポリエステル系エラストマーが特に好ましい。

【００２４】
上記高融点結晶性ポリエステルセグメントと低融点軟質重合体セグメントとの共重合割合は、適宜変えることができる。一般に、高融点結晶性ポリエステルセグメントの割合が増大すると、得られるポリエステル系エラストマーは硬くなり、機械的特性が向上する。低融点軟質重合体セグメントの割合が増大すると、得られるポリエステル系エラストマーは軟質化し、低温特性が向上する。従って、機械的強度、低温特性などのバランスを考慮しながら、両者の共重合割合を選定することができる。標準的な配合比率としては、重量比で高融点結晶性ポリエステルセグメントと低融点軟質重合体セグメントが９７／３～５／９５、より一般的には９５／５～３０／７０の程度の範囲である。

【００２５】
フィルムが全光線透過率４０％以下となって、フィルムに光線遮断性を付与するためには、例えば、フィルムを構成するポリエステル樹脂中に、無機微粒子又は有機微粒子等の不活性微粒子をフィルム重量に対して０．１～２０重量％、好ましくは０．５～１０重量％含有させることが好適である。不活性微粒子を０．１重量％以上含有させることが光線遮断性を得るために好ましく、一方、２０重量％を超えるとフィルム強度が低下して製膜が困難になる傾向にある。

【００２６】
熱収縮性ポリエステル系フィルムを形成するポリエステル樹脂中に不活性微粒子を含有させる場合には、不活性微粒子はポリエステル重合前に添加してもよいが、通常は、ポリエステル重合後に添加する。不活性微粒子としては、例えば、カオリン、クレー、炭酸カルシウム、酸化ケイ素、テレフタル酸カルシウム、酸化アルミニウム、酸化チタン、リン酸カルシウム、カーボンブラック等の公知の不活性無機微粒子、ポリエステル樹脂の溶融製

膜に際して不溶な高融点有機化合物微粒子、架橋ポリマー微粒子及びポリエステル合成時に使用する金属化合物触媒、例えばアルカリ金属化合物、アルカリ土類金属化合物などによってポリエステル製造時に、ポリマー内部に形成される内部粒子などを挙げることができる。

【００２７】

ポリエステル樹脂中に含有させるのに好ましい不活性微粒子の平均粒径は、通常、０．００１～３．５μｍの範囲である。ここで、微粒子の平均粒径は、コールターカウンター法により測定したものである。

【００２８】

ポリエステル樹脂中に含有させるのに好ましい非相溶性樹脂は、ポリエステルに非相溶性の樹脂であれば特に限定されるものではないが、好ましくは非相溶性の熱可塑性樹脂であって、具体的には、ポリスチレン系樹脂、ポリオレフィン系樹脂、ポリアクリル系樹脂、ポリカーボネート系樹脂、ポリスルホン系樹脂、セルロース系樹脂などが挙げられる。特に、全光線透過率を４０％以下にするためにフィルムに空洞を形成するには、空洞形成性が優れていることからポリスチレン系樹脂あるいはポリメチルペンテン、ポリプロピレンなどのポリオレフィン系樹脂を用いるのが好ましい。

【００２９】

上記非相溶性樹脂としてのポリスチレン系樹脂としては、ポリスチレン構造を基本構成要素として含む熱可塑性樹脂を指し、アタクティックポリスチレン、シンジオタクティックポリスチレン、アイソタクティックポリスチレン等のホモポリマーのほか、その他の成分をグラフトあるいはブロック共重合した改質樹脂、例えば耐衝撃性ポリスチレン樹脂や変性ポリフェニレンエーテル樹脂等、さらにはこれらのポリスチレン系樹脂と相溶性を有する熱可塑性樹脂、例えばポリフェニレンエーテルとの混合物等を例示することができる。

【００３０】

ポリエステル樹脂と非相溶性樹脂を混合調整するにあたっては、例えば、各樹脂のチップを混合し押出機内で溶融混練して押出してもよいし、予め混練機によって両樹脂を混練したものをさらに押出機より溶融押出ししてもよい。また、ポリエステルの重合工程においてポリスチレン系樹脂を添加し、撹　分散して得たチップを溶融押出ししてもよい。

【００３１】

本発明の熱収縮性ポリエステル系フィルムは、主としてポリエステル樹脂から形成してなる単層又は多層のフィルムであるが、不活性微粒子及び非相溶性樹脂を含有するポリエステル樹脂からなる空洞含有層を少なくとも１層有する多層フィルムであることが好ましい。

【００３２】

本発明の熱収縮性ポリエステル系フィルムは内部に多数の空洞を含有する空洞含有層から構成される単層フィルムであるほか、内部に多数の空洞を含有する空洞含有層の少なくとも一方の面に、上記空洞含有層よりも空洞の少ない又は空洞を含有しないフィルム層を設けた、多層フィルムとすることができる。多層フィルムの構成にするためには、異なる原料をＡ、Ｂそれぞれ異なる押出機に投入、溶融し、Ｔ－ダイの前又はダイ内部にて溶融状態で貼り合わせ、冷却ロール上で密着固化させた後、少なくとも１方向に延伸することが好ましい。このとき、原料として空洞の少ない又は空洞を含有しないフィルム層には非相溶性樹脂は空洞含有層への配合量より少なくするか、または配合しないことが好ましい。このようにすることにより、得られるフィルム層は空洞が少ないか、または空洞を含有しないため、表面の荒れが少なくなる。空洞の少ない又は空洞を含有しないフィルム層を表面に位置することにより印刷の美観を損なわない空洞含有フィルムとすることができる。また、フィルム全体としての空洞含有率が低いため、フィルムの腰が弱くならずラベルとしたときに装着性に優れるフィルムとなる。

【００３３】

さらに、本発明の熱収縮性ポリエステル系フィルムは内部に多数の空洞を含有する空洞含有層を中間層とし、両表層に空洞の少ない又は空洞を含有しないフィルム層を設けること

が特に好ましい。ポリエステル樹脂中に含有させるのに用いる熱可塑性樹脂は、ポリエステルに非相溶性の樹脂であれば特に限定されるものではないが、空洞を発現させるのに好ましい熱可塑性樹脂を添加することで溶融押出時に煙が発生し、工程を汚して操業性悪化を引き起こすことがあり、このような場合、空洞含有層を中間層にすることにより溶融押出時にダイリップに接触して発煙するという問題が解消され、長時間の安定生産が実施可能となる。特に、空洞を発現させるのに好ましい熱可塑性樹脂としてポリスチレン系樹脂を用いる場合には発煙が問題視されるので、空洞含有層を中間層にすることが推奨される。

【００３４】

また、本発明のフィルムは、必要に応じて、安定剤、着色剤、酸化防止剤、帯電防止剤等の添加剤を含有するものであってもよい。

【００３５】

本発明の熱収縮性ポリエステル系フィルムは、ＪＩＳ－Ｋ－７１３６に準じて測定されたフィルムの全光線透過率が４０％以下であることが必要である。全光線透過率が４０％を越えると、ラベルとして装着時に内容物が透けて見えたり、紫外線を遮断できずに内容物が劣化したりしていずれも好ましくない。全光線透過率は３０％以下であることが、特に好ましい。

【００３６】

本発明のフィルムは、８０℃における最大収縮方向の温湯収縮率が６５％以上であり、好ましくは６５～９５％である。本発明のフィルムをボトルのラベルとして用いる場合には、フィルムの８０℃における最大収縮方向を、環状のラベルの周方向にあわせてラベルとするが、最大収縮方向の温湯収縮率が６５％未満であるとペットボトル等の筒状容器の細い口部分で、環状のラベルの収縮不足が発生する。一方、最大収縮方向の温湯収縮率が９５％を越えると、収縮率が大きいために、筒状容器に未収縮ラベルを装着して収縮トンネルを通過させる間に大きく収縮して、ラベルの飛び上がりが発生する場合があるので、収縮工程の管理を慎重に行う必要がある。

【００３７】

また、８０℃における最大収縮方向と直交する方向の温湯収縮率が２％以下、好ましくは０～２％であり、さらに好ましくは０～１％である。環状のラベルの周方向と直角の方向、言い換えれば、環状のラベルの幅方向にあわせて温湯収縮率が０％未満（収縮率がマイナス）であるとフィルムが伸びることになり許容できるのは約－２％程度までであり、それ以上大きくなると、最大収縮方向に収縮するときに生じたラベルの横シワが消えにくくなる傾向にある。一方、最大収縮方向と直交する方向の温湯収縮率が２％を超えるとラベルの縦収縮が大きくなり、使用するフィルム量が多くなり経済的に問題が生ずるので、好ましくない。

【００３８】

本発明のフィルムは、処理温度３０℃、処理湿度８５％ＲＨにおける雰囲気下で２８日間保持した後に、最大収縮方向と直交する方向の破断伸度が５％以上であり、好ましくは１０％以上である。破断伸度が５％未満の場合は印刷加工時のフィルム張力で切れが発生し、生産性が悪くなり好ましくない。また、製造直後の熱収縮性ポリエステル系フィルムの、最大収縮方向と直交する方向の破断伸度も、５％以上である。

【００３９】

本発明の熱収縮性ポリエステル系フィルムのガラス転移温度（Ｔｇ）は５０～９０℃程度、好ましくは５５～８５℃、さらに好ましくは５５～８０℃の範囲である。ガラス転移温度（Ｔｇ）がこの範囲内にあれば、低温収縮性は十分でかつ自然収縮が大きすぎることがなく、ラベルの仕上がりが良好である。

【００４０】

本発明のフィルムは、ベンゼン、トルエン、キシレン、トリメチルベンゼン等の芳香族炭化水素、塩化メチレン、クロロホルム等の八ロゲン化炭化水素、フェノール等のフェノール類、テトラヒドロフラン等のフラン類、１，３－ジオキソラン等のオキソラン類等の有

機溶剤による溶剤接着性を有することが好ましい。特に、有機溶剤による溶剤接着性としては、１，３－ジオキソランによる溶剤接着性で典型的に示すことができる。１，３－ジオキソランを用いることは、安全性の点からも好ましい。ここで、フィルムを表裏面接着したフィルムの溶剤接着強度が４Ｎ／１５ｍｍ以上であることが好ましい。４Ｎ／１５ｍｍ未満では、ラベルを容器に収縮させる際に接合部が剥がれ、好ましくない。溶剤接着強度が４Ｎ／１５ｍｍ以上である場合には剥離抵抗力があると評価できる。

【００４１】

本発明のフィルムの溶剤接着性をさらに向上させるためには、例えば、ポリエステルに、そのガラス転移温度（Ｔｇ）を低下させる成分を共重合することが有効である。

【００４２】

以上の特性を満足するために、本発明の熱収縮性ポリエステル系フィルムは空洞含有層からなる単一の層でもよいが、好ましい層構成は内部に多数の空洞を含有する空洞含有層（以下、単にＢ層ということがある）の少なくとも一方の面に、上記空洞含有層よりも空洞の少ない又は空洞を含有しないフィルム層（以下、単にＡ層ということがある）を設けた多層フィルム、即ち、Ａ層／Ｂ層又はＡ層／Ｂ層／Ａ層からなる多層フィルムである。Ａ層／Ｂ層からなる２層体である場合、Ａ層とＢ層の厚み比率はＡ層／Ｂ層＝５０／５０から２０／８０が好ましい。Ｂ層の厚み比率が５０％未満では、光線遮断性が不足し、内容物が透けて見えたり、紫外線を遮断できずに内容物が劣化したりしていずれも好ましくない。また、Ａ層／Ｂ層／Ａ層からなる３層体である場合、Ａ層とＢ層の厚み比率はＡ層／Ｂ層／Ａ層＝２５／５０／２５から１０／８０／１０が好ましい。Ｂ層の厚み比率が５０％未満では、光線遮断性が不足し、内容物が透けて見えたり、紫外線を遮断できずに内容物が劣化したりしていずれも好ましくない。

【００４３】

以下、本発明フィルムの製造方法を具体的に説明する。本発明の熱収縮性ポリエステル系フィルムを製造するのに用いるポリエステル樹脂は、単独でもよいし、２種以上を混合して用いてもよいが熱収縮特性を容易に得るためには、ガラス転移温度（Ｔｇ）の異なる２種以上のポリエステル樹脂を混合して使用することが好ましく、また、不活性微粒子及び非相溶性樹脂を含有するポリエステル樹脂、さらに好ましくは不活性微粒子及び非相溶性樹脂を含有しガラス転移温度（Ｔｇ）の異なる２種以上のポリエステル樹脂をを通常のホッパードライヤー、パドルドライヤー、真空乾燥機等を用いて乾燥した後、２００～３２０℃の温度で溶融し、押出しを行う。押出しに際しては、Ｔダイ法、チューブラー法等、既存の方法を使用し、単層であるほか同一又は異なる組成の二層、三層で共押出しすることができる。

【００４４】

溶融押出し後、急冷して未延伸フィルムを得るが、Ｔダイ法の場合、急冷時にいわゆる静電印加密着法を用いることにより、厚み斑の少ないフィルムを得ることができる。

【００４５】

得られた未延伸フィルムを、最終的に得られるフィルムが本発明の構成要件を満たすように、１軸延伸又は２軸延伸する。延伸方法としては、ロール法で縦１軸のみに延伸したり、テンター法で横１軸にのみ延伸する方法の外、公知の２軸延伸に際し縦又は横のいずれか一方向に強く延伸し、他方を極力小さく延伸することも可能であり、必要に応じて再延伸を施してもよい。

【００４６】

上記延伸において、主収縮方向には少なくとも２．０倍以上、好ましくは２．５倍以上延伸し、必要に応じて主収縮方向と直交する方向に延伸し、次いで熱処理を行い、本発明のフィルムを得ることができる。

【００４７】

熱処理は通常、緊張下で実施されるが、同時に２０％以下の弛緩又は幅出しを行うことも可能である。熱処理方法としては加熱ロールに接触させる方法やテンター内でクリップに把持して行う方法等の既存の方法を行うことも可能である。

【００４８】
前記延伸工程中、延伸前又は延伸後にフィルムの一方の面又は両方の面にコロナ放電処理を施し、フィルムの印刷層及び／又は接着剤層に対する接着剤層等に対する接着性を向上させることも可能である。
【００４９】
また、上記延伸工程中、延伸前又は延伸後にフィルムの一方の面又は両方の面に塗布を施し、フィルムの接着性、離型性、帯電防止性、易滑性、遮光性等を向上させることも可能である。
【００５０】
得られるフィルムを空洞含有フィルムとする場合、あるいは空洞含有層を一層以上有する多層フィルムとする場合は、８０℃における最大収縮方向の温湯収縮率が６５％以上、８０℃における最大収縮方向と直交する方向の温湯収縮率が２％以下という本発明フィルムの収縮特性を満足するフィルムを容易に得ることができる。特に、不活性微粒子及び非相溶性樹脂を含有するポリエステル樹脂からなる空洞含有層をフィルム構成成分を少なくとも一層とする場合は、特に、上記収縮特性を満足するフィルムを容易に得ることができる。
【００５１】
本発明の熱収縮性ポリエステル系フィルムを空洞含有フィルムとする場合、あるいは空洞含有層を一層以上有する多層フィルムとする場合は、最大収縮方向と直交する方向の温湯収縮率が２％以下という低い値を容易に得ることができる。その理由は明らかではないが、延伸方向の収縮は延伸前に戻ろうとして問題にはならないが、延伸方向と直交する方向は空洞がクッション材となり収縮を阻害するためではないかと推測することができる。
【００５２】
本発明の熱収縮性ポリエステル系フィルムの厚みは特に限定するものではないが、ラベル用熱収縮性フィルムとして好ましくは１０～２００μｍ、さらに好ましくは２０～１００μｍの範囲である。
【００５３】
【実施例】
以下、実施例により本発明をさらに具体的に説明するが、本発明はその要旨を越えない限り、これらの実施例に限定されるものではない。
【００５４】
（１）全光線透過率
日本電飾工業社製ＮＤＨ－２０００Ｔを用い、ＪＩＳ－Ｋ－７１３６に準じ測定した。
【００５５】
（２）温湯収縮率
試料を主収縮方向及びその直交方向に沿うように１０ｃｍ×１０ｃｍの正方形に裁断し、８０℃±０．５℃の温湯中に、無荷重状態で１０秒間浸漬して熱収縮させた後、２５℃±０．５℃の水中に１０秒浸漬し、その後、試料の縦（主収縮）方向及び横（直交）方向の長さを測定し、下記式に従って試料の縦（主収縮）方向及び横（直交）方向についてそれぞれ求めた値である。
温湯収縮率＝（（収縮前の長さ－収縮後の長さ）／収縮前の長さ）×１００（％）
試料の主収縮方向及びその直交方向のうち、最も収縮率の大きい方向を最大収縮方向とし、最大収縮方向の温湯収縮率を「８０℃における最大収縮方向の温湯収縮率」とした。
【００５６】
（３）破断伸度
主収縮方向において１５ｍｍ幅のフィルムを、東洋ボールドウィン社製のテンシロン（型式：ＳＴＭ－Ｔ－５０ＢＰ）でチャック間距離５０ｍｍ、引張速度２００ｍｍ／分で測定した。
【００５７】
（４）収縮仕上がり性

Ｆｕｊｉ　ＡＳｔｅｃ　Ｉｎｃ社製スチームトンネル（型式：ＳＨ－１５００－Ｌ）を用い、通過時間２．５秒、ゾーン温度８０℃で５００ｍＬの角型ペットボトル（高さ２１０ｍｍ、底部の長径６０ｍｍ：吉野工業社製でサントリー社の烏龍茶に使用されているボトル）を用いてテストした（測定数＝２０）。

【００５８】

評価は目視で行い、基準は下記の通りとした。

シワ、飛び上がり、収縮不足のいずれもの発生なし　：○

シワ、飛び上がり、または収縮不足が発生する　：×

【００５９】

（５）溶剤接着性

フィルムを２３０ｍｍ幅にスリットし、続いて、センターシールマシンを用いて１，３－ジオキソランで長さ方向に表裏面接着しながら連続してチューブを作り、二つ折り状態で巻き取った。次いで、該チューブ状体を加工時の接合加工方向と直交方向に１５ｍｍ幅に切断して環状のサンプルを作り、環状のサンプルを切開して東洋精機社製のテンシロン（型式：ＵＴＬ－４Ｌ）を用いてチャック間を２０ｍｍにして引っ張り、溶剤接着部分が剥離したときの溶剤接着強度を測定した。測定値が４Ｎ／１５ｍｍ以上であれば、剥離抵抗力あり「○」とし、４Ｎ／１５ｍｍ未満であれば、剥離抵抗力なし「×」として表した。

【００６０】

（６）ガラス転移温度（Ｔｇ）

セイコー電子工業社製のＤＳＣ（型式：ＤＳＣ２２０）を用いて、未延伸フィルム１０ｍｇを、－４０℃から１２０℃まで昇温速度２０℃／分で昇温し、得られた吸熱曲線より求めた。吸熱曲線の変曲点の前後に接線を引き、その交点をガラス転移温度（Ｔｇ）とした。

【００６１】

実施例、比較例に用いたポリエステルは以下の通りである。

ポリエステルａ：ポリエチレンテレフタレート（ＩＶ：０．７５）

ポリエステルｂ：テレフタル酸１００モル％と、エチレングリコール７０モル％、ネオペンチルグリコール３０モル％とからなるポリエステル（ＩＶ：０．７２）

ポリエステルｃ：ポリブチレンテレフタレート７０重量％とε－カプロラクトン３０重量％とからなるポリエステルエラストマー（還元粘度（ｎｓｐ／ｃ）１．３０）

ポリエステルｄ：ポリブチレンテレフタレート（ＩＶ：１．２０）

【００６２】

（実施例１）

内部に多数の空洞を含有する空洞含有層（Ｂ層）の両方の面に、上記空洞含有層よりも空洞の少ない又は空洞を含有しないフィルム層（Ａ層）を設けた多層フィルムからなる熱収縮性ポリエステル系フィルムを製造した。

【００６３】

表１に示すように、Ａ層の原料して、ポリエステルａを３０重量％、ポリエステルｂを６７重量％、ポリエステルｃを３重量％混合したポリエステル組成物を、Ｂ層の原料して、ポリエステルａを１０重量％、ポリエステルｂを６５重量％、ポリエステルｃを５重量％と結晶性ポリスチレン樹脂（Ｇ７９７Ｎ　日本ポリスチレン社製）１０重量％及び二酸化チタン（ＴＡ－３００富士チタン社製）１０重量％をそれぞれ別々の押出機に投入、混合、溶融したものをフィードブロックで接合し、２８０℃でＴダイから延伸後のＡ層／Ｂ層／Ａ層の厚み比率が１０μｍ／２０μｍ／１０μｍとなるように積層しながら溶融押出しし、チルロールで急冷して未延伸フィルムを得た。得られた未延伸フィルムを、テンターでフィルム温度７０℃で横方向に４．０倍延伸し、厚み４０μｍの熱収縮性ポリエステル系フィルムを得た。

【００６４】

（実施例２及び比較例１～３）

表１に示すように、ポリエステル、ポリスチレン及び二酸化チタン配合割合、製膜条件を

変えたこと以外は、実施例１と同様にして厚み４０μｍの熱収縮性ポリエステル系フィルムを得た。

【００６５】

実施例１～２及び比較例１～３で得られたフィルムの評価結果を表１に示す。

【００６６】

【表１】

		原料処方(重量%)						製膜条件		全光線透過率	温湯収縮率(%)(80℃・10秒)		破断伸度(%)		収縮仕上り性	剥離抵抗力
		ポリエステル				添加剤		延伸温度	延伸倍率		最大収縮方向	直交方向	直後	28日後		
	層	a	b	c	d	ポリスチレン	二酸化チタン	(℃)	(倍)	(%)						
実施例1	A	30	67	3	0	0	0	70	4.0	31	69.0	0.0	500以上	100以上	○	○
	B	10	65	5	0	10	10									
	A	30	67	3	0	0	0									
実施例2	A	30	65	5	0	0	0	69	4.0	30	70.0	0.0	500以上	100以上	○	○
	B	10	65	5	0	10	10									
	A	30	65	5	0	0	0									
比較例1	A	10	67	3	0	10	10	74	4.0	25	68.0	1.0	500以上	100以上	○	×
	B	10	67	3	0	10	10									
	A	10	67	3	0	10	10									
比較例2	A	30	65	5	0	0	0	74	4.0	85	71.0	1.0	500以上	4	○	○
	B	30	65	5	0	0	0									
	A	30	65	5	0	0	0									
比較例3	A	15	60	0	25	0	0	78	5.0	80	62.0	4.0	500以上	3	×	○
	B	15	60	0	25	0	0									
	A	15	60	0	25	0	0									

ポリエステルａ：TPA//EG=100//100(モル%)

ポリエステルｂ：TPA//EG/NPG=100//70/30(モル%)

ポリエステルｃ：(TPA//BD=100//100)(モル%)/ε-ｶﾌﾟﾛﾗｸﾄﾝ=70/30(重量%)の共重合ポリエステル

ポリエステルｄ：TPA//BD=100//100(モル%)

ＴＰＡ：テレフタル酸

ＥＧ　：エチレングリコール

ＮＰＧ：ネオペンチルグリコール

ＢＤ　：ブタンジオール

【００６７】

表１から明らかなように、実施例１～２で得られた熱収縮性ポリエステル系フィルムは、いずれもペットボトルのフルラベル用に好適な熱収縮性ポリエステル系フィルムであって、かつ、良好な光線遮断性を有するものであった。

【００６８】
本発明の熱収縮性ポリエステル系フィルムは、高品質で実用性が高く、特に紫外線で劣化しやすい内容物の包装収縮ラベル用として好適である。
【００６９】
一方、比較例１で得られた熱収縮性ポリエステル系フィルムは、光線遮断性を有するものの溶剤接着性が劣っており、比較例２～３で得られた熱収縮性ポリエステル系フィルムは、光線遮断性が劣っていた。このように比較例の熱収縮性ポリエステル系フィルムは、品質が劣り、実用性の低いものであった。
【００７０】
【発明の効果】
本発明の熱収縮性ポリエステル系フィルムによれば、収縮仕上がり性が好適で、ボトル等の胴部に装着する表示用のラベルにしたときに端部に歪みがなく、また、印刷加工を施さなくとも光線遮断性を有する。

フロントページの続き

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BB08 BC01
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RG43

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	0	((("BROOK") near3 ("&") near3 ("WHITTLE") near3 ("LIMITED"))).AS,AANM.	(USPAT)	OR	ON	ON	2023/07/27 12:46 PM
L2	120	((("SHARP") near3 ("Andrew")) OR (("MORGAN") near3 ("Mitchell"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/27 12:46 PM
L3	3922	(G09F3/0291).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/27 12:46 PM
L5	9611	(G09F2003/0208,0251, 0257,0272).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/27 12:46 PM
L6	2468	(B65D23/0878).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN,	OR	ON	ON	2023/07/27 12:47 PM

			WO); FPRS; EPO; JPO; DERWENT)				
L7	301	(B65B7/167).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/27 12:47 PM
L8	356	(shrink NEAR label) AND (recyclable)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/27 12:47 PM
L9	1	(18/103234).app.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/27 12:49 PM
L10	44	(Artificial Intelligence) More like doc: US-20230177980-A1 Text: (WO-2022241272-A1 OR US-20130126462-A1 OR JP-2002055613-A OR US-20030068453-A1 OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO,	OR	ON	ON	2023/07/27 12:50 PM

		JP-6620526-B2 OR US-8235712-B1 OR US-20130033031-A1 OR WO-2013019907-A1 OR WO-2016193966-A1 OR JP-WO2020137798-A1 OR KR-20160080454-A OR BR-PI0606722-B1 OR MX-2007008258-A OR US-20150294602-A1 OR EP-1836048-A1 OR RU-2424907-C2 OR AU-2006205076-A1 OR KR-20070104389-A OR AU-2006205076-B2 OR CA-2590678-A1).did.	NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L11	3	("20090233067")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/27 01:12 PM
L12	13	"20030068453"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/27 01:12 PM
L13	8	(shrink NEAR label) AND (recyclable) AND ((opaque OR opacifying OR (light NEAR block$3)) NEAR layer)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL,	OR	ON	ON	2023/07/31 02:37 PM

			PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L14	0	(shrink NEAR label) AND (recyclable) AND ((titanium NEAR dioxide) NEAR layer)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/31 02:39 PM
L15	20	(shrink NEAR label) AND (recyclable) AND ((titanium NEAR dioxide) SAME layer)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/31 02:39 PM
L16	6	(shrink NEAR label) AND (recyclable) AND ((light NEAR blocking) SAME layer)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/07/31 02:40 PM
L17	19	((US-20230203349-A1 OR US-20180215127-A1 OR US-20170283116-A1 OR US-20170223879-A1 OR US-20170213484-A1 OR US-	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS,	OR	ON	ON	2023/08/01 10:27 AM

		20170174379-A1 OR US-20160193815-A1 OR US-20160152010-A1 OR US-20160136934-A1 OR US-20160136935-A1 OR US-20140151258-A1 OR US-20140053509-A1 OR US-20090291284-A1 OR US-20030203166-A1 OR US-20090301636-A1).did. AND PGPB.dbnm.) OR ((WO-2021165081-A1).did. AND DWPI.dbnm.) OR ((WO-2018187203-A1 OR CN-104364035-A OR KR-100910406-B1).did. AND FTDB.dbnm.)	IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L18	5913	label AND (anti NEAR blocking NEAR agent)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 10:30 AM
L19	356	label AND ((anti NEAR blocking NEAR agent) SAME (titanium NEAR dioxide))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 10:30 AM
L20	1	label AND ((anti NEAR blocking NEAR agent) SAME (titanium NEAR dioxide) AND (light NEAR block))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2023/08/01 10:31 AM

			EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L21	356	label AND ((anti NEAR blocking NEAR agent) SAME (titanium NEAR dioxide))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 10:31 AM
L22	107	"6821592"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 10:58 AM
L23	88	"7217463"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 10:59 AM
L24	6	((heat NEAR shrink) SAME label) AND (light	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2023/08/01 11:03 AM

		NEAR blocking NEAR (additive OR agent))	AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L25	1407	(light NEAR blocking NEAR (additive OR agent)) SAME ((titanium NEAR dioxide) OR zinc OR aluminum OR copper OR silver OR mica OR (carbon NEAR black) OR (reflective NEAR pigment))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 11:06 AM
L26	2	L25 AND (heat NEAR shrink NEAR label)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 11:06 AM
L27	368328	(blocking NEAR agent) OR (light NEAR blocker) OR (light NEAR blocking NEAR agent)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2023/08/01 11:07 AM

			JPO; DERWENT)				
L28	176	((blocking NEAR agent) OR (light NEAR blocker) OR (light NEAR blocking NEAR agent)) AND (heat NEAR shrink NEAR label)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 11:07 AM
L29	2	"20230177980"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 01:19 PM
L30	6	"201216296"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 01:20 PM
L31	15	"2012162696"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE,	OR	ON	ON	2023/08/01 01:20 PM

			SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L32	8	"2010284941"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 01:43 PM
L33	23	"2007015747"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/01 01:44 PM
L34	441	((blocking NEAR agent) OR (light NEAR blocker) OR (light NEAR blocking NEAR agent)) AND (metal NEAR particulate)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:24 AM
L35	272	((blocking NEAR agent) OR (light NEAR blocker) OR (light NEAR blocking NEAR agent)) AND ((metal NEAR particulate) SAME (particle size))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV,	OR	ON	ON	2023/08/02 06:25 AM

			MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L36	7	((light NEAR blocker) OR (light NEAR blocking NEAR agent)) SAME ((metal NEAR particulate) SAME (particle size))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:25 AM
L37	10	((light NEAR blocker) OR (light NEAR blocking NEAR agent)) SAME ((metal NEAR particle) SAME (particle size))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:27 AM
L38	5	(light NEAR blocking NEAR agent) SAME ((metal NEAR particle) SAME (particle size))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:27 AM
L39	408199	(light NEAR block) OR (UV NEAR block) OR (ultraviolet NEAR block) OR (visible NEAR light NEAR block)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2023/08/02 06:28 AM

			EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L40	0	((light NEAR block) OR (UV NEAR block) OR (ultraviolet NEAR block) OR (visible NEAR light NEAR block)) same3 (metal NEAR paticle) SAME (particle NEAR size)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:29 AM
L41	0	((light NEAR block) OR (UV NEAR block) OR (ultraviolet NEAR block) OR (visible NEAR light NEAR block)) same3 (metal NEAR paticle) same3 (particle NEAR size)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:29 AM
L42	289	(light NEAR blocking) SAME (metal NEAR pigment)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 06:30 AM
L43	1	(light NEAR blocking) SAME (metal NEAR	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2023/08/02 06:30 AM

		pigment) SAME (pigment NEAR size)	AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L44	39	(light NEAR blocking) SAME (metal NEAR particle) SAME (particle NEAR size)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:04 AM
L45	32430	(metal NEAR (particulate OR particle)) SAME (zinc OR aluminum OR copper OR silver) SAME (particle NEAR size)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:07 AM
L46	63	(metal NEAR (particulate OR particle)) SAME (zinc OR aluminum OR copper OR silver) SAME (particle NEAR size) SAME (light NEAR block$3)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2023/08/02 10:08 AM

			JPO; DERWENT)				
L47	131	(metal NEAR (particulate OR particle)) SAME (zinc OR aluminum OR copper OR silver) SAME (particle NEAR size) same3 (light NEAR block$3)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:12 AM
L48	10	"2008138282"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:15 AM
L49	17	"2008138287"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:15 AM
L50	16	"2008203841"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE,	OR	ON	ON	2023/08/02 10:16 AM

			SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L51	3148	(light NEAR blocking) SAME (particle NEAR size)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:17 AM
L52	816	(light NEAR blocking) SAME (particle NEAR size) SAME metal	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:17 AM
L53	37	((light NEAR blocking) SAME (particle NEAR size) SAME metal) AND label	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 10:53 AM
L54	12	(US-0068453-$ | US-0126462-$ | US-0233067-$ | US-20030068453-$ | US-20090233067-$ | US-20130126462-$).DID.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV,	OR	ON	ON	2023/08/02 11:15 AM

			MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)				
L55	24	((US-20230203349-A1 OR US-20180215127-A1 OR US-20170283116-A1 OR US-20170223879-A1 OR US-20170213484-A1 OR US-20170174379-A1 OR US-20160193815-A1 OR US-20160152010-A1 OR US-20160136934-A1 OR US-20160136935-A1 OR US-20140151258-A1 OR US-20140053509-A1 OR US-20090291284-A1 OR US-20030203166-A1 OR US-20090301636-A1 OR US-20200298541-A1 OR US-20170368811-A1).did. AND PGPB.dbnm.) OR ((WO-2021165081-A1).did. AND DWPI.dbnm.) OR ((WO-2018187203-A1 OR CN-104364035-A OR KR-100910406-B1 OR JP-2012162696-A OR JP-2010284941-A OR JP-2004114498-A).did. AND FTDB.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/08/02 01:05 PM
L56	3	"20090233067"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/02 02:46 PM

L57	31	"2006076327"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/08/03 01:19 PM
L58	0	"202030177980"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/03 10:48 AM
L59	2	"20230177980"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/03 10:48 AM
L60	37	(Artificial Intelligence) More like doc: US-20230177980-A1 Text: (WO-2022241272-A1 OR JP-2002055613-A OR US-2003068453-A1 OR JP-6620526-B2 OR JP-WO2020137798-A1 OR CN-219392855-U OR BR-PI0606722-B1 OR MX-2007008258-A	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK,	OR	ON	ON	2023/11/03 10:48 AM

		OR US-2015294602-A1 OR EP-1836048-A1 OR RU-2424907-C2 OR AU-2006205076-A1 OR KR-20070104389-A OR AU-2006205076-B2 OR CA-2590678-A1 OR WO-2006076327-A1 OR US-9916777-B2 OR US-2009233067-A1 OR EP-1836048-B1 OR US-7927688-B2).did.	TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L61	9	"20090042024"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/03 10:54 AM
L62	9	(particle NEAR size) SAME (metal NEAR particle) SAME (light NEAR block)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/03 03:27 PM
L63	2	(particle NEAR size) SAME (metal NEAR particle) SAME (shrink NEAR label)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/03 03:28 PM

L64	9	(particle NEAR size) SAME (metal NEAR particle) SAME (shrink NEAR (label OR film))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT)	OR	ON	ON	2023/11/03 03:28 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

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B65D 65/02	(2006.01)	B65D 65/02	BRHF	4F210
B32B 27/00	(2006.01)	B32B 27/00	H	
B29K 105/02	(2006.01)	B29K 105:02		

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最終頁に続く

(54)【発明の名称】遮光性シュリンクフィルム

(57)【要約】
【課題】遮光性及び断熱性を有すると共に、簡易な構成であって容易にリサイクルすることができる遮光性シュリンクフィルムの提供。
【解決手段】結晶性を有するポリマーからなり、長尺状の空洞をその長さ方向が第１の方向に配向した状態で内部に含有する結晶性高分子フィルムであって、前記結晶性高分子フィルムにおける、前記空洞の配向方向に直交する断面において、前記空洞の中心から前記結晶性高分子フィルムの表面までの距離が最も短い１０個の前記空洞について、各中心から前記結晶性高分子フィルムの表面までの距離ｈ（ｉ）を算出し、算出された各前記距離ｈ（ｉ）の算術平均値ｈ（ａｖｇ）が、次式、ｈ（ａｖｇ）＞Ｔ／１００、の関係を満たす結晶性高分子フィルムと、熱収縮性合成樹脂フィルムとを備える遮光性シュリンクフィルムである。
【選択図】なし

【特許請求の範囲】
【請求項1】
結晶性を有するポリマーからなり、長尺状の空洞をその長さ方向が第１の方向に配向した状態で内部に含有する結晶性高分子フィルムであって、
前記結晶性高分子フィルムにおける、前記空洞の配向方向に直交する断面において、前記空洞の中心から前記結晶性高分子フィルムの表面までの距離が最も短い１０個の前記空洞について、各中心から前記結晶性高分子フィルムの表面までの距離ｈ（ｉ）を算出し、算出された各前記距離ｈ（ｉ）の算術平均値ｈ（ａｖｇ）が、次式、ｈ（ａｖｇ）＞Ｔ／１００、の関係を満たす結晶性高分子フィルムと、
［但し、Ｔは、前記断面における厚みの算術平均値を表し、１０個の前記空洞は、前記厚み方向に平行な任意の一の直線と、前記一の直線に対し平行でかつ２０×Ｔだけ離れて位置する他の直線とで挟まれた領域内に存在する空洞の中から選択される。］
熱収縮性合成樹脂フィルムとを備えることを特徴とする遮光性シュリンクフィルム。
【請求項2】
熱収縮性合成樹脂フィルムと結晶性高分子フィルムとは、熱収縮率の差が５％以下である請求項１に記載の遮光性シュリンクフィルム。
【請求項3】
波長３００ｎｍ～７８０ｎｍから選択される１つの波長の光に対する透過率が５％以下である請求項１から２のいずれかに記載の遮光性シュリンクフィルム。

【発明の詳細な説明】
【技術分野】
【0001】
本発明は、熱収縮性合成樹脂フィルムと、内部に空洞を含有する結晶性高分子フィルムとを備える遮光性シュリンクフィルムに関する。
【背景技術】
【0002】
従来、乳・乳飲料、ビール、ビタミン飲料、ジュース、炭酸飲料、水、お茶等の飲料水、あるいは、オイル、調味料、その他種々の液状食品を充填包装するために、種々の形態からなるプラスチック製ボトル、ガラス瓶、金属缶等（以下「容器」という）が開発されている。而して、これらの容器の表面に、容器の保護、結束、ラベル貼り等の目的で、上記容器の口部、肩部、胴部等の一部または全部を迅速に被覆、あるいは、結束する包装材料として、シュリンクフィルムが、知られている。
シュリンクフィルムの包装方法としては、例えば、筒状、若しくは、袋状のフィルムに少し余裕を持たせて一次包装した後、熱風、スチーム等によって該フィルムを容器外周面にシュリンクさせる方法が知られている。また、フィルムをある程度緊張状態で包装し、フィルムの端を容器の底部に折り込んで、該折り込み部をフィルム同士の自己密着力または熱融着により一次包装した後、シュリンク処理させてフィルムの弛みやシワを除去するストレッチシュリンク等の方法が知られている。
シュリンク包装は、角状、丸状、ひょうたん状等のあらゆる形状の容器にフィットすることができるため、容器形状の選択を広くとることができるものである。また、シュリンクフィルムと容器を直接接着していないため、容器と完全に分離することもできるものである。このため、環境面においても、リサイクルの観点から、容器と分別可能なシュリンクフィルムは、今後益々需要の拡大が期待される。シュリンク包装としては、これらの容器の全面、密封する部分に、無色のシュリンクフィルムや、商品名、製造業者名、内容物、デザインを表示する機能を付加するために、印刷を施したシュリンクフィルムで容器を包装することも行われている。また、ビール等の遮光性を必要とする内容物を外部光より遮断するために、着色のシュリンクフィルムを用いることによって、遮光性の機能を付加したシュリンクフィルムで容器全体を包装することも行われている。
【0003】
シュリンクフィルムに遮光性を付与する技術として、例えば、シュリンクフィルムに金

属（アルミニウム等）の薄膜層を積層すること（特許文献１参照）、シュリンクフィルムにアルミペーストを含有する白色インキ層を積層すること（特許文献２参照）、紫外線吸収剤を含むシュリンクフィルムに酸化チタンを含有する遮光性粘着剤を積層すること（特許文献３参照）等がある。これらの技術は、シュリンクフィルムに、顔料、染料、金属、無機粒子等を含有する層を有する遮光材層を積層することによって遮光性を付与したものであり、簡易な構成のものでないため、リサイクルが困難であった。また、これらの遮光性が付与された積層体は、容器の内容物の保存性を向上するために必要な断熱性を有するものではなかった。

【図面の簡単な説明】

【0009】

【図1】図１は、本発明の遮光性シュリンクフィルムにおける結晶性高分子フィルムの製造方法の一例を示す図であって、二軸延伸フィルム製造装置のフロー図である。

【図2A】図２Ａは、アスペクト比を具体的に説明するための図であって、結晶性高分子フィルムの斜視図である。

【図2B】図２Ｂは、アスペクト比を具体的に説明するための図であって、図２Ａにおける結晶性高分子フィルムのＡ－Ａ’断面図である。

【図2C】図２Ｃは、アスペクト比を具体的に説明するための図であって、図２Ａにおける結晶性高分子フィルムのＢ－Ｂ’断面図である。

【図2D】図２Ｄは、フィルム表面から最も近くに位置する１０個の空洞の、フィルム表面からの距離を測定する方法を説明するための図であって、図２ＡにおけるＡ－Ａ’断面図である。

【図3】図３は、実施例１の遮光性シュリンクフィルムについて透過率を評価した結果を示す図である。

【産業上の利用可能性】

【0097】

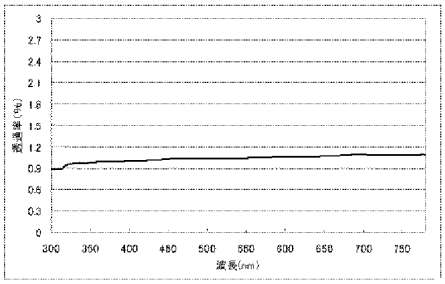
本発明の空洞含有樹脂成形体は、前記空洞を含有しているため、例えば、電子機器の照明用部材、一般家庭用照明部材、内照看板などの反射板、昇華転写記録材料又は熱転写記録材料に対応できる受像フィルム素材又は受像シート素材、各種断熱材、感圧記録材料、農業用マルチフィルム、化粧料の成分、食品用包装材、遮光性シュリンクフィルム、スクリーンなどとして利用することができる。

【符号の説明】

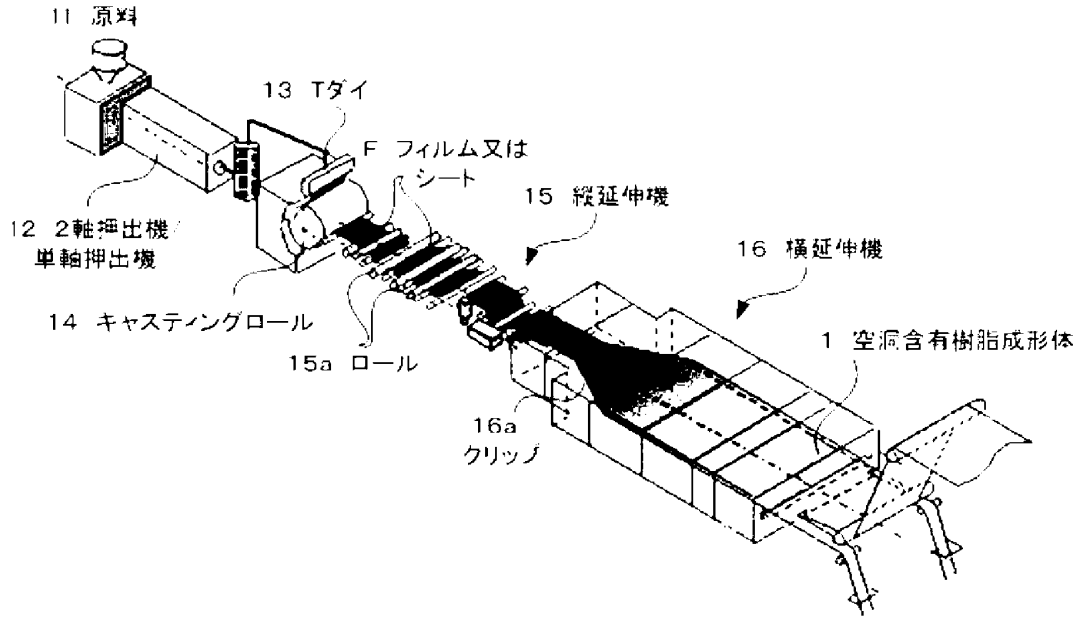
【0098】

１	結晶性高分子フィルム
１ａ	表面
１００	空洞
Ｌ	空洞の配向方向における空洞の長さ
ｒ	空洞の配向方向に直交する厚み方向における空洞の長さ

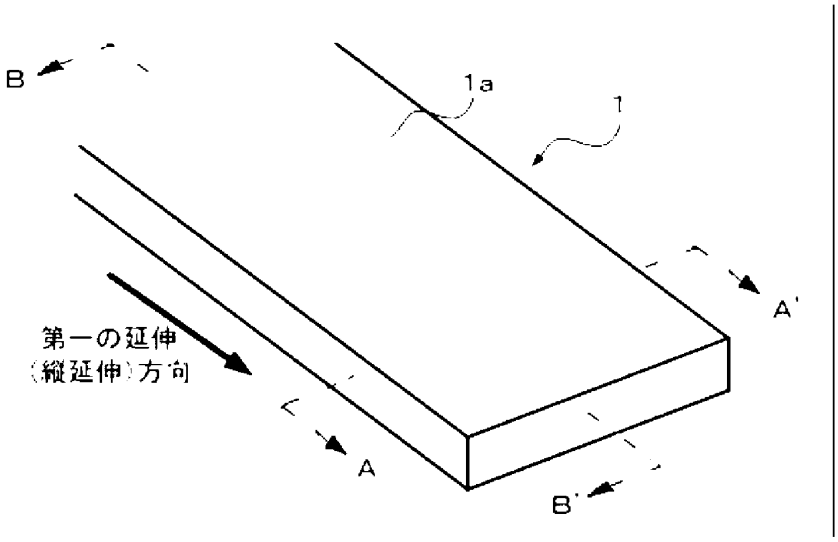
【図３】


3
2.7
2.4
2.1
1.8
1.5
1.2
0.9
0.6
0.3
0
300
350
400
450
500
550
600
650
700
750
波長(nm)

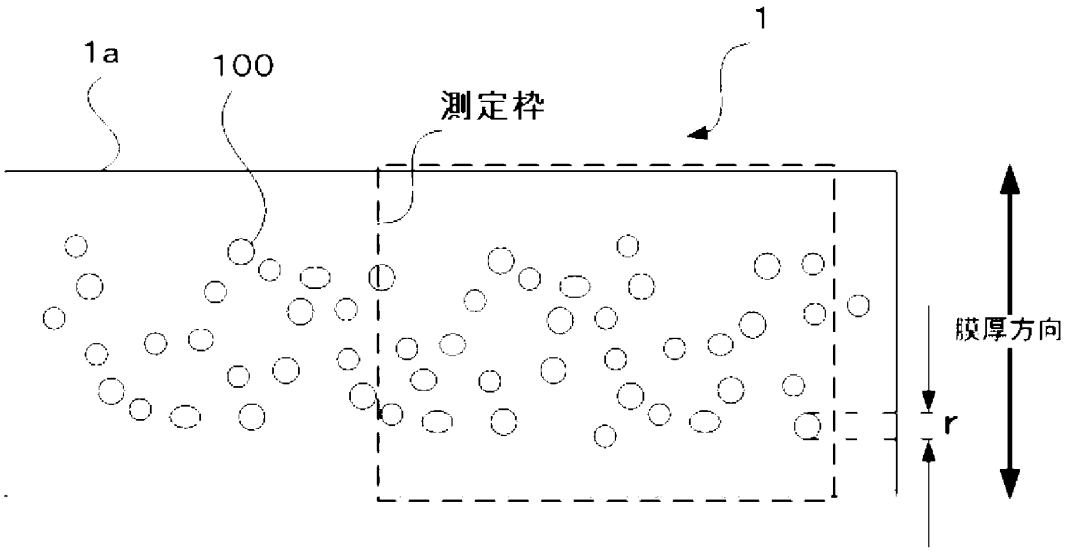
【図1】


11 原料
13 Tダイ
F フィルム又は
シート
15 縦延伸機
16 横延伸機
12 2軸押出機
単軸押出機
14 キャスティングロール
15a ロール
1 空洞含有樹脂成形体
16a
クリップ

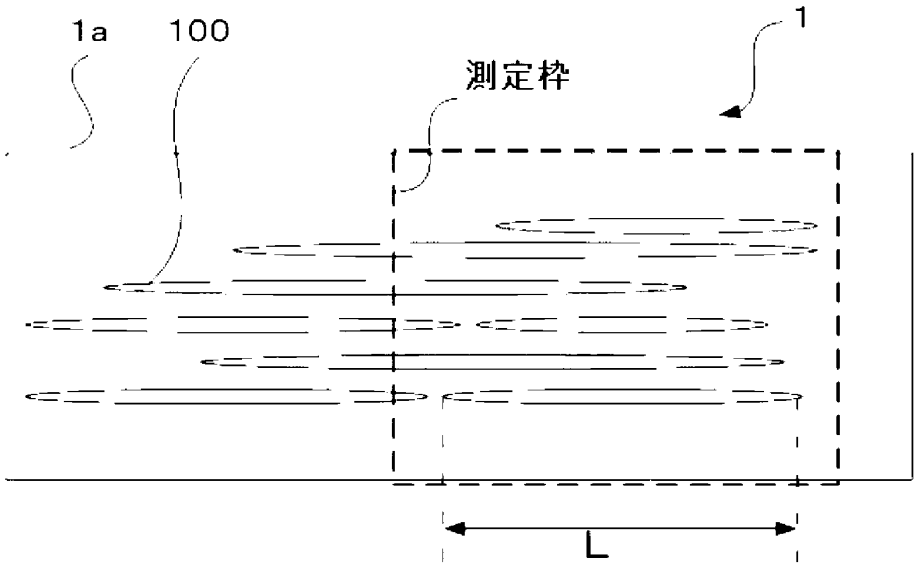
【図2A】



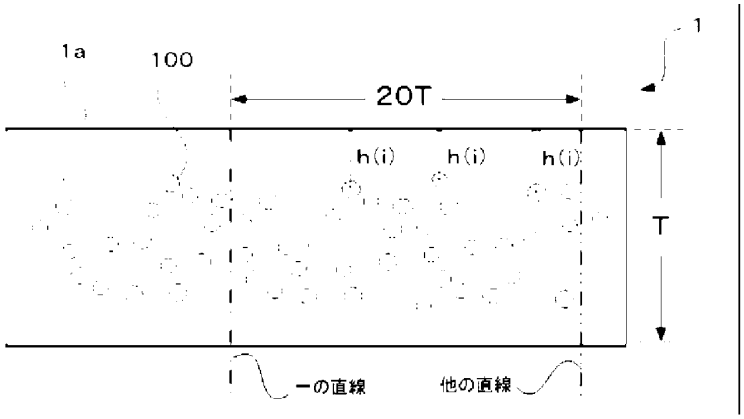
【図2B】



【図2C】



【図2D】



(51)Int.Cl.		F I		テーマコード（参考）
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Ｂ２９Ｌ 7/00	(2006.01)	Ｂ２９Ｌ 7:00		
Ｂ２９Ｌ 9/00	(2006.01)	Ｂ２９Ｌ 9:00		

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Ｆターム(参考) 3E086 AB02 AD16 BA02 BA15 BA27 BA33 BB22 BB37 BB67 CA01
CA11
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JA03B JJ02 JL00 JN02 YY00A YY00B
4F210 AA11 AA24 AA25 AE01 AG01 AG03 AG20 AH54 AR12 RA03
RC02 RG01 RG04 RG09 RG21 RG35 RG43

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/103,234	01/30/2023	Andrew Sharp	0644.000001US01	8140

26813 7590 12/27/2023

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EXAMINER
POWERS, LAURA C

ART UNIT	PAPER NUMBER
1785	

NOTIFICATION DATE	DELIVERY MODE
12/27/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptodocketing@mrgs.com

Applicant-Initiated Interview Summary	**Application No.** 18/103,234	**Applicant(s)** Sharp et al.		
	Examiner LAURA POWERS	**Art Unit** 1785	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
LAURA POWERS	Primary Examiner	Telephonic
Lotta Kiuru-Ribar	Attorney of Record	

Date of Interview: 20 December 2023

Issues Discussed:

Proposed Amendment(s)

During the interview the proposed amendments were discussed with respect to amending the limitations of claim 12 into claim 1 and a new independent claim that would combine original claim 1 with claim 3. Sasaki et al. was discussed regarding whether the reference taught including inorganic fine particles or taught against it. The Examiner agreed to consider the response as a whole one received, and agreed to obtain a full translation of the Sasaki et al. reference in order to look at the data on Table 2. No agreement as to allowability was reached during the interview.

/LAURA C POWERS/ Primary Examiner, Art Unit 1785	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 18/103,234	Filing Date 01/30/2023	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $480 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	01/10/2024	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 19	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/STEFANIE A BRYCE/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/103,234	**01/10/2024 01:34:57 PM Z ET**	**0644.000001US01**

Title of Invention

RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	8140	FILED BY	Angela Hoernemann
PATENT CENTER #	63903147	FILING DATE	01/30/2023
CUSTOMER #	26813	FIRST NAMED INVENTOR	Andrew Sharp
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Lotta Kiuru-Ribar

Documents

TOTAL DOCUMENTS: 5

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
2024-01-10-Amendment and Response.pdf		11	-	180 KB
2024-01-10-Amendment and Response-A.NE.pdf	(1-1)	1	Response After Final Action	87 KB
2024-01-10-Amendment and Response-CLM.pdf	(2-5)	4	Claims	127 KB
2024-01-10-Amendment and Response-INTRVIEW.APP.pdf	(6-6)	1	Applicant summary of interview with examiner	104 KB
2024-01-10-Amendment	(7-11)	5	Applicant Arguments/Remarks	165 KB

and Response-REM.pdf		Made in an Amendment	
2024-01-10-After-Final-Pilot-Prog-Request.pdf	2	After Final Consideration Program Request	245 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2024-01-10-Amendment and Response.pdf	A3582F4054C0A02C8F05344C31FC29973CD092F0B2D5CDC7378DF7EFAA8047A9FD424D8FF1FBFB517D0B291792F61E9416C1A9967234F19C5A782903403EE0B2
2024-01-10-Amendment and Response-A.NE.pdf	38325CD8273AFAA176BBD0EEC2B2BB1076A0D13AD98F66176962B78A9E96D2A1DF8B70D0D819A2425E4566616CAB1142DE3361BF2F148341A9E1BFB5176DE53B
2024-01-10-Amendment and Response-CLM.pdf	B24ACDCC78234D4B749CC7460EFCDC48592199CA831F7133C05C7F30996A0B1223B510C89F9A1F2CF09ACD60437B77884604F4BBF5089F0991661C633C71D6A9
2024-01-10-Amendment and Response-INTRVIEW.APP.pdf	664FF6A022A6F68A1C87045CD1597DA2151CE40FE0F0907A9CEF8FB4D854D07AFDF4A5594D2AC5841E443763D0ED418460FCEFF34117A768D82C7C74F861CDBC
2024-01-10-Amendment and Response-REM.pdf	E341605FA4C0F43028FE5E3BB0F12E62ACAA03821459F9B1896EAE5D16C72742B00F98B17CB0A1D1F23B1FB2509F9D8347C0CCD12CF3697F90DDD9EF569DBB88
2024-01-10-After-Final-Pilot-Prog-Request.pdf	5D55468BDE5D551539345258 9A46C638EA5C0F5F6C1B67A8084D9737CD9BD9E2FD99AD0C91CEE9E8292A1C1DCDC61EF54743FF27D9ECFA9F0D325225961B4539

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d)

and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	18/103,234	Attorney Docket No.:	0644.000001US01
Confirmation No.:	8140	Customer No.:	26813
Filing Date:	January 30, 2023	Examiner Name:	Laura C. Powers
First Named Inventor:	Andrew Sharp	Group Art Unit:	1785
Title of Invention:	RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER		

AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.116

Commissioner for Patents
Mail Stop AF
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

In response to the Final Office Action of November 13, 2023, please consider the following.

Amendments to the Claims begin on the page entitled "Amendments to the Claims."

Remarks begin on the page entitled "Remarks."

Authorization is given to charge Deposit Account No. 13-4895 any necessary fees for this filing and all required extension of time fees.

Amendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

Listing of Claims

1. (**Currently Amended**) A recyclable shrink label comprising:

a heat shrink film comprising polyethylene terephthalate (PET) and having a first surface and a second surface opposite of the first surface, the heat shrink film having a thickness from 15 μm to 100 μm; and

a light blocking layer disposed adjacent the first surface and comprising a light blocking component, the light blocking layer being constructed for the recyclable shrink label to block at least 80 % of incident light having wavelengths in a range of 200 nm to 900 nm, wherein the light blocking component comprises a particulate having a particle size of 0.1 μm to 100 μm, wherein the particulate comprises metal, metal oxide, a reflective pigment, carbon black, mica, or a combination thereof, and

wherein the recyclable shrink label is recyclable with a PET container.

2. (Previously Presented) The recyclable shrink label of claim 1 further comprising an indicia layer.

3. (Previously Presented) The recyclable shrink label of claim 1 further comprising a high opacity layer comprising a white pigment.

4. (Original) The recyclable shrink label of claim 3, wherein the recyclable shrink label comprises an indicia layer and wherein the high opacity layer is disposed between the indicia layer and the light blocking layer.

5. (Cancelled)

6. (Previously Presented) The recyclable shrink label of claim 1, wherein the heat shrink film consists of polyethylene terephthalate (PET).

7. (Previously Presented) The recyclable shrink label according to claim 8, wherein the heat shrink film comprises a seam.

8. (Previously Presented) The recyclable shrink label according to claim 1, wherein the recyclable shrink label is in a form of a sleeve or tube.

9. (Previously Presented) The recyclable shrink label according to claim 1, wherein when heated to 100 °C, the heat shrink film contracts or shrinks by about 1 % to about 90 %.

10. (Previously Presented) The recyclable shrink label according to claim 1, wherein when heated to 100 °C, the entire recyclable shrink label contracts or shrinks by about 1 % to about 90 %.

11. (Previously Presented) The recyclable shrink label according to claim 3, wherein the high opacity layer comprises a pigment selected from titanium dioxide (TiO_2), precipitated calcium carbonate (PCC), aluminum silicate, aluminum oxide (alumina), mica-based pigments coated with thin layer(s) of white pigment, or a combination thereof.

12. (**Cancelled**)

13. (Previously Presented) The recyclable shrink label according to claim 1, wherein the light blocking component comprises zinc, aluminum, copper, silver, or an alloy thereof, titanium dioxide, carbon black, mica, a reflective pigment, a polymer capable of blocking light, a mineral capable of blocking light, or a combination thereof.

14. (Previously Presented) The recyclable shrink label according to claim 1, wherein the light blocking layer is present in an amount of 0.5 ppr to 25 ppr relative to the recyclable shrink label.

15. (Previously Presented) The recyclable shrink label according to claim 1, wherein the light blocking layer comprises from 0.1 ppr to 10 ppr of the light blocking component.

16. (Previously Presented) An article comprising:

a container comprising polyethylene terephthalate (PET) and defining an external surface; and

the recyclable shrink label of claim 1 disposed on the container.

17-19. (Cancelled)

20. (Withdrawn) A method of making a label for a container, the method comprising:

depositing an indicia layer on a heat shrinkable film;

optionally depositing a high opacity layer on the indicia layer; and

depositing a light blocking composition on the indicia layer, on the heat shrinkable film, or on the high opacity layer,

wherein the light blocking layer comprises one or more light blocking components, and wherein the label is capable of blocking at least 80 % of incident light having wavelengths in a range of 200 nm to 900 nm.

21. (Cancelled)

22. (Cancelled)

23. (Previously Presented) The recyclable shrink label according to claim 16, wherein the first surface of the heat shrink film faces the external surface of the container.

24. (Previously Presented) The recyclable shrink label according to claim 2, wherein the indicia layer is disposed on the first surface.

25. (**Currently Amended**) The recyclable shrink label according to claim 9, wherein the heat shrink film contracts [[of]]or shrinks by about 1 % to 90 % in a transverse direction.

26. (Previously Presented) The recyclable shrink label according to claim 1, wherein the heat shrink film comprises crystallizable polyethylene terephthalate (PET).

27. (**New**) A recyclable shrink label comprising:

a heat shrink film comprising polyethylene terephthalate (PET) and having a first surface and a second surface opposite of the first surface, the heat shrink film having a thickness from 15 μm to 100 μm;

a light blocking layer disposed adjacent the first surface and comprising a light blocking component, the light blocking layer being constructed for the recyclable shrink label to block at least 80 % of incident light having wavelengths in a range of 200 nm to 900 nm, and

a high opacity layer comprising a white pigment,

wherein the recyclable shrink label is recyclable with a PET container.

Interview Summary

Applicant thanks the Examiner for the courtesy extended during an Interview conducted on December 20, 2023, between Applicant's representative Lotta Kiuru-Ribar and Examiner Laura C. Powers. During the interview, potential claim amendments and differences between the claimed articles and the prior art were discussed. The amendments and comments made here reflect those discussed during the interview.

Remarks

The Final Office Action of November 13, 2023 has been received and reviewed. In this Response, claims 1 and 25 are amended, claims 12, 21, and 22 are cancelled, without prejudice, and claim 27 is added. Therefore, claims 1-3, 5-11, 13-16, 20, and 23-27 are pending. Applicant requests that the Examiner reconsider and withdraw the rejections.

Support for Claim Amendments

Support for amended claim 1 can be found, for example, in claims 12 and 13.

Support for new claim 27 can be found, for example, in claims 1 and 3.

Objection

Claim 25 was objected to for informalities error.

Claim 25 is amended to correct the word "or." Withdrawal of the objection is respectfully requested.

The 35 U.S.C. § 102 Rejection

Claims 1 and 6 are rejected under 35 U.S.C. § 102(a)(1) as being anticipated by Sasaki (JP2009-214535A). Applicant respectfully traverses this rejection.

Claim 1 is amended to include the subject matter of claim 12, which is not rejected under § 102 over Sasaki. Withdrawal of the rejection is respectfully requested.

The 35 U.S.C. § 103 Rejection

1. Claims 2, 7, 8, 9, 10, 14, 15, 24, 25, and 26 are rejected under 35 U.S.C. § 103 as being unpatentable over Sasaki (JP2009-214535A). Applicant respectfully traverses this rejection.

Claim 1 is amended to include the subject matter of claim 12, which is not rejected under § 103 over Sasaki. Withdrawal of the rejection is respectfully requested.

2. Claims 3, 4, 11, 16, and 23 are rejected under 35 U.S.C. § 103 as being unpatentable over Sasaki (JP2009-214535A) in view of Mitchell (U.S. Patent Publication No. 2017/0223879). Applicant respectfully traverses this rejection.

Claim 1 is amended to include the subject matter of claim 12, which is not rejected under § 103 over Sasaki in view of Mitchell. Withdrawal of the rejection is respectfully requested.

3. Claims 12 and 13 are rejected under 35 U.S.C. § 103 as being unpatentable over Sasaki (JP2009-214535A) in view of Hashimoto (JP2004-114498A). Applicant respectfully traverses this rejection.

Claim 1 is amended to include the subject matter of claim 12. Thus, this rejection is discussed with regard to claim 1.

The cited references do not teach or suggest all of the limitations of the claims. In particular, the cited references fail to teach or suggest a recyclable shrink label comprising, among other things, a **light blocking layer** disposed adjacent the first surface and **comprising a light blocking component**, the light blocking layer being constructed for the recyclable shrink label to block at least 80 % of incident light having wavelengths in a range of 200 nm to 900 nm, **wherein the light blocking component comprises a particulate having a particle size of 0.1 µm to 100 µm, wherein the particulate comprises metal, metal oxide, a reflective pigment, carbon black, mica, or a combination thereof**, and wherein the recyclable shrink label is **recyclable with a PET container**.

The Office Action asserts that "Sasaki et al. teaches a light shielding shrink film (recyclable shrink label) with light shielding and heat insulating properties having a simple structure and can be easily recycled ([0005]). The light shielding shrink film is comprised of a heat shrinkable synthetic resin film (heat shrink film) and a crystalline polymer film (light blocking layer) . . . . The crystalline polymeric film contains a polymer (light blocking component), cavities and has a transmittance for light of a wavelength selected from 300nm to 780nm of 5% or less." Office Action at page 3. The Office Action asserts that "[a]s Sasaki et al. teaches a light shielding shrink film (recyclable shrink label) that can be easily recycled ([0005]), it is capable of performing in the manner claimed." Office Action at page 3.

The Office Action acknowledges that Sasaki does not teach that the crystalline polymer film (light blocking layer) comprises metal particles having a particle size of 0.1 µm to 100µm.

The Office Action asserts that Hashimoto teaches a heat shrinkable polyester film that comprises inert fine particles, such as titanium oxide to impart light blocking properties. The Office Action asserts that it would have been obvious to modify the light blocking layer of Sasaki to include the inert fine particles of Hashimoto.

Applicant respectfully disagrees.

A person of ordinary skill in the art would not have been motivated to include the inert fine particles of Hashimoto in the light blocking layer of Sasaki because Sasaki teaches against including inorganic fine particles, and because doing so would prevent recyclability of the Sasaki film.

The Sasaki film is rendered light blocking by incorporating a **plurality of cavities** in the crystalline polymeric film. *See, e.g.,* Sasaki para. [0036]-[0037] and [0052]. That is, Sasaki achieves light blocking without incorporating any foreign materials in the crystalline polymeric film. Sasaki taches that the voids (cavities) can be formed "**without the need to** specifically **add** void-forming agents such as **inorganic fine particles or incompatible resins**, which were added in the prior art." *See* ¶ [0032], emphasis added. Later Sasaki explicitly teaches that the "crystalline polymer film . . . **does not contain inorganic fine particles**." *See* Sasaki para. [0046], emphasis added.

Sasaki also provides Examples, where Comparative Example 1 includes a PET film and a white ink layer containing aluminum paste. The results of the evaluation of the samples are provided in Table 2 at paragraph [0095]. The samples were evaluated for, among other things, light transmittance at 550 nm and for recyclability. It can be seen that although Comparative Example 1 provided good light blocking (only 1 % transmittance), the **recyclability of the film is low**.

Sasaki, therefore, teaches against including the inert fine particles of Hashimoto in the light blocking layer.

Further, as has previously been discussed, incorporating material in the polymer layer itself that would contaminate the recycling stream would prevent recyclability of the film. *See,*

e.g., Resource Document by the Association of Plastic Recyclers (APR), provided with previous response. Pigments, particles, or non-PET polymers being incorporated into the PET film itself are not removable and would contaminate the polymer flake during the recycling process. Sasaki recognizes this problem, teaching that prior art techniques for imparting light-shielding properties to a shrink film include "laminating a shrink film with a light-shielding material layer containing layers containing **pigments, dyes, metals, inorganic particles**" but that such films "**cannot be recycled**." *See* Sasaki para. [0003], emphasis added. Thus, a person of ordinary skill in the art would not have been motivated to include the inert fine particles of Hashimoto in the light blocking layer of Sasaki.

The cited references do not teach or suggest all of the limitations of the claims. Further, a person of ordinary skill in the art would not have been motivated to combine the references as suggested in the Office Action, and even if they were so combined, the cited references would not result in the claimed article. Withdrawal of the rejection is respectfully requested.

New Claim 27

New claim 27 is a combination of claims 1 and 3 and recites a recyclable shrink label comprising a light blocking layer and high opacity layer comprising a white pigment. Claim 27 is believed to be patentable for at least some of the same reasons as discussed above with regard to claim 1.

As noted above, Sasaki teaches against including pigments, dyes, metals, or inorganic particles in the light-shielding material layer containing layers because such films, according to Sasaki, "cannot be recycled." *See* Sasaki para. [0003]. Thus, a person of ordinary skill in the art would not have been motivated to modify Sasaki by including a high opacity layer comprising a white pigment.

Summary

Applicant submits that the claims are in condition for allowance and requests notification to that effect. Applicant invites the Examiner to contact the undersigned Applicant's

Representative at the telephone number listed below if doing so may advance prosecution of this application.

Respectfully submitted by

Mueting Raasch Group
111 Washington Ave. S., Suite 700
Minneapolis, MN 55401
Phone: (612) 305-1220
Facsimile: (612) 305-1228

1/10/2024
Date

/Lotta Kiuru-Ribar/
Lotta Kiuru-Ribar
Reg. No. 66,979
Direct Dial: 612-767-5005

Doc Code: A.NE.AFCP
Document Description: After Final Consideration Program Request

PTO/SB/434 (3-22)

CERTIFICATION AND REQUEST FOR CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0

Practitioner Docket No.:	Application No.:	Filing Date:
0644.000001US01	18/103,234	January 30, 2023
First Named Inventor:	**Title:**	
Andrew Sharp	RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER	

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0 (AFCP 2.0) OF THE ACCOMPANYING RESPONSE UNDER 37 CFR 1.116.

1. The above-identified application is (i) an original utility, plant, or design nonprovisional application filed under 35 U.S.C. 111(a) [a continuing application (*e.g.*, a continuation or divisional application) is filed under 35 U.S.C. 111(a) and is eligible under (i)], or (ii) an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).
2. The above-identified application contains an outstanding final rejection.
3. Submitted herewith is a response under 37 CFR 1.116 to the outstanding final rejection. The response includes an amendment to at least one independent claim, and the amendment does not broaden the scope of the independent claim in any aspect.
4. This certification and request for consideration under AFCP 2.0 is the only AFCP 2.0 certification and request filed in response to the outstanding final rejection.
5. Applicant is willing and available to participate in any interview requested by the examiner concerning the present response.
6. This certification and request is being filed electronically using the USPTO's patent electronic filing system.
7. Any fees that would be necessary consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, extension of time fees, are being concurrently filed herewith. [There is no additional fee required to request consideration under AFCP 2.0.]
8. By filing this certification and request, applicant acknowledges the following:
    - Reissue applications and reexamination proceedings are not eligible to participate in AFCP 2.0.
    - The examiner will verify that the AFCP 2.0 submission is compliant, *i.e.*, that the requirements of the program have been met (see items 1 to 7 above). For compliant submissions:
        - The examiner will review the response under 37 CFR 1.116 to determine if additional search and/or consideration (i) is necessitated by the amendment and (ii) could be completed within the time allotted under AFCP 2.0. If additional search and/or consideration is required but cannot be completed within the allotted time, the examiner will process the submission consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, by mailing an advisory action.
        - If the examiner determines that the amendment does not necessitate additional search and/or consideration, or if the examiner determines that additional search and/or consideration is required and could be completed within the allotted time, then the examiner will consider whether the amendment places the application in condition for allowance (after completing the additional search and/or consideration, if required). If the examiner determines that the amendment does not place the application in condition for allowance, then the examiner will contact the applicant and request an interview.
            - The interview will be conducted by the examiner, and if the examiner does not have negotiation authority, a primary examiner and/or supervisory patent examiner will also participate.
            - If the applicant declines the interview, or if the interview cannot be scheduled within ten (10) calendar days from the date that the examiner first contacts the applicant, then the examiner will proceed consistent with current practice concerning responses after final rejection under 37 CFR 1.116.

Signature	Date	Practitioner Registration No.
/Lotta Kiuru-Ribar/	1/10/2024	66,979
Name (Print/Typed)	**Telephone Number**	
Lotta Kiuru-Ribar	612-767-5005	

***Note**: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

☐ * Total of _____ forms are submitted.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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NOTICE OF ALLOWANCE AND FEE(S) DUE

26813 7590 02/06/2024

MUETING RAASCH GROUP
111 WASHINGTON AVE. S., SUITE 700
MINNEAPOLIS, MN 55401

EXAMINER	
POWERS, LAURA C	
ART UNIT	**PAPER NUMBER**
1785	

DATE MAILED: 02/06/2024

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/103,234	01/30/2023	Andrew Sharp	0644.000001US01	8140

TITLE OF INVENTION: RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	05/06/2024

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via the USPTO patent electronic filing system.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26813 7590 02/06/2024
MUETING RAASCH GROUP
111 WASHINGTON AVE. S., SUITE 700
MINNEAPOLIS, MN 55401

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via the USPTO patent electronic filing system or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/103,234	01/30/2023	Andrew Sharp	0644.000001US01	8140

TITLE OF INVENTION: RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	05/06/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
POWERS, LAURA C	1785	428-195100

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via the USPTO patent electronic filing system ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/103,234	01/30/2023	Andrew Sharp	0644.000001US01	8140

26813 7590 02/06/2024

MUETING RAASCH GROUP
111 WASHINGTON AVE. S., SUITE 700
MINNEAPOLIS, MN 55401

EXAMINER	
POWERS, LAURA C	
ART UNIT	**PAPER NUMBER**
1785	

DATE MAILED: 02/06/2024

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/ owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013).
https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to:

1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
2) a federal, state, local, or international agency, in response to its request;
3) a contractor of the USPTO having need for the information in order to perform a contract;
4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
8) another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c));
9) the Office of Personnel Management (OPM) for personnel research purposes; and
10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 18/103,234	Applicant(s) Sharp et al.	
	Examiner LAURA POWERS	Art Unit 1785	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to AFCP 2.0 response received 1/10/2024.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-4,6-11,13-16 and 23-27 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☑ Interview Summary (PTO-413), Paper No./Mail Date. Attached.
5. ☑ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☑ Other PTO-2323.

/LAURA C POWERS/
Primary Examiner, Art Unit 1785

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Summary

2. The After Final Consideration Program response received on 01/10/2024 is entered into the file. Currently, claims 1 and 25 are amended; claims 5, 12, 17-19, 21 and 22 are cancelled; claim 20 is withdrawn; claim 27 is new; resulting in claims 1-4, 6-11, 13-16 and 23-27 pending for examination.

Response to Arguments

Response-Claim Objections

3. The previous objection to claim 25 is overcome by Applicants amendment in the response filed 01/10/2024.

Response-Claim Rejections - 35 USC § 102 and 103

4. Applicant's arguments, see pages 7 through 11, filed 01/10/2024, with respect to 1-4, 6-11, 13-16, 23-27 have been fully considered and are persuasive. The previous rejections of claims 1 and 6 under 35 U.S.C. 102(a)(1) as being anticipated by Sasaki et al. (JP2009-214535A, machine translation via EPO provided); and the rejection of claims 2, 7, 8, 9, 10, 14, 15, 24, 25 and 26 under 35 U.S.C. 103 as being unpatentable

over Sasaki et al. (JP2009-214535A, machine translation via EPO provided) have been withdrawn.

EXAMINER'S AMENDMENT

5. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with Lotta Kiuru-Ribar on 01/20/2024.

The application has been amended as follows:

a. **Cancel withdrawn claim 20.**

Reasons for Allowance

6. Claims 1-4, 6-11, 13-16 and 23-27 are allowed.

7. The following is an examiner's statement of reasons for allowance: the prior art does not teach or render obvious the claimed invention of the instant application.

8. Independent claim 1 is directed to a recyclable shrink label comprising a PET heat shrink film having a first surface, second opposing surface and a thickness of 15-100μm. The label further comprises a light blocking layer disposed on the first surface of

the PET heat shrink film, the light blocking layer is comprised of a light blocking component which blocks at least 80% of incident light having wavelengths in the range of 200nm to 900nm. The light blocking component is comprised of a particulate including a metal, metal oxide, a reflective pigment, carbon black, mica or a combination thereof, and having a particle size of 0.1- 100μm. The recyclable shrink label is recyclable with a PET container.

9. Independent claim 27 is directed to a recyclable shrink label comprising a PET heat shrink film having a first surface, a second opposing surface and a thickness of 15-100μm. The label further comprises a light blocking layer disposed on the first surface of the PET heat shrink film, the light blocking layer comprises a light blocking component that blocks 80% of incident light having wavelengths in a range of 200nm to 900nm. The label further comprises a high opacity layer comprising a white pigment and the recyclable heat shrink label is recyclable with a PET container.

3. The closest prior art to the claimed invention is to that of Sasaki et al. (JP2009-214535A). Sasaki et al. teaches a light shielding shrink film with light shielding and heat insulating properties having a simple structure and can be easily recycled ([0005]). The light shielding shrink film is comprised of a heat shrinkable synthetic resin film (heat shrink film) and a crystalline polymer film (light blocking layer) ([0011-0016, 0020, 0032-0035, 0048-0052, 0073-0074]). The heat shrinkable synthetic resin film (heat shrink film) may be colored transparently or opaquely with a coloring agent, and is stretched in either a uniaxial or biaxial direction ([0011]). The crystalline polymeric film contains a polymer (light blocking component), cavities and has a transmittance for light of a wavelength selected from 300nm to 780nm of 5% or less ([0013-0016, 0032-0033,

0049-0052]), meaning that 95% or more of the light is blocked or absorbed. In Example 1, the heat shrinkable film is said to be 30mm thick ([0073-0074]), falling squarely within the claimed range.

4. Sasaki et al. does not teach that the crystalline polymeric film contains a polymer (light blocking component) comprises a particulate comprising a metal, a metal oxide, a reflective pigment, carbon black, mica or a combination thereof as presently recited by claim 1.The secondary reference to Hashimoto et al. (JP 2004-114498A) was used to teach this limitation, wherein Hashimoto et al. teaches a heat shrinkable polyester film for attachment to a beverage bottle or the like, wherein the film comprises inert fine particles, such as titanium oxide, carbon black, etc. to impart light blocking properties, wherein the inert fine particles have an average particle size of 0.001 to 3.5 micrometer (pg. 4-5 Ln. 157-187).

5. However, as the Applicant points on page 9 of the arguments, the crystalline polymeric film of Sasaki et al. is light blocking due to the incorporation of a plurality of cavities into the crystalline polymeric film ([0036-0037, 0052]). Sasaki et al. teaches that voids can be formed in the crystalline polymeric film without the need to add void forming agents, such as inorganic fine particles or incompatible resins, which results in improved recyclability of the film. This is further demonstrated by the Comparative Example in paragraph [0079] of Sasaki et al. wherein the a PET film includes a white ink layer containing aluminum paste, and was found to have low recyclability compared to Examples 1 through 6. A written translation of Table 2 paragraph [0079] from Sasaki et al. was obtained through STIC translation services and a copy is provided with this office action.

10. Sasaki et al. therefore teaches against including inert fine particles, such as those taught in Hashimoto et al. in the crystalline polymer film, therefore, the rejections are overcome.

11. Newly added independent claim 27 incorporates dependent claim 3, and is allowable over Sasaki et al. for similar reasons as expressed above, as Sasaki et al. teaches away from including inert fine particles. Additionally, Comparative Example in paragraph [0079] of Sasaki et al. wherein the a PET film includes a white ink layer containing aluminum paste, and was found to have low recyclability compared to Examples 1 through 6.

12. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAURA POWERS whose telephone number is (571)270-5624. The examiner can normally be reached Monday-Friday, 10:00AM-3:00PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Ruthkosky can be reached on 571-272-1291. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LAURA POWERS
Examiner
Art Unit 1785

/LAURA C POWERS/
Primary Examiner, Art Unit 1785

Examiner-Initiated Interview Summary	**Application No.** 18/103,234	**Applicant(s)** Sharp et al.		
	Examiner LAURA POWERS	**Art Unit** 1785	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
LAURA POWERS	Primary Examiner	Telephonic
Lotta Kiuru-Ribar	Attorney of Record	

Date of Interview: 30 January 2024

Issues Discussed:

Proposed Amendment(s)

During the interview, the representative for the Applicant agreed to the cancellation of withdrawn claim 20 to put the Application in condition for allowance.

/LAURA C POWERS/ Primary Examiner, Art Unit 1785	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Notice of References Cited	Application/Control No. 18/103,234	Applicant(s)/Patent Under Reexamination Sharp et al.	
	Examiner LAURA POWERS	Art Unit 1785	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
	A					
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Written Translation of Table 2 JP 2009214535A via STIC translation services (Year: 2009)
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

AFCP 2.0 Decision

Application No.	Applicant(s)	
18/103,234	Sharp et al.	
Examiner	**Art Unit**	**AIA (FITF) Status**
LAURA POWERS	1785	Yes

This is in response to the After Final Consideration Pilot request filed 10 January 2024.

1. **Improper Request** – The AFCP 2.0 request is improper for the following reason(s) and the after final amendment submitted with the request will be treated under pre-pilot procedure.

   ☐ An AFCP 2.0 request form PTO/SB/434 (or equivalent document) was not submitted.

   ☐ A non-broadening amendment to at least one independent claim was not submitted.

   ☐ The request is not the first proper AFCP 2.0 request submitted in response to the most recent final rejection.

   ☐ Other: _____

2. **Proper Request**

   A. After final amendment submitted with the request will not be treated under AFCP 2.0.
   The after final amendment cannot be reviewed and a search conducted within the guidelines of the pilot program.

   ☐ The after final amendment will be treated under pre-pilot procedure.

   B. Updated search and/or completed additional consideration.
   The examiner performed an updated search and/or completed additional consideration of the after final amendment within the time authorized for the pilot program. The result(s) of the updated search and/or completed additional consideration are:

   ☑ 1. All of the rejections in the most recent final Office action are overcome and a Notice of Allowance is issued herewith.

   ☐ 2. The after final amendment would not overcome all of the rejections in the most recent final Office action . See attached interview summary for further details.

   ☐ 3. The after final amendment was reviewed, and it raises a new issue(s). See attached interview summary for further details.

   ☐ 4. The after final amendment raises new issues, but would overcome all of the rejections in the most recent final Office action. A decision on determining allowability could not be made within the guidelines of the pilot. See attached interview summary for further details, including any newly discovered prior art.

   ☑ 5. Other: Interview summary to cancel withdrawn claims

   Examiner Note: Please attach an interview summary when necessary as described above.

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/103,234	Sharp et al.
	Examiner	**Art Unit**
	LAURA POWERS	1785

CPC								
Symbol							**Type**	**Version**
G09F	/	3	/	0291			F	2013-01-01
B65D	/	23	/	0878			I	2013-01-01
G09F	/	2003	/	0208			A	2013-01-01
G09F	/	2003	/	0251			A	2013-01-01
G09F	/	2003	/	0257			A	2013-01-01
G09F	/	2003	/	0272			A	2013-01-01
B65B	/	7	/	167			A	2013-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	19	
/LAURA C POWERS/ Primary Examiner, Art Unit 1785	30 January 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1D

U.S. Patent and Trademark Office — Part of Paper No.: 20240126

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/103,234	Sharp et al.
	Examiner	**Art Unit**
	LAURA POWERS	1785

INTERNATIONAL CLASSIFICATION					
CLAIMED					
G09F3/00	/	3	/	00	
G09F3/02	/	3	/	02	

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	19	
/LAURA C POWERS/ Primary Examiner, Art Unit 1785	30 January 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1D

U.S. Patent and Trademark Office — Part of Paper No.: 20240126

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/103,234	Sharp et al.
	Examiner	**Art Unit**
	LAURA POWERS	1785

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	9	10	-	19										
2	2	10	11	-	20										
3	3	-	12	-	21										
4	4	11	13	-	22										
-	5	12	14	15	23										
5	6	13	15	16	24										
6	7	14	16	17	25										
7	8	-	17	18	26										
8	9	-	18	19	27										

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	19	
/LAURA C POWERS/ Primary Examiner, Art Unit 1785	30 January 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1D

U.S. Patent and Trademark Office Part of Paper No.: 20240126

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/103,234	Sharp et al.
	Examiner	Art Unit
	LAURA POWERS	1785

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/103,234	Sharp et al.
	Examiner	Art Unit
	LAURA POWERS	1785

Search Notes		
Search Notes	**Date**	**Examiner**
Assignee and Inventor Name Search	07/27/2023	LCP
CPC search limited by keyword	07/27/2023	LCP
Keyword search	07/27/2023	LCP
Keyword search	07/31/2023	LCP
Keyword search	08/01/2023	LCP
Keyword search	08/02/2023	LCP
STIC search	07/31/2023	LCP
STIC search	10/29/2023	LCP
Updated keyword search	11/03/2023	LCP
Interference assignee and inventor name search	01/26/2024	LCP
Interference CPC search limited by keyword	01/26/2024	LCP
Interference claim keyword and keyword search	01/26/2024	LCP

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
G09F	3/0291; 2003/0208,0251,0257,0272	01/26/2024	LCP
B65B	7/167	01/26/2024	LCP
B65D	23/0878	01/26/2024	LCP

OK TO ENTER: /L.C.P/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	18/103,234	Attorney Docket No.:	0644.000001US01
Confirmation No.:	8140	Customer No.:	26813
Filing Date:	January 30, 2023	Examiner Name:	Laura C. Powers
First Named Inventor:	Andrew Sharp	Group Art Unit:	1785
Title of Invention:	RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER		

AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.116

Commissioner for Patents
Mail Stop AF
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

In response to the Final Office Action of November 13, 2023, please consider the following.

Amendments to the Claims begin on the page entitled "Amendments to the Claims."

Remarks begin on the page entitled "Remarks."

Authorization is given to charge Deposit Account No. 13-4895 any necessary fees for this filing and all required extension of time fees.

PE2E SEARCH - Search History (Prior Art)

There are no Prior Art searches to show.

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	0	((("BROOK") near3 ("&") near3 ("WHITTLE") near3 ("LIMITED"))).AS,AANM.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 01:52 PM
N2	106	((("SHARP") near3 ("Andrew")) OR (("MORGAN") near3 ("Mitchell"))).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 01:52 PM
N3	483	(G09F3/0291).cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 01:53 PM
N4	1508	(G09F2003/0208,0251,0257,0272).cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 01:53 PM
N5	249	(B65D23/0878).cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 01:53 PM
N6	55	(B65B7/167).cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 01:53 PM
N7	100	(shrink NEAR label) AND (recyclable)	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 01:53 PM
N8	1083	label AND (anti NEAR blocking NEAR agent)	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 01:53 PM
N9	56	(N3 OR N4 OR N5 OR N6) AND (recycl$4 SAME shrink SAME label)	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 01:59 PM
N10	4	(N3 OR N4 OR N5 OR N6) AND (recycl$4 SAME label) AND (shrink$4) AND (light NEAR block$4)	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 02:00 PM
N11	0	(recycl$4 SAME (heat NEAR shrink) SAME (light NEAR block$4) SAME (metal OR (metal NEAR oxide) OR (carbon NEAR black) OR mica OR (reflective))).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 02:13 PM
N12	1	(recycl$4 AND (heat NEAR shrink) AND (light NEAR block$4) AND (metal OR (metal NEAR oxide) OR	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 02:14 PM

		(carbon NEAR black) OR mica OR (reflective))).clm.					
N13	1	(recycl$4 AND (heat NEAR shrink) AND (light NEAR block$4)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/01/26 02:14 PM

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/103,234	**02/27/2024 08:49:50 AM Z ET**	**0644.000001US01**

Title of Invention

RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	8140	FILED BY	Margaret Rausch
PATENT CENTER #	64457081	FILING DATE	01/30/2023
CUSTOMER #	26813	FIRST NAMED INVENTOR	Andrew Sharp
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Lotta Kiuru-Ribar

Documents

TOTAL DOCUMENTS: 3

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
2024-02-27-Rule 1.312 Amendment.pdf		5	-	125 KB
2024-02-27-Rule 1.312 Amendment-A.NA.pdf	(1-1)	1	Amendment after Notice of Allowance (Rule 312)	78 KB
2024-02-27-Rule 1.312 Amendment-CLM.pdf	(2-4)	3	Claims	117 KB
2024-02-27-Rule 1.312 Amendment-REM.pdf	(5-5)	1	Applicant Arguments/Remarks Made in an Amendment	97 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)

2024-02-27-Rule 1.312 Amendment.pdf	427645A6C0BE9DF19DF2C3552EFF810F38B7A5C7AFB116A00073BDE252029550F9A2FA0D09C891A889D2B7D6C78E086250EF157DC09E9A20257C202EE38B76DC
2024-02-27-Rule 1.312 Amendment-A.NA.pdf	A6E112984807B00C0493FDE48ABEE420DB22CE9EFFFF9F239193254DB97CE892D51A5E88AD39BF20F0ECCC736CCEB4A89A92EE5449B46B3386B504FA6B974801
2024-02-27-Rule 1.312 Amendment-CLM.pdf	9A6D6574CE6CA83C29BD1349012510D49BDB9C41F0734242AFC2406E5C4513CCDAFCD8DE3E8E924634B2829004337FB01A8FC6EEE40495F91F99623645AB1FD3
2024-02-27-Rule 1.312 Amendment-REM.pdf	A50EDED53E5E5A58DA3F70B9758FF4142DC2195D5F76A8AC38B29E5F0390EBE2E980EA62B718660717092E3693D89DB615D800407F0FBDBF718C7F56A95CFA45

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	18/103,234	Attorney Docket No.:	0644.000001US01
Confirmation No.:	8140	Customer No.:	26813
Filing Date:	January 30, 2023	Examiner Name:	Laura C. Powers
First Named Inventor:	Andrew Sharp	Group Art Unit:	1785
Title of Invention:	RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER		

Amendment Under 37 CFR 1.312

Commissioner for Patents
Mail Stop Issue Fee
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

In response to the Notice of Allowance mailed February 6, 2024, please amend the application as follows:

Amendments to the Claims begin on the page entitled "Amendments to the Claims."

Remarks begin on the page entitled "Remarks."

Authorization is given to charge Deposit Account No. 13-4895 any necessary fees for this filing and all required extension of time fees.

Amendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

Listing of Claims

1. (Previously Presented) A recyclable shrink label comprising:

a heat shrink film comprising polyethylene terephthalate (PET) and having a first surface and a second surface opposite of the first surface, the heat shrink film having a thickness from 15 μm to 100 μm; and

a light blocking layer disposed adjacent the first surface and comprising a light blocking component, the light blocking layer being constructed for the recyclable shrink label to block at least 80 % of incident light having wavelengths in a range of 200 nm to 900 nm, wherein the light blocking component comprises a particulate having a particle size of 0.1 μm to 100 μm, wherein the particulate comprises metal, metal oxide, a reflective pigment, carbon black, mica, or a combination thereof, and

wherein the recyclable shrink label is recyclable with a PET container.

2. (Previously Presented) The recyclable shrink label of claim 1 further comprising an indicia layer.

3. (Previously Presented) The recyclable shrink label of claim 1 further comprising a high opacity layer comprising a white pigment.

4. (Original) The recyclable shrink label of claim 3, wherein the recyclable shrink label comprises an indicia layer and wherein the high opacity layer is disposed between the indicia layer and the light blocking layer.

5. (Cancelled)

6. (Previously Presented) The recyclable shrink label of claim 1, wherein the heat shrink film consists of polyethylene terephthalate (PET).

7. (Previously Presented) The recyclable shrink label according to claim 8, wherein the heat shrink film comprises a seam.

8. (Previously Presented) The recyclable shrink label according to claim 1, wherein the recyclable shrink label is in a form of a sleeve or tube.

9. (Previously Presented) The recyclable shrink label according to claim 1, wherein when heated to 100 °C, the heat shrink film contracts or shrinks by about 1 % to about 90 %.

10. (Previously Presented) The recyclable shrink label according to claim 1, wherein when heated to 100 °C, the entire recyclable shrink label contracts or shrinks by about 1 % to about 90 %.

11. (Previously Presented) The recyclable shrink label according to claim 3, wherein the high opacity layer comprises a pigment selected from titanium dioxide (TiO_2), precipitated calcium carbonate (PCC), aluminum silicate, aluminum oxide (alumina), mica-based pigments coated with thin layer(s) of white pigment, or a combination thereof.

12. (Cancelled)

13. (Previously Presented) The recyclable shrink label according to claim 1, wherein the light blocking component comprises zinc, aluminum, copper, silver, or an alloy thereof, titanium dioxide, carbon black, mica, a reflective pigment, a polymer capable of blocking light, a mineral capable of blocking light, or a combination thereof.

14. (Previously Presented) The recyclable shrink label according to claim 1, wherein the light blocking layer is present in an amount of 0.5 ppr to 25 ppr relative to the recyclable shrink label.

15. (Previously Presented) The recyclable shrink label according to claim 1, wherein the light blocking layer comprises from 0.1 ppr to 10 ppr of the light blocking component.

16. (Previously Presented) An article comprising:

a container comprising polyethylene terephthalate (PET) and defining an external surface; and

the recyclable shrink label of claim 1 disposed on the container.

17-22. (Cancelled)

23. (**Currently Amended**) The ~~recyclable shrink label~~ article according to claim 16, wherein the first surface of the heat shrink film faces the external surface of the container.

24. (Previously Presented) The recyclable shrink label according to claim 2, wherein the indicia layer is disposed on the first surface.

25. (Previously Presented) The recyclable shrink label according to claim 9, wherein the heat shrink film contracts or shrinks by about 1 % to 90 % in a transverse direction.

26. (Previously Presented) The recyclable shrink label according to claim 1, wherein the heat shrink film comprises crystallizable polyethylene terephthalate (PET).

27. (Previously Presented) A recyclable shrink label comprising:

a heat shrink film comprising polyethylene terephthalate (PET) and having a first surface and a second surface opposite of the first surface, the heat shrink film having a thickness from 15 μm to 100 μm;

a light blocking layer disposed adjacent the first surface and comprising a light blocking component, the light blocking layer being constructed for the recyclable shrink label to block at least 80 % of incident light having wavelengths in a range of 200 nm to 900 nm, and

a high opacity layer comprising a white pigment,

wherein the recyclable shrink label is recyclable with a PET container.

Remarks

The Notice of Allowance issued on February 6, 2024 has been received and reviewed.

In this Amendment under 37 C.F.R. § 1.312, claim 23 is amended to correct a formality. Specifically, the preamble of claim 23, which depends from claim 16, is corrected to match the preamble of claim 16. The preamble of claim 23 is amended to recite "The article according to claim 16." No new matter has been added.

Applicant respectfully requests entry of the amendment, and further submits that pending claims 1-4, 6-11, 13-16, and 23-27 remain in condition for allowance.

Conclusion

Applicant invites the Examiner to contact the undersigned Applicant's Representative at the telephone number listed below if there are any questions regarding this Preliminary Amendment or if doing so may advance prosecution of this application.

Respectfully submitted by

Mueting Raasch Group
111 Washington Ave. S., Suite 700
Minneapolis, MN 55401
Phone: (612) 305-1220
Facsimile: (612) 305-1228

2/27/2024
Date

/Lotta Kiuru-Ribar/
Lotta Kiuru-Ribar
Reg. No. 66,979
Direct Dial: 612-767-5005

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via the USPTO patent electronic filing system.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26813 7590 02/06/2024
MUETING RAASCH GROUP
111 WASHINGTON AVE. S., SUITE 700
MINNEAPOLIS, MN 55401

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via the USPTO patent electronic filing system or by facsimile to (571) 273-2885, on the date below.

Margaret H. Rausch	(Typed or printed name)
/Margaret H. Rausch/	(Signature)
March 4, 2024	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/103,234	01/30/2023	Andrew Sharp	0644.000001US01	8140

TITLE OF INVENTION: RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	05/06/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
POWERS, LAURA C	1785	428-195100

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 MUETING RAASCH
2 GROUP
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: BROOK & WHITTLE LIMITED

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Amherst , NY

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via the USPTO patent electronic filing system ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 134895

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

☐ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Lotta Kiuru-Ribar/ Date 3/4/2024

Typed or printed name Lotta Kiuru-Ribar Registration No. 66,979

PTOL-85 Part B (11/23) Approved for use through 03/31/2026 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	18/103,234	Attorney Docket No.:	0644.000001US01
Confirmation No.:	8140	Customer No.:	26813
Filing Date:	January 30, 2023	Examiner Name:	Laura C. Powers
First Named Inventor:	Andrew Sharp	Group Art Unit:	1785
Title of Invention:	RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER		

Comments on Statement of Reasons for Allowance

Commissioner for Patents
Mail Stop Issue Fee
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

This communication is in response to the Notice of Allowance mailed February 6, 2024, in the above-noted application. Applicant appreciatively acknowledges the allowance of claims 1-4, 6-11, 13-16, and 23-27.

Applicant notes that there may be one or more additional or alternative reasons for allowance that have not been specifically recited by the Examiner, which apply to one or more of the allowed claims. Applicant respectfully asserts that each of the allowed claims is patentable in its own right for the reasons indicated by the Examiner and for other reasons, such as those raised during the prosecution and those explained or implied in the specification of this application. Applicant expressly traverses the Examiner's Statement of Reasons for Allowance to the extent that any comment is intended or has the effect of limiting a claim scope, explicitly or implicitly, by not reciting verbatim the respective claim language, or is intended or has the effect of limiting a claim scope by stating or implying that all the reasons for patentability are in any way fully enumerated. Further, Applicant does not concede the interpretation of any claim elements implicitly relied on or explicitly recited in the Statement of the Reasons for Allowable Subject Matter.

It is believed that no fee is due; however, in the event a fee is required, please charge any fee due for such extension or any other fee required in connection with this paper to Deposit Account No. 13-4895.

Respectfully submitted by
Mueting Raasch Group
111 Washington Ave. S., Suite 700
Minneapolis, MN 55401
Phone: (612) 305-1220

3/4/2024
Date

/Lotta Kiuru-Ribar/
Lotta Kiuru-Ribar
Reg. No. 66,979
Direct Dial: (612) 767-5005

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/103,234	**03/04/2024 06:25:29 PM Z ET**	**0644.000001US01**

Title of Invention

RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	8140	FILED BY	Margaret Rausch
PATENT CENTER #	64541965	AUTHORIZED BY	Lotta Kiuru-Ribar
CUSTOMER #	26813	FILING DATE	01/30/2023
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Andrew Sharp

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
DA / 134895	**E202434I26309400**	**Margaret Rausch**

PRE-AUTHORIZED ACCOUNT	PRE-AUTHORIZED CATEGORY
134895	**37 CFR 1.16 (National application filing, search, and examination fees); 37 CFR 1.17 (Patent application and reexamination processing fees); 37 CFR 1.19 (Document supply fees); 37 CFR 1.20 (Post Issuance fees); 37 CFR 1.21 (Miscellaneous fees and charges)**

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
1501	UTILITY ISSUE FEE	1200.00	1	1200.00
			TOTAL AMOUNT:	**$1,200.00**

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement

Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/103,234	**03/04/2024 06:25:29 PM Z ET**	**0644.000001US01**

Title of Invention

RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	8140	FILED BY	Margaret Rausch
PATENT CENTER #	64541965	FILING DATE	01/30/2023
CUSTOMER #	26813	FIRST NAMED INVENTOR	Andrew Sharp
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Lotta Kiuru-Ribar

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2024-03-04-Issue Fee Transmittal.pdf	1	Issue Fee Payment (PTO-85B)	145 KB
Warning: The attached file contains comments or annotations. Comments are not recommended and may cause processing problems with the document.			
2024-03-04-Comments on Statement of Reasons for Allowance.pdf	2	Post Allowance Communication - Incoming	99 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2024-03-04-Issue Fee	A5F173E66CE467D60DEAD9C5323D3F23DB94A298FDA3D079

Transmittal.pdf	B9B4E843397AE0542C261494815DAA356A59B1AC6841FD800 3BE66D3F9E360B45F5BF4950F1BE3DF
2024-03-04-Comments on Statement of Reasons for Allowance.pdf	2C23C5A65EC4391144AA81D24CF3F49C71C6694009E37B690 701E3FC0BB51764E80F201FEC7C11BCB5201D119737908701 EFED86F9990175A54ED6A39C3B8423

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

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New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/103,234	01/30/2023	Andrew Sharp	0644.000001US01	8140

26813 7590 03/14/2024

MUETING RAASCH GROUP
111 WASHINGTON AVE. S., SUITE 700
MINNEAPOLIS, MN 55401

EXAMINER	
POWERS, LAURA C	

ART UNIT	PAPER NUMBER
1785	

NOTIFICATION DATE	DELIVERY MODE
03/14/2024	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptodocketing@mrgs.com

Response to Rule 312 Communication	Application No.	Applicant(s)	
	18/103,234	Sharp et al.	
	Examiner	Art Unit	AIA (FITF) Status
	LAURA POWERS	1785	Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☑ The amendment filed on 27 February 2024 under 37 CFR 1.312 has been considered, and has been:

a) ☐ entered.

b) ☑ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.
Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☐ entered in part. See explanation below.

f) ☐ not entered because the supplemental or corrected Application Data sheet (ADS)

☐ was not accompanied by a petition to accept an unintentionally delayed claim under 37 CFR 1.55 or 27 CFR 1.78;

☐ did not identify the information being changed in accordance with 37 CFR 1.76(c)(2);

☐ was not properly signed in accordance with 37 CFR 1.76(e) (or 37 CFR 1.33(b) for applications filed prior to September 16, 2012).

/LAURA C POWERS/
Primary Examiner, Art Unit 1785

OK TO ENTER: /L.C.P/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	18/103,234	Attorney Docket No.:	0644.000001US01
Confirmation No.:	8140	Customer No.:	26813
Filing Date:	January 30, 2023	Examiner Name:	Laura C. Powers
First Named Inventor:	Andrew Sharp	Group Art Unit:	1785
Title of Invention:	RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER		

Amendment Under 37 CFR 1.312

Commissioner for Patents
Mail Stop Issue Fee
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

In response to the Notice of Allowance mailed February 6, 2024, please amend the application as follows:

Amendments to the Claims begin on the page entitled "Amendments to the Claims."

Remarks begin on the page entitled "Remarks."

Authorization is given to charge Deposit Account No. 13-4895 any necessary fees for this filing and all required extension of time fees.

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/103,234	Sharp et al.
	Examiner	**Art Unit**
	LAURA POWERS	1785

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	9	10	-	19										
2	2	10	11	-	20										
3	3	-	12	-	21										
4	4	11	13	-	22										
-	5	12	14	15	23										
5	6	13	15	16	24										
7	7	14	16	17	25										
6	8	-	17	18	26										
8	9	-	18	19	27										

Change(s) applied
to document,
/N.B.H./
2/18/2024

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	19	
/LAURA C POWERS/ Primary Examiner, Art Unit 1785	30 January 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1D

U.S. Patent and Trademark Office — Part of Paper No.: 20240126

Doc Code: PA.
Document Description: Power of Attorney

PTO/AIA/82B (07-18)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date
18/103,234	2023-01-30

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 26813

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

BROOK & WHITTLE LIMITED

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	AP	Date (Optional)	
Name	Andrew Sharp		
Title	Vice President		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/103,234	**03/18/2024 02:49:49 PM Z ET**	**0644.000001US01**

Title of Invention

RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	8140	FILED BY	Margaret Rausch
PATENT CENTER #	64727515	FILING DATE	01/30/2023
CUSTOMER #	26813	FIRST NAMED INVENTOR	Andrew Sharp
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Lotta Kiuru-Ribar

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2024-03-18-Executed Power of Attorney.pdf	1	Power of Attorney	1983 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2024-03-18-Executed Power of Attorney.pdf	275CE63B371D1CF70FBA3230BDCB515665186D8647AE3A0CE256158BE470BC4324F07A414239444644F4AC7918509174D94F20317CF55F9C5E21F1A279BCB44F

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
18/103,234	01/30/2023	Andrew Sharp	0644.000001US01

CONFIRMATION NO. 8140

26813
MUETING RAASCH GROUP
111 WASHINGTON AVE. S., SUITE 700
MINNEAPOLIS, MN 55401

POA ACCEPTANCE LETTER

OC000000070228869

Date Mailed: 03/27/2024

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/18/2024.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/sibrahim/

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/103,234	04/16/2024	11961422	0644.000001US01	8140

26813 7590 03/27/2024

MUETING RAASCH GROUP
111 WASHINGTON AVE. S., SUITE 700
MINNEAPOLIS, MN 55401

ISSUE NOTIFICATION

The projected patent number and issue date are specified above. The patent will issue electronically. The electronically issued patent is the official patent grant pursuant to 35 U.S.C. § 153. The patent may be accessed on or after the issue date through Patent Center at https://patentcenter.uspto.gov/. The patent will be available in both the public and the private sides of Patent Center. Further assistance in electronically accessing the patent, or about Patent Center, is available by calling the Patent Electronic Business Center at 1-888-217-9197.

The USPTO is implementing electronic patent issuance with a transition period, during which period the USPTO will mail a ceremonial paper copy of the electronic patent grant to the correspondence address of record. Additional copies of the patent (i.e., certified and presentation copies) may be ordered for a fee from the USPTO's Certified Copy Center at https://certifiedcopycenter.uspto.gov/index.html. The Certified Copy Center may be reached at (800)972-6382.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Center (https://patentcenter.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PATENT CENTER site https://patentcenter.uspto.gov for additional inventors):

Andrew Sharp, Orchard Park, NY;
Mitchell J. Morgan, Buffalo, NY;

APPLICANT(s) (Please see PATENT CENTER site https://patentcenter.uspto.gov for additional applicants):

BROOK & WHITTLE LIMITED, Amherst, NY;

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/103,234	01/30/2023	Andrew Sharp	0644.000001US01	8140

26813 7590 04/16/2024

MUETING RAASCH GROUP
111 WASHINGTON AVE. S., SUITE 700
MINNEAPOLIS, MN 55401

EXAMINER	
POWERS, LAURA C	

ART UNIT	PAPER NUMBER
1785	

NOTIFICATION DATE	DELIVERY MODE
04/16/2024	ELECTRONIC

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The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptodocketing@mrgs.com

APPLICATION NO.	ISSUE DATE	PATENT NO.
18/103,234	16-Apr-2024	11961422

MUETING RAASCH GROUP
111 WASHINGTON AVE. S., SUITE 700
MINNEAPOLIS, MN 55401

EGRANT NOTIFICATION

Your electronic patent grant (eGrant) is now available, which can be accessed via Patent Center at https://patentcenter.uspto.gov

The electronic patent grant is the official patent grant under 35 U.S.C. 153. For more information, please visit https://www.uspto.gov/electronicgrants