Appeal Decision

Appeal No. 2019-1931

Appellant NITTO DENKO CORPORATION

Patent Attorney MOMII, Takafumi

The case of appeal against the examiner's decision of refusal of Japanese Patent Application No. 2018-120364, entitled "POLARIZING PLATE AND POLARIZING PLATE ROLL", (the application published on November 7, 2019, Japanese Unexamined Patent Application Publication No. 2019-194659) has resulted in the following appeal decision.

Conclusion

The appeal of the case was groundless.

Reasons

No. 1 Outline of the case

1 Outline of the procedures

In Japanese Patent Application No. 2018-120364 (hereinafter, referred to as "the present application"), a part of Japanese Patent Application No. 2018-89238 filed on May 7, 2018 (priority claim based on the prior application: September 13, 2017, February 28, 2018, and April 25, 2018) is a new patent application filed on June. 26, 2018, and the outline of the procedures is as follows.

July 20, 2018 : notification of reasons for refusal
September 20, 2018 : written opinion
November 21, 2018 : decision of refusal
February 12, 2019 : written request for appeal
February 12, 2019 : written amendment
November 7, 2019 : written statement
November 29, 2019 : notification of reasons for refusal
January 30, 2020 : written opinion and written amendment (hereinafter, amendments made in the written amendment is referred to as "the present amendment").

2 Present Invention

The inventions according to Claims 1 to 3 of the present application are specified by the matters described in Claims 1 to 3 of the scope of claims after the present amendment, and the inventions according to Claims 1 and 2 (hereinafter, referred to as "Present Invention 1" and "Present Invention 2", and these may be collectively referred to as "the present invention") are as follows.

"[Claim 1]

A polarizing plate comprising: a polarizing film having a thickness of 8 μm or less, a single transmittance of 43.5% to 44.0%, and a polarization degree of 99.940% to 99.990%; and a protective layer disposed on at least one side of the polarizing film, wherein

the difference between the maximum value and the minimum value of the single transmittance in the region of 50 cm^2 is 0.15% or less.

[Claim 2]

A polarizing plate comprising: a polarizing film having a thickness of 8 μm or less, a single transmittance of 43.5% to 44.0%, and a polarization degree of 99.940% to 99.990%; and a protective layer disposed on at least one side of the polarizing film, wherein

the polarizing plate has a width of 1,000 mm or more, and

the difference between the maximum value and the minimum value of the single transmittance at five positions at equal intervals along a width direction is 0.2% or less."

3 Outline of reasons for refusal notified by the body

The outline of the reasons for refusal notified by the body notified in the notification of reasons for refusal dated November 29, 2019 is as follows.

● Reason 1: (Inventive step) The inventions according to Claims 1 to 3 of the present application cannot be granted a patent under the provisions of Article 29(2) of the Patent Act for the reason that the inventions could have been easily conceived by a person having usual knowledge in the technical field to which the invention belongs before the application was filed (hereinafter, referred to as "a person skilled in the art") based on the invention described in the following document, which can be made available to the public in Japan or abroad through electric communication lines in advance of the earliest prior application (hereinafter, simply referred to as "the prior application").

● Reason 2: (Support requirement) The inventions according to Claims 1 to 3 of the present application cannot be recognized to be described in the detailed description of the invention. Therefore, the description of the scope of claims of the present application does not satisfy the requirements as provided in Article 36(6)(i) of the Patent Act.

● Reason 3: (Clarity requirement) The inventions according to Claims 2 to 3 of the present application cannot be recognized to be clear. Therefore, the description of the scope of claims of the present application does not satisfy the requirements as provided in Article 36(6)(ii) of the Patent Act.

● Reason 4: (Enablement requirement) In the present application, the detailed description of the invention does not satisfy the requirements as provided in Article 36(4)(i) of the Patent Act.

Note

Cited Document 1: Japanese Unexamined Patent Application Publication No. 2015-191224

Reference Document 1: Japanese Unexamined Patent Application Publication No. 2017-68282

No. 2 Judgement by the body (● Reason 1: [Inventive step])

1 Description of Cited Document 1

Cited Document 1 (Japanese Unexamined Patent Application Publication No. 2015-191224) describes an invention that can be made available to the public in Japan or abroad through electric communication lines in advance of the prior application and includes the following descriptions.

Note that underlines are added by the body, and the underlines indicate portions used for recognition, judgment, etc. of the cited invention.

(1) "[Claims]

[Claim 1]

A manufacturing method for a stretched laminate, comprising:

a process of forming a polyvinyl alcohol-based resin layer on an elongated thermoplastic resin substrate to prepare a laminate; and

a process of performing in-air stretching on the laminate while conveying the laminate in a longitudinal direction to prepare a stretched laminate, wherein

the thickness of the polyvinyl alcohol-based resin layer in the stretched laminate is 15 μm or less, and the difference between the maximum value and the minimum value in the width direction of birefringence Δn_{xy} in the front direction of the polyvinyl alcohol-based resin layer is 0.6×10^{-3} or less.

[Claim 2]

The manufacturing method for a stretched laminate according to Claim 1, wherein the in-air stretching includes a heat roll stretching process in which the stretching is performed by a circumferential speed difference between heat rolls, and the variation in temperature in the width direction of the heat rolls is 3°C or lower.

･･･Omitted･･･

[Claim 6]

A stretched laminate produced by the manufacturing method according to any one of Claims 1 to 5.

[Claim 7]

A manufacturing method for a polarizing film, comprising a process of dyeing the stretched laminate according to Claim 6.

[Claim 8]

The manufacturing method for a polarizing film according to Claim 7, further comprising the process of stretching the stretched laminate in an aqueous solution of boric acid after the dyeing process.

[Claim 9]

A polarizing film produced by the manufacturing method according to Claim 7 or 8, wherein the polarizing film has a thickness of 10 μm or less."

(2) "[Detailed Description of the Invention]

[Technical Field]

[0001]

The present invention relates to a manufacturing method for a stretched laminate and a stretched laminate obtained by such a manufacturing method, as well as a manufacturing method for a polarizing film and a polarizing film obtained by such a manufacturing method.

[Background Art]

[0002]

In a liquid crystal display device, which is a typical image display device, polarizing films are disposed on both sides of a liquid crystal cell due to an image forming method thereof. In recent years, since thinning of a polarizing film has been desired, for example, a method for obtaining a polarizing film by subjecting a laminate of a specific thermoplastic resin substrate and a polyvinyl alcohol-based resin layer to in-air stretching and dyeing, and then further subjecting the laminate to stretching in an aqueous solution of boric acid is proposed (e.g., Patent Document 1). However, the polarizing film obtained by such a manufacturing method may have variation in transmittance.

・・・Omitted・・・

[Summary of Invention]

[Technical Problem]

[0004]

The present invention has been made to solve the above-mentioned prior problem, and the main object of the present invention is to provide a method for manufacturing a stretched laminate capable of obtaining a polarizing film in which variation in transmittance is inhibited.

[Solution to Problem]

[0005]

The manufacturing method for a stretched laminate according to the present invention includes: a process of forming a polyvinyl alcohol-based resin layer on an elongated thermoplastic resin substrate to prepare a laminate; and a process of performing in-air stretching on the laminate while conveying the laminate in a longitudinal direction to prepare a stretched laminate. The thickness of the polyvinyl alcohol-based resin layer in the stretched laminate is 15 μm or less, and the difference between the maximum value and the minimum value in the width direction of birefringence Δn_{xy} in the front direction of the polyvinyl alcohol-based resin layer is 0.6×10^{-3} or less.

According to one embodiment, the in-air stretching includes a heat roll stretching process in which the stretching is performed by a circumferential speed difference between heat rolls, and the variation in temperature in the width direction of the heat rolls is 3°C or lower.

According to one embodiment, the temperature of the heat rolls is 120°C or higher.

According to one embodiment, heating of the heat roll is performed by passing a heat medium through a pipe in the heat roll and includes passing the heat medium through a spiral pipe arranged to be inscribed in the outer peripheral portion of the roll.

According to one embodiment, the ratio between the volume of the heat medium in the heat roll and the flow rate of the heat medium is 2 times/min or more.

According to another aspect of the present invention, a stretched laminate is provided. The stretched laminate is manufactured by the above-mentioned manufacturing method.

According to another aspect of the present invention, the manufacturing method for a polarizing film is provided. The manufacturing method for a polarizing film includes the process of dyeing the stretched laminate.

According to one embodiment, the manufacturing method for a polarizing film further includes the process of stretching the stretched laminate in an aqueous solution of boric acid after the dyeing process.

According to another aspect of the present invention, a polarizing film is provided. The polarizing film is manufactured by the above-mentioned manufacturing method and has a thickness of 10 μm or less.

[Effect of the Invention]

[0006]

According to the present invention, by manufacturing a stretched laminate such that the difference between the maximum value and the minimum value in the width direction of birefringence Δn_{xy} in the front direction of the polyvinyl alcohol (PVA)-based resin layer of a stretched laminate, which is an intermediate of a thin (for example, 10 μm or less) polarizing film, is 0.6×10^{-3} or less, variation in transmittance of the stretched laminate after the dyeing can be inhibited. As a result, variation in transmittance of the obtained polarizing film can be inhibited. According to one embodiment, variation in birefringence Δn_{xy} in the width direction (the difference between the maximum value and the minimum value in the width direction) can be controlled by adjusting the variation in temperature in the width direction of the heat rolls used for the in-air stretching to a predetermined value or less.

・・・Omitted・・・

[Description of Embodiments]

[0008]

Hereinafter, preferred embodiments of the present invention will be described, but the present invention is not limited to these embodiments.

A. Manufacturing method for stretched laminate

The manufacturing method for a stretched laminate according to the present invention includes: a process of forming a polyvinyl alcohol-based resin layer on an elongated thermoplastic resin substrate to prepare a laminate; and a process of performing in-air stretching on the laminate while conveying the laminate in a longitudinal direction to prepare a stretched laminate. Hereinafter, each process will be described.

[0009]

A-1. Process of preparing laminate

FIG. 1 is a partial cross-sectional view of a laminate that can be used in the manufacturing method for a stretched laminate according to one embodiment of the present invention. The laminate 10 includes a thermoplastic resin substrate 11 and a polyvinyl alcohol (PVA)-based resin layer 12. The laminate 10 is prepared by forming the PVA-based resin layer 12 on an elongated thermoplastic resin substrate. Any appropriate method may be adopted as a method for forming the PVA-based resin layer 12. Preferably, a coating liquid containing a PVA-based resin is applied onto the PVA-based resin substrate 11 and dried to form the PVA-based resin layer 12.

・・・Omitted・・・

[0027]

A-2. In-air stretching process

The in-air stretching process includes a heat roll stretching process of stretching the laminate by the circumferential speed difference between heat rolls while conveying the laminate in the longitudinal direction thereof. The in-air stretching process typically includes a zone stretching process and a heat roll stretching process. In addition, the order of the zone stretching process and the heat roll stretching process is not limited, and the zone stretching process may be performed first, or the heat roll stretching process may be performed first. The zone stretching process may be omitted. According to one embodiment, the zone stretching process and the heat roll stretching process are performed in this order. Hereinafter, the zone stretching process and the heat roll stretching process in this embodiment will be described, and then characteristic portions in the entire in-air stretching process will be described.

・・・Omitted・・・

[0039]

A-2-3. Entire in-air stretching process

The stretching magnification by the in-air stretching (heat roll stretching and zone stretching) is preferably 1.5 times to 4.0 times, and more preferably 1.8 times to 3.0 times with respect to the original length of the laminate. The stretching magnification by the in-air stretching is a product of the stretching magnification by the zone stretching and the stretching magnification by the heat roll stretching. When the in-air stretching is only heat roll stretching, the stretching magnification of the heat roll stretching falls within the range described above.

[0040]

According to the present invention, the in-air stretching is performed such that the difference between the maximum value and the minimum value in the width direction of the birefringence Δn_{xy} in the front direction of the PVA-based resin layer in the stretched laminate to be obtained (hereinafter, also simply referred to as the variation in birefringence) is 0.6×10^{-3} or less, preferably 0.4×10^{-3} or less, and more preferably 0.2×10^{-3} or less. In addition, the birefringence Δn_{xy} is obtained by the formula: $\Delta n_{xy} = nx - ny$. Here, nx represents the refractive index in the direction (i.e., slow axis direction) in which the in-plane refractive index becomes the maximum value, and ny represents the refractive index in the direction orthogonal to the slow axis in the plane.

[0041]

By controlling the variation in birefringence within the range described above, the variation in transmittance (typically, single transmittance) of the polarizing film to be obtained using the stretched laminate can be significantly inhibited. That is, when the birefringence of the PVA-based resin layer changes, the crystal state of the PVA-based resin changes, and dyeing affinity in the dyeing process to be described later changes (specifically, as Δn increases, the dyeing affinity decreases). As a result, when the variation in birefringence in the width direction of the PVA-based resin layer is large, the variation in transmittance in the width direction of the polarizing film to be obtained is large. Therefore, by controlling the variation in birefringence to be equal to or less than the predetermined value, the variation in transmittance of the polarizing film can be significantly inhibited. Hereinafter, the details will be described.

Display unevenness is recognized due to variation in luminance of the liquid crystal display device. Conversely, when the variation in luminance is equal to or less than the predetermined value, the display unevenness is not recognized by the viewer. Here, when the variation in luminance ΔL^* is x and the display unevenness is y, it is known that the relationship thereof can be approximated to the linear function of the following Formula (1) (Tokyo Institute of Technology, doctoral thesis of 2000, Evidence A No. 4798, "Research on Evaluation Methods of Glass Quality Based on Visual Criteria", Kurumisawa Makoto).

$y = 2.75x - 1.54$ ･･･(1)

According to Formula (1), when x (i.e., ΔL^*) is less than 0.56, y = 0, it can be said that the display unevenness is not visually recognized. Here, the luminance L^* of the liquid crystal display device is represented by L^*// when two pieces of polarizing plates are arranged such that their absorption axes are parallel to each other, and characteristics of the polarizing plates are represented by a single transmittance (transmittance with one piece of polarizing plate) Y value: Ts. When the correlation between L^*// and Ts was examined while changing the single transmittance of the polarizing plate in a wide range, it was confirmed that the variation in luminance ΔL^*// and the variation in single transmittance ΔTs were expressed by the linear function of Formula (2).

$\Delta L^*// = 1.289 \times \Delta Ts$ ･･･(2)

According to Formula (2), it can be seen that ΔTs may be less than 0.43 in order to make the variation in luminance L^*// (corresponding to L^*) less than 0.56, which is the threshold value at which the display unevenness is not visually recognized.

However, the inventors have found that, in the stretched laminate for preparing the thin (e.g., 10 μm or less) polarizing film, the transmittance of the polarizing film can be changed due to the birefringence of the PVA-based resin layer, and as a result of trial and error through experiments, it was confirmed that there is a correlation represented by the following Formula (3) between the variation in birefringence Δn_{xy} of the PVA-based resin layer and the variation in single transmittance ΔTs.

$\Delta Ts = 9.53 \times 10^{-5} \times (\text{variation in } \Delta n_{xy})^2 + 117 \times (\text{variation in } \Delta n_{xy})$ ･･･(3)

According to Formula (3), ΔTs can be set to 0.43 or less by performing the in-air stretching such that the variation in birefringence Δn_{xy} of the PVA-based resin layer in the stretched laminate to be obtained is 0.6×10^{-3} or less, and as a result, the display unevenness can be prevented from being visually recognized.

[0042]

Further, the inventors have found that the desired variation in birefringence described above can be realized in the PVA-based resin layer of the stretched laminate to be obtained by controlling particularly conditions of the heat roll stretching in the in-air stretching process. Specifically, the desired variation in birefringence described above can be realized by controlling the variation in temperature in the width direction of the heat roll (the difference between the maximum value and the minimum value of temperature in the width direction). More specifically, as a result of trial and error by experiments, the correlation represented by the following Formula (4) was recognized between the variation in temperature in the width direction of the heat roll and the birefringence Δn_{xy}.

(Variation in temperature in width direction of heat roll)

$= 2{,}770 \times \{1{,}000 \times (\text{variation in } \Delta n_{xy})^2 + (\text{variation in } \Delta n_{xy})\}$ ･･･(4)

When Formula (4) is adopted, the variation in temperature in the width direction of the heat roll can be controlled such that the variation in birefringence Δn_{xy} of the PVA-based resin layer in the stretched laminate to be obtained is 0.6×10^{-3} or less. Specifically, the variation in temperature in the width direction of the heat roll is preferably 3°C or lower, more preferably 2°C or lower, still more preferably 1.5°C or lower, particularly preferably 1°C or lower, and most preferably 0.5°C or lower.

･･･Omitted･･･

[0044]

B. Stretched laminate

･･･Omitted･･･

[0045]

As described above, the variation in the width direction of the birefringence Δn_{xy} in the front direction of the PVA-based resin layer of the stretched laminate is 0.6×10^{-3} or less, preferably 0.4×10^{-3} or less, and more preferably 0.2×10^{-3} or less. The lower limit of the variation in birefringence Δn_{xy} is, for example, 0.1×10^{-3}. When the variation in birefringence falls within such a range, as described above, the variation in transmittance (typically, single transmittance) of the polarizing film to be obtained using the stretched laminate can be significantly inhibited.

･･･Omitted･･･

[0048]

C-1 In-water stretching

According to the preferred embodiment, the stretched laminate is subjected to an in-water stretching (in-boric-acid-solution stretching). Specifically, the in-water stretching is performed in a direction parallel to the stretching direction of the laminate. According to the in-water stretching, the stretching can be performed at a temperature lower than the glass transition temperature (typically, about 80°C) of the resin substrate or the PVA-based resin layer, and the PVA-based resin layer can be stretched at a high magnification while inhibiting crystallization thereof. As a result, a polarizing film having excellent optical characteristics (for example, polarization degree) can be prepared. In addition, in the present specification, the term "direction parallel to" includes a case of 0° +/- 5.0°, preferably 0° +/- 3.0°, and more preferably 0° +/- 1.0°.

・・・Omitted・・・

[0054]

By combining the thermoplastic resin substrate and the in-water stretching (in-boric-acid-solution stretching), the stretching can be performed at a high magnification, and a polarizing film having excellent optical characteristics (for example, polarization degree) can be prepared. Specifically, the maximum stretching magnification is preferably 5.0 times or more, more preferably 5.5 times or more, and still more preferably 6.0 times or more with respect to the original length of the laminate (including the stretching magnification of the stretched laminate). In the present specification, the "maximum stretching magnification" refers to the stretching magnification immediately before the stretched laminate is broken, and further refers to the value lower than the value obtained by confirming the stretching magnification at which the stretched laminate is broken by 0.2. In addition, the maximum stretching magnification of the laminate using the thermoplastic resin substrate can be higher by performing the in-water stretching than by only performing the in-air stretching.

・・・Omitted・・・

[0055]

C-2. Others

The dyeing treatment is typically a treatment of dyeing the PVA-based resin layer with a dichroic substance. Preferably, the dyeing treatment is performed by allowing the PVA-based resin layer to adsorb the dichroic substance. Examples of the adsorption method include a method of immersing the PVA-based resin layer (stretched laminate) in a dyeing liquid containing a dichroic substance, a method of applying the dyeing liquid to the PVA-based resin layer, and a method of spraying the dyeing liquid onto the PVA-based resin layer. Preferably, the adsorption method is a method of immersing the stretched laminate in a dyeing liquid containing a dichroic substance. This is because the dichroic substance can be satisfactorily adsorbed.

[0056]

Examples of the dichroic substance include iodine and a dichroic dye. Preferably, iodine is used. When iodine is used as the dichroic substance, the dyeing liquid is an iodine aqueous solution. The compounding amount of iodine is preferably 0.1 parts by weight to 0.5 parts by weight with respect to 100 parts by weight of water. In order to increase the solubility of iodine in water, it is preferable to add an iodide to the iodine aqueous solution. Specific examples of the iodide are as described above. The compounding amount of the iodide is preferably 0.02 parts by weight to 20 parts by weight, more preferably 0.1 parts by weight to 10 parts by weight, and still more preferably 0.7 parts by weight to 3.5 parts by weight with respect to 100 parts by weight of water. The liquid temperature during dyeing of the dyeing liquid is preferably 20°C to 50°C in order to inhibit dissolution of the PVA-based resin. When the PVA-based resin layer is immersed in the dyeing liquid, the immersion time is preferably 5 seconds to 5 minutes in order to ensure the transmittance of the PVA-based resin layer. In addition, dyeing conditions (concentration, liquid temperature, and immersion time) can be set such that the polarization degree or the single transmittance of the polarizing film to be finally obtained falls within a predetermined range. According to one embodiment, the immersion time is set such that the polarization degree of the polarizing film to be obtained is 99.98% or more. According to another embodiment, the immersion time is set such that the single transmittance of the polarizing film to be obtained is 40% to 44%.

・・・Omitted・・・

[0059]

The cross-linking treatment is typically performed by immersing the PVA-based resin layer in an aqueous solution of boric acid. By performing the cross-linking treatment, water resistance can be imparted to the PVA-based resin layer.

・・・Omitted・・・

[0064]

D. Optical film laminate and optical functional film laminate

The polarizing film can be used in an optical film laminate and/or an optical functional film laminate. FIG. 6A is a schematic cross-sectional view of an optical film laminate in which a polarizing film can be used, and FIG. 6B is a schematic cross-sectional view of an optical functional film laminate in which a polarizing film can be used. The optical film laminate 100 includes a resin substrate 11', a polarizing film 12', a pressure-sensitive adhesive layer 13, and a separator 14, in this order. The optical functional film laminate 200 includes a resin substrate 11', a polarizing film 12', an adhesive layer 15, an optical functional film 16, a pressure-sensitive adhesive layer 13, and a separator 14, in this order. In these embodiments, the resin substrate is directly used as an optical member without being peeled off from the obtained polarizing film 12'. The resin substrate 11' can function as, for example, a protective film of the polarizing film 12'.

・・・Omitted・・・

[Examples]

[0067]

Hereinafter, the present invention will be described in detail with reference to the examples. However, the present invention is not limited to these examples. In addition, methods for measuring respective characteristics are as follows.

(1) Thickness

The laminate was measured using a digital micrometer (manufactured by Anritsu Corporation, trade name: "KC-351C"). The PVA-based resin layer of the stretched laminate was measured at intervals of 100 mm in the width direction of the stretched laminate using an interference film thickness meter (manufactured by Otsuka Electronics Co., Ltd., trade name: "MCPD3000").

(2) Glass transition temperature (Tg)

Measured according to JIS K 7121.

(3) Variation in roll temperature

Measurement was performed at intervals of 100 mm along the width direction of the roll using a contact-type thermometer. The difference between the maximum value and the minimum value of the measured values was defined as the variation.

(4) Variation in birefringence

The portion of the PVA-based resin layer whose thickness was measured in the above-mentioned (1) was transferred to glass with a pressure-sensitive adhesive having no phase difference, and the front phase difference was measured using KOBRA-WPR manufactured by Oji Scientific Instruments. The obtained front phase difference value was divided by the thickness of the PVA-based resin layer obtained in the above-mentioned (1) to calculate the birefringence. The difference between the maximum value and the minimum value of the calculated birefringence was defined as the variation.

(5) Variation in single transmittance

Single transmittances Ts of polarizing plates obtained in the examples and the comparative examples were measured at intervals of 100 mm along the width direction of the polarizing film using an ultraviolet-visible spectrophotometer (manufactured by JASCO Corporation, trade name: "V7100"). The difference between the maximum value and the minimum value of the measured values was defined as the variation. The single transmittance Ts is the Y value measured by a two-degree field of view (C light source) of JIS Z 8701 and subjected to visibility correction.

(6) Display unevenness

The polarizing plates obtained in the examples and the comparative examples were cut out into two pieces in a size of 200 mm × 300 mm. Absorption axes of the two pieces of polarizing plates were overlapped with each other in a state where the absorption axes were parallel to each other and in a state where the absorption axes were orthogonal to each other, and each of the overlapped polarizing plates was disposed on a backlight (5,000 cd), and display unevenness was visually confirmed. The case where the display unevenness was not visually recognized in both the parallel state and the orthogonal state was evaluated as '○', and the case where the display unevenness was visually recognized in at least one of the parallel state and the orthogonal state was evaluated as 'x'."

(3) "[0068]
[Example 1]
As the thermoplastic resin substrate, an amorphous isophthalic acid-copolymerized polyethylene terephthalate (IPA copolymerized PET) film (thickness: 100 μm) having an elongated shape, a water absorption of 0.75%, and a Tg of 75°C was used.
One surface of the thermoplastic resin substrate was subjected to a corona treatment (treatment condition: 55W･min/m^2), and an aqueous solution containing 90 parts by weight of polyvinyl alcohol (polymerization degree: 4,200, saponification degree: 99.2 mol%) and 10 parts by weight of acetoacetyl-modified PVA (polymerization degree: 1,200, acetoacetyl modification degree: 4.6%, saponification degree: 99.0 mol% or more, manufactured by The Nippon Synthetic Chemical Industry Co., Ltd., trade name: "GOHSEFIMER Z200") was applied to the corona-treated surface at 60°C and dried to form a PVA-based resin layer having a thickness of 11 μm, thereby preparing a laminate.
[0069]
The obtained laminate was sandwiched between roll pairs respectively provided at an inlet and an outlet of a temperature-adjustable oven and was stretched 1.5 times in the longitudinal direction with a circumferential speed difference between these rolls (zone stretching process). The zone-stretched laminate was further stretched 1.3 times between a plurality of rolls heated to 130°C (heat roll stretching process). In this manner, the laminate was subjected to in-air stretching at a total stretching magnification of 2.0 times. In addition, the roll was provided with a spiral pipe as shown in FIG. 4B, and the roll was heated by flowing a heating medium through the pipe. The volume of the heat medium in the heat roll is 40 L, and the flow rate of the heat medium is 400 L/min, and therefore, the ratio of the volume of the heat medium in the heat roll and the flow rate of the heat medium (flow rate of heat medium/volume of heat medium in heat roll) was 10 times/min. The variation in temperature (the difference between the maximum value and the minimum value) in the width direction of the roll was 0.1°C. The variation in the width

direction of the birefringence Δn_{xy} in the front direction of the PVA-based resin layer of the obtained stretched laminate (width: 2,500 mm) was 0.13 × 10^{-3}. The center value of the birefringence Δn_{xy} was 16.6 × 10^{-3}.

[0070]

Next, the stretched laminate was immersed in an insolubilization bath (an aqueous solution of boric acid obtained by compounding 100 parts by weight of water with 4 parts by weight of boric acid) having a liquid temperature of 30°C for 30 seconds (insolubilization treatment).

Next, the stretched laminate was immersed in a dyeing bath having a liquid temperature of 30°C while the iodine concentration and the immersion time were adjusted such that the transmittance of the polarizing film to be obtained was 42.6%. In this example, an iodine aqueous solution obtained by compounding 100 parts by weight of water with 0.2 parts by weight of iodine and 1.0 parts by weight of potassium iodide was used as the dyeing bath, and the stretched laminate was immersed in the dyeing bath for 60 seconds (dyeing treatment).

Next, the stretched laminate was immersed in a cross-linking bath (an aqueous solution of boric acid obtained by compounding 100 parts by weight of water with 3 parts by weight of potassium iodide and 3 parts by weight of boric acid) having a liquid temperature of 30°C for 30 seconds (cross-linking treatment).

Thereafter, while the stretched laminate was immersed in an aqueous solution of boric acid (an aqueous solution of boric acid obtained by compounding 100 parts by weight of water with 5 parts by weight of potassium iodide and 4 parts by weight of boric acid) having a liquid temperature of 70°C, uniaxial stretching was performed between rolls having different circumferential speeds such that the total stretching magnification became 5.5 times in the vertical direction (longitudinal direction) (in-water stretching).

Thereafter, the stretched laminate was immersed in a washing bath (an aqueous solution obtained by compounding 100 parts by weight of water with 4 parts by weight of potassium iodide) having a liquid temperature of 30°C (washing treatment).

Thus, a polarizing film having a thickness of 5 μm was formed on the thermoplastic resin substrate.

[0071]

Subsequently, a PVA-based resin aqueous solution (manufactured by The Nippon Synthetic Chemical Industry Co., Ltd., trade name: "GOHSEFIMER (registered trademark) Z-200", resin concentration: 3% by weight) was applied to the surface of the polarizing film of the laminate obtained as described above, and a triacetyl cellulose film (manufactured by Konica Minolta, Inc., trade name: "KC4UY", thickness: 40 μm) was bonded thereon, followed by heating in an oven maintained at 60°C for 5 minutes to prepare an optical functional film laminate (polarizing plate) provided with a polarizing film having a thickness of 5 μm. Subsequently, the thermoplastic resin substrate was peeled off to obtain a polarizing plate having a configuration in which a protective film is provided on one surface.

[0072]

The transmittance (single transmittance) of the obtained polarizing plate was 42.6%. The variation in single transmittance (the difference between the maximum value and the minimum value) was 0.02%. Further, when the display unevenness of the obtained polarizing plate was observed as described in the above-mentioned (6), the display unevenness was not recognized.

[0073]

[Example 2]

In the in-air stretching process, a stretched laminate was prepared in the same manner as in Example 1 except that the ratio of the volume of the heat medium in the heat roll and the flow rate of the heat medium was 5 times/min. The variation in temperature in the width direction of the roll was 1.4°C, and the variation in birefringence Δn_{xy} of the PVA-based resin layer of the obtained stretched laminate was 0.36×10^{-3}. A polarizing plate was prepared in the same manner as in Example 1 except that this stretched laminate was used. The obtained polarizing plate was evaluated in the same manner as in Example 1. Results are shown in Table 1.

[0074]

[Example 3]

In the in-air stretching process, a stretched laminate was prepared in the same manner as in Example 1 except that the ratio of the volume of the heat medium in the heat roll and the flow rate of the heat medium was 2.5 times/min. The variation in temperature in the width direction of the roll was 2.7°C, and the variation in birefringence Δn_{xy} of the PVA-based resin layer of the obtained stretched laminate was 0.58×10^{-3}. A polarizing plate was prepared in the same manner as in Example 1 except that this stretched laminate was used. The obtained polarizing plate was evaluated in the same manner as in Example 1. Results are shown in Table 1.

[0075]

[Comparative Example 1]

In the in-air stretching process, a stretched laminate was prepared in the same manner as in Example 1 except that the ratio of the volume of the heat medium in the heat roll and the flow rate of the heat medium was 0.5 times/min. The variation in temperature in the width direction of the roll was 4.5°C, and the variation in birefringence Δn_{xy} of the PVA-based resin layer of the obtained stretched laminate was 1.0×10^{-3}. A polarizing plate was prepared in the same manner as in Example 1 except that this stretched laminate was used. The obtained polarizing plate was evaluated in the same manner as in Example 1. Results are shown in Table 1.

[0076]

[Comparative Example 2]

In the in-air stretching process, a stretched laminate was prepared in the same manner as in Example 1 except that a linear pipe as shown in FIG. 4A was provided and the roll was heated by flowing a heating medium through the pipe, and the ratio of the volume of the heat medium in the heat roll and the flow rate of the heat medium was 0.5 times/min. The variation in temperature in the width direction of the roll was 3.9°C, and the variation in birefringence Δn_{xy} of the PVA-based resin layer of the obtained stretched laminate was 0.80×10^{-3}. A polarizing plate was prepared in the same manner as in Example 1 except that this stretched laminate was used. The obtained polarizing plate was evaluated in the same manner as in Example 1. Results are shown in Table 1.

[0077]

[Table 1]

	ロール温度（℃）	ロール内配管形状	熱ロール中の熱媒体積（l）	熱媒流量（l/分）	比（倍/分）	複屈折	単体透過率（%）	表示ムラ
中心値（設定値）	130	－	－	－	－	0.0166	42.6	－
	ばらつき					ばらつき	ばらつき	
実施例1	0.1	らせん	40	400	10.0	0.00013	0.02	○
実施例2	1.4	らせん	40	200	5.0	0.00036	0.17	○
実施例3	2.7	らせん	40	100	2.5	0.00058	0.39	○
比較例1	4.5	らせん	40	20	0.5	0.00100	1.00	×
比較例2	3.9	直線	280	150	0.54	0.00080	0.70	×

	Roll temperature (°C)	In-roll pipe shape	Volume of heat medium in heat roll (1)	Flow rate of heat medium (1/min)	Ratio (times/min)	Birefringence	Single transmittance (%)	Display unevenness
Center value (set value)								
	Variation							
Example 1		Spiral						
Example 2		Spiral						
Example 3		Spiral						
Comparative Example 1		Spiral						
Comparative Example 2		Linear						

[0078]
[Evaluation]
As is clear from Table 1, by reducing the variation in birefringence Δn_{xy} of the PVA-based resin layer of the stretched laminate, the variation in single transmittance of the polarizing plate to be obtained can be reduced. As a result, the display unevenness can be reduced. Further, as is clear from Table 1, it can be seen that the variation in birefringence can be controlled by adjusting the variation in temperature of the heat roll in the heat roll stretching in the in-air stretching."

2 Invention described in Cited Document 1

Cited Document 1 describes a "manufacturing method for a polarizing film" according to Claim 8 that is dependent on Claims 1 to 7. In addition, paragraphs [0067] to [0072] of Cited Document 1 describe a "polarizing plate" obtained by specifically applying the "manufacturing method for a polarizing film" as Example 1.

Therefore, Cited Document 1 describes the following invention of a "polarizing plate" (hereinafter referred to as "the cited invention").

The terms "process of dyeing" and "dyeing process" are unified to the latter.

"A polarizing plate having a configuration in which a protective film is provided on one surface, obtained by: applying an aqueous solution containing 90 parts by weight of polyvinyl alcohol and 10 parts by weight of acetoacetyl-modified PVA to one surface of a thermoplastic resin substrate and drying the aqueous solution to form a PVA-based resin layer having a thickness of 11 µm, thereby preparing a laminate;

sandwiching the obtained laminate between roll pairs respectively provided at the inlet and the outlet of a temperature-adjustable oven, and stretching the laminate 1.5 times in the longitudinal direction with a circumferential speed difference between these rolls (zone stretching process);

further stretching the stretched laminate 1.3 times between a plurality of rolls heated to 130°C (heat roll stretching process), and performing in-air stretching at a total stretching magnification of 2.0 times,

here, the variation in temperature (the difference between the maximum value and the minimum value) in the width direction of the roll in the heat roll stretching process is 0.1°C, and the variation in the width direction of birefringence Δn_{xy} in the front direction of the PVA-based resin layer of the obtained stretched laminate (width: 2,500 mm) is 0.13 $\times 10^{-3}$;

next, immersing the stretched laminate in an insolubilization bath having a liquid temperature of 30°C for 30 seconds (insolubilization treatment);

next, immersing the stretched laminate in a dyeing bath having a liquid temperature of 30°C while adjusting the iodine concentration and the immersion time such that the transmittance of the polarizing film to be obtained is 42.6% (dyeing treatment);

next, immersing the stretched laminate in a cross-linking bath having a liquid temperature of 30°C for 30 seconds (cross-linking treatment);

thereafter, while immersing the stretched laminate in an aqueous solution of boric acid having a liquid temperature of 70°C, performing uniaxial stretching between rolls having different circumferential speeds such that the total stretching magnification became 5.5 times in the vertical direction (in-water stretching);

forming a polarizing film having a thickness of 5 μm on the thermoplastic resin substrate; and

subsequently, bonding a triacetyl cellulose film on the surface of the polarizing film of the obtained laminate to prepare a polarizing plate provided with a polarizing film having a thickness of 5 μm, and subsequently, peeling the thermoplastic resin substrate off,

in the polarizing plate, the transmittance (single transmittance) of the polarizing plate is 42.6%, and the variation in single transmittance (the difference between the maximum value and the minimum value) is 0.02%.

Here, the variation in single transmittance is

the difference between the maximum value and the minimum value measured at intervals of 100 mm along the width direction of the polarizing film, and the single transmittance Ts is a Y value measured by a two-degree field of view (C light source) of

JIS Z 87012 and subjected to visibility correction."

3 Description of Reference Document 1

Reference Document 1 (Japanese Unexamined Patent Application Publication No. 2017-68282) describes an invention that can be made available to the public in Japan or abroad through electric communication lines in advance of the prior application and includes the following descriptions.

Note that underlines are added by the body, and the underlines indicate portions used for recognition, judgment, etc. of common technical knowledge.

(1) "[Claims]
[Claim 1]
A polarizing film for an organic EL display device on a continuous web made of a polyvinyl alcohol-based resin in which a dichroic substance is oriented, wherein
the polarizing film is provided with a thickness of 10 μm or less by stretching a laminate including the polyvinyl alcohol-based resin layer formed on an amorphous thermoplastic resin substrate in a two-stage stretching process including preliminary in-air stretching and in-boric-acid-solution stretching, and
the polarizing film is provided with optical characteristics satisfying conditions of
$T \geq 42.5$ and $P \geq 99.5$,
where T represents the single transmittance and P represents the polarization degree."

(2) "[Detailed Description of the Invention]
[Technical Field]
[0001]
The present invention relates to a polarizing film, an optical film laminate including the polarizing film, a stretched laminate for use in manufacturing of the optical film laminate including the polarizing film, methods for manufacturing those, and an organic EL display device including the polarizing film. In particular, the present invention relates to a polarizing film having a thickness of 10 μm or less made of a polyvinyl alcohol-based resin in which a dichroic substance is oriented, an optical film laminate including such a polarizing film, a stretched laminate for use in manufacturing of the optical film laminate including such a polarizing film, methods for manufacturing those, and an organic EL display device including such a polarizing film.
･･･Omitted･･･
[Technical Problem]

[0014]

The method for manufacturing a polarizing film by coating and forming a PVA-based resin layer on a thermoplastic resin substrate and stretching the PVA-based resin layer and the thermoplastic resin substrate is already known as described in Patent Documents 1 to 5. However, a highly functional polarizing film having a very thin thickness of 10 μm or less and satisfying optical characteristics of a single transmittance of 42.5 or more and a polarization degree of 99.5 or more, preferably a single transmittance of 43.0 or more and a polarization degree of 99.5 or more, which is required as a polarizing film for an organic EL display device, has not yet been realized or has not yet been stably manufactured.

･･･Omitted･･･

[Solution to Problem]

[0016]

The inventors have completed the present invention by succeeding in obtaining a novel polarizing film that has a thickness of 10 μm or less and in which the optical characteristics represented by the single transmittance T and the polarization degree P can satisfy characteristics required for a polarizing film to be used in an optical display device, by integrally stretching an amorphous thermoplastic resin substrate and a PVA-based resin layer coated and formed thereon in a two-stage stretching process including preliminary in-air stretching and in-boric-acid-solution stretching, and subjecting the PVA-based resin layer to a dyeing treatment with a dichroic dye. The present inventors set, as optical characteristics required for the polarizing film to be used in the organic EL display device, conditions represented by

$T \geq 42.5$ and $P \geq 99.5$,

where T represents the single transmittance and P represents the polarization degree. The present invention provides an organic EL display device using a polarizing film having a thickness of 10 μm or less and in which the optical characteristics represented by the single transmittance T and the polarization degree P satisfy the conditions described above, which is obtained by the stretching and the dyeing described above."

(3) "[Description of Embodiments]

[0064]

(Technical background related to polarizing film)

As the background art of the polarizing film, material characteristics of the thermoplastic resin substrate used in the present invention and optical characteristics represented by polarization performance of the polarizing film will be described.

･･･Omitted･･･
[0068]
Next, the optical characteristics of the polarizing film that can be used in the organic EL display device will be outlined.
In short, the optical characteristics of the polarizing film refer to the polarization performance represented by the polarization degree P and the single transmittance T. In general, the polarization degree P and the single transmittance T of the polarizing film are in a trade-off relationship. These two optical characteristic values can be represented by a T-P graph. In the T-P graph, as the plotted line is in a direction in which the single transmittance is high and in a direction in which the polarization degree is high, the polarization performance of the polarizing film is excellent.
[0069]
Here, referring to FIG. 3 showing the T-P graph, ideal optical characteristics are when T = 5.0% and P = 100%. As can be seen from the figure, the P value tends to be easily increased when the T value is lower, and the P value is less likely to be increased when the T value is higher. Further, referring to FIG. 4 showing a function of the transmittance T and the polarization degree P for the polarization performance of the polarizing film, regarding the single transmittance T and the polarization degree P of the polarizing film, a range defined as the region above the line 1 (T = 42.5) and the line 2 (P = 99.5) in FIG. 4 is a performance considered to be an optical characteristic required as the polarizing film performance of the organic EL display device. The single transmittance T is more preferably $T \geq 43.0$."

(4) "[0085]
[Example 1]
As an amorphous ester-based thermoplastic resin substrate, a substrate of a continuous web of isophthalic acid-copolymerized polyethylene terephthalate (hereinafter, referred to as "amorphous PET") obtained by copolymerizing isophthalic acid in an amount of 6 mol% was prepared. The glass transition temperature of the amorphous PET is 75°C. A laminate composed of the amorphous PET substrate of the continuous web and a polyvinyl alcohol (hereinafter, referred to as "PVA") layer was prepared as follows. The glass transition temperature of the PVA is 80°C.
[0086]
An amorphous PET substrate having a thickness of 200 µm and a PVA aqueous solution having a concentration of 4% to 5% obtained by dissolving a PVA powder having a polymerization degree of 1,000 or more and a saponification degree of 99% or more in

water were prepared.
・・・Omitted・・・
Next, a PVA aqueous solution was applied to the above-mentioned amorphous PET substrate having a thickness of 200 μm and dried at a temperature of 50°C to 60°C to form a PVA layer having a thickness of 7 μm on the amorphous PET substrate. Hereinafter, this is referred to as "a laminate in which a 7 μm-thick PVA layer is formed on an amorphous PET substrate", "a laminate including a 7 μm-thick PVA layer", or simply "a laminate".
[0087]
A laminate including a 7 μm-thick PVA layer was subjected to the following processes including a two-stage stretching process of preliminary in-air stretching and in-boric-acid-solution stretching to manufacture a 3 μm-thick polarizing film.
・・・Omitted・・・
[0088]
Next, a dyed laminate in which iodine was absorbed in a 5 μm-thick PVA layer in which PVA molecules were oriented was formed by the dyeing process. Hereinafter, this is referred to as "the dyed laminate". Specifically, the dyed laminate is obtained by immersing the stretched laminate in a dyeing solution containing iodine and potassium iodide at a liquid temperature of 30°C for an arbitrary time such that the single transmittance of the PVA layer constituting the polarizing film to be finally formed is 40% to 44%, thereby allowing the PVA layer contained in the stretched laminate to adsorb iodine.
・・・Omitted・・・
[0089]
・・・Omitted・・・
In Example 1, the immersion time of the stretched laminate in the dyeing solution having an iodine concentration of 0.30% by weight and a potassium iodide concentration of 2.1% by weight was changed to adjust an iodine adsorption amount such that the single transmittance of the polarizing film to be finally formed was 40% to 44%, thereby forming various dyed laminates having different single transmittances and polarization degrees.
[0090]
Further, in the in-boric-acid-solution stretching process, which is a second stage, the dyed laminate was further stretched integrally with the amorphous PET substrate to form an optical film laminate including a PVA layer constituting a 3 μm-thick polarizing film.
・・・Omitted・・・

[0092]

As described above, in Example 1, first, the laminate in which the 7 μm-thick PVA layer was formed on the amorphous PET substrate was subjected to the preliminary in-air stretching at a stretching temperature of 130°C to form a stretched laminate, then the stretched laminate was subjected to dyeing to form a dyed laminate, and further, the dyed laminate was subjected to the in-boric-acid-solution stretching at a stretching temperature of 65°C to form an optical film laminate including a 3 μm-thick PVA layer that was stretched integrally with the amorphous PET substrate such that the total stretching magnification became 5.94 times. It was possible to form an optical film laminate including a 3 μm-thick PVA layer constituting a polarizing film in which PVA molecules of the PVA layer formed on the amorphous PET substrate were highly oriented by such two-stage stretching, and iodine absorbed by dyeing was highly oriented in one direction as a polyiodine ion complex."

(5) "[0144]

[Table 2]

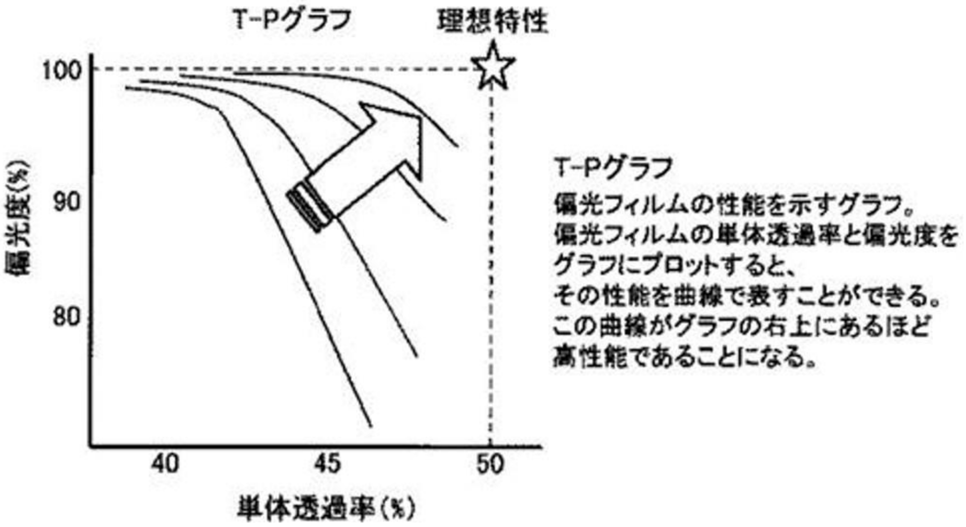
実施例番号	延伸対象	補助延伸条件	水中延伸条件	空中延伸条件	総延伸倍(倍)	偏光膜厚(μm)	単体透過(%)	偏光度(－)	反射率(%)	ディスプレ白輝度	反り(mm)	色ムラ
実施例4－1	PVA・基材積層体	130℃ 1.8倍	75℃ 3.3倍	-	5.94	3	43.5	99.97	1.5	99	○ 0.3	○
実施例8－1	PVA・基材積層体	130℃ 1.5倍	75℃ 4.0倍	-	6	3	43	99.97	1.5	98	○ 0.3	○
実施例12－1	PVA・基材積層体	150℃ 1.8倍	3.3倍	-	5.94	3	44	99.9	1.5	100	○ 0.3	○
実施例19－1	PVA・基材積層体	130℃ 2.0倍	75℃ 3.0倍	-	6	3.5	44.5	99.5	1.6	101	○ 0.3	○
実施例19－2	PVA・基材積層体	130℃ 2.0倍	75℃ 3.0倍	-	6	3.5	43	99.99	1.4	98	○ 0.3	○
実施例19－3	PVA・基材積層体	130℃ 2.0倍	75℃ 3.0倍	-	6	3.5	42.5	99.994	1.3	97	○ 0.3	○
実施例20－1	PVA・基材積層体	130℃ 2.0倍	75℃ 3.0倍	-	6	2.5	43	99.99	1.4	98	○ 0.2	○
実施例21－1	PVA・基材積層体	130℃ 2.0倍	75℃ 3.0倍	-	6	6	43	99.99	1.4	98	○ 0.4	○
実施例22－1	PVA・基材積層体	130℃ 2.0倍	75℃ 3.0倍	-	6	10	43	99.99	1.4	98	○ 0.5	○
実施例23－1	PVA・基材積層体	130℃ 2.0倍	75℃ 3.25倍	-	6.5	3.5	43.7	99.97	1.5	100	○ 0.3	○
実施例24－1	PVA・基材積層体	110℃ 2.0倍	75℃ 2.5倍	-	5	3.5	43	99.5	1.6	98	○ 0.3	○
実施例25－1	PVA・基材積層体	95℃ 2.0倍	75℃ 2.5倍	-	5	3.5	42.5	99.5	1.6	97	○ 0.3	○
比較例1－1	PVA・基材積層体	-	-	130℃ 4.0倍	4	3.5	44	98	2.3 ×	100	○ 0.3	○
比較例1－2	PVA・基材積層体	-	-	130℃ 4.0倍	4	3.5	41.5	99.9	1.5	95 ×	○ 0.3	○
比較例4－1	PVA単層体	-	60℃ 6倍	-	6	30	43.8	99.9	1.5	100	× 3.3	×

Example number	Stretching object	Auxiliary stretching condition	In-water stretching condition	In-air stretching condition	Total stretching magnification	Polarizing film thickness (μm)	Single transmittance (%)	Polarization degree (-)	Reflectance (%)	Display white luminance	Warpage (mm)	Color unevenness

					(times)							
Example 4-1	PVA substrate laminate	130°C 1.8 times	75°C 3.3 times									
Example 8-1	PVA substrate laminate	130°C 1.5 times	75°C 4.0 times									
Example 12-1	PVA substrate laminate	150°C 1.8 times	3.3 times									
Example 19-1	PVA substrate laminate	130°C 2.0 times	75°C 3.0 times									
Example 19-2	PVA substrate laminate	130°C 2.0 times	75°C 3.0 times									
Example 19-3	PVA substrate laminate	130°C 2.0 times	75°C 3.0 times									
Example 20-1	PVA substrate laminate	130°C 2.0 times	75°C 3.0 times									
Example 21-1	PVA substrate laminate	130°C 2.0 times	75°C 3.0 times									
Example 22-1	PVA substrate laminate	130°C 2.0 times	75°C 3.0 times									
Example 23-1	PVA substrate laminate	130°C 2.0 times	75°C 3.25 times									
Example 24-1	PVA substrate laminate	110 °C 2.0 times	75°C 2.5 times									
Example 25-1	PVA substrate laminate	95°C 2.0 times	75°C 2.5 times									
Comparative Example 1-1	PVA substrate laminate			130°C 4.0 times								
Comparative Example 1-2	PVA substrate laminate			130°C 4.0 times								
Comparative Example 4-1	PVA single layer		60 °C 6 times									

" (Note from the body: For convenience, it was rotated by 90° and the aspect ratio was adjusted.)

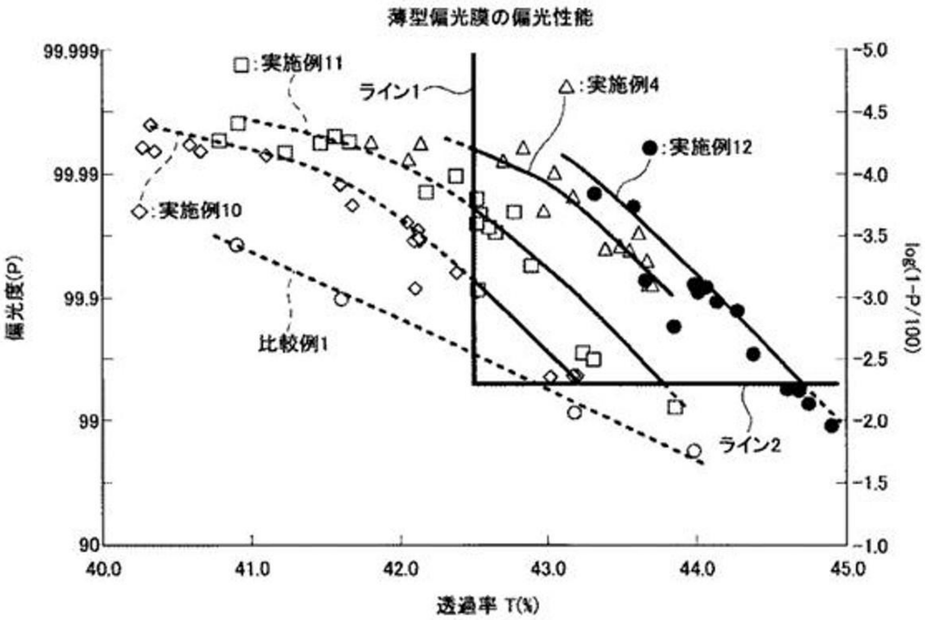
(6) [FIG. 3]
"



"

偏光度(%)	Polarization degree (%)
単体透過率(%)	Single transmittance (%)
T-P グラフ	T-P Graph
理想特性	Ideal characteristics
T-P グラフ 偏光フィルムの性能を示すグラフ。 偏光フィルムの単体透過率と偏光度をグラフにプロットすると、その性能を曲線で表すことができる。 この曲線がグラフの右上にあるほど高性能であることになる。	T-P graph A graph showing the performance of the polarizing film. When the single transmittance and the polarization degree of the polarizing film are plotted on the graph, the performance thereof can be represented by a curve. The higher the curve is on the upper right of the graph, the higher the performance is.

(7) [FIG. 15]

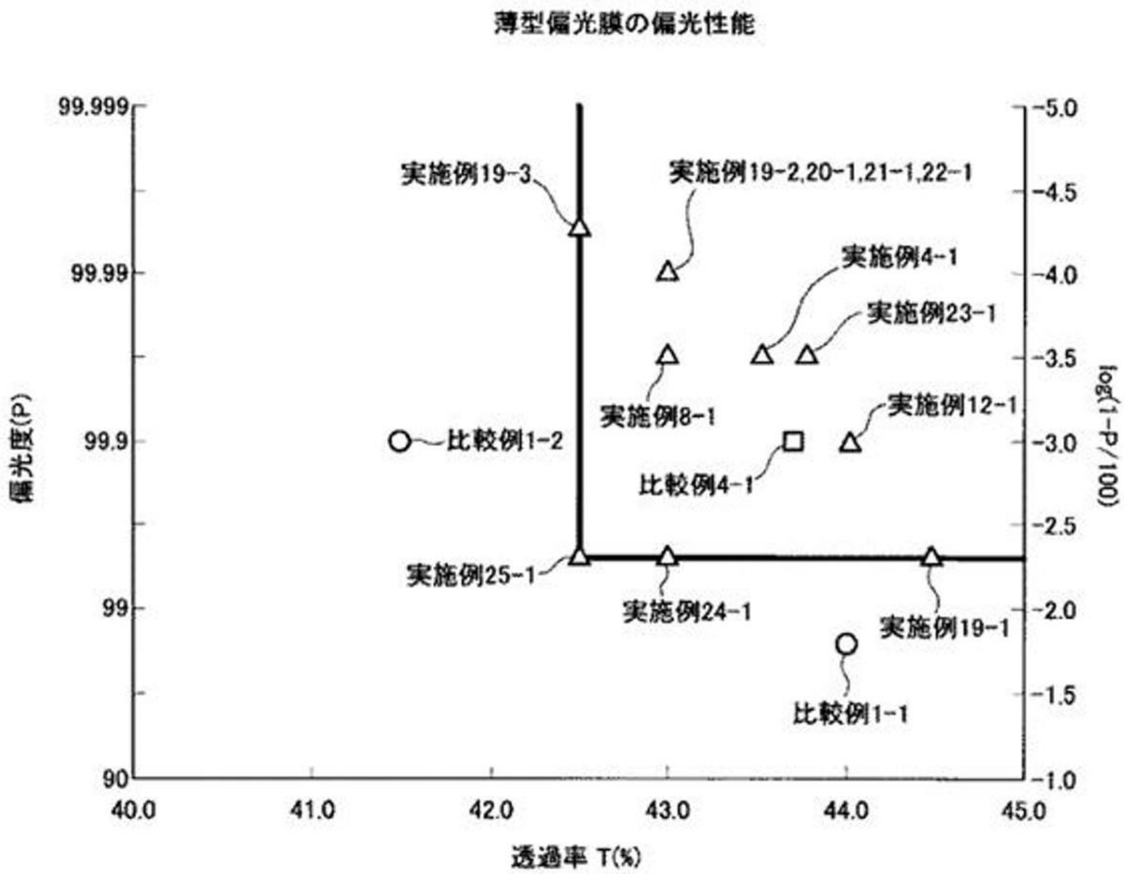


偏光度(P)	Polarization degree (P)
透過率 T(%)	Transmittance T (%)
薄型偏光膜の偏光性能	Polarization performance of thin polarizing film
実施例 10	Example 10
実施例 11	Example 11
実施例 4	Example 4
実施例 12	Example 12
比較例1	Comparative Example 1
ライン1	Line 1
ライン2	Line 2

" (Note from the body: For convenience, FIG. 15 is rotated by 90°.)

(8) [FIG. 30]

"



偏光度(P)	Polarization degree (P)
透過率 T(%)	Transmittance T (%)
薄型偏光膜の偏光性能	Polarization performance of thin polarizing film
実施例 19-3	Example 19-3
実施例 19-2，20-1，21-1，22-1	Examples 19-2, 20-1, 21-1, and 22-1
実施例 4-1	Example 4-1
実施例 8-1	Example 8-1
実施例 23-1	Example 23-1
実施例 12-1	Example 12-1
実施例 25-1	Example 25-1
実施例 24-1	Example 24-1
実施例 19-1	Example 19-1
比較例 1-1	Comparative Example 1-1
比較例 1-2	Comparative Example 1-2
比較例 4-1	Comparative Example 4-1

" (Note from the body: For convenience, FIG. 30 is rotated by 90°.)

3 Comparison and Judgment

(1) Comparison

In view of the case, Present Invention 2 will be examined.

The comparison between Present Invention 2 and the cited invention is as follows.

(A) Polarizing film

The "polarizing film" in the cited invention has a "thickness of 5 μm".

The term "polarizing film" in the cited invention is as indicated by the wording.

Consequently, the "polarizing film" in the cited invention is equivalent to the "polarizing film" in Present Invention 2 and satisfies the requirement of "having a thickness of 8 μm or less".

(B) Protective layer

Since the "polarizing plate" in the cited invention is a "polarizing plate having a configuration in which a protective film is provided on one surface", it can be recognized that the "protective film" is "one of those forming the overlap" in the "polarizing plate" in view of the laminated structure thereof.

Therefore, the "protective film" in the cited invention is equivalent to the "protective layer" in Present Invention 2.

(Note from the body: a "layer" means "one of those forming the overlap" [KOJIEN, 7th edition, Iwanami Shoten]).

(C) Polarizing plate

The "polarizing plate" in the cited invention is a "polarizing plate having a configuration in which a protective film is provided on one surface, obtained by: preparing a polarizing plate provided with a polarizing film having a thickness of 5 μm, and subsequently, peeling the thermoplastic resin substrate off". Here, the "polarizing plate" in the cited invention is as indicated by the wording and is equivalent to the "polarizing plate" of Present Invention 2.

In addition, the "protective film" is equivalent to the "protective layer" in Present Invention 2 as described in the above-mentioned (B).

According to the above, the "polarizing plate" in the cited invention satisfies the requirement of "including a polarizing film" "having a thickness of 8 μm or less", "and a protective layer disposed on at least one side of the polarizing film" in the "polarizing plate" in Present Invention 2.

(D) Width direction dimension

The "polarizing plate" in the cited invention was obtained by "performing in-air stretching at a total stretching magnification of 2.0 times" and regarding "the obtained stretched laminate (width: 2,500 mm)", "performing uniaxial stretching between rolls having different circumferential speeds such that the total stretching magnification became 5.5 times in the vertical direction (in-water stretching)".

Thus, from a simple technical consideration, the width of the polarizing plate to be finally obtained is about 1,500 mm.

According to the above, the "polarizing plate" in the cited invention satisfies the requirement of "having a width of 1,000 mm or more" in the "polarizing plate" in Present Invention 2.

(Note from the body: The width direction dimension of the polarizing plate was estimated based on 2.75 times [= 5.5 ÷ 2.0 times] the magnification of the in-water stretching understood as free-end longitudinal uniaxial stretching and the width direction dimension "2,500 mm" before the in-water stretching [$= 2{,}500 \div (2.75)^{0.5} \approx 1{,}508$ mm]).

(2) Corresponding features and different features

(A) Corresponding features

Present Invention 2 and the cited invention are common in the following configuration.

"A polarizing plate including a polarizing film having a thickness of 8 μm or less, and a protective layer disposed on at least one side of the polarizing film, wherein

the polarizing plate having a width of 1,000 mm or more".

(B) Different features

Present Invention 2 and the cited invention are different from each other in the following points.

(Different feature 1)

Regarding the "polarizing film", Present Invention 2 describes "having a single transmittance of 43.5% to 44.0%, and a polarization degree of 99.940% to 99.990%", whereas in the cited invention, "the transmittance (single transmittance) of the polarizing plate is 42.6%" and the polarization degree is not specified.

(Different feature 2)

Regarding the "single transmittance", in Present Invention 2, "the difference between the maximum value and the minimum value is 0.2% or less" at "five positions at equal intervals along the width direction", whereas in the cited invention, "the variation in single transmittance (the difference between the maximum value and the minimum value)" "of the polarizing plate", which is "the difference between the maximum value and the minimum value measured at intervals of 100 mm along the width direction of the polarizing film", "is 0.02%".

(3) Judgment

The above-mentioned different features will be examined.

(A) Regarding the different feature 1

It is common technical knowledge for a person skilled in the art in the technical field of polarizing plates that the single transmittance and the polarization degree of the polarizing film are in a trade-off relationship, and by changing dyeing conditions such as dyeing time, dyeing temperature, and dye concentration, the single transmittance can be adjusted to be relatively high and the polarization degree can be adjusted to be relatively low, or the former can be adjusted to be relatively low and the latter can be adjusted to be relatively high. (Note from the body: Refer to paragraph [0056] of Cited Document 1, and paragraphs [0068] to [0069], [0089], and [0144], [Table 2] (in particular, Example 4-1 and Example 23-1), [FIG. 15], [FIG. 30], etc., of Reference Document 1).

In addition, when higher optical performance (paragraph [0069] and the upper-right region of the T-P graph in [FIG. 3] of Reference Document 1) is desired, for example, as can be understood from [Table 2], [FIG. 15], and Example 4-1 and Example 23-1 in [FIG. 30] of Reference Document 1, it is also possible to perform adjustment (adjustment to deviate from the same curve in the T-P graph) to increase the single transmittance while maintaining the polarization degree substantially constant by changing the stretching magnification or the like in addition to the dyeing conditions, and a person skilled in the art knows that such adjustment is possible.

(Note from the body: In both Example 4-1 and Example 23-1, the polarizing film in Present Invention 2 is located in the vicinity of the curve when the polarizing film is represented by the T-P graph.)

As described above, in the cited invention, it could have been easily conceived by a person skilled in the art who knows the above-mentioned common technical knowledge to satisfy the requirements of the single transmittance and the polarization degree according to the different feature 1 by adjusting the dyeing conditions and the stretching conditions according to the optical characteristics required for the polarizing film.

(B) Regarding the different feature 2

In the cited invention, "the variation in single transmittance (the difference between the maximum value and the minimum value)", which is "the difference between the maximum value and the minimum value measured at intervals of 100 mm along the width direction of the polarizing film", "is 0.02%". In addition, it is recognized that this measurement condition is stricter than that in Present Invention 2, which is "the difference between the maximum value and the minimum value of the single transmittance at five positions at equal intervals along the width direction".

Consequently, it is recognized that the cited invention satisfies the requirement in Present Invention 2 according to the different feature 2.

In addition, in the above-mentioned (A), as a result of examining changing the manufacturing conditions of the polarizing film, such as the dyeing conditions and the stretching conditions, when the manufacturing conditions are changed, the "variation in single transmittance" may also change. However, it is unlikely that the "variation in single transmittance" in the cited invention defined as "0.02%" deteriorates to the extent of exceeding "0.2%".

Alternatively, as a method for inhibiting the variation in single transmittance, a person skilled in the art knows a method for minimizing the "variation in temperature (the difference between the maximum value and the minimum value) in the width direction of the roll" in the "heat roll stretching process" as in the cited invention. In addition, for example, in order to inhibit disturbance of the orientation of stretched polyvinyl alcohol, that is, a decrease in the degree of orientation, the method for adding a halide to the polyvinyl alcohol-based resin layer (paragraph [0103] of International Publication No. WO 2015/137514) and the finding that the single transmittance is stable without decreasing in the central portion in the width direction as compared with the end portion of the elongated polarizing plate [Japanese Unexamined Patent Application Publication No. 2006-227604 (paragraphs [0005] and [0069], [FIG. 1], etc.)] are provided as common technical knowledge.

Here, according to the descriptions of paragraphs [0006], [0041], and [0042] of Cited Document 1, the cited invention is an invention mainly intended to inhibit the variation in single transmittance of the polarizing plate in the width direction.

Consequently, it is considered that a person skilled in the art takes various countermeasures so as to continuously satisfy the different feature 2 even when the optical characteristics (single transmittance and polarization degree) of the polarizing plate in the cited invention are improved and adjusted to the numerical range of the different feature 1 as described in the above-mentioned (A).

Then, in the elongated polarizing plate thus obtained, it is recognized that the different features 1 and 2 are satisfied at any position in the longitudinal direction (in particular, at

the central region in the width direction where the optical characteristics are relatively stable).
(Note from the body: the different features 1 and 2 are technically related to each other, and thus the different feature 1 has been described also in the above-mentioned [A]).

(C) Note
The "single transmittance" and the "polarization degree" in Present Invention 2 are those of the "polarizing film", whereas the "single transmittance", etc., of the cited invention are those of the "polarizing plate". However, as can be understood from the descriptions of paragraphs [0014], [0066], [0072], etc., in the specification of the present application, the "polarizing film" and the "polarizing plate" can be regarded as the same or can be substituted.

(4) Advantageous Effects of Invention
Paragraph [0006] of the specification of the present application describes, as an advantageous effects of invention, that "according to the present invention, there can be provided a polarizing plate including a polarizing film having a thickness of 8 μm or less, a single transmittance of 43.5% or more, and a polarization degree of 99.940% or more, the polarizing plate having excellent optical characteristics and inhibited variation in optical characteristics".
However, the above-mentioned effect is an effect exerted by an invention that could have been conceived by a person skilled in the art based on the cited invention and is a matter that could have been expected by a person skilled in the art based on the invention described in Cited Document 1 and common technical knowledge.

(5) Allegations of the appellant
The appellant alleges the following points in the written opinion dated January 30, 2020.

(A) The cited invention is merely an invention relating to how the variation is reduced when the single transmittance is the same, and merely shows the best result when the single transmittance is 42.6%.
(B) In the cited invention, a variation of 0.2% or less in the width direction cannot be realized.
(C) Since TP curves in the present invention and the cited invention are completely different from each other, no matter how the dyeing conditions, etc., are adjusted in the cited invention, it never reaches the TP characteristics of "single transmittance of 43.5%

to 44.0% and polarization degree of 99.940% to 99.990%", which is the requirement of the present invention.

However, regarding the above-mentioned (A), a person skilled in the art who had read paragraph [0056] of Cited Document 1 will not understand that the method disclosed in the cited invention (method for inhibiting the variation in birefringence) is applied only to a case of a specific single transmittance (42.6%), and the above-mentioned (A) and (C) are as examined in the above-mentioned (3).

Therefore, the allegations of the appellant cannot be adopted.

(6) Summary

Present Invention 2 could have been easily made by a person skilled in the art based on the cited invention.

No. 3 Judgment by the body (● Reason 2: [support requirement] and ● Reason 4 [enablement requirement))

1 Described contents in detailed description of the invention

The detailed description of the invention in the specification of the present application is described as follows.

(1) "[Technical Problem]

[0004]

The present invention has been made to solve the above-mentioned prior problem, and <u>the main object of the present invention is to provide a polarizing plate having excellent optical characteristics and inhibited variation in optical characteristics.</u>

[Solution to Problem]

[0005]

The polarizing plate according to the present invention includes: a polarizing film having a thickness of 8 μm or less, a single transmittance of 43.5% or more, and a polarization degree of 99.940% or more; and a protective layer disposed on at least one side of the polarizing film, and in the polarizing plate, the difference between the maximum value and the minimum value of the single transmittance in the region of 50 cm^2 is 0.15% or less.

<u>The polarizing plate according to the present invention includes: a polarizing film having a thickness of 8 μm or less, a single transmittance of 43.5% or more, and a polarization degree of 99.940% or more; and a protective layer disposed on at least one side of the polarizing film, the polarizing plate having a width of 1,000 mm or more, and the difference between the maximum value and the minimum value of the single axis</u>

transmittance at a position along the width direction of 0.3% or less.
According to one embodiment, the single transmittance of the polarizing film is 44.0% or less, and the polarization degree of the polarizing film is 99.990% or less.
According to another aspect of the present invention, a polarizing plate roll is provided. The polarizing plate roll is formed by winding the polarizing plate in a roll shape.
[Advantageous Effects of Invention]
[0006]
According to the present invention, there can be provided a polarizing plate including a polarizing film having a thickness of 8 μm or less, a single transmittance of 43.5% or more, and a polarization degree of 99.940% or more, the polarizing plate having excellent optical characteristics and inhibited variation in optical characteristics."

(2) "[Description of Embodiments]
[0010]
The polarizing plate may have an elongated shape or a sheet shape. When the polarizing plate has an elongated shape, the polarizing plate is preferably wound into a roll shape to form a polarizing plate roll. The polarizing plate has excellent optical characteristics and small variations in optical characteristics. According to one embodiment, the polarizing plate has a width of 1,000 mm or more, and a difference (D1) between a maximum value and a minimum value of single transmittance at a position along the width direction of 0.3% or less. The upper limit of D1 is preferably 0.25%, and more preferably 0.2%. It is preferable that D1 be as small as possible, and the lower limit is, for example, 0.01%. When D1 is within the above-mentioned range, a polarizing plate having excellent optical characteristics can be industrially manufactured. According to another embodiment, the polarizing plate has a difference (D2) between the maximum value and the minimum value of the single transmittance in the region of 50 cm^2 is 0.15% or less. The upper limit of D2 is preferably 0.1%, more preferably 0.08%. It is preferable that D2 be as small as possible, and the lower limit of D2 is, for example, 0.01%. When D2 is within the above-mentioned range, variation in luminance on a display screen can be inhibited when the polarizing plate is used in an image display device.
･･･Omitted･･･
[0017]
The manufacturing method for a polarizing film according to the present invention includes: forming a polyvinyl alcohol-based resin layer containing a halide and a polyvinyl alcohol-based resin on one side of an elongated thermoplastic resin substrate to form a laminate; and subjecting the laminate to a preliminary in-air stretching treatment,

a dyeing treatment, an in-water stretching treatment, and a drying shrinkage treatment in which the laminate is shrunk by 2% or more in the width direction by heating, while being conveyed in a longitudinal direction, in this order. As a result, there can be provided a polarizing film having a thickness of 8 μm or less, a single transmittance of 43.5% or more, and a polarization degree of 99.940% or more, the polarizing film having excellent optical characteristics and inhibited variation in optical characteristics.

・・・Omitted・・・

[0021]

C. Manufacturing method for polarizing film

The manufacturing method for a polarizing film according to one embodiment of the present invention includes: forming a polyvinyl alcohol-based resin layer (PVA-based resin layer) containing a halide and a polyvinyl alcohol-based resin (PVA-based resin) on one side of an elongated thermoplastic resin substrate to form a laminate; and subjecting the laminate to an preliminary in-air stretching treatment, a dyeing treatment, an in-water stretching treatment, and a drying shrinkage treatment in which the laminate is shrunk by 2% or more in the width direction by heating while being conveyed in a longitudinal direction, in this order. The content of the halide in the PVA-based resin layer is preferably 5 parts by weight to 20 parts by weight with respect to 100 parts by weight of the PVA-based resin. The drying shrinkage treatment is preferably performed using a heating roll, and the temperature of the heating roll is preferably 60°C to 120°C. According to such a manufacturing method, the above-mentioned polarizing film can be obtained. In particular, by preparing a laminate including a PVA-based resin layer containing a halide, performing stretching of the laminate by multi-stage stretching including preliminary in-air stretching and in-water stretching, and heating the stretched laminate by a heating roll, a polarizing film having excellent optical characteristics (typically, single transmittance and polarization degree) and inhibited variation in optical characteristics can be obtained. Specifically, by using the heating roll in the drying shrinkage treatment process, the entire laminate can be uniformly shrunk while being conveyed. As a result, not only the optical characteristics of the polarizing film to be obtained can be enhanced, but also the polarizing film having excellent optical characteristics can be stably manufactured, and the variation in optical characteristics (in particular, single transmittance) of the polarizing film can be inhibited."

(3) "[Examples]

[0066]

・・・Omitted・・・

(3) Variation in optical characteristics of elongated polarizing plate

Measurement samples were cut out from the elongated polarizing plates of the examples and the reference examples at five positions at equal intervals along the width direction, and single transmittance at a central portion of each of the five measurement samples was measured in the same manner as in the above-mentioned (2). Next, the difference between the maximum value and the minimum value of the single transmittance measured at each measurement position was calculated, and this value was defined as the variation in optical characteristics of the elongated polarizing plate (the difference between the maximum value and the minimum value of the single transmittance at the positions along the width direction of the elongated polarizing plate).

(4) Variation in optical characteristics of sheet-shaped polarizing plate

A measurement sample of 100 mm × 100 mm was cut out from each of the elongated polarizing plates of the examples and the reference examples, and optical characteristics of the sheet-shaped polarizing plate (50 cm^2) were determined. Specifically, the single transmittance was measured at a total of five positions including the central portion and positions in the vicinity of about 1.5 cm to 2.0 cm inward from the middle point of each side of four sides of the measurement sample, in the same manner as in the above-mentioned (2). Next, the difference between the maximum value and the minimum value of the single transmittance measured at each measurement position was calculated, and this value was defined as the variation in optical characteristics of the sheet-shaped polarizing plate (the difference between the maximum value and the minimum value of the single transmittance in a region of 50 cm^2).

[0067]

[Example 1]

1. Preparation of polarizing film

As the thermoplastic resin substrate, an amorphous isophthalic copolymer polyethylene terephthalate film (thickness: 100 μm) having an elongated shape, a water absorption rate of 0.75%, and a Tg of about 75°C was used. One surface of the resin substrate was subjected to a corona treatment.

To 100 parts by weight of a PVA-based resin obtained by mixing polyvinyl alcohol (polymerization degree: 4,200, saponification degree: 99.2 mol%) and an acetoacetyl-modified PVA (manufactured by The Nippon Synthetic Chemical Industry Co., Ltd., trade name: "GOHSEFIMER Z410") at 9:1, 13 parts by weight of potassium iodide was added to prepare a PVA aqueous solution (coating liquid).

The above-mentioned PVA aqueous solution was applied to the corona-treated surface of the resin substrate and dried at 60°C to form a 13 μm-thick PVA-based resin layer, thereby preparing a laminate.

The obtained laminate was subjected to free-end uniaxial stretching at 2.4 times in the vertical direction (longitudinal direction) between rolls having different circumferential speeds in an oven at 130°C (preliminary in-air stretching treatment).

Next, the laminate was immersed in an insolubilization bath (an aqueous solution of boric acid obtained by compounding 100 parts by weight of water with 4 parts by weight of boric acid) having a liquid temperature of 40°C for 30 seconds (insolubilization treatment).

Next, the laminate was immersed in a dyeing bath (an iodine aqueous solution obtained by compounding iodine and potassium iodide at a weight ratio of 1:7 with respect to 100 parts by weight of water) having a liquid temperature of 30°C for 60 seconds while adjusting the concentration such that the single transmittance (Ts) of the polarizing film to be finally obtained is 43.5% or more (dyeing treatment).

Next, the laminate was immersed in a cross-linking bath (an aqueous solution of boric acid obtained by compounding 100 parts by weight of water with 3 parts by weight of potassium iodide and 5 parts by weight of boric acid) having a liquid temperature of 40°C for 30 seconds (cross-linking treatment).

Thereafter, while immersing the laminate in an aqueous solution of boric acid (boric acid concentration: 4.0% by weight) having a liquid temperature of 70°C, performing uniaxial stretching between rolls having different circumferential speeds such that the total stretching magnification became 5.5 times in the vertical direction (longitudinal direction) (in-water stretching).

Thereafter, the laminate was immersed in a washing bath (an aqueous solution obtained by compounding 100 parts by weight of water with 4 parts by weight of potassium iodide) having a liquid temperature of 20°C (washing treatment).

Thereafter, while drying in an oven maintained at 90°C, the laminate was brought into contact with an SUS heating roll maintained at a surface temperature of 75°C for about 2 seconds (drying shrinkage treatment). The shrinkage ratio of the laminate in the width direction by the drying shrinkage treatment was 5.2%.

Thus, a polarizing film having a thickness of 5 μm was formed on the resin substrate. Further, the same procedures were repeated to prepare a total of fourteen polarizing films.

2. Preparation of polarizing plate

An acrylic film (surface refractive index of 1.50, 40 μm) as a protective film was bonded to the surface (surface opposite to the resin substrate) of each of the polarizing films obtained above via an ultraviolet curable adhesive. Specifically, coating was performed such that the total thickness of the curable adhesive was 1.0 μm, and the curable adhesive was bonded using a roll machine. Thereafter, UV light was irradiated from the protective film side to cure the adhesive. Next, after both end portions were slit, the resin substrate was peeled off to obtain fourteen elongated polarizing plates (width: 1,300 mm) having a configuration of protective film/polarizing film.

[0068]

[Example 2]

Four polarizing films and polarizing plates were prepared in the same manner as in Example 1 except that the temperature of the oven was set to 70°C and the temperature of the heating roll was set to 70°C in the drying shrinkage treatment. The shrinkage ratio of the laminate in the width direction by the drying shrinkage treatment was 2.5%.

・・・Omitted・・・

[0070]

[Comparative Example 2]

Six polarizing films and polarizing plates were prepared in the same manner as in Example 1 except that the stretching magnification in the preliminary in-air stretching treatment was set to 1.8 times and the heating roll was not used in the drying shrinkage treatment.

[0071]

[Reference Example 1]

The polarizing film obtained in the same manner as in Comparative Example 2 was held in a constant temperature and humidity zone set at a temperature of 60°C and a humidity of 90% RH for 30 minutes. Thereafter, the polarizing plate was prepared in the same manner as in Example 1.

[0072]

For each of the polarizing plates in the examples and the comparative examples, the single transmittance and the polarization degree were measured. The results are shown in Table 2 and FIG. 3.

[0073]

[Table 2]

	製造工程				光学特性	
	空中補助延伸処理の延伸倍率	ヨウ化カリウム添加量	熱ロール温度	熱ロール乾燥による収縮率	単体透過率 (%)	偏光度 (%)
実施例1-1	2.4倍	13重量部	75℃	5.2%	43.52	99.969
実施例1-2					43.58	99.967
実施例1-3					43.63	99.966
実施例1-4					43.66	99.966
実施例1-5					43.74	99.965
実施例1-6					43.76	99.960
実施例1-7					43.80	99.974
実施例1-8					43.81	99.978
実施例1-9					43.82	99.952
実施例1-10					43.84	99.971
実施例1-11					43.84	99.967
実施例1-12					43.86	99.956
実施例1-13					43.88	99.945
実施例1-14					43.89	99.945
実施例2-1	2.4倍	13重量部	70℃	2.5%	43.61	99.949
実施例2-2					43.62	99.946
実施例2-3					43.64	99.954
実施例2-4					43.65	99.944
比較例1-1	1.8倍	-	-	-	42.65	99.983
比較例1-2					43.04	99.931
比較例1-3					43.13	99.881
比較例1-4					43.22	99.883
比較例1-5					43.23	99.886
比較例1-6					43.47	99.771
比較例1-7					43.69	99.611
比較例1-8					43.72	99.627
比較例2-1	1.8倍	13重量部	-	-	42.71	99.968
比較例2-2					43.22	99.970
比較例2-3					43.47	99.940
比較例2-4					43.48	99.923
比較例2-5					43.58	99.919
比較例2-6					43.65	99.889

	Manufacturing process				Optical characteristics	
	Stretching magnification in preliminary in-air stretching treatment	Addition amount of potassium iodide	Temperature of heat roll	Shrinkage ratio by heat roll drying	Single transmittance (%)	Polarization degree (%)
Example 1-1	2.4 times	13 parts by weight				
Example 1-2						
Example 1-3						
Example 1-4						
Example 1-5						
Example 1-6						
Example 1-7						
Example 1-8						
Example 1-9						
Example 1-10						
Example 1-11						
Example 1-12						
Example 1-13						
Example 1-14						
Example 2-1	2.4 times	13 parts by weight				
Example 2-2						
Example 2-3						
Example 2-4						

Comparative Example 1-1	1.8 times					
Comparative Example 1-2						
Comparative Example 1-3						
Comparative Example 1-4						
Comparative Example 1-5						
Comparative Example 1-6						
Comparative Example 1-7						
Comparative Example 1-8						
Comparative Example 2-1	1.8 times	13 parts by weight				
Comparative Example 2-2						
Comparative Example 2-3						
Comparative Example 2-4						
Comparative Example 2-5						
Comparative Example 2-6						

[0074]

The polarizing films obtained by the manufacturing methods in the comparative examples did not satisfy the requirements of a single transmittance of 43.5% or more and a polarization degree of 99.940% or more at the same time. However, the polarizing films obtained by the manufacturing methods in the examples had excellent optical characteristics in which the single transmittance was 43.5% or more and the polarization degree was 99.940% or more.

[0075]

For each of the polarizing plates in the examples and the reference examples, variations in optical characteristics of the elongated polarizing plate and the sheet-shaped polarizing plate were measured. The results are shown in Table 3.

[0076]

[Table 3]

	単体透過率バラつき（長尺状）	単体透過率バラつき（枚葉状）
実施例1	0.14%	0.06%
実施例2	0.19%	－
参考例1	0.32%	0.19%

	Variation in single transmittance (elongated)	Variation in single transmittance (sheet-shaped)
Example 1		
Example 2		
Reference Example 1		

[0077]

The elongated polarizing plate obtained by the manufacturing method in the example has a variation in single transmittance of 0.3% or less, and the sheet-shaped polarizing plate obtained by the manufacturing method in the example has a variation in single transmittance of 0.15% or less, and the variation in optical characteristics is inhibited to such an extent that there is no problem. On the other hand, the polarizing plates in the reference examples obtained through a process of humidifying the polarizing film had a large variation in optical characteristics in both the elongated polarizing plate and the sheet-shaped polarizing plate."

2 Regarding Reason 2: (Support requirement)

(1) It is understood that whether the description of the scope of claims meets the requirement (hereinafter referred to as "the support requirement") as provided in Article 36(6)(i) of the Patent Act should be determined by comparing the scope of claims with the detailed description of the invention in the specification of the present application, and examining whether the invention described in the scope of claims is within a range in which a person skilled in the art could have recognized that the problem of the invention can be solved by the description or suggestion of the detailed description of the invention, and whether the invention described in the scope of claims is within a range in which a person skilled in the art could have recognized that the problem of the invention can be solved in light of the common technical knowledge at the time of filing of the present application without the description or suggestion thereof. Thus, it can be recognized that,

in order for the scope of claims to meet the support requirement, as a premise thereof, there is a necessity that the scope of claims includes a description of at least a matter that "the problem can be recognized as being solved", that is, means for solving the problem.

(2) With regard to the inventions according to Claims 1 and 2 (hereinafter, collectively referred to as "the present invention") in the scope of claims after the present amendment, among matters described in the scope of claims, the descriptions "a single transmittance of 43.5% to 44.0%, and a polarization degree of 99.940% to 99.990%", "the difference between the maximum value and the minimum value of the single transmittance in the region of 50 cm^2 is 0.15% or less", and "a difference between a maximum value and a minimum value of the single transmittance at five positions at equal intervals along the width direction is 0.2% or less" can be interpreted as quantitative descriptions adopting a numerical range instead of the qualitative descriptions "excellent optical characteristics" and "inhibited variation in optical characteristics" (see the above-mentioned "[1] of 1", etc.) relating to the problem of the present invention. In addition to the descriptions quantitatively representing that those problems of the invention can be solved, the scope of claims only describes "having a thickness of 8 μm or less", "a polarizing plate including a polarizing film, and a protective layer disposed on at least one side of the polarizing film", and "having a width of 1,000 mm or more", and as it is understood that the descriptions exceed or do not correspond to the scope of the polarizing plate including the polarizing film understood by a person skilled in the art based on the manufacturing method described in paragraph [0021] of the specification, it is clear that the "polarizing plate" specified by the descriptions of "thickness", etc., does not necessarily solve the problem of the present invention.

(3) Regarding this point, the appellant alleges the following in "(4) Regarding the support requirement" of the written opinion dated January 30, 2020.

"The present invention is 'a solution to solve a problem that was desired but could not be solved for a long period of time (that is, a solution to realize optical characteristics/TP characteristics that were desired but could not be realized for a long period of time)'. The variations in TP characteristics and single transmittance of the present invention show the structure, configuration, and composition of a polarizing film in which the orientation of PVA, the balance of the contents of iodine (I_2, I^-, I^{3-}, and I^{5-}), the state of PVA/iodine complex, etc., are organically combined, and are matters that can be regarded as means for solving the problems. On the other hand, as is understood, it is substantially impossible to clearly specify such a structure, configuration, and composition in a polymer in the technical field of polymeric chemistry. Therefore, it is understood that the PBP claim that is hardly recognized in other fields is recognized (as structure specifying means) in the technical field of the polymer chemistry. ・・・Omitted・・・ Therefore, as in the case of the PBP claim, it is considered that the variations in TP characteristics and single transmittance should be recognized as the structure specifying means for the polarizing film."

However, even if the invention is an invention in which a so-called PBP claim is recognized, it is not allowed to specify the invention by matters (quantitatively describing that the problem can be solved) exceeding the scope described in the detailed description of the invention.

In addition, the appellant alleges that the present invention simultaneously satisfies a high single transmittance, a high polarization degree, and a low variation that have not been realized by the technical breakthrough, but as described in the above-mentioned 3 of "No. 2", the present invention is limited to a product within the scope that can be expected by a person skilled in the art based on the cited invention (Note from the body: A person skilled in the art before 2010 could hardly assume a polarizing film having a single transmittance and a polarization degree similar to those in the present invention and a thickness similar to that in the present invention, but the present invention has no such circumstances).

Therefore, the above-mentioned allegation of the appellant cannot be adopted.

In addition, the same applies to the invention according to Claim 3 that is dependent on Claim 1 or 2.

(4) As described above, it cannot be recognized that the inventions according to Claims 1 to 3 of the present application are described in the detailed description of the invention.

Therefore, the description of the scope of claims of the present application does not satisfy the requirement as provided in Article 36(6)(i) of the Patent Act.

3 Regarding Reason 4: (Enablement requirement)

(1) Present Invention 1 and Present Invention 2 specify that the difference between the maximum value and the minimum value of the single transmittance at a specific region or a specific position along a specific direction of the polarizing plate is within a specific range, but Claims 1 and 2 do not specify which position (in particular, which position in the longitudinal direction) of the elongated polarizing plate to be obtained the specific region or the specific position is. Thus, in Present Invention 1 and Present Invention 2, a

polarizing plate in which the variation in single transmittance satisfies the requirements of "0.15% or less" or "0.2% or less" in an arbitrary region (for example, the entire region in the longitudinal direction of the elongated polarizing plate) of the elongated polarizing plate to be manufactured is included in the technical scope thereof.

(2) Therefore, whether the detailed description of the invention in the specification of the present application is clearly and sufficiently described such that a person skilled in the art could manufacture a polarizing plate satisfying the above-mentioned requirements (whether the enablement requirement is satisfied) will be examined below.

The description of the specification of the present application is as described in the above-mentioned "1 of No.3", and data for confirming that a polarizing plate satisfying the above-mentioned requirements is obtained is temporarily described in paragraph [0076] and [Table 3]. It is understood that the data is data measured for a total of eighteen elongated polarizing plates of Examples 1-1 to 1-14 and Examples 2-1 to 2-4. However, with respect to each polarizing plate, there is no disclosure of data capable of confirming that the above-mentioned requirements are satisfied over the entire region in the longitudinal direction. (Note from the body: It is recognized that at most only a specific position in the longitudinal direction was measured.)

According to the above, it is not recognized that the detailed description of the invention in the specification of the present application is clearly and sufficiently described to the extent that the polarizing plate according to the present invention, which is suitable for the purpose of the present invention (the above-mentioned paragraph [0010] in [1] of 1), can be stably manufactured, the purpose being "a width of 1,000 mm or more, and the difference (D1) between the maximum value and the minimum value of single transmittance at a position along the width direction is 0.3% or less. The upper limit of D1 is ・・・ and more preferably 0.2%. ・・・ the lower limit is, for example, 0.01%. <u>When D1 is within the above-mentioned range, a polarizing plate having excellent optical characteristics can be industrially manufactured.</u> According to another embodiment, in the polarizing plate, the difference (D2) between the maximum value and the minimum value of the single transmittance in a region of 50 cm^2 is 0.15% or less. ・・・ When D2 is within the above-mentioned range, variation in luminance on a display screen can be inhibited when the polarizing plate is used in an image display device" (the underline is given by the body).

(3) Regarding the enablement requirement, the appellant alleges the following in the

written opinion dated January 30, 2020.

"In the specification of the present application, it is clearly described that fourteen polarizing films and fourteen polarizing plates were obtained in Example 1 (paragraph [0067]), and that four polarizing films and four polarizing plates were obtained in Example 2 (paragraph [0068]). Further, paragraph [0072] describes that 'for each of the polarizing plates in the examples and the comparative examples, the single transmittance and the polarization degree were measured. The results are shown in Table 2 and FIG. 3', and Table 2 shows the results of fourteen polarizing plates in Example 1 and four polarizing plates in Example 2. ・・・Omitted・・・ According to the examination guidelines, it is said that 'the fact that an invention of a product can be implemented means that the product can be manufactured and used'. According to the specification of the present application, a person skilled in the art could manufacture the polarizing plate according to the present invention and use the polarizing plate without performing excessive trial and error and complicated advanced experiments."

However, as described in the above-mentioned (1), although Present Invention 1 and Present Invention 2 include an elongated polarizing plate whose length in the longitudinal direction is not specified, it cannot be recognized that the detailed description of the invention in the specification of the present application is not clearly and sufficiently described to the extent that a person skilled in the art could manufacture a polarizing plate satisfying the requirements "the difference between the maximum value and the minimum value of the single transmittance at five positions at equal intervals along the width direction is 0.2% or less" or "the difference between the maximum value and the minimum value of the single transmittance in the region of 50 cm^2 is 0.15% or less" over the corresponding portion in the longitudinal direction to the extent that the polarizing plate contributes to industrial production.

(4) As described above, it cannot be recognized that the detailed description of the invention of the present application is clearly and sufficiently described to the extent that a person skilled in the art could implement the invention.

No. 4 Closing

Present Invention 2 could have been easily made by a person skilled in the art based on the invention described in Cited Document 1 and the well-known technique, and thus cannot be patented under the provisions of Article 29(2) of the Patent Act.

In addition, the description of the scope of claims of the present application does not satisfy the requirements as provided in Article 36(6)(i) of the Patent Act.

Alternatively, the detailed description of the invention of the present application does not satisfy the requirements as provided in Article 36(4)(i) of the Patent Act.

Therefore, the present application should be refused without examining the inventions according to other claims.

Therefore, the appeal decision shall be made as described in the conclusion.

June 26, 2020

Chief administrative judge: HIGUCHI, Nobuhiro
Administrative judge: SATOMURA, Toshimitsu
Administrative judge: KAWAHARA, Tadashi