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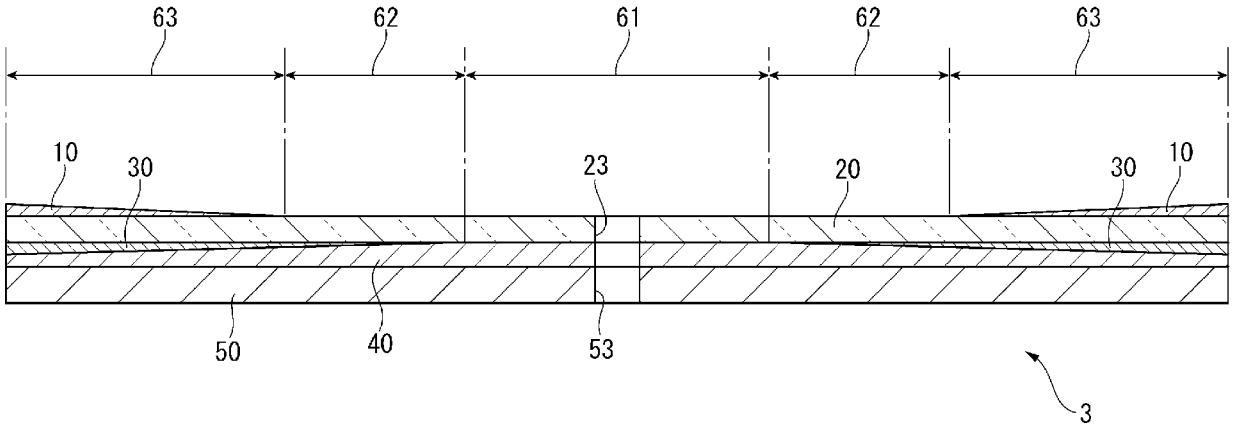
(54) **TIMEPIECE DIAL AND TIMEPIECE**

(57) A timepiece dial includes a translucent substrate, a front gradationally colored film formed on a front surface of the translucent substrate by gradationally coloring the front surface with a front surface coloring material, and a back gradationally colored film formed on a back surface of the translucent substrate by gradationally coloring the back surface with a back surface coloring material. Since the front gradationally colored film and the back gradationally colored film are formed through gradation-coloring in which the density of color, where coloring is performed, is changed, it is possible to provide a variety of highly aesthetic timepiece dials.

FIG. 2



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Description

BACKGROUND

1. Technical Field

[0001] The present disclosure relates to a timepiece dial and a timepiece including the dial.

2. Related Art

[0002] JP-T-2021-510820 discloses a dial of a timepiece including a support body and a mother-of-pearl sheet. The mother-of-pearl sheet has a front side and a back side. The back side faces the support body and has a pattern printed thereon. The mother-of-pearl sheet is formed with a thickness dimension such that the pattern printed on the back side of the mother-of-pearl sheet is visible through the mother-of-pearl under normal lighting conditions.

[0003] In the dial in JP-T-2021-510820, the pattern is printed on the back side of the mother-of-pearl sheet, which is a bottom, by using silk screen printing, photolithography, ink jet printing, or the like. Therefore, although it is possible to realize a timepiece dial that utilizes the pattern of the mother-of-pearl sheet, there is a demand for timepiece dials and timepieces that are more diverse and have higher aesthetic appeal.

SUMMARY

[0004] A timepiece dial of the present disclosure includes: a translucent substrate; a front gradationally colored film formed on a front surface of the translucent substrate by gradationally coloring the front surface with a front surface coloring material; and a back gradationally colored film formed on a back surface of the translucent substrate by gradationally coloring the back surface with a back surface coloring material.

[0005] A timepiece of the present disclosure includes the timepiece dial.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

FIG. 1 is a front view illustrating a timepiece including a timepiece dial according to a first embodiment.
FIG. 2 is a cross-sectional view illustrating the timepiece dial of the first embodiment.
FIG. 3 is an exploded view illustrating a layer configuration of the timepiece dial according to the first embodiment.
FIG. 4 is an exploded perspective view illustrating the layer configuration of the timepiece dial according to the first embodiment.
FIG. 5 is a cross-sectional view illustrating a timepiece dial of a second embodiment.
FIG. 6 is an exploded perspective view illustrating a layer configuration of the timepiece dial according to the second embodiment.
FIG. 7 is a cross-sectional view illustrating a timepiece dial of a third embodiment.
FIG. 8 is an exploded perspective view illustrating a layer configuration of the timepiece dial according to the third embodiment.
FIG. 9 is a cross-sectional view illustrating a timepiece dial according to a fourth embodiment.

DESCRIPTION OF EMBODIMENTS

First Embodiment

[0007] FIG. 1 is a front view illustrating a timepiece 1 including a timepiece dial 3 according to a first embodiment. The timepiece 1 is a wristwatch worn on the wrist of a user, includes an outer case 2 having a cylindrical shape, and has the timepiece dial 3 disposed on an inner peripheral side of the outer case 2. Among the two openings of the outer case 2, the opening on a front surface side is closed with a cover glass, and the opening on a back surface side is closed with a back cover. Further, the timepiece 1 includes a movement (not illustrated) accommodated in the outer case 2, an hour hand 4A, a minute hand 4B, and a second hand 4C, which are timepiece hands indicating time information, an index 5 attached to the timepiece dial 3, and a winding crown 7. Although the index 5 of the timepiece 1 of the present embodiment uses Roman numerals, the index 5 may use Arabic numerals and may be configured with bar indexes, and the type of the index is not limited to Roman numerals.

[0008] In the following description, a plan view means viewing the timepiece dial 3 from a direction orthogonal to a front surface of the timepiece dial 3, that is a shaft direction of a timepiece hand shaft to which the timepiece hands are attached. Further, a front surface of each component means a surface on a cover glass side, and a back surface of each component means a surface on a back cover side.

[0009] As shown in FIGS. 2 to 4, the timepiece dial 3 is constructed by sequentially laminating a front gradationally colored film 10, a translucent substrate 20, a back gradationally colored film 30, a backing colored film 40, and a base material 50 from a front surface side of the timepiece 1, that is, the cover glass side to a back surface side of the timepiece 1, that is, the back cover side.

[0010] The translucent substrate 20 is a substrate that has translucency and that is made of a semi-translucent material that allows visible light to pass therethrough. Therefore, the translucent substrate 20 may be a substrate that can visually recognize the back surface side from the front surface side, and in the present embodiment, the translucent substrate 20 is made of mother-of-pearl. Mother-of-pearl is a member having a plate shape made by slicing the shells of mother-of-pearl oysters, such as white-lipped oysters, used for pearl cultivation.

In the present embodiment, the translucent substrate 20 is made of thin mother-of-pearl having a thickness dimension of substantially 50 μm to 200 μm. Particularly, the translucent substrate 20, which is made of mother-of-pearl, is preferably set to have a thickness dimension of substantially 100 μm in terms of facilitating handling and ensuring translucency.

[0011] The translucent substrate 20 is formed in a plane circular plate shape and has a through hole 23 formed in a plane center, into which the timepiece hand shaft is inserted.

[0012] The front gradationally colored film 10 is formed by gradationally coloring a front surface 21 of the translucent substrate 20 with a front surface coloring material through coating or printing.

[0013] The gradation-coloring means performing coloring by changing the density continuously or stepwise through coating or printing by using the front surface coloring material. Specifically, coloring may be performed by changing the density for coloring of a coloring material to change the density of the color to be used for coloring continuously or stepwise by increasing or decreasing the coating amount or printing amount of the front surface coloring material applied per unit area.

[0014] For example, when the gradation-coloring is realized through coating, the coloring may be performed by placing the translucent substrate 20 on a rotating table, rotating the translucent substrate 20, and applying a coating material, which is the front surface coloring material, on the front surface 21 of the translucent substrate 20 by using a spray gun. At this time, when a discharging direction center of the coating material, which is discharged from a nozzle of the spray gun, is directed toward an outer periphery of the translucent substrate 20 that is rotated around the through hole 23, the density of the coating material on an outer peripheral edge of the translucent substrate 20 becomes higher and the coloring becomes darker. On the other hand, the density of the coating material becomes lower and the coloring becomes lighter when the discharging direction center of the coating material is directed toward an inner periphery of the translucent substrate 20. Therefore, through the coating, it is possible to realize gradation-coloring in which the color becomes lighter from the outer periphery toward the inside of the translucent substrate 20 concentrically about the through hole 23. A range in which the front gradationally colored film 10 is formed can be changed by adjusting the throttle amount of the nozzle of the spray gun. That is, by tightening the nozzle of the spray gun to narrow the discharging range of the coating material, the range of forming the front gradationally colored film 10 can be narrowed, and by widening the nozzle of the spray gun to widen the discharging range of the coating material, the range of forming the front gradationally colored film 10 can be widened. In the present embodiment, an outer peripheral edge 11 of the front gradationally colored film 10 is at the same position as an outer peripheral edge 24 of the translucent substrate 20 in plan view, and an inner peripheral edge 12 is positioned outward from an intermediate position in a radial direction between the through hole 23 of the translucent substrate 20 and the outer periphery, that is, the 1/2 position of the radius. Therefore, on the front surface 21 of the translucent substrate 20, the front gradationally colored film 10 is provided outward from the intermediate position in the radial direction.

[0015] The back gradationally colored film 30 is formed by gradationally coloring a back surface 22 of the translucent substrate 20 with a back surface coloring material through coating or printing. In the present embodiment, similar to the front gradationally colored film 10, the coloring is performed by placing the translucent substrate 20 on the rotating table, rotating the translucent substrate 20, and applying the coating material, which is the back surface coloring material, on the back surface 22 of the translucent substrate 20 using the spray gun. In the present embodiment, an outer peripheral edge 31 of the back gradationally colored film 30 is at the same position as the outer peripheral edge 24 of the translucent substrate 20 in plan view, and an inner peripheral edge 32 is positioned inward from the intermediate position in the radial direction between the through hole 23 of the translucent substrate 20 and the outer periphery, that is, the 1/2 position of the radius. Specifically, the back gradationally colored film 30 is formed between the outer peripheral edge 24 of the back surface 22 of the translucent substrate 20 and a position substantially 3/4 of the radius from the outer peripheral edge 24 in the radial direction, by gradationally coloring the back surface 22 concentrically about the through hole 23 such that the color becomes lighter from the outer periphery toward the inside of the translucent substrate 20. On the back surface 22 of the translucent substrate 20, a region where the back gradationally colored film 30 is not provided is inward from the intermediate position in the radial direction, and the back gradationally colored film 30 is provided in a range from the inner side of the intermediate position to the outer peripheral edge 24.

[0016] As described above, the front gradationally colored film 10 and the back gradationally colored film 30 are formed by gradationally coloring the front surface 21 and the back surface 22 concentrically about the through hole 23 such that the color on the outer peripheral side is dark and the color becomes lighter toward the inner periphery. The cross-sectional views in FIGS. 2 and 3 schematically represent that the colors of the front gradationally colored film 10 and the back gradationally colored film 30 gradually become lighter from the outer peripheral side toward the inner peripheral side by increasing a film thickness of dark colored portions of the front gradationally colored film 10 and the back gradationally colored film 30, that is, on the outer peripheral side of the translucent substrate 20 and by gradually decreasing the film thickness toward the inner peripheral side. Therefore, in the actual timepiece dial 3, the film thickness of the front gradationally colored film 10 or the

back gradationally colored film 30 is almost the same in the radial direction of the timepiece dial 3 or is slightly thicker on the outer peripheral side, and there is no change in the thickness that can be visually determined. Further, since the film thicknesses of the front gradationally colored film 10 and the back gradationally colored film 30 are small, when viewing the timepiece dial 3 from the front surface side, complex and delicate designs can be realized under the influence of the back gradationally colored film 30 or backing colored film 40, which is laminated on the back surface side, especially on the inner peripheral side where the color is lighter. The thicknesses of the front gradationally colored film 10 and the back gradationally colored film 30 are 10 μm or less, that is, several μm in a portion where the color is the dark, and the film thickness gradually decreases from several μm to 0 μm from a portion where the color is dark to a portion where the color is light. This point also applies to other embodiments described later.

[0017] The backing colored film 40 is formed by coating or performing printing on the back surface 22 of the translucent substrate 20 and the back surface of the back gradationally colored film 30 with the backing coloring material. The backing colored film 40 is a film colored with a single color having substantially constant color density and is different from the front gradationally colored film 10 or the back gradationally colored film 30 in that the color density does not change.

[0018] The backing colored film 40 is formed in a region from the through hole 23 to the outer peripheral edge 24 of the translucent substrate 20. Therefore, in the region where the back gradationally colored film 30 is formed, the backing colored film 40 is laminated on the back surface of the back gradationally colored film 30. That is, the back gradationally colored film 30 is formed between the translucent substrate 20 and the backing colored film 40.

[0019] When the front gradationally colored film 10, the back gradationally colored film 30, and the backing colored film 40 are printed, coloring may be performed by inkjet printing using each ink for the front surface coloring material, the back surface coloring material, and the backing coloring material.

[0020] The base material 50 is a plate material having a disc shape made of metal or synthetic resin and is provided to ensure the strength of the timepiece dial 3. A through hole 53 into which the timepiece hand shaft is inserted is formed at a plane center of the base material 50.

[0021] A front surface 51 of the base material 50 is adhered to the backing colored film 40 with an adhesive agent. The adhesive agent may be applied to the front surface 51 of the base material 50 by using, for example, screen printing or spraying. Further, the base material 50 may be bonded using a double-sided tape instead of the adhesive agent.

[0022] Each of the colors of the front gradationally colored film 10, the back gradationally colored film 30, and the backing colored film 40 may be appropriately set according to the design of the timepiece dial 3. For example, a seasonal feeling can be obtained and a highly aesthetic timepiece dial 3 can be realized by using black as the front surface coloring material, light blue as the back surface coloring material, and blue as the backing coloring material, or by using dark blue as the front surface coloring material, pink as the back surface coloring material, and purple as the backing coloring material, or by using dark green as the front surface coloring material, yellow green as the back surface coloring material, and green as the backing coloring material.

[0023] Since the timepiece dial 3 has the above layer configuration, as illustrated in FIGS. 2 and 3, in plan view seen from the front surface side of the timepiece 1, a first region 61 having a ring shape, where the translucent substrate 20 and the backing colored film 40 are laminated and visible, is provided around the through holes 23 and 53. Further, in plan view, a second region 62 having a ring shape, where the translucent substrate 20, the back gradationally colored film 30, and the backing colored film 40 are laminated and visible, is provided around the first region 61. Further, in plan view, a third region 63 having a ring shape, where the front gradationally colored film 10, the translucent substrate 20, the back gradationally colored film 30, and the backing colored film 40 are laminated and visible, is provided around the second region 62.

[0024] In the timepiece dial 3 of the present embodiment, the front gradationally colored film 10 may be formed on the front surface 21 of the translucent substrate 20, the back gradationally colored film 30 and the backing colored film 40 may be sequentially formed on the back surface 22 of the translucent substrate 20, the base material 50 may be adhered to the back surface of the backing colored film 40, and the laminating order is not particularly limited.

[0025] According to the timepiece dial 3 of the present embodiment, three regions, that is, the first region 61, the second region 62, and the third region 63 are provided in plan view, and since the layer configurations of these regions 61 to 63 are different from each other, the design or aesthetics of the timepiece dial 3 can be improved.

[0026] Since the first region 61 has a layer configuration in which the backing colored film 40 is formed on the back surface of the translucent substrate 20 made of mother-of-pearl, it is possible to realize a design in which the colorings of the backing colored film 40 overlap while utilizing the pattern of the mother-of-pearl.

[0027] Since the second region 62 has a layer configuration in which the back gradationally colored film 30 and the backing colored film 40 are laminated on the back surface of the translucent substrate 20 made of mother-of-pearl, it is possible to realize a delicate design in which the change in shade of the color due to the gradation-coloring of the back gradationally colored film 30 and the colorings of the backing colored film 40 overlap while utilizing the pattern of the mother-of-pearl.

[0028] Since the third region 63 has a layer configuration in which the front gradationally colored film 10 is laminated on the front surface of the translucent substrate 20 made of mother-of-pearl and the back gradationally colored film 30 and the backing colored film 40 are laminated on the back surface, it is possible to realize a delicate design in which the change in shade of the color due to the gradation-coloring of the front gradationally colored film 10 and the back gradationally colored film 30 and the colorings of the backing colored film 40 overlap while utilizing the pattern of the mother-of-pearl.

[0029] As described above, the aesthetics of the timepiece dial 3 can be improved.

[0030] Since the backing colored film 40 is formed on the front surface side of the base material 50, the base material 50 is not visually recognized through the translucent substrate 20. Therefore, it is possible to prevent the design of the timepiece dial 3 from being hindered by the base material 50, and it is possible to ensure both strength and design by providing the base material 50.

[0031] Since the front gradationally colored film 10 and the back gradationally colored film 30 are formed through gradation-coloring such that the color on the outer peripheral side is dark and the color becomes lighter toward the inner peripheral side, a delicate and highly aesthetic design can be realized.

Second Embodiment

[0032] A timepiece dial 3B of a second embodiment will be described with reference to FIGS. 5 and 6.

[0033] The timepiece dial 3B includes a front gradationally colored film 10B, a translucent substrate 20B, a back gradationally colored film 30B, a backing colored film 40B, and a base material 50B. Since the translucent substrate 20B, the backing colored film 40B, and the base material 50B have the same configuration as in the first embodiment, the description thereof will be omitted.

[0034] The front gradationally colored film 10B is formed by gradationally coloring the front surface 21 of the translucent substrate 20B with the front surface coloring material through the inkjet printing. In the present embodiment, an inner peripheral edge 12 of the front gradationally colored film 10B is at a position along the through hole 23 of the translucent substrate 20B in plan view, and an outer peripheral edge 11 is positioned inward from the intermediate position in the radial direction between the through hole 23 of the translucent substrate 20B and the outer periphery in plan view, that is, the 1/2 position of the radius.

[0035] The back gradationally colored film 30B is formed by gradationally coloring the back surface 22 of the translucent substrate 20B with the back surface coloring material through the inkjet printing. In the present embodiment, an inner peripheral edge 32 of the back gradationally colored film 30B is at a position along the through hole 23 of the translucent substrate 20B in plan view, and an outer peripheral edge 31 is formed to a substantially 3/4 position in the radial direction from the through hole 23 of the translucent substrate 20B to the outer periphery in plan view. Therefore, the outer peripheral edge 31 of the back gradationally colored film 30B is disposed outward from the outer peripheral edge 11 of the front gradationally colored film 10B.

[0036] The front gradationally colored film 10B and the back gradationally colored film 30B are formed by gradationally coloring the front surface 21 and the back surface 22 concentrically about the through hole 23 such that the color on the inner peripheral side is dark and the color becomes lighter toward the outer periphery. Therefore, similar to FIG. 2, the cross-sectional view in FIG. 5 schematically represents that the colors of the front gradationally colored film 10B and the back gradationally colored film 30B gradually become lighter from the inner peripheral side toward the outer peripheral side by increasing a film thickness of dark colored portions of the front gradationally colored film 10B and the back gradationally colored film 30B, that is, center portions along the through hole 23 of the translucent substrate 20B and by gradually decreasing the film thickness toward the outer peripheral side.

[0037] Each of the colors of the front gradationally colored film 10B, the back gradationally colored film 30B, and the backing colored film 40B may be appropriately set according to the design of the timepiece dial 3B as in the first embodiment.

[0038] According to the timepiece dial 3B of the present embodiment, three regions, that is, a first region 61B, a second region 62B, and a third region 63B are provided from the center side to the outer peripheral side in plan view, and since the layer configurations of these regions 61B to 63B are different from each other, the design of the timepiece dial 3B can be improved.

[0039] Since the first region 61B has a layer configuration in which the front gradationally colored film 10B is laminated on the front surface 21 of the translucent substrate 20B made of mother-of-pearl and the back gradationally colored film 30B and the backing colored film 40B are laminated on the back surface 22, it is possible to realize a delicate design in which the change in shade of the color due to the gradation-coloring of the front gradationally colored film 10B and the back gradationally colored film 30B and the colorings of the backing colored film 40B overlap while utilizing the pattern of the mother-of-pearl.

[0040] Since the second region 62B has a layer configuration in which the back gradationally colored film 30B and the backing colored film 40B are laminated on the back surface 22 of the translucent substrate 20B made of mother-of-pearl, it is possible to realize a delicate design in which the change in shade of the color due to the gradation-coloring of the back gradationally colored film 30B and the colorings of the backing colored film 40B overlap while utilizing the pattern of the mother-of-pearl.

[0041] Since the third region 63B has a layer configuration in which the backing colored film 40B is formed on

the back surface 22 of the translucent substrate 20B made of mother-of-pearl, it is possible to realize a design in which the colorings of the backing colored film 40 overlap while utilizing the pattern of the mother-of-pearl.

[0042] As described above, the aesthetics of the timepiece dial 3B can be improved.

Third Embodiment

[0043] A timepiece dial 3C of a third embodiment will be described with reference to FIGS. 7 and 8.

[0044] The timepiece dial 3C is a dial having a plane rectangular shape and includes a front gradationally colored film 10C, a translucent substrate 20C, and a back gradationally colored film 30C.

[0045] The translucent substrate 20C is configured with a synthetic resin plate having a plane rectangular shape with translucency such as polycarbonate.

[0046] The front gradationally colored film 10C is formed by gradationally coloring the front surface 21 of the translucent substrate 20C with the front surface coloring material through the ink jet printing. In the present embodiment, the front gradationally colored film 10C is formed in a linear shape extending in a direction connecting indexes (not illustrated) of 12 o'clock and 6 o'clock of the timepiece dial 3C.

[0047] A width dimension of the front gradationally colored film 10C, that is, a dimension in the 3 o'clock and 9 o'clock directions of the timepiece dial 3C is constant, and in the present embodiment, the dimension is defined as a dimension of substantially 1/2 of a dimension from the through hole 23 at the center of the translucent substrate 20C to the outer periphery in the 3 o'clock and 9 o'clock directions.

[0048] The back gradationally colored film 30C is formed by gradationally coloring the back surface 22 of the translucent substrate 20C with the back surface coloring material through the ink jet printing. In the present embodiment, similar to the front gradationally colored film 10C, the back gradationally colored film 30C is formed in a linear shape extending in a direction connecting indexes (not illustrated) of 12 o'clock and 6 o'clock of the timepiece dial 3C.

[0049] A width dimension of the back gradationally colored film 30C, that is, a dimension in the 3 o'clock and 9 o'clock directions of the timepiece dial 3C is constant, and the dimension is defined as a dimension of substantially 3/4 of a dimension from the through hole 23 at the center of the translucent substrate 20C to the outer periphery in the 3 o'clock and 9 o'clock directions. Therefore, the width dimension of the back gradationally colored film 30C is larger than the width dimension of the front gradationally colored film 10C.

[0050] The front gradationally colored film 10C and the back gradationally colored film 30C are formed through gradation-coloring such that the color at the center position connecting the 12 o'clock and 6 o'clock directions is dark, and the color becomes lighter toward the 3 o'clock and 9 o'clock directions. Therefore, the cross-sectional view in FIG. 7 schematically represents that the colors of the front gradationally colored film 10C and the back gradationally colored film 30C gradually become lighter from the center side toward the outer peripheral side by increasing a film thickness of a center portion connecting the 12 o'clock and 6 o'clock directions of the timepiece dial 3C, that is, a center portion passing through the through hole 23 of the translucent substrate 20C and by gradually decreasing the film thickness toward the outer periphery in the 3 o'clock and 9 o'clock directions, in the front gradationally colored film 10C and the back gradationally colored film 30C.

[0051] According to the timepiece dial 3C of the present embodiment, three regions, that is, a first region 61C, a second region 62C, and a third region 63C are provided from the center side, which connects indexes of 12 o'clock and 6 o'clock, toward the sides of 3 o'clock and 9 o'clock in plan view, and since the layer configurations of these regions 61C to 63C are different from each other, the design of the timepiece dial 3C can be improved.

[0052] Since the first region 61C, which is on the center side of the timepiece dial 3C, has a layer configuration in which the front gradationally colored film 10C is laminated on the front surface 21 of the translucent substrate 20C and the back gradationally colored film 30C is laminated on the back surface 22, it is possible to realize a delicate design in which the change in shade of the color due to the gradation-coloring of the front gradationally colored film 10C and the back gradationally colored film 30C overlap.

[0053] Since the second region 62C has a layer configuration in which the back gradationally colored film 30C is laminated on the back surface 22 of the translucent substrate 20C, it is possible to realize a design in which the shade of the color is changed through the gradation-coloring of the back gradationally colored film 30C.

[0054] The third region 63C can realize a design utilizing the translucent substrate 20C. Further, since the front gradationally colored film 10C and the back gradationally colored film 30C are not laminated in the third region 63C, the transmittance of light can be improved. Therefore, particularly, when realizing a timepiece in which a solar panel is disposed on the back surface of the timepiece dial 3C, the power generation efficiency can be improved.

Fourth Embodiment

[0055] A timepiece dial 3D of a fourth embodiment will be described with reference to FIG. 9.

[0056] The timepiece dial 3D is a dial having a disc shape and includes a front gradationally colored film 10D, a translucent substrate 20D, a back gradationally colored film 30D, a backing colored film 40D, and a base material 50D. Since the translucent substrate 20D, the backing colored film 40D, and the base material 50D have the same configuration as in the first and second embodi-

ments, the description thereof will be omitted.

[0057] The front gradationally colored film 10D is formed by gradationally coloring the front surface of the translucent substrate 20D with the front surface coloring material through the ink jet printing. In the present embodiment, the front gradationally colored film 10D has an elliptical shape in plan view, has a center disposed at a position shifted in the 3 o'clock direction with respect to the through hole 23, and is formed through gradation-coloring such that the color on the 3 o'clock side is the darkest and the color becomes lighter toward the 9 o'clock side.

[0058] The back gradationally colored film 30D is formed by gradationally coloring the back surface of the translucent substrate 20D with the back surface coloring material through the ink jet printing. In the present embodiment, the back gradationally colored film 30D has an elliptical shape in plan view, has a center disposed at a position shifted in the 9 o'clock direction with respect to the through hole 23, and is formed through gradation-coloring such that the color on the 9 o'clock side is the darkest and the color becomes lighter toward the 3 o'clock side.

[0059] Similar to the cross-sectional view of each of the embodiments, FIG. 9 schematically represents that the colors gradually become lighter by increasing a film thickness of dark colored portions of the front gradationally colored film 10D and the back gradationally colored film 30D and gradually decreasing the film thickness.

[0060] Further, in the timepiece dial 3D of the fourth embodiment, each of the colors of the front gradationally colored film 10D, the back gradationally colored film 30D, and the backing colored film 40D may be appropriately set according to the design of the timepiece dial 3D as in each embodiment.

[0061] In the timepiece dial 3D of the fourth embodiment, the front gradationally colored film 10D and the back gradationally colored film 30D have regions where the front gradationally colored film 10D and the back gradationally colored film 30D overlap each other in plan view on the center side of the timepiece dial 3D, and do not overlap each other on the outer peripheral side. That is, the timepiece dial 3D includes a first region 61D where the front gradationally colored film 10D, the back gradationally colored film 30D, and the backing colored film 40D overlap in plan view, a second region 62D where the back gradationally colored film 30D and the backing colored film 40D overlap in plan view, and the front gradationally colored film 10D does not overlap, a third region 63D where the front gradationally colored film 10D and the backing colored film 40 overlap in plan view, and the back gradationally colored film 30D does not overlap, and a fourth region 64D where only the backing colored film 40D overlaps with the translucent substrate 20D, and the front gradationally colored film 10D and the back gradationally colored film 30D do not overlap. Since the layer configurations of the regions 61D to 64D are different from each other, the design of the timepiece dial 3D can be improved. Modification Example

[0062] The configuration of the timepiece dial is not limited to each of the embodiments described above.

[0063] For example, each timepiece dial is not limited to those having only the above-mentioned layer configuration, and a protective film, an antireflection film, or the like may be added to a front surface of the translucent substrate, that is, a surface on which the front gradationally colored film is formed. Further, the translucent substrate is not limited to mother-of-pearl or polycarbonate and may be any material as long as the translucent substrate is made of a translucent material, and the back gradationally colored film affects the design of the timepiece dial through the translucent substrate.

[0064] The front gradationally colored film and the back gradationally colored film are not limited to those in which the color density is continuously changed and may be those in which the color density is changed discontinuously, that is, stepwise.

[0065] Although the backing colored film may be formed through a single coating or a single printing such that the color density is uniform, the entire surface of the backing colored film does not necessarily have to have a uniform color, and the color of a part of the backing colored film may be changed depending on the design.

[0066] When a solar panel is disposed on the back surface of the timepiece dial, it is preferable that the backing colored film and the base material are not provided as in the timepiece dial 3C in that the amount of light reaching the solar panel can be increased. However, when the amount of light required to generate electricity reaches the solar panel by decreasing the film thickness of the backing colored film, the backing colored film may also be provided. Further, as the base material, when the amount of light required to generate electricity reaches the solar panel by using transparent synthetic resin, the base material may be provided, and both the backing colored film and the base material may be provided.

[0067] In the timepiece dials 3, 3B, 3C, and 3D of each embodiment, the direction of change in the color of the gradation may be reversed. For example, in the timepiece dial 3, although the gradation-coloring is employed in which the color on the outer peripheral side is dark and the color becomes lighter toward the inner periphery, conversely, gradation-coloring may be employed in which the color on the inner peripheral side is dark and the color becomes lighter toward the outer periphery. Similarly, in the other timepiece dials 3B, 3C, and 3D, the direction in which the color becomes lighter may be set in the reverse direction.

[0068] In the timepiece dials 3 and 3B, although the gradation-coloring is employed in which the color is changed in the radial direction of the translucent substrates 20 and 20B, gradation-coloring may be employed in which the color is changed in a circumferential direction of the translucent substrates 20 and 20B. For example, gradation-coloring may be performed such that the color at the 12 o'clock position on the timepiece dial is the

darkest, and the color becomes lighter toward the 6 o'clock position via the 3 o'clock and 9 o'clock positions.

[0069] In the timepiece dial 3C, although the front gradationally colored film 10C and the back gradationally colored film 30C are provided along the 12 o'clock and 6 o'clock directions, the present disclosure is not limited thereto. That is, in various timepiece dials having a disc shape or a rectangular shape, each of gradationally colored films on the front and back may be formed in a linear shape such as a direction connecting each index at 12 o'clock and 6 o'clock, that is, a vertical line, a horizontal line connecting each index at 3 o'clock and 9 o'clock, and further a diagonal line such as a direction connecting each index at 2 o'clock and 8 o'clock. In this case, two or more gradationally colored films may be provided in the intersecting direction. Further, a plurality of front gradationally colored films may be provided in parallel, and a plurality of back gradationally colored films may be provided in parallel. Further, when the gradationally colored film is formed in a linear shape, as in the timepiece dial 3C, a gradationally colored film of which the color is changed in the extension direction may be employed, in addition to the gradationally colored film of which the color is changed in a direction orthogonal to the extension direction of the gradationally colored film.

[0070] The gradationally colored films on the front and back may be formed in a radial shape from the plane center of the timepiece dial toward the outer periphery. For example, a fan-shaped front gradationally colored film having a center angle of 30 degrees may be formed in four directions at 12 o'clock, 3 o'clock, 6 o'clock, and 9 o'clock on the timepiece dial, and a fan-shaped back gradationally colored film having a center angle of 60 degrees may be formed in the same four directions. In this case, for example, the back gradationally colored film is formed in ranges of 11 o'clock to 1 o'clock, 2 o'clock to 4 o'clock, 5 o'clock to 7 o'clock, and 8 o'clock to 10 o'clock on the timepiece dial, the front gradationally colored film is formed in a range of $\pm$ 15 degrees around the four directions of 12 o'clock, 3 o'clock, 6 o'clock, and 9 o'clock, each gradationally colored film is not formed in ranges of 1 o'clock to 2 o'clock, 4 o'clock to 5 o'clock, 7 o'clock to 8 o'clock, and 10 o'clock to 11 o'clock, and for example, a region is formed where the backing colored film is exposed.

[0071] Further, each of the gradationally colored films may be formed in a spiral shape in plan view or may be formed in a star shape, a crescent shape, or the like. Further, a plane shape may be used which is different for each gradationally colored film, such as forming the front gradationally colored film with a linear shape and forming the back gradationally colored film with a circular shape.

[0072] Furthermore, the backing colored film is not limited to being formed on the entire back surface side of the translucent substrate, for example, the backing colored film may be formed only in a region where front and back gradationally colored films are not formed or may be formed only in a region where front and back gradationally colored films are formed.

[0073] That is, the regions, the number, the plane shapes, the color change directions, or the like for forming the front gradationally colored film, the back gradationally colored film, and the backing colored film may be appropriately set according to the design of the timepiece dial. Particularly, when each colored film is formed through ink jet printing, the region, the number, the plane shape, the color change direction, or the like for each colored film can be freely designed, and thus the design freedom of the timepiece dial can be increased.

Summary of Present Disclosure

[0074] A timepiece dial of the present disclosure includes: a translucent substrate; a front gradationally colored film formed on a front surface of the translucent substrate by gradationally coloring the front surface with a front surface coloring material; and a back gradationally colored film formed on a back surface of the translucent substrate by gradationally coloring the back surface with a back surface coloring material.

[0075] According to the timepiece dial of the present disclosure, since the front surface and the back surface of the translucent substrate are gradationally colored, that is, the front gradationally colored film and the back gradationally colored film are provided by the coloring using the coloring material such that the color density is changed continuously or stepwise, it is possible to form a portion where the front gradationally colored film is a main part and a portion where the back gradationally colored film is a main part in terms of design, and thus delicate coloring and patterns can be formed, and the range of design expression for timepiece dials can be expanded. Further, when a pattern is formed on the translucent substrate, the synergistic effect of the pattern on the translucent substrate and each of the gradationally colored films on both the front and back surfaces interposing the pattern can enhance the aesthetics of the timepiece dial.

[0076] In the timepiece dial of the present disclosure, in a plan view seen from a direction orthogonal to the front surface of the translucent substrate, the timepiece dial may include at least a region where the front gradationally colored film and the back gradationally colored film are provided in an overlapping manner, and a region where the back gradationally colored film is provided and the front gradationally colored film is not provided.

[0077] According to the timepiece dial of the present disclosure, since it is possible to form a region where each of the gradationally colored films on the front and back is provided in an overlapping manner and a region where only the back gradationally colored film is provided, delicate designs can be represented by making use of change in colors or change in shade of the colors.

[0078] In the timepiece dial of the present disclosure, in the plan view, the front gradationally colored film may entirely overlap the back gradationally colored film, and

the back gradationally colored film may include a region that overlaps the front gradationally colored film and a region that does not overlap the front gradationally colored film.

[0079] According to the timepiece dial of the present disclosure, since the entire region of the front gradationally colored film overlaps a part of the back gradationally colored film, and the back gradationally colored film can be formed over a wider region than the front gradationally colored film, the color of the front gradationally colored film can be set based on the color of the back gradationally colored film, and thus aesthetically excellent color combinations can be easily set.

[0080] In the timepiece dial of the present disclosure, a backing colored film, which is colored with a backing coloring material, may be formed on the back surface of the translucent substrate and a back surface of the back gradationally colored film, and in a plan view seen from a direction orthogonal to the front surface of the translucent substrate, the timepiece dial may include a region where the front gradationally colored film and the back gradationally colored film are not provided, and the backing colored film is provided.

[0081] According to the timepiece dial of the present disclosure, since the backing colored film is formed, a more delicate and complicated design can be represented by overlapping the front gradationally colored film or the back gradationally colored film and the backing colored film. Further, since the region where only the backing colored film can be visually recognized is provided, a more complicated design can be realized.

[0082] In the timepiece dial of the present disclosure, a backing colored film, which is colored with a backing coloring material, may be formed on the back surface of the translucent substrate and a back surface of the back gradationally colored film, and a base material may be bonded on a back surface side of the backing colored film.

[0083] According to the timepiece dial of the present disclosure, since the base material, which is bonded on the back surface side of the backing colored film, is provided, the strength of the timepiece dial can be increased. Further, since the base material is hidden due to the backing colored film, it is possible to prevent the metal or synthetic resin base material from being directly visually recognized, and it is possible to improve the design of the timepiece dial.

[0084] In the timepiece dial of the present disclosure, a through hole may be formed in a center of a plane of the translucent substrate, and the front gradationally colored film and the back gradationally colored film may be formed by gradationally coloring the front surface and the back surface concentrically about the through hole such that color becomes lighter from an outer periphery toward the center of the translucent substrate.

[0085] According to the timepiece dial of the present disclosure, since the color on the outer peripheral side is dark and the color becomes lighter toward the inside, a design having a bright center side can be realized.

[0086] In the timepiece dial of the present disclosure, a through hole may be formed in a center of a plane of the translucent substrate, and the front gradationally colored film and the back gradationally colored film may be formed by gradationally coloring the front surface and the back surface concentrically about the through hole such that color becomes lighter from the center toward an outer periphery of the translucent substrate.

[0087] According to the timepiece dial of the present disclosure, since the color on the center side is dark and the color becomes lighter toward the outer periphery, a design having a bright outer peripheral side can be realized.

[0088] In the timepiece dial of the present disclosure, an inner peripheral edge of the back gradationally colored film may be positioned at an intermediate position between the through hole of the translucent substrate and an outer peripheral edge of the translucent substrate or positioned inward from the intermediate position, and an inner peripheral edge of the front gradationally colored film may be positioned outward from the intermediate position.

[0089] According to the timepiece dial of the present disclosure, since the inner peripheral edge of the back gradationally colored film is formed farther inside the translucent substrate than the inner peripheral edge of the front gradationally colored film, in the timepiece dial, the region where gradationally colored films on both the front and back sides are not provided on the center side of the plane can be formed, the region where the back gradationally colored film is provided on the outside can be formed, and the region where gradationally colored films on both the front and back are provided on the outside can be formed, and thus it is possible to realize a design in which the color or the color density is changed along the radial direction.

[0090] In the timepiece dial of the present disclosure, the back gradationally colored film may be provided in a linear shape with a constant width dimension, the front gradationally colored film may be provided in a linear shape with a constant width dimension, and the width dimension of the front gradationally colored film may be smaller than the width dimension of the back gradationally colored film, and the front gradationally colored film and the back gradationally colored film may be provided in an overlapping manner.

[0091] According to the timepiece dial of the present disclosure, it is possible to realize a design having gradation-coloring in a linear shape.

[0092] In the timepiece dial of the present disclosure, the back gradationally colored film and the front gradationally colored film are preferably formed through coating or ink jet printing.

[0093] When the timepiece dial has a disc shape, it is possible to realize the gradation-coloring by rotating the translucent substrate on the rotating table and discharging the coating material from the spray gun. Further, with

the ink jet printing, printing can be performed not only on the timepiece dial having a disc shape but also on various timepiece dials with different plane shapes such as a rectangular shape and an elliptical shape.

[0094] In the timepiece dial of the present disclosure, the backing colored film is preferably formed through coating or ink jet printing.

[0095] When the timepiece dial has a disc shape, the backing colored film can be realized by rotating the translucent substrate on the rotating table and discharging the coating material from the spray gun. Further, with the ink jet printing, the backing colored film can be printed not only on the timepiece dial having a disc shape but also on various timepiece dials with different plane shapes such as a rectangular shape and an elliptical shape.

[0096] In the timepiece dial of the present disclosure, the translucent substrate is preferably made of mother-of-pearl.

[0097] When the translucent substrate is made of mother-of-pearl, it is possible to provide a highly aesthetic timepiece dial that utilizes the natural pattern of the mother-of-pearl oyster.

[0098] In the timepiece dial of the present disclosure, the translucent substrate may utilize a substrate made of polycarbonate.

[0099] When the translucent substrate is configured with a substrate made of polycarbonate, the translucent substrate can secure the strength required for the timepiece dial. Therefore, since there is no need to provide the base material separate from the translucent substrate to increase the strength, a solar panel can be provided on the back surface side of the timepiece dial to generate electricity.

[0100] A timepiece of the present disclosure includes the timepiece dial described above.

[0101] According to the timepiece of the present disclosure, the aesthetics of the timepiece dial can be enhanced, and thus a timepiece with excellent design can be provided.

Claims

1. A timepiece dial comprising:

a translucent substrate;
a front gradationally colored film formed on a front surface of the translucent substrate by gradationally coloring the front surface with a front surface coloring material; and
a back gradationally colored film formed on a back surface of the translucent substrate by gradationally coloring the back surface with a back surface coloring material.

2. The timepiece dial according to claim 1, wherein

in a plan view seen from a direction orthogonal to the front surface of the translucent substrate, the timepiece dial includes at least
a region where the front gradationally colored film and the back gradationally colored film are provided in an overlapping manner and
a region where the back gradationally colored film is provided and the front gradationally colored film is not provided.

3. The timepiece dial according to claim 2, wherein

in the plan view,
the front gradationally colored film entirely overlaps the back gradationally colored film, and
the back gradationally colored film includes a region that overlaps the front gradationally colored film and a region that does not overlap the front gradationally colored film.

4. The timepiece dial according to claim 1, wherein

a backing colored film, which is colored with a backing coloring material, is formed on the back surface of the translucent substrate and a back surface of the back gradationally colored film, and
in a plan view seen from a direction orthogonal to the front surface of the translucent substrate, the timepiece dial includes a region where the front gradationally colored film and the back gradationally colored film are not provided, and the backing colored film is provided.

5. The timepiece dial according to claim 1, wherein

a backing colored film, which is colored with a backing coloring material, is formed on the back surface of the translucent substrate and a back surface of the back gradationally colored film, and
a base material is bonded on a back surface side of the backing colored film.

6. The timepiece dial according to claim 1, wherein

a through hole is formed in a center of a plane of the translucent substrate, and
the front gradationally colored film and the back gradationally colored film are formed by gradationally coloring the front surface and the back surface concentrically about the through hole such that color becomes lighter from an outer periphery toward the center of the translucent substrate.

7. The timepiece dial according to claim 1, wherein

a through hole is formed in a center of a plane of

the translucent substrate, and
the front gradationally colored film and the back gradationally colored film are formed by gradationally coloring the front surface and the back surface concentrically about the through hole such that color becomes lighter from the center toward an outer periphery of the translucent substrate.

8. The timepiece dial according to claim 6, wherein

an inner peripheral edge of the back gradationally colored film is positioned at an intermediate position between the through hole of the translucent substrate and an outer peripheral edge of the translucent substrate or positioned inward from the intermediate position, and
an inner peripheral edge of the front gradationally colored film is positioned outward from the intermediate position.

9. The timepiece dial according to claim 1, wherein

the back gradationally colored film is provided in a linear shape with a constant width dimension,
the front gradationally colored film is provided in a linear shape with a constant width dimension, and
a width dimension of the front gradationally colored film is smaller than a width dimension of the back gradationally colored film, and the front gradationally colored film and the back gradationally colored film are provided in an overlapping manner.

10. The timepiece dial according to claim 1, wherein
the back gradationally colored film and the front gradationally colored film are formed through coating or inkjet printing.

11. The timepiece dial according to claim 4, wherein
the backing colored film is formed through coating or ink jet printing.

12. The timepiece dial according to claim 1, wherein
the translucent substrate is made of mother-of-pearl.

13. The timepiece dial according to claim 1, wherein
the translucent substrate is a substrate made of polycarbonate.

14. A timepiece comprising:
the timepiece dial according to claim 1.

FIG. 1

FIG. 2

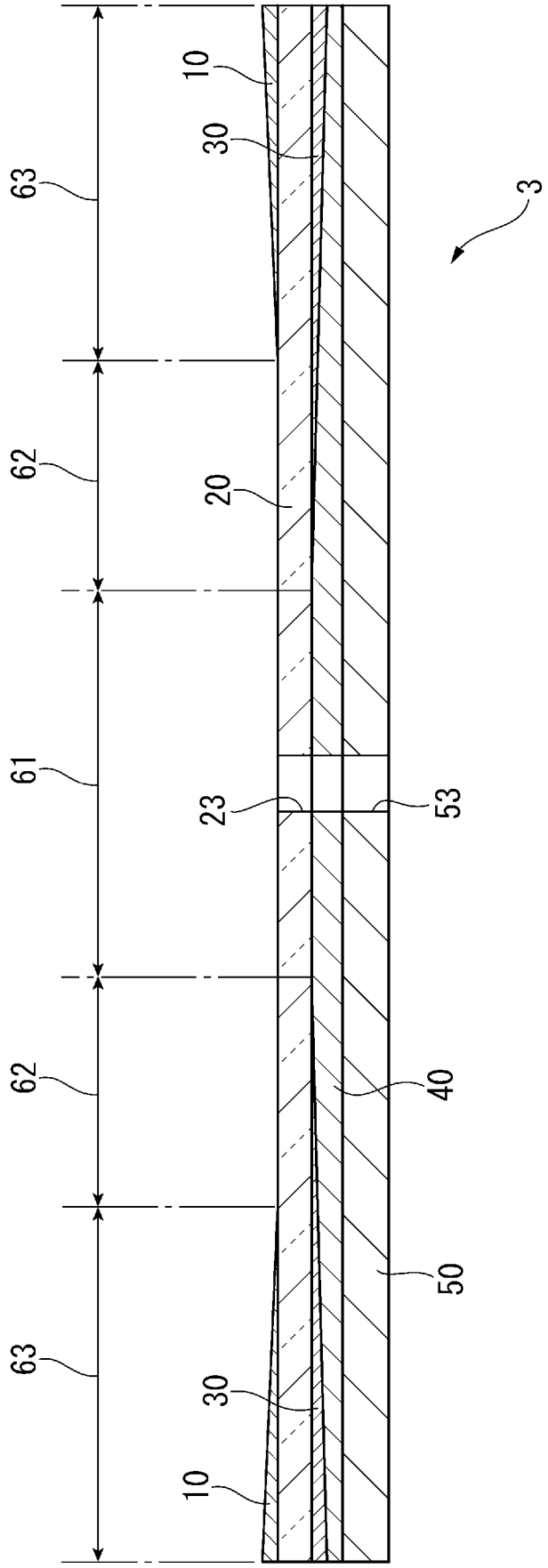


FIG. 3

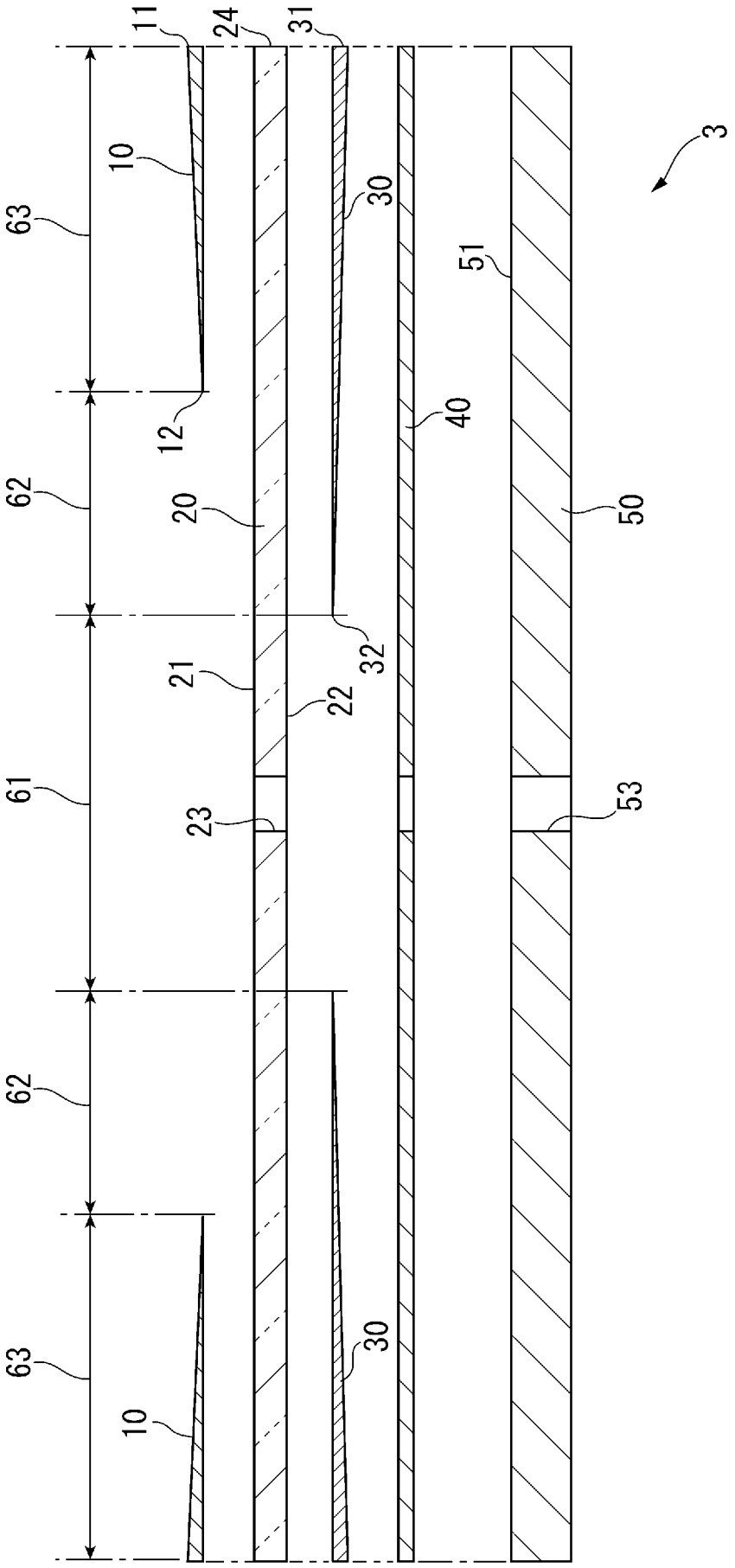


FIG. 4

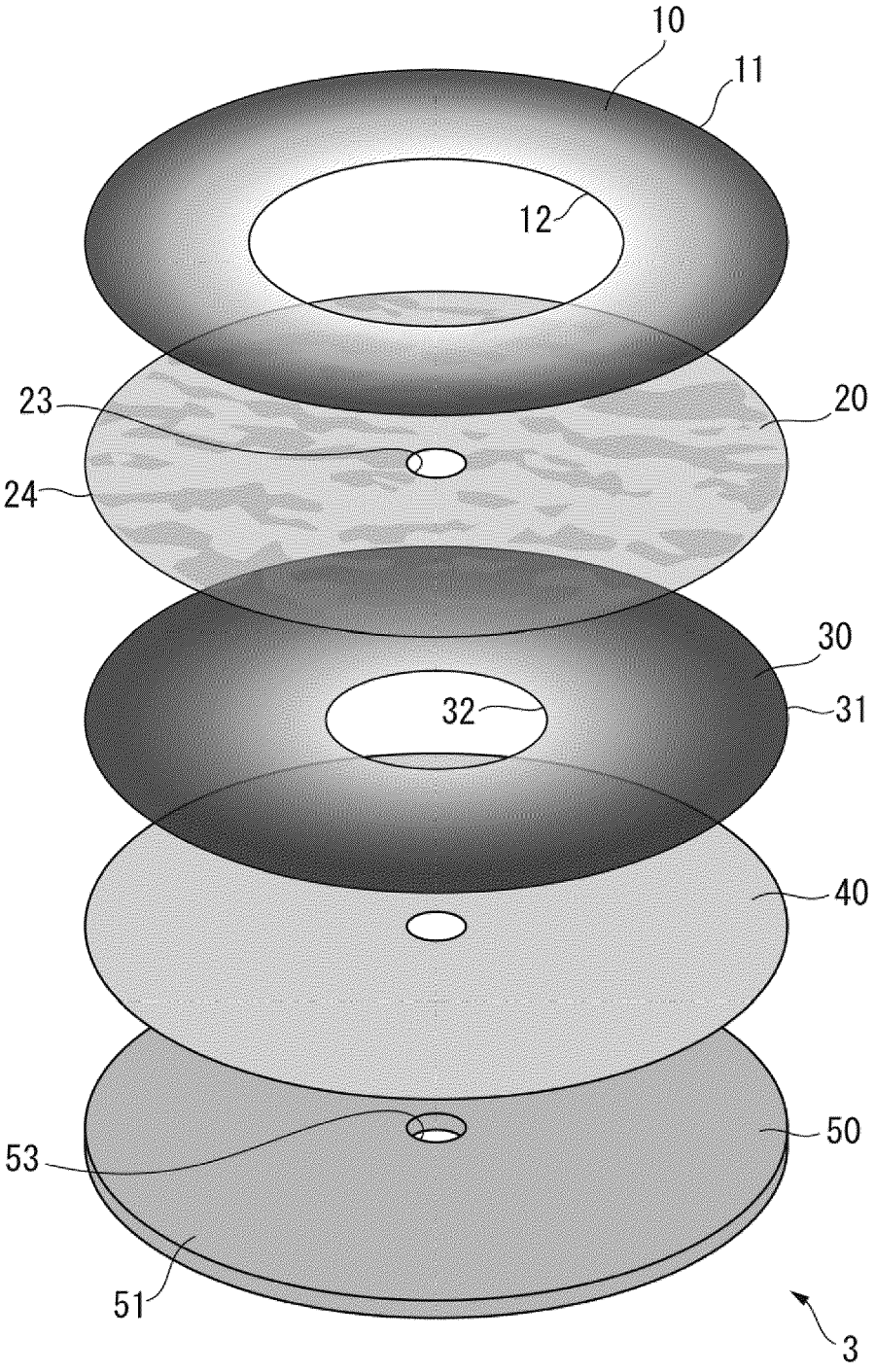


FIG. 5

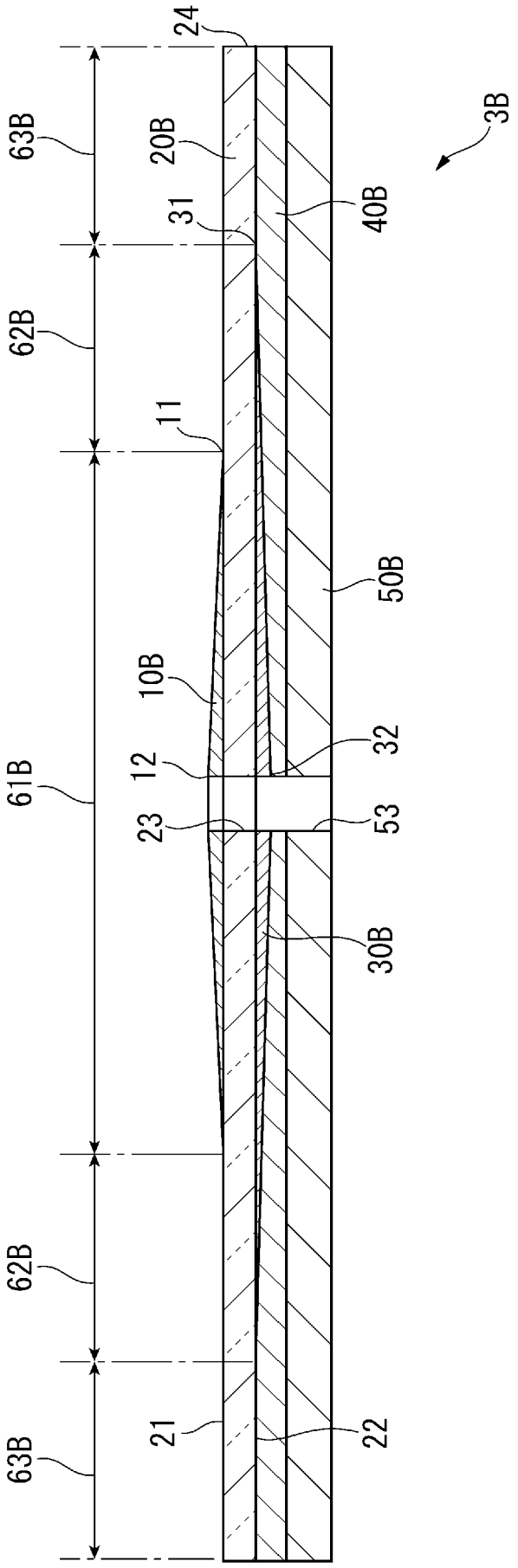

24
63B
20B
3B
31
40B
62B
11
50B
10B
32
61B
12
53
23
30B
62B
63B
21
22

FIG. 6

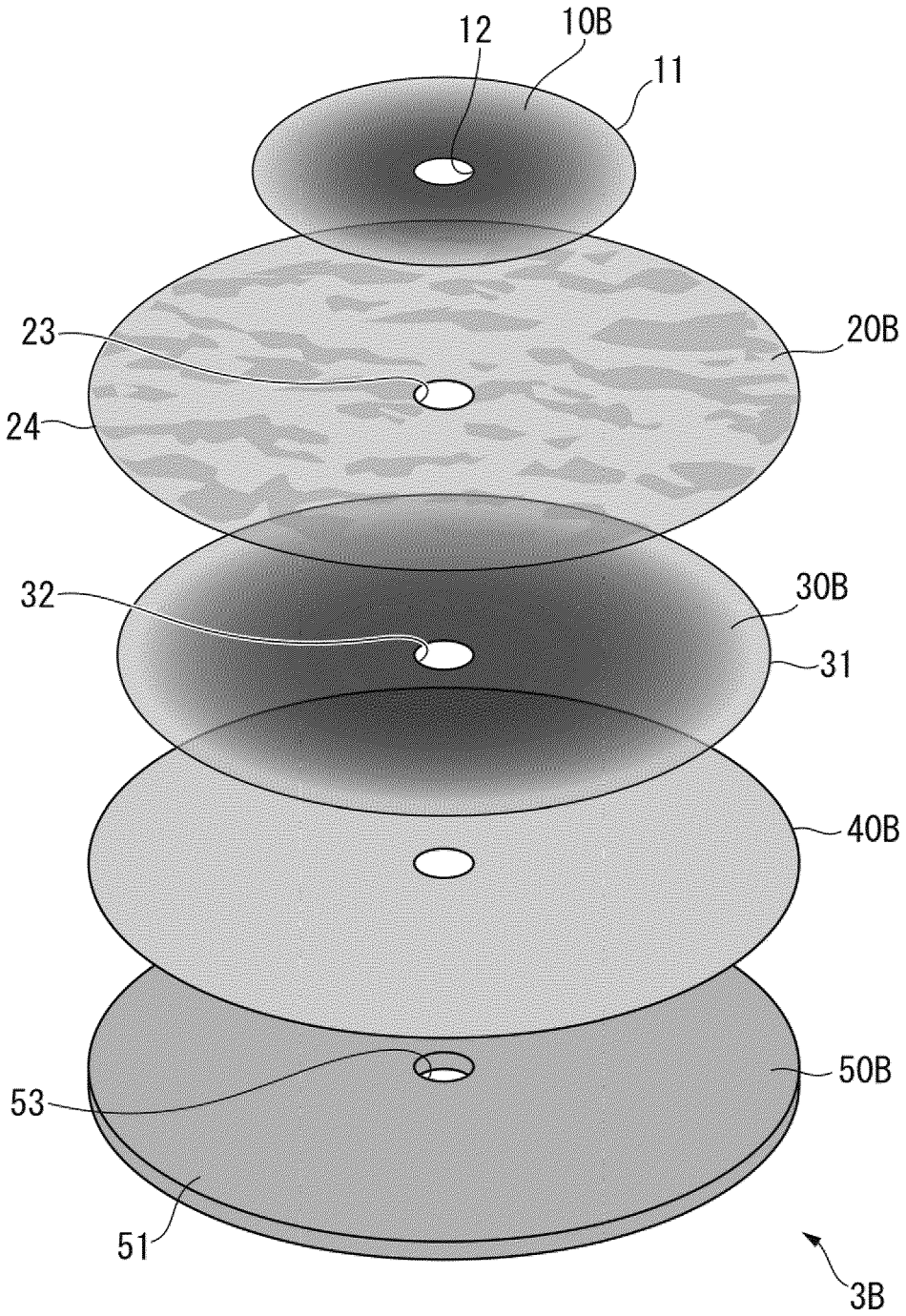


FIG. 7

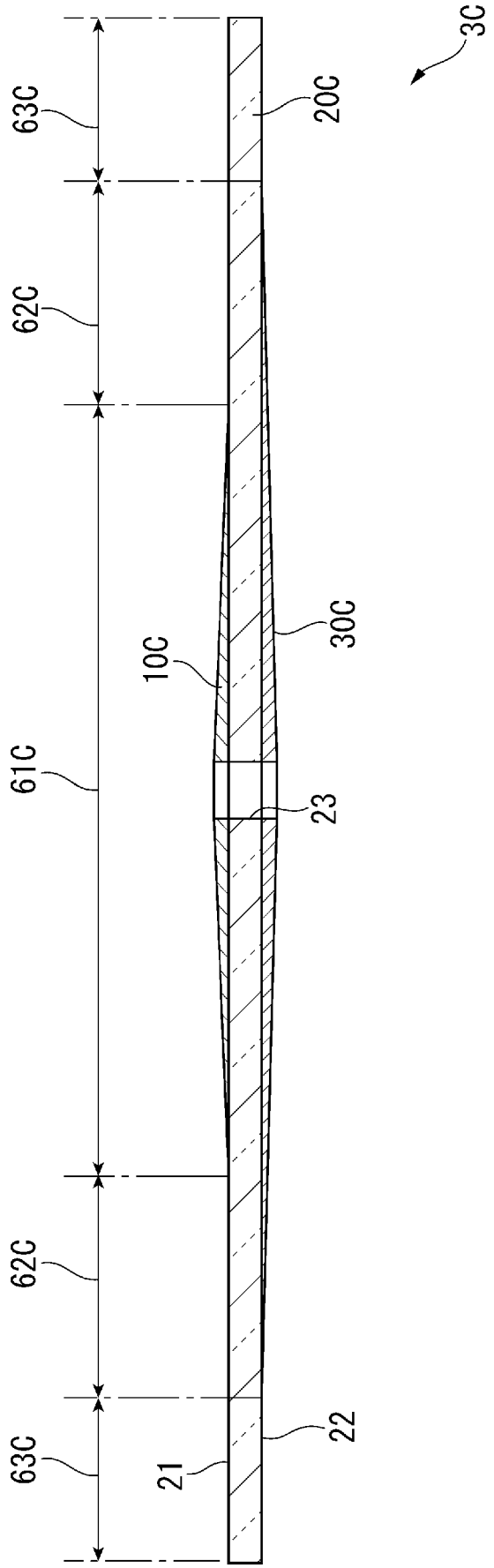


FIG. 8

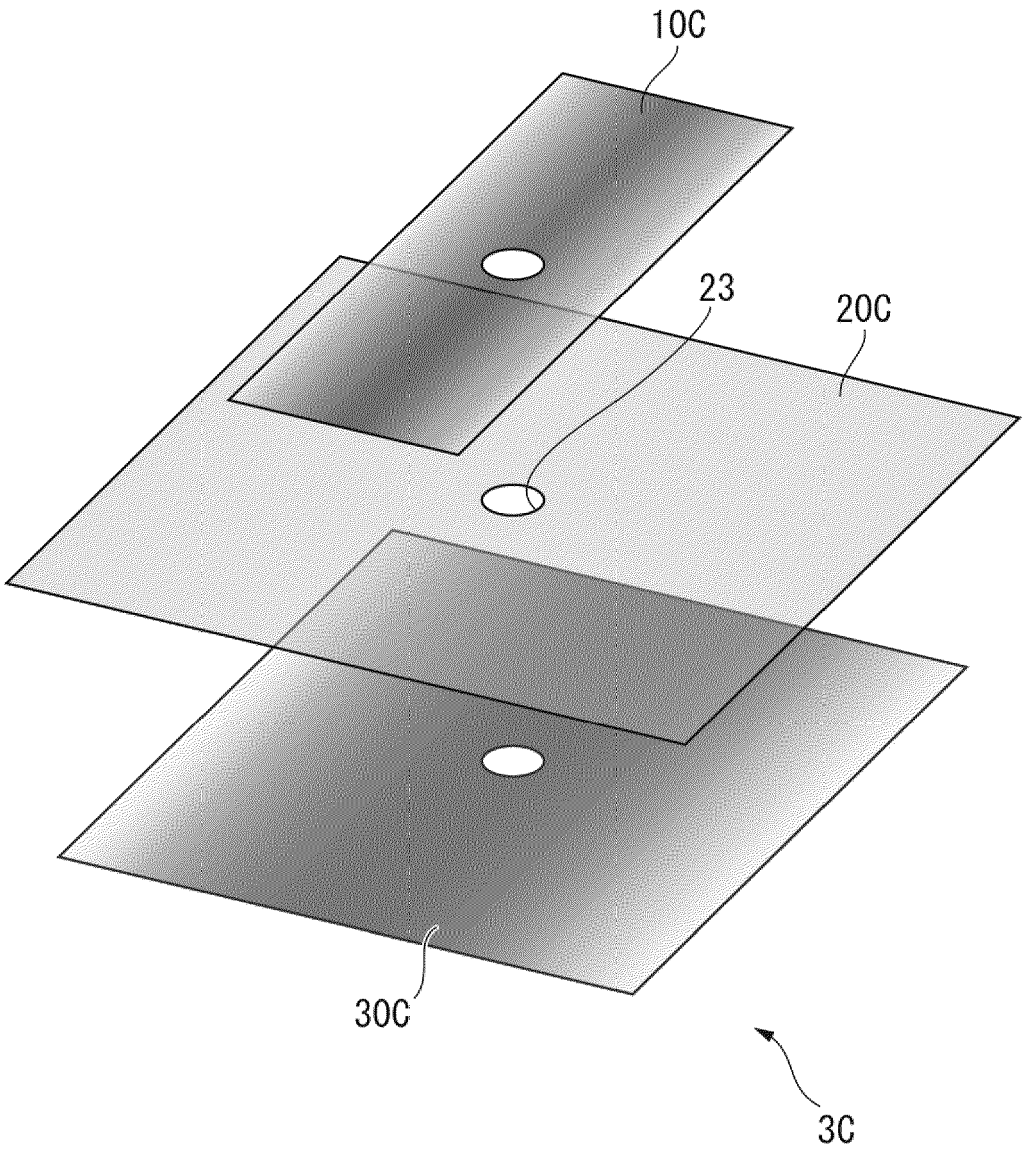
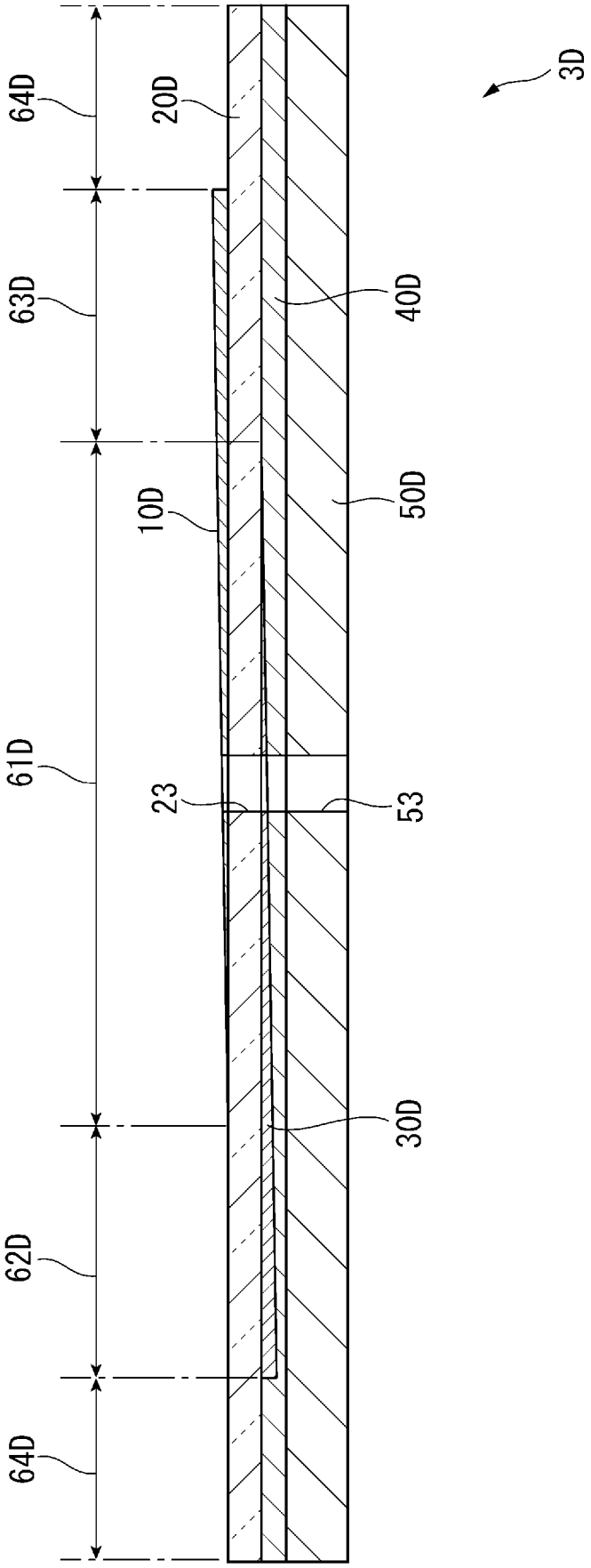


FIG. 9



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EUROPEAN SEARCH REPORT

Application Number
EP 24 18 6724

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CN 114 190 019 A (OPPO GUANGDONG MOBILE COMMUNICATION CO LTD) 15 March 2022 (2022-03-15) * the whole translated version *	1-14	INV. G04B45/00 G04D3/00
A	CH 717 875 A2 (SWATCH GROUP RES & DEV LTD [CH]) 31 March 2022 (2022-03-31) * paragraphs [0023] - [0030]; figure 6d *	1	
A	JP H09 218277 A (NAMIKI PRECISION JEWEL CO LTD) 19 August 1997 (1997-08-19) * paragraphs [0008] - [0027]; figure 12 *	1	

TECHNICAL FIELDS SEARCHED (IPC)
G04B
G04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 November 2024	Camatchy Toppé, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
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29-11-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 114190019 A	15-03-2022	NONE	
CH 717875 A2	31-03-2022	NONE	
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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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