

# The Patent Process Explained

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Patent Attorney

INVENTION



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graph TD; A[INVENTION] --> B[PRIOR ART SEARCH]; B --> C[DRAFT APPLICATION]; C --> D[FILE APPLICATION]; D --> E[EXAMINATION];
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PRIOR ART SEARCH

DRAFT APPLICATION

FILE APPLICATION

EXAMINATION

# Prior Art Search

- Prior Art = any disclosure made to the public
  - Ex: patents, publications, presentations, etc.
- Expose potential for licensing
- Useful for drafting the application
- Learn more about the field of your invention
- Avoid patent infringement

# Prior Art Search

- Search options:
  - Self-search
  - Hired search
- Considerations:
  - Cost v. thoroughness
  - Time
  - Knowledge of the technology

# Prior Art Self-Search

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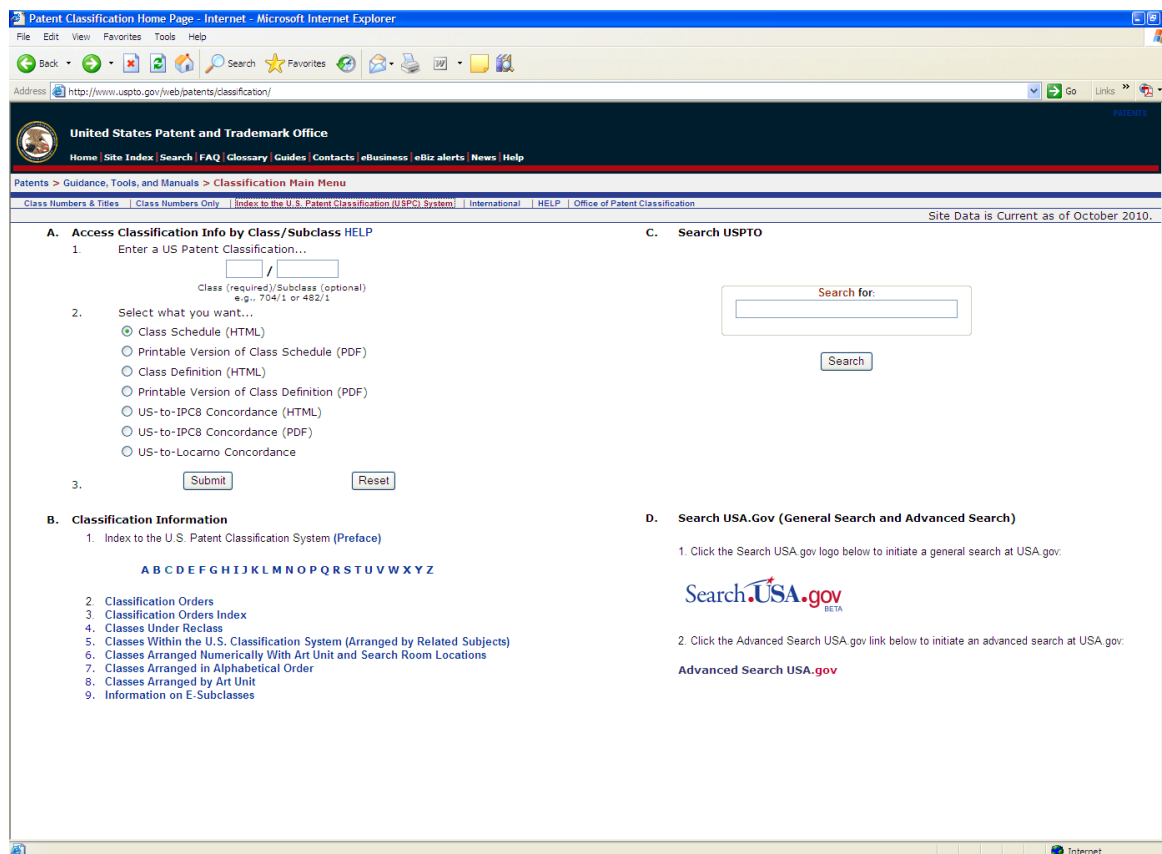
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- International publications  
–Ex: World Intellectual Property Organization (“WIPO”)

# Prior Art Self-Search, Cont.

## • Patent and Trademark Depository Libraries (PTDL)

– Search by technology classification: class and subclasses are assigned by the USPTO in the Manual of Classification



# Disclosure Requirements

- Must disclose relevant prior art to the USPTO (for non-provisional applications)

“... [I]nformation is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

- It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
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- \$180 for large entity; \$0 for small entity

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		Filing Date	01-02-91
		First Named Inventor	C. Smith
		Art Unit	3815
		Examiner Name	John Doe
		Attorney Docket Number	56789
Sheet	of		

U. S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. <sup>1</sup>	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code <sup>2</sup> if known	MM-DD-YYYY		
JD		US- 3703445	11-07-1972	Tow	All
JD		US- 3994000	06-09-1975	Reitor	All Figures
JD		US- 3694509	01-26-1971	Sarich	Pages 2 -10
JD		US- 4325777	05-22-1990	Wolfe	All

FOREIGN PATENT DOCUMENTS					
Examiner Initials*	Cite No. <sup>1</sup>	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear
		Country Code <sup>3</sup> Number <sup>4</sup> Kind Code <sup>5</sup> if known	MM-DD-YYYY		
		FR, 338540	06-1975		
JD		DE, 1137729	06-1965		
JD		EP, 9141	08-1979		
JD		WO, 80/01871	09-1980		
JD		JP, 50-3106	11-1979		

Examiner Signature	/John Doe/	Date Considered	09/30/1991
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. <sup>1</sup> Applicant's unique citation designation number (optional). <sup>2</sup> See Kinds Codes of USPTO Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>6</sup> Applicant is to place a check mark here if English language Translation is attached.  
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# What type of Application to file?

- Provisional - establishes an early effective filing date and “Patent Pending” status
  - Only subject matter included in provisional is given the effective filing date
  - \$220 filing fee for large entity; \$110 for small entity
- Non-provisional - Utility (most common), Design, and Plant
  - May claim benefit to provisional application
- PCT - provides a centralized filing system, including an international filing date, a search, and time period for filing national-stage applications
  - International and national stage fees



# Costs for Utility

<b>Fixed Fees</b>	<b>Large Entity</b>	<b>Small Entity</b>
Basic filing fee	330.00	165.00
Search fee	540.00	270.00
Examination fee	220.00	110.00
Issue fee	1,510.00	755.00
Publication fee	300.00	0
Maintenance fees:		
- Due at 3.5 years	980.00	490.00
- Due at 7.5 years	2,480.00	1,240.00
- Due at 11.5 years	4,110.00	2,055.00
TOTAL =	\$10,470.00	\$5,085.00

<b>Commonly Occurring Additional Fees</b>	<b>Large entity</b>	<b>Small entity</b>
Independent claims in excess of 3	220.00	110.00
Claims in excess of 20	52.00	26.00
Request for Continued Examination	810.00	405.00
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Notice of Appeal	540.00	270.00
Filing a brief in support of appeal	540.00	270.00
Submission of an Information Disclosure Statement	180.00	0

# Drafting the Application

- Requirements for Non-provisional:
  - Description
    - Must be “clear, concise, and exact terms ... to enable any person skilled in the art ... to make and use” the invention
    - Must include the best mode for carrying out the invention
    - In the case of improvements, must describe “matter to which the improvement relates”
    - Must be on page separate from the other parts of the application (claims, abstract, etc.)
  - At least one claim
  - Drawing if necessary for understanding of invention

# Drafting the Application, Cont.

- Non-provisional applications may be filed without:
  - Filing, search, and examination fee
  - Names of all the inventors
  - Oath or declaration
- A Notice of Missing Parts will subsequently be sent, requesting the missing items
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# Drafting the Application, Cont.



## Title

- Should appear as a heading on the first page of the specification
- May not exceed 500 characters
- Must be as short and specific as possible

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

(10) **Patent No.:** US 6,531,214 B2  
(45) **Date of Patent:** Mar. 11, 2003

(64) **REPLACEMENT FOR PLASTICIZED POLYVINYL CHLORIDE**

(75) **Inventors:** Brandt K. Carter, Woodbury, MN (US); Barron R. Ree, Stillwater, MN (US); Osei A. Owusu, Woodbury, MN (US); Mark E. Napierala, St. Paul, MN (US)

(73) **Assignee:** 3M Innovative Properties Company, St. Paul, MN (US)

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

4,394,235 A	7/1983	Brandt et al.	204/165
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5,248,719 A	9/1993	Kehe et al.	

(List continued on next page.)

(21) **Appl. No.:** 09/783,356

(22) **Filed:** Feb. 14, 2001

(65) **Prior Publication Data**

US 2002/0155283 A1 Oct. 24, 2002

(51) **Int. Cl. 7** B32B 7/02

(52) **U.S. Cl.** 428/336; 428/523; 525/55; 525/185; 526/348.1

(58) **Field of Search** 428/523, 352, 428/353, 354, 364, 910; 525/55, 88, 89, 95, 185, 242, 410; 526/348.1, 352, 352.2

(56) **References Cited**

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3,341,626 A	9/1967	Peterkin	260/897
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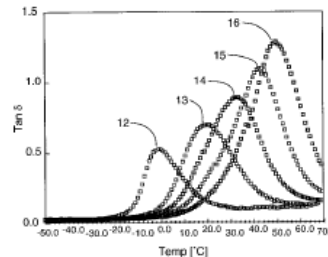
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Primary Examiner—Robert Dawson  
Assistant Examiner—Christopher Kochan  
(74) **Attorney, Agent, or Firm**—Carolyn A. Bates

(57) **ABSTRACT**

A blend comprising polyolefin and hydrocarbon resin wherein the polyolefin is semicrystalline and has a suitable degree of crystallinity and molecular weight, or the polyolefin is amorphous and has sufficiently high molecular weight, and sufficient hydrocarbon resin is present in the blend, so that a film made from the blend is substantially vinyl-like and non-elastomeric. Some of the films are also conformable, drapable or affinely deformable by hand.

61 Claims, 12 Drawing Sheets



## Effective filing date

## Abstract

- must be submitted on separate page, preferably following the claims
- May not exceed 150 words
- Provides nature and gist of the technical disclosure

# Drafting the Application, Cont.

US 6,531,214 B2

1  
**REPLACEMENT FOR PLASTICIZED  
POLYVINYL CHLORIDE**

**TECHNICAL FIELD**

This invention relates to films and fibers, and to materials that can serve as substitutes for plasticized polyvinyl chloride (PVC).

**BACKGROUND OF THE INVENTION**

Plasticized PVC films and tapes are conventionally used for a wide variety of applications including graphic films, retroreflective sheeting, and auto paint masking. PVC has many advantages that have caused it to become a material of choice in such applications. For example, plasticized PVC films can readily be applied to many irregular surfaces. Thus a PVC-based graphic film or retroreflective sheet can be heated slightly above room temperature and stretched over rivets and into small indentations such as may be present on the substrates to which such graphic films or retroreflective sheets may be applied. Many materials that have been tried as substitutes for PVC have been found to undergo necking or other non-affine deformation when stretched, thus rendering such materials unsuitable for applications in which non-uniform distortion during stretching would be unacceptable.

Plasticizers are typically employed in PVC films in order to make the films more flexible and more stretchable. However, plasticizers can migrate to the substrate on which PVC films are adhered, leaving a residue or "ghosting" when removed. In some cases the ghosting is not removable with solvent wipes. Thus, the exterior appearance of an automobile may be detrimentally affected when PVC films are used as the tape backing in auto paint masking tapes. Furthermore, PVC plasticizers can degrade the performance of adjacent adhesive layers, reducing the adherence of a tape to an automobile, or a graphic to a substrate. PVC plasticizers can also migrate into and thereby degrade the performance of retroreflective sheeting.

In addition, there is growing concern, particularly in European and Japanese markets, about the environmental impact of land filling or incinerating PVC materials. PVC has only limited recycling utility.

A variety of stiff, relatively high modulus packaging films (e.g., twist films for candy wrapping) have been made from isotactic (crystalline) polypropylene and hydrocarbon resins, including the films described in U.S. Pat. Nos. 3,278,646; 3,361,849; 3,666,836; 4,032,493; 4,289,831; 4,394,235; 5,091,237; 5,128,183; 5,212,009; 5,213,744; 5,246,659; 5,290,635; 5,451,455; 5,545,223; 5,560,948 and 5,777,055; and in European Patent Specification No. EP 0 681 914 B1. U.S. Pat. No. 5,085,943 also describes a twist film made from polypropylene and hydrocarbon resin, the film being said to have increased stiffness. PCT International Application Nos. WO 98/38041, WO 99/2331 and WO 99/51432 describe multilayer films having a core layer that contains isotactic propylene and various modifiers including atactic polypropylene. European Patent Specification No. EP 0 763 422 A1 refers to various multilayer films containing low-modulus polypropylene in an interior layer, and refers to but does not exemplify film layers containing a blend of low-modulus polypropylene and hydrocarbon resin.

Fibers made from isotactic polypropylene and hydrocarbon resins are described in, for example, U.S. Pat. Nos. 4,115,620 and 5,171,628, and in European Patent Application No. 0 399 792 A3.

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Hot melt adhesives, sealants and other compositions containing, inter alia, atactic (amorphous) polypropylene and various hydrocarbon resins are described in many references, including U.S. Pat. Nos. 3,341,626; 3,983,206; 4,048,376; 4,081,415 and 4,279,659. U.S. Pat. No. 4,999,231 describes cast hot melt adhesive films for use on carpet backing, wherein the films contain, inter alia, atactic polypropylene, hydrocarbon resin and calcium carbonate filler. U.S. Pat. No. 4,692,370 describes a fibrous coating made from blown strands of a hot melt material made from, inter alia, atactic polypropylene and a polyterpene resin. U.S. Pat. Nos. 5,047,462; 5,248,719 and 5,472,764 describe coating compositions containing, inter alia, various atactic copolymers and hydrocarbon resin. European Patent Application No. 0 557 593 A2 describes packaging films containing, inter alia, a hydrocarbon resin and a wax. Atactic polypropylene is mentioned as one possible wax. PVC replacement films are described in, for example, U.S. Pat. Nos. 5,112,674; 5,132,074 and 5,460,861.

**SUMMARY OF THE INVENTION**

The present invention provides, in one aspect, a blend comprising polyolefin and hydrocarbon resin, wherein the polyolefin is semicrystalline and has a suitable degree of crystallinity and molecular weight, or the polyolefin is amorphous and has sufficiently high molecular weight, and sufficient hydrocarbon resin is present in the blend, so that a film made from the blend is substantially vinyl-like and non-elastomeric. In other embodiments, films made from such a blend are also conformable, drapable or affinely deformable by hand.

In another aspect, the invention provides films and fibers made from the above-mentioned blend.

In another aspect, the invention provides multilayer films and fibers comprising a core of the above-mentioned blend and one or more additional layers made of a different material.

The invention provides, in yet another aspect, a vinyl-like non-elastomeric film comprising a blend of hydrocarbon resin together with semicrystalline or amorphous polyolefin, or a mixture thereof. In a preferred embodiment, the polyolefin comprises an ethylene or propylene copolymer, a mixed tacticity polypropylene, or a blend thereof.

The invention also provides a method for making a plasticized-PVC-like film comprising blending, extruding and optionally orienting a mixture comprising polyolefin and hydrocarbon resin, wherein the polyolefin is semicrystalline and has a suitable degree of crystallinity and molecular weight, or the polyolefin is amorphous and has sufficiently high molecular weight, and wherein sufficient hydrocarbon resin is present in the blend, so that a film made from the mixture is substantially vinyl-like and non-elastomeric. In other embodiments, the films are also conformable, drapable or affinely deformable by hand. In yet other embodiments, the films are oriented sufficiently so that the film has a deformation index (as defined below) that is less than about 1.1.

The invention provides films having vinyl-like features and behavior. The blends and method of the invention can be tailored to provide specific desired physical properties at room temperature (20° C.) and at elevated temperatures, and can provide workable substitutes for existing plasticized PVC films and fibers. At present raw material pricing, the invention enables a desirable reduction in raw material cost compared to the use of many PVCs.

**BRIEF DESCRIPTION OF THE DRAWING**

FIG. 1 is a graph illustrating  $\tan \delta$  vs. temperature for various blends of polyolefin and hydrocarbon resin.

## Background of the Invention

- May include brief description of relevant prior art

## Summary of Invention

- Precedes the Detailed Description
- Should match the scope of the claims
- May include a statement of the object of the invention

## Brief Description of the Drawings

# Drafting the Application, Cont.

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## EXAMPLE 16

Using the method of Example 15, a polyolefin (ATTANE™ 4404, Dow Chemical Co.) and a hydrocarbon resin (REGALITE™ V3 120, Hercules, Inc.) were mixed in selected proportions using a BRABENDER mixing head to formulate individual blends containing 0%, 20%, 25% or 30% hydrocarbon resin. Each blend was then pressed and quenched to form a clear homogenous film between 0.2 and 0.4 mm thick. Using the method of Example 1, the T<sub>g</sub> of each of the films was evaluated. Curves 141, 142, 143, and 144 in FIG. 14 show the resulting dynamic mechanical analysis (DMA) curves illustrating Tan δ vs. temperature for 100% polyolefin (curve 141) and for blends containing 20%, 25% and 30% hydrocarbon resin (curves 142, 143 and 144, respectively). The pure polyolefin exhibited two Tan δ peaks, suggesting the existence of phase separation. As an increasing amount of the hydrocarbon resin was added to the polyolefin, the two tan delta peaks collapsed into a single symmetric peak, indicative of improved optical properties and reduced haze for the resulting film. Thus the hydrocarbon resin may act as a compatibilizer and inhibit phase separation.

Various modifications and alterations of this invention will be apparent to those skilled in the art without departing from the scope and spirit of this invention. This invention should not be restricted to that set forth herein for illustrative purposes only.

We claim:

1. A blend comprising polyolefin and hydrocarbon resin, wherein the polyolefin is semicrystalline and has a suitable degree of crystallinity and molecular weight, or the polyolefin is amorphous and has sufficiently high molecular weight, and sufficient hydrocarbon resin is present in the blend, so that a 0.05 to 0.1 mm thick film made from the blend and aged at least 7 to 10 days is substantially non-elastomeric and resembles a plasticized polyvinyl chloride film sample of similar caliper when placed between a thumb and index finger and flexed or otherwise felt by hand at room temperature.

2. A blend according to claim 1, wherein the film is also conformable, drapable or affinely deformable by hand.

3. A blend according to claim 1, wherein the film is also conformable, drapable and affinely deformable by hand.

4. A blend according to claim 1, wherein the film has a deformation index that is less than about 1.1.

5. A blend according to claim 1, wherein the film is dead-stretchable by hand at low elongation rates.

6. A blend according to claim 1, wherein the film is tearable by hand at high elongation rates.

7. A film comprising a blend according to claim 1.

8. A film according to claim 7, wherein the film is oriented.

9. A film according to claim 8, wherein the orientation is biaxial at an orientation ratio of at least about 2x2.

10. A film according to claim 8, wherein the orientation is biaxial at an orientation ratio of at least about 4x4.

11. A film according to claim 7, wherein the film has a deformation index less than about 1.1.

12. A film according to claim 7, wherein the film has a deformation index less than about 1.05.

13. A film according to claim 7, wherein the film is substantially isotropic in two orthogonal directions in the plane of the film.

14. A film according to claim 7, wherein the film is clear and non-hazy.

15. A film according to claim 7, wherein the blend is ink-receptive.

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16. A film according to claim 7, wherein the film comprises a multilayer film having a layer or layers comprising the blend and one or more additional layers.

17. A film according to claim 16, wherein at least one of the additional layers comprises an ink-receptive layer.

18. A film according to claim 16, wherein at least one of the additional layers comprises an adhesive.

19. A film according to claim 16, wherein at least one of the additional layers is scratch-resistant.

20. A film according to claim 7, wherein the film is sewable, launderable and weldable.

21. A film according to claim 7, wherein the film is non-blocking.

22. A blend according to claim 1, in the form of a fiber.

23. A blend according to claim 1, comprising at least about 20 wt. % hydrocarbon resin.

24. A blend according to claim 1, wherein the blend comprises at least about 40 wt. % hydrocarbon resin.

25. A blend according to claim 1, wherein the blend comprises at least about 50 wt. % hydrocarbon resin.

26. A blend according to claim 1, wherein the blend comprises at least about 60 wt. % hydrocarbon resin.

27. A blend according to claim 1, wherein the blend comprises about 40 to about 60 wt. % hydrocarbon resin.

28. A non-elastomeric film comprising a blend of hydrocarbon resin together with semicrystalline or amorphous polyolefin, or a mixture thereof, the blend being such that a 0.05 to 0.1 mm thick film made from the blend and aged at least 7 to 10 days resembles a plasticized polyvinyl chloride film sample of similar caliper when placed between a thumb and index finger and flexed or otherwise felt by hand at room temperature.

29. A film according to claim 28, wherein the polyolefin comprises an ethylene or propylene copolymer, a mixed tacticity polypropylene, or a blend thereof.

30. A film according to claim 29, wherein the polyolefin comprises an ethylene/butene, ethylene/hexene or ethylene/octene copolymer.

31. A film according to claim 28, wherein the polyolefin is an ethylene copolymer.

32. A film according to claim 28, wherein the polyolefin is a propylene copolymer.

33. A film according to claim 28, comprising a graphic marking film comprising an adhesive layer and a release liner.

34. A film according to claim 33, further comprising an image receptive layer.

35. A film according to claim 34, wherein the image receptive layer comprises an ink receptive layer.

36. A film according to claim 33, further comprising an image.

37. A film according to claim 36, further comprising a protective overlayer.

38. A film according to claim 28, comprising a tape backing and an adhesive layer.

39. A film according to claim 24, comprising a layer of retroreflective elements.

40. A film according to claim 38, further comprising a gloss layer.

41. A film according to claim 38, further comprising a colored layer.

42. A film according to claim 28, wherein the film is conformable, drapable or affinely deformable by hand.

43. A film according to claim 28, wherein the film is conformable, drapable and affinely deformable by hand.

44. A method for making a film comprising blending, extruding and optionally orienting a mixture comprising

## Claims

- Dependent claims provide limitations to broader independent claims
- Should be numbered
- Must start on separate page

# Filing the Application

- File in the following order:
  - Application Transmittal form
  - Fee transmittal form
  - Application Data Sheet – may be voluntarily submitted to provide bibliographic data for the Applicant, correspondence information, priority information, and assignee information
  - Specification - includes the following sections in order:
    - Title; Cross-reference to related applications; Statement regarding federally sponsored research; Names of parties to joint research agreement; Reference to “Sequence Listing”; Background of Invention; Brief Summary of Invention; Brief Description of Drawings; Detailed Description; Claims; Abstract; “Sequence Listing”
  - Drawings
  - Oath or Declaration



# Filing the Application, Cont.

The screenshot shows the Microsoft Internet Explorer browser window displaying the USPTO EFS-Web website. The address bar shows the URL: <http://www.uspto.gov/patents/process/file/efs/index.jsp>. The page header includes the USPTO logo and the text "United States Patent and Trademark Office An Agency of the Department of Commerce". A search bar and a "HOW DO I:" dropdown menu are visible. The main navigation menu includes links for "About USPTO", "Patents", "Trademarks", "IP Law & Policy", "Products & Services", "Careers", "Inventors", "News & Notices", "eBusiness/Alerts", "FAQs", and "For Kids". The "Patents" section is expanded, showing a "Patent Process" sidebar with links like "Search for Patents", "View Fee Schedule", "File Online", "EFS-Web", "Announcements", "Resources", "Accelerated Examination", "First Action Interview", "Patent Prosecution Highway", "Check Status", "Maintain/Pay Fees", "Appeal", and "Change Ownership". The main content area is titled "About EFS-Web" and contains a description of the system, a globe icon, and a list of links: "Launch EFS-Web Registered eFiler", "Launch EFS-Web Unregistered eFiler", "Launch EFS-Web Contingency Unregistered eFiler", "EFS-Web Announcements", and "EFS-Web Resources". At the bottom, there is contact information for the Patent Electronic Business Center.

- May file electronically via the USPTO Electronic Filing System (“EFS”)

# Examination

- Restriction Requirement – Examiner alleges claims are independent or distinct and must be examined separately
- Non-final Office Action
  - 3 months from date of rejection to respond with up to 3 additional months of extension (with extension fees)
  - May make amendments and/or present arguments in rebuttal to the Examiner's rejections
- Final Office Action
  - File early response within 2 months from date of final rejection (may make form amendments; cancel claims; or show good reasons why merit amendments were not entered earlier)
  - File a Request for Continued Examination (may make amendments on merits of application)
  - File an Appeal – file Notice of Appeal and an Appeal Brief within 2 months from the date the Notice of Appeal was filed

# Average Time to Issuance

<b>Technology</b>	<b>Average time to 1<sup>st</sup> Office Action (months)</b>	<b>Average total pendency (months)</b>
Biotechnology and Organic Chemistry	22.5	35.1
Chemical and Materials Engineering	25.9	37.4
Semiconductor, Electrical, Optical Systems	20.8	29.7
Mechanical Engineering, Manufacturing and Products	26.5	35.5
<b>Total:</b>	<b>25.8</b>	<b>34.6</b>

\* USPTO records for 2009

# Patent Term

- Term begins on the date the patent issues and ends 20 years from the date the application was filed
  - Earliest effective filing date may be date of provisional filing or PCT application

Questions?