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WATCH COMPONENT AND METHOD OF DECORATING WATCH COMPONENT

(57) A watch component includes a base material having a first pattern, wherein a second pattern is displayed by dot-forming a binarized pattern with ink composed of metal nanoparticles on a front surface of the base material, and a desired design is expressed with the first pattern and the second pattern.

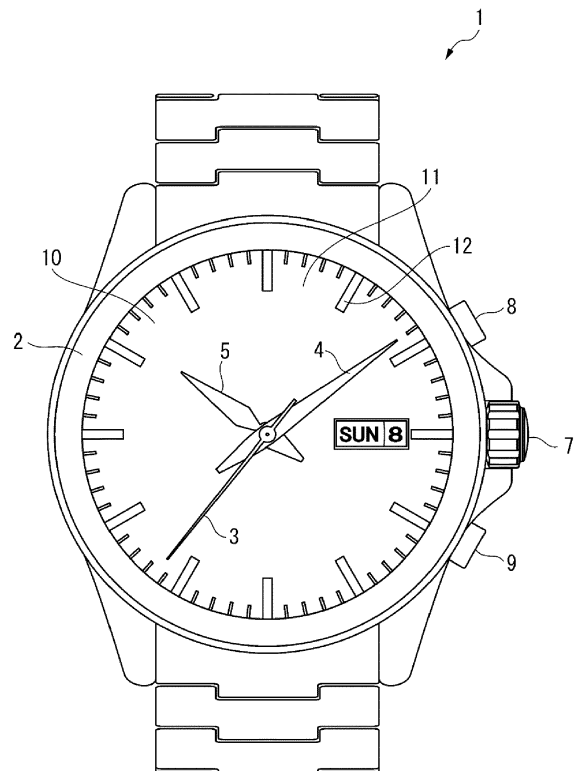


FIG. 1

Description

BACKGROUND

1. Technical Field

[0001] The present disclosure relates to a watch component and a method of decorating a watch component.

2. Related Art

[0002] JP-A-2000-111660 discloses a dial on which a character or an image is formed by subjecting a metal plate with plating to ink-jet printing.

[0003] In JP-A-2000-111660, a transparent ink reception layer is formed on a surface of the metal plate with plating, and hence manufacturing of a film or a printing plate is not required. With this, a variety of dials in small quantities can be produced in a short time at a low cost.

[0004] In JP-A-2000-111660, a character or an image is simply formed through ink-jet on the surface of the metal plate with plating. Thus, it is difficult to express an innovative design.

SUMMARY

[0005] A watch component of the present disclosure includes a base material having a first pattern, wherein a second pattern is displayed by dot-forming a binarized pattern with ink composed of metal nanoparticles on a front surface of the base material, and a desired design is expressed with the first pattern and the second pattern.

[0006] A method of decorating a watch component of the present disclosure includes a first pattern display step for displaying a first pattern on a base material, and a second pattern display step for displaying a second pattern on a surface of the base material by dot-forming a binarized pattern with ink composed of metal nanoparticles.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007]

FIG. 1 is a front view illustrating a watch according to a first embodiment.

FIG. 2 is a cross-sectional view illustrating a main part of a dial of the first embodiment.

FIG. 3 is a view illustrating a decoration step of a dial of the first embodiment.

FIG. 4 is a front view illustrating an outline of the dial of the first embodiment.

FIG. 5 is a view illustrating dots formed by causing ink composed of metal nanoparticles to impact on a surface of a base material.

FIG. 6 is a view illustrating a manufacturing step of a dial of a second embodiment.

FIG. 7 is a front view illustrating an outline of the dial

of the second embodiment.

DESCRIPTION OF EMBODIMENTS

5 First Embodiment

[0008] A watch 1 according to an embodiment of the present disclosure is described below with reference to the drawings.

10 **[0009]** FIG. 1 is a front view illustrating the watch 1. In the present embodiment, the watch 1 is configured as a wristwatch worn on a wrist of a user.

[0010] As illustrated in FIG. 1, the watch 1 includes a metal case 2. Further, the case 2 includes, in the inside, 15 a disk-shaped dial 10, a seconds hand 3, a minute hand 4, an hour hand 5, a crown 7, a button A 8, and a button B 9. Note that the dial 10 is an example of the watch component of the present disclosure.

20 Dial

[0011] FIG. 2 is a cross-sectional view illustrating a main part of the dial 10. Note that FIG. 2 is a cross-sectional view taken along a base material 30 of the dial 10 25 in a thickness direction.

[0012] As illustrated in FIG. 2, the dial 10 is configured to include the base material 30. In the present embodiment, the base material 30 is formed of any one of a seashell, a resin, and metal or a combination thereof. 30 With this, the texture of those materials can be expressed. For example, the design in which a color tone changes with variation in light can be expressed by carving a pearl mother shell to form the base material 30. Further, a sense of luxury can be obtained by forming 35 the base material 30 with noble metal such as platinum.

[0013] Further, a plurality of recessed portions 32 are formed in the surface 31 of the base material 30. In the present embodiment, the recessed portions 32 are formed by subjecting the surface 31 of the base material 30 to streak forming processing. More specifically, the surface 31 of the base material 30 is subjected to streak forming processing so that the recessed portions 32 are 40 formed radially from the center.

[0014] In this manner, in the present embodiment, the recessed portions 32 are formed so that a first pattern 45 40 is displayed on the surface 31 of the base material 30.

[0015] Note that the recessed portions 32 are not limited to the above-mentioned configuration. For example, the recessed portions 32 may be formed by cutting, laser processing, chemical removal processing, polishing, 50 forging and casting, or the like.

[0016] Further, dots 33 are formed on the surface 31 of the base material 30. In the present embodiment, ink composed of metal nanoparticles impacts on the surface 31 of the base material 30 in accordance with a binarized pattern. In this manner, the dots 33 are formed. With this, 55 in the present embodiment, a second pattern 50 is displayed with the dots 33 on the surface 31 of the base

material 30. More specifically, in accordance with the binarized pattern in which the dots are formed radially from the center, the ink composed of the metal nanoparticles is printed onto the surface 31 of the base material 30 through ink-jet printing. With this, the second pattern 50 is displayed.

[0017] Herein, the ink composed of the metal nanoparticles is a composition in which the metal nanoparticles are dispersed in a dispersion medium. Further, the metal nanoparticles indicates metal particles each having a particle diameter falling within a range of 1 nm or more and 1 μm or less, and may be configured to contain any one of gold, silver, copper, and platinum. With this, the second pattern 50 having luster can be expressed, and a more luxurious design can be expressed.

[0018] Further, in the present embodiment, the dots 33 are formed to have a diameter D of 11 μm or more and 60 μm or less.

[0019] In general, even when a pattern is expressed with dots each having a diameter of 10 μm or less, which is an excessively small dot diameter, it is less likely to be visually recognized that the pattern is expressed with the dots. In the present embodiment, the dots 33 are formed so that the diameter D is 11 μm or more and 60 μm or less. With this, the second pattern 50 with the visually-recognizable and fine dots 33 can be expressed.

Method of Decorating Dial

[0020] FIG. 3 is a view illustrating a decoration step of the dial 10, and FIG. 4 is a front view illustrating an outline of the dial 10.

[0021] As illustrated in FIG. 3, in a first pattern display step, first, the recessed portions 32 are formed by subjecting the surface 31 of the base material 30 to streak forming processing and punching to display the first pattern 40.

[0022] Next, in a second pattern display step, in accordance with the binarized pattern that is prepared in advance, the surface 31 of the base material 30 is subjected to ink-jet printing with the ink composed of the metal nanoparticles. With this, the dots 33 are formed to display the second pattern 50.

[0023] Further, finally, in a lapping step, a transparent film is applied on the surface 31 of the base material 30 on which the dots 33 are formed, and the transparent film is polished. With this, in a finishing step, the transparent film applied to the surface 31 of the base material 30 is polished. Thus, the design aesthetics can further be improved.

[0024] The dial 10 is decorated as described above. With this, as illustrated in FIG. 4, a desired design with the first pattern 40 and the second pattern 50 can be achieved.

[0025] Note that, in the present embodiment, even when the same first pattern 40 is expressed on the base material 30, the second pattern can easily be changed by changing the binarized pattern. Thus, a dial having an

impression different from FIG. 4 can easily be provided.

[0026] Further, in the present embodiment, both the first pattern 40 expressed on the base material 30 and the second pattern 50 displayed by dot-forming the binarized pattern can be recognized visually. Thus, an innovative design with complexity can be expressed.

[0027] Moreover, in the present embodiment, the second pattern 50 is dot-formed with the ink composed of the metal nanoparticles having luster. Thus, an external appearance with a sense of luxury can be obtained.

[0028] Further, in the present embodiment, as described above, the first pattern 40 is displayed by forming the recessed portions 32 radially with respect to the surface 31 of the base material 30, and the second pattern 50 is displayed by forming the dots 33 in accordance with the binarized pattern in which the dots are formed radially. In other words, in the present embodiment, the first pattern 40 and the second pattern 50 are associated with each other. With this, as illustrated in FIG. 4, the first pattern 40 is emphasized by the second pattern 50. Thus, the design that highlights the first pattern 40 can be expressed.

[0029] FIG. 5 is a view illustrating the dots 33 formed by causing the ink composed of the metal nanoparticles to impact on the surface 31 of the base material 30.

[0030] As illustrated in FIG. 5, the ink composed of the metal nanoparticles impacts on the surface 31 of the base material 30 to form the dots 33. Such dots each has a diameter of approximately 20 μm , and is formed to have a diameter of 11 μm or more and 60 μm or less. Note that this is not limitative when impact positions overlap with each other. In other words, in the present embodiment, at the position at which the ink impact positions do not overlap with each other, the dots 33 are formed to have the diameter D of 11 μm or more and 60 μm or less.

[0031] The reason for this is assumed that, in the present embodiment, the ink is composed of the metal nanoparticles having an extremely small particle diameter and the surface 31 of the base material 30 is not subjected to water repellent treatment. Consequently, the ink impacting on the surface 31 of the base material 30 spreads to a moderate degree. In other words, the ink composed of the metal nanoparticles having an extremely small particle diameter impacts on the surface 31 of the base material 30 in a hydrophilic state or a hydrophobic state. With this, the dots 33 can be formed to have the diameter D of 11 μm or more and 60 μm or less.

[0032] Note that, as evaluation on wettability in general, a state in which a contact angle formed between the surface and a tangent to a contour curve of a liquid droplet adhering to the surface is 40 degrees or less is a hydrophilic state. A state in which the contact angle is approximately from 40 degrees to 90 degrees is a hydrophobic state. Moreover, a state in which the contact angle exceeds 90 degrees is a water-repellent state.

[0033] In the present embodiment, the second pattern 50 that is visually recognizable and fine can be expressed by forming the dots 33 described above.

Operational Effects of First Embodiment

[0034] According to the present embodiment described above, the following effects can be achieved.

[0035] In the present embodiment, both the first pattern 40 expressed on the base material 30 and the second pattern 50 displayed by dot-forming the binarized pattern can be recognized visually. Thus, an innovative design with complexity can be expressed. Further, the second pattern 50 is dot-formed with the ink composed of the metal nanoparticles having luster. Thus, an external appearance with a sense of luxury can be obtained.

[0036] Moreover, in the present embodiment, the watch component having a different impression can easily be provided by changing the second pattern 50 formed on the surface 31 of the base material 30.

[0037] In the present embodiment, the base material 30 is formed of any one of a seashell, a resin, and metal, and hence the texture of those materials can be expressed.

[0038] In the present embodiment, the first pattern 40 and the second pattern 50 are associated with each other, and the second pattern 50 is dot-formed to emphasize the first pattern 40. Thus, the design that highlights the first pattern 40 can be expressed.

[0039] In the present embodiment, the metal nanoparticles for dot-forming the second pattern 50 is configured to contain any one of gold, silver, copper, and platinum. Thus, the second pattern 50 having luster can be expressed, and a more luxurious design can be expressed.

[0040] In the present embodiment, the diameter D of the dot formed by causing the ink composed of the metal nanoparticles to impact on the surface 31 of the base material 30 is 11 μm or more and 60 μm or less. Thus, the second pattern 50 with the visually-recognizable and fine dots 33 can be expressed, and a more delicate design can be expressed.

[0041] In the present embodiment, in the finishing step, the surface 31 of the base material 30 is polished. Thus, the design aesthetics can further be improved.

Second Embodiment

[0042] Next, a second embodiment of the present disclosure is described with reference to FIG. 6 and FIG. 7. The second embodiment is different from the first embodiment described above in that a first pattern 40A is displayed in a matte finish and a second pattern 50A is displayed by forming dots 33A in accordance with a binarized pattern in which dots are formed in a lattice shape.

[0043] Note that, in the second embodiment, the same or similar components to those of the first embodiment are denoted with the same reference symbols, and the description is omitted or simplified.

[0044] FIG. 6 is a view illustrating a decoration step of a dial 10A of the second embodiment, and FIG. 7 is a front view illustrating an outline of the dial 10A.

[0045] As illustrated in FIG. 6 and FIG. 7, in the present embodiment, the first pattern 40A in a matte finish is displayed on a surface 31A of a base material 30A. Moreover, the ink composed of the metal nanoparticles impacts on the surface 31A of the base material 30A on which the first pattern 40A is displayed, in accordance with the binarized pattern in a lattice shape. With this, the dots 33A are formed to display the second pattern 50A.

[0046] With this, as illustrated in FIG. 7, the complex design in which the first pattern 40A in a matte finish is blurred by the second pattern 50A in a lattice shape can be expressed.

[0047] Moreover, in the present embodiment, the dots 33A forming the second pattern 50A are formed with gradation. With this, the design having the part where the first pattern 40A in a matte finish is recognized relatively clearly and the part where the first pattern 40A in a matte finish is recognized relatively unclearly can be expressed.

Operational Effects of Second Embodiment

[0048] According to the present embodiment described above, the following effects can be achieved.

[0049] In the present embodiment, the first pattern 40A in a matte finish is displayed on the surface 31A of the base material 30A, and the second pattern 50A is displayed by forming the dots 33A in accordance with the binarized pattern in a lattice shape. Thus, the complex design in which the first pattern 40A in a matte finish is blurred by the second pattern 50A in a lattice shape can be expressed.

[0050] In the present embodiment, the dots 33A forming the second pattern 50A are formed with gradation. Thus, the design having the part where the first pattern 40A in a matte finish is recognized relatively clearly and the part where the first pattern 40A in a matte finish is recognized relatively unclearly can be expressed.

Modification Examples

[0051] Note that the present disclosure is not limited to each of the embodiments described above, and may be modified and changed as far as the advantages of the present disclosure can be achieved.

[0052] In each of the embodiments described above, the first pattern 40, 40A and the second pattern 50A are displayed on a base body of the base material 30, 30A formed of any one of a seashell, a resin, and metal or a combination thereof, but this is not limitative. For example, the base material may be subjected to plating treatment or coating with a coating material. With this, luster and a color of the base material can freely be expressed.

[0053] In the first embodiment described above, the first pattern 40 is displayed by forming the recessed portions 32 in the surface 31 of the base material 30, but this is not limitative. For example, the first pattern may

be displayed by printing or transferring the first pattern with respect to the surface of the base material.

[0054] Moreover, the base material is formed of a resin having transparency such as polycarbonate, or glass, and the first pattern is displayed on a movement or the like arranged on the back side of the dial. With this, the first pattern may be displayed in a visually recognizable manner through the base material. With this, the design expressed with the first pattern and the second pattern has a sense of depth. Thus, an innovative design with more complexity can be expressed.

[0055] In each of the embodiments described above, the design expressed with the first pattern 40, 40A and the second pattern 50, 50A may be configured to change in accordance with a visual recognition angle. More specifically, with gradation of the dots 33, 33A forming the second pattern 50, 50A, the design may be configured to change in accordance with a visual recognition angle. With this, the design expressed with the first pattern and the second pattern changes in accordance with a visual recognition angle. Thus, an innovative design with more complexity can be expressed.

[0056] Further, in each of the embodiments described above, a dark color may be added to the base material 30, 30A, and the second pattern 50, 50A may be displayed with ink having metallic luster. With this, a deep color is added to the base material 30, 30A, and hence the second pattern 50, 50A having metallic luster can be highlighted. In particular, when the base material is black, and the second pattern is displayed with ink configured to contain gold or silver, a luxurious design such as gold leaf lacquerware can be expressed.

[0057] In each of the embodiments described above, the watch component of the present disclosure is configured as the dial 10, 10A, but this is not limitative. For example, the watch component of the present disclosure may be configured as one of a case, a dial ring, a glass edge, a movement and a main plate thereof, a hand, an abbreviation, and an oscillating weight.

Overview of Present Disclosure

[0058] A watch component of the present disclosure includes a base material having a first pattern, wherein a second pattern is displayed by dot-forming a binarized pattern with ink composed of metal nanoparticles on a front surface of the base material, and a desired design is expressed with the first pattern and the second pattern.

[0059] In the present embodiment, both the first pattern expressed on the base material and the second pattern displayed by dot-forming the binarized pattern can be recognized visually. Thus, an innovative design with complexity can be expressed. Further, the second pattern is dot-formed with the ink composed of the metal nanoparticles having luster. Thus, an external appearance with a sense of luxury can be obtained.

[0060] Moreover, in the present disclosure, the watch component having a different impression can easily be

provided by changing the second pattern formed on the surface of the base material.

[0061] In the watch component of the present disclosure, the base material may be formed of any one of a seashell, a resin, and metal or a combination thereof.

[0062] With this, the base material is formed of any one of a seashell, a resin, and metal or a combination thereof. Thus, the texture of those materials can be expressed.

[0063] In the watch component of the present disclosure, the base material may be subjected to plating treatment or coating with a coating material.

[0064] With this, the base material is subjected to plating treatment or coating with a coating material. Thus, luster and a color of the vase material can freely be expressed.

[0065] In the watch component of the present disclosure, the base material may be formed of a resin having transparency or glass, and the first pattern may be displayed on the surface of the base material or may be displayed in a visually recognizable manner through the base material.

[0066] With this, the base material is formed of a resin having transparency or glass. Thus, for example, the first pattern can be visually recognizable by displaying the first pattern on a member arranged on the back side of the base material instead of displaying the first pattern directly on the base material. Thus, the design expressed with the first pattern and the second pattern has a sense of depth, and hence an innovative design with more complexity can be expressed.

[0067] Note that, in this case, first, the ink may impact on the surface of the base material to form the dots. With this, the second pattern may be displayed. Subsequently, the first pattern may be displayed on the member arranged on the back side of the base material. After that, the watch component of the present disclosure and the member arranged on the back side of the base material may be assembled with each other. In other words, the order of performing the first pattern display step and the second pattern display step may be switched.

[0068] In the watch component of the present disclosure, the first pattern and the second pattern may be associated with each other, and the second pattern may be obtained through dot formation to emphasize the first pattern.

[0069] With this, the first pattern is emphasized more than the second pattern. Thus, the design that highlights the first pattern can be expressed.

[0070] In the watch component of the present disclosure, dots forming the second pattern may be formed with gradation.

[0071] With this, the dots forming the second pattern are formed with gradation, and the design having the part where the first pattern is recognized relatively clearly and the part where the first pattern is recognized relatively unclearly can be expressed.

[0072] In the watch component of the present disclosure, the design expressed with the first pattern and the

second pattern may be configured to change in accordance with a visual recognition angle.

[0073] With this, the design expressed with the first pattern and the second pattern changes in accordance with a visual recognition angle. Thus, an innovative design with more complexity can be expressed.

[0074] In the watch component of the present disclosure, the metal nanoparticles may be configured to contain any one of gold, silver, copper, and platinum.

[0075] With this, the metal nanoparticles for dot-forming the second pattern is configured to contain any one of gold, silver, copper, and platinum. Thus, the second pattern having luster can be expressed, and a more luxurious design can be expressed.

[0076] In the watch component of the present disclosure, a diameter of a dot may be 11 μm or more and 60 μm or less, the dot being formed by causing the ink composed of the metal nanoparticles to impact on the surface of the base material.

[0077] With this, the second pattern with the visually-recognizable and fine dots is displayed. With this, a more delicate design can be expressed.

[0078] In the watch component of the present disclosure, a deep color may be added to the base material, and the second pattern may be displayed with the ink having metallic luster.

[0079] With this, a deep color is added to the base material, and hence the second pattern having metallic luster can be highlighted. In particular, when the base material is black, and the second pattern is displayed with ink configured to contain gold or silver, a luxurious design such as gold leaf lacquerware can be expressed.

[0080] A method of decorating a watch component of the present disclosure includes a first pattern display step for displaying a first pattern on a base material, and a second pattern display step for displaying a second pattern on a surface of the base material by dot-forming a binarized pattern with ink composed of metal nanoparticles.

[0081] In the present embodiment, both the first pattern expressed on the base material and the second pattern displayed by dot-forming the binarized pattern can be recognized visually. Thus, an innovative design with complexity can be expressed. Moreover, the second pattern is dot-formed with the ink composed of the metal nanoparticles having luster. Thus, an external appearance with a sense of luxury can be obtained.

[0082] Further, in the present disclosure, the watch component having a different impression can easily be provided by changing the second pattern formed on the surface of the base material.

[0083] The method of decorating a watch component of the present disclosure may include a lapping step for applying a transparent film on the surface of the base material on which dots are formed and polishing the transparent film, the lapping step being performed after the second pattern display step.

[0084] With this, in the finishing step, the transparent

film applied to the surface of the base material is polished. Thus, the design aesthetics can further be improved.

5 Claims

1. A watch component comprising:

a base material having a first pattern, wherein a second pattern is displayed through dot formation with ink composed of metal nanoparticles on a surface of the base material, and a desired design is expressed with the first pattern and the second pattern.

2. A watch component according to claim 1, wherein the base material is formed of any one of a seashell, a resin, and metal or a combination thereof.

3. A watch component according to claim 2, wherein the base material is subjected to plating treatment or coating with a coating material.

4. A watch component according to claim 2, wherein

the base material is formed of a resin having transparency or glass, and the first pattern is displayed on the surface of the base material, or is displayed in a visually recognizable manner through the base material.

5. A watch component according to claim 1, wherein

the first pattern and the second pattern are associated with each other, and the second pattern is obtained through dot formation to emphasize the first pattern.

6. A watch component according to claim 1, wherein dots forming the second pattern are formed with gradation.

7. A watch component according to claim 1, wherein the design expressed with the first pattern and the second pattern is configured to change in accordance with a visual recognition angle.

8. A watch component according to claim 1, wherein the metal nanoparticles are configured to contain any one of gold, silver, copper, and platinum.

9. A watch component according to claim 1, wherein a diameter of a dot is 11 μm or more and 60 μm or less, the dot being formed by causing the ink composed of the metal nanoparticles to impact on the surface of the base material.

10. A watch component according to claim 1, wherein

the watch component is configured as a dial, and a deep color is added to the base material, and the second pattern is displayed with the ink having metallic luster.

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11. A method of decorating a watch component, comprising:

a first pattern display step for displaying a first pattern on a base material; and
a second pattern display step for displaying a second pattern on a surface of the base material by dot-forming a binarized pattern with ink composed of metal nanoparticles.

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12. A method of decorating a watch component according to claim 11, comprising:

a lapping step for applying a transparent film on the surface of the base material on which dots are formed and polishing the transparent film, the lapping step being performed after the second pattern display step.

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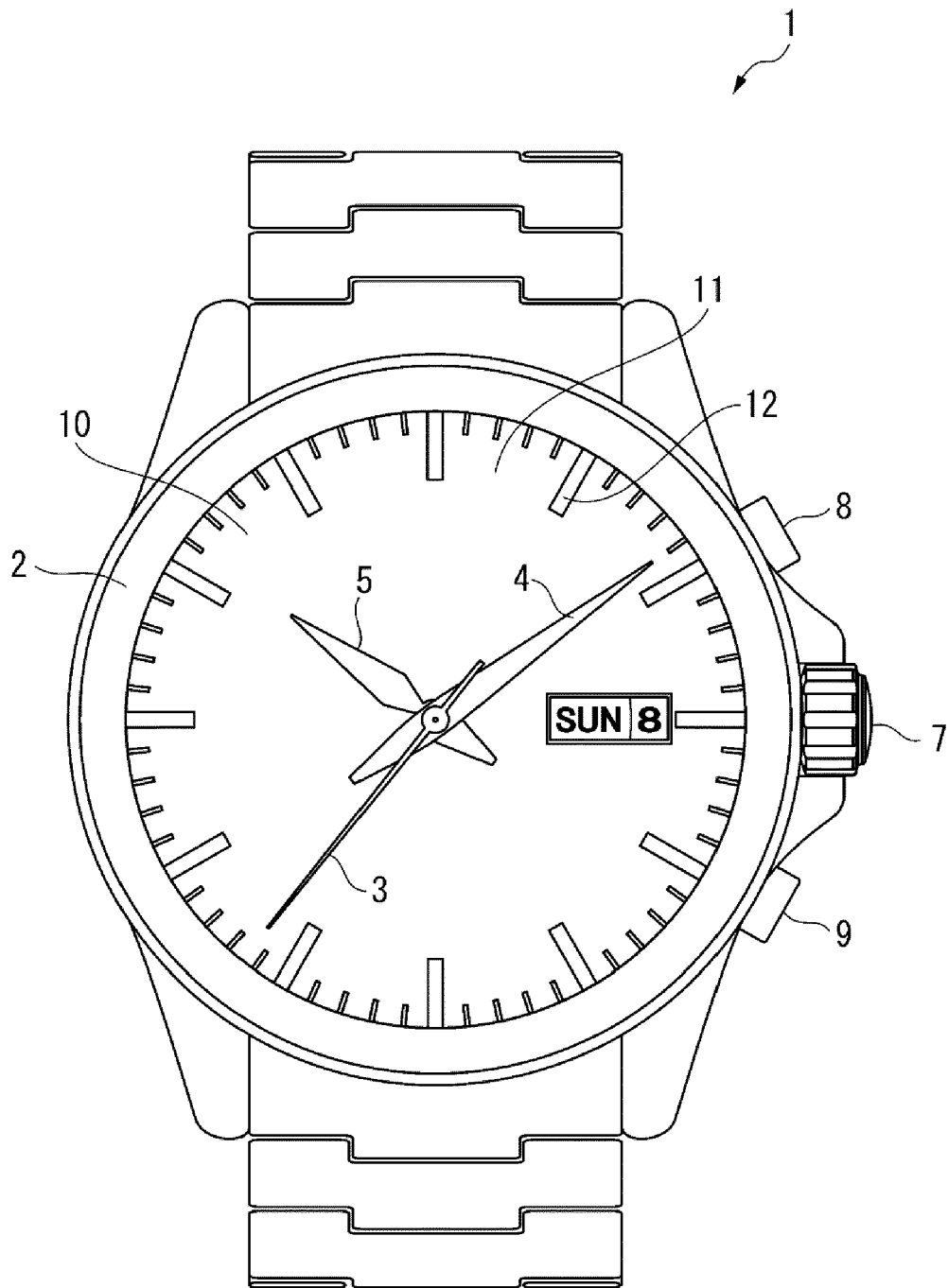


FIG. 1

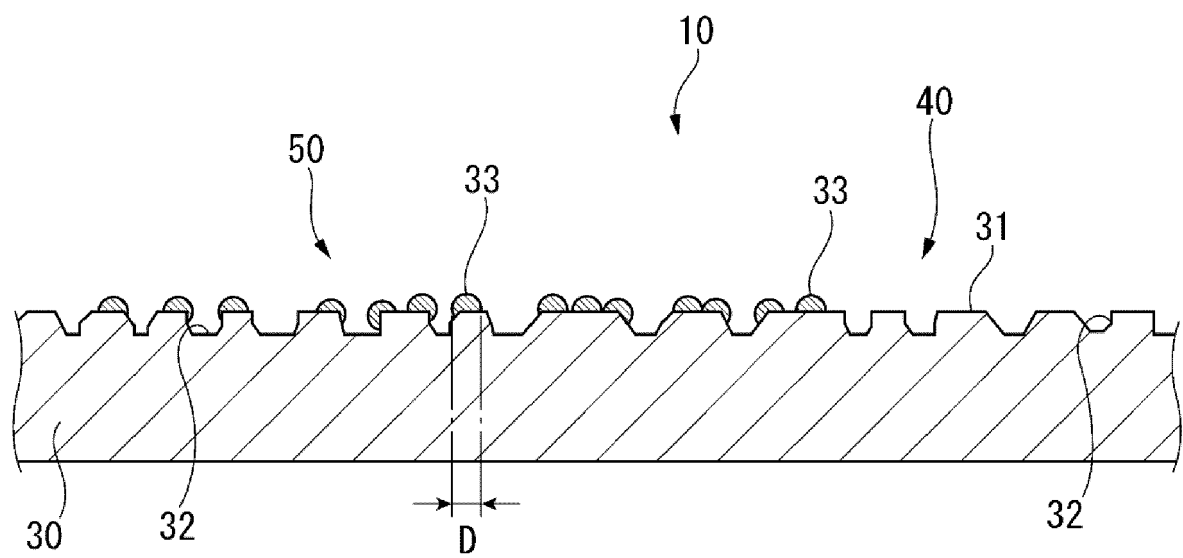


FIG. 2

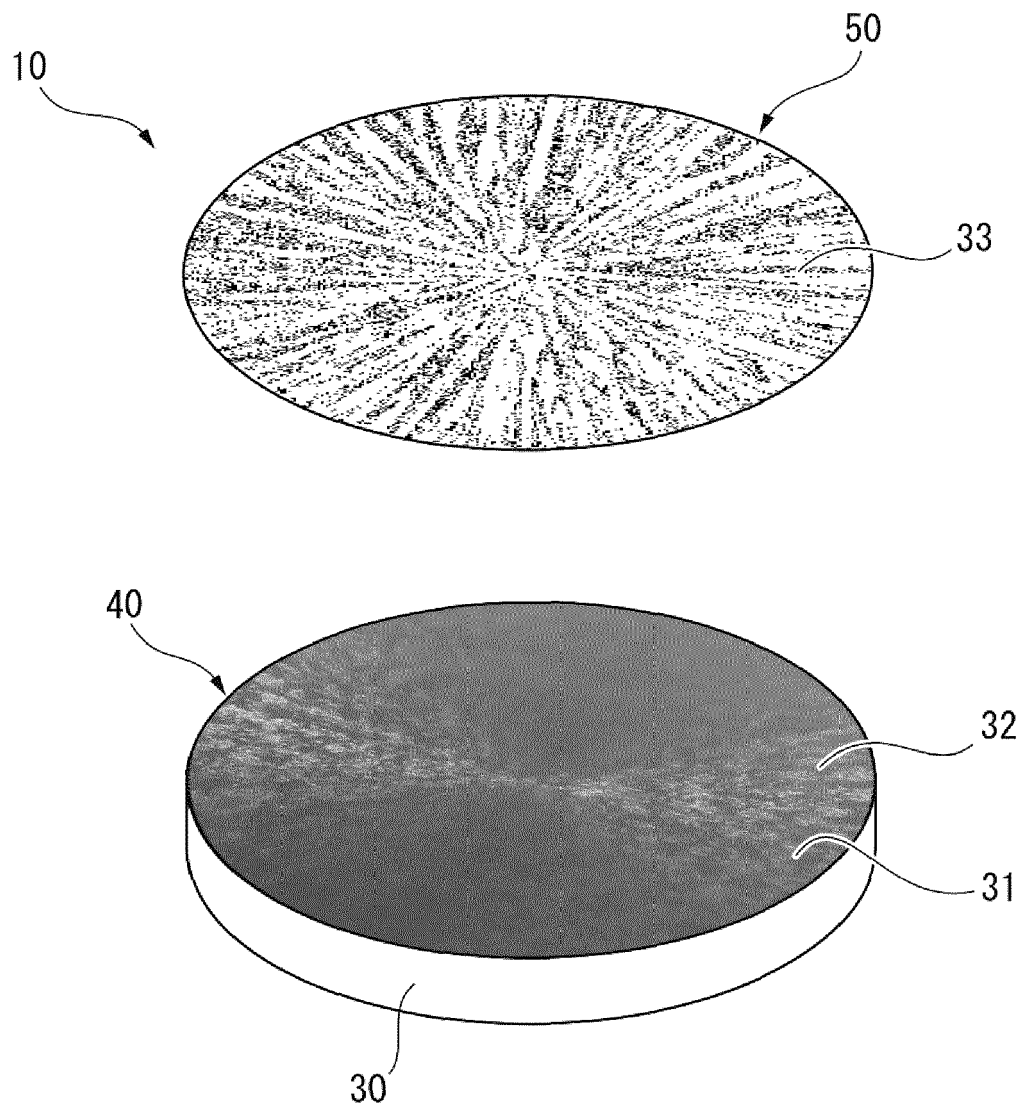


FIG. 3

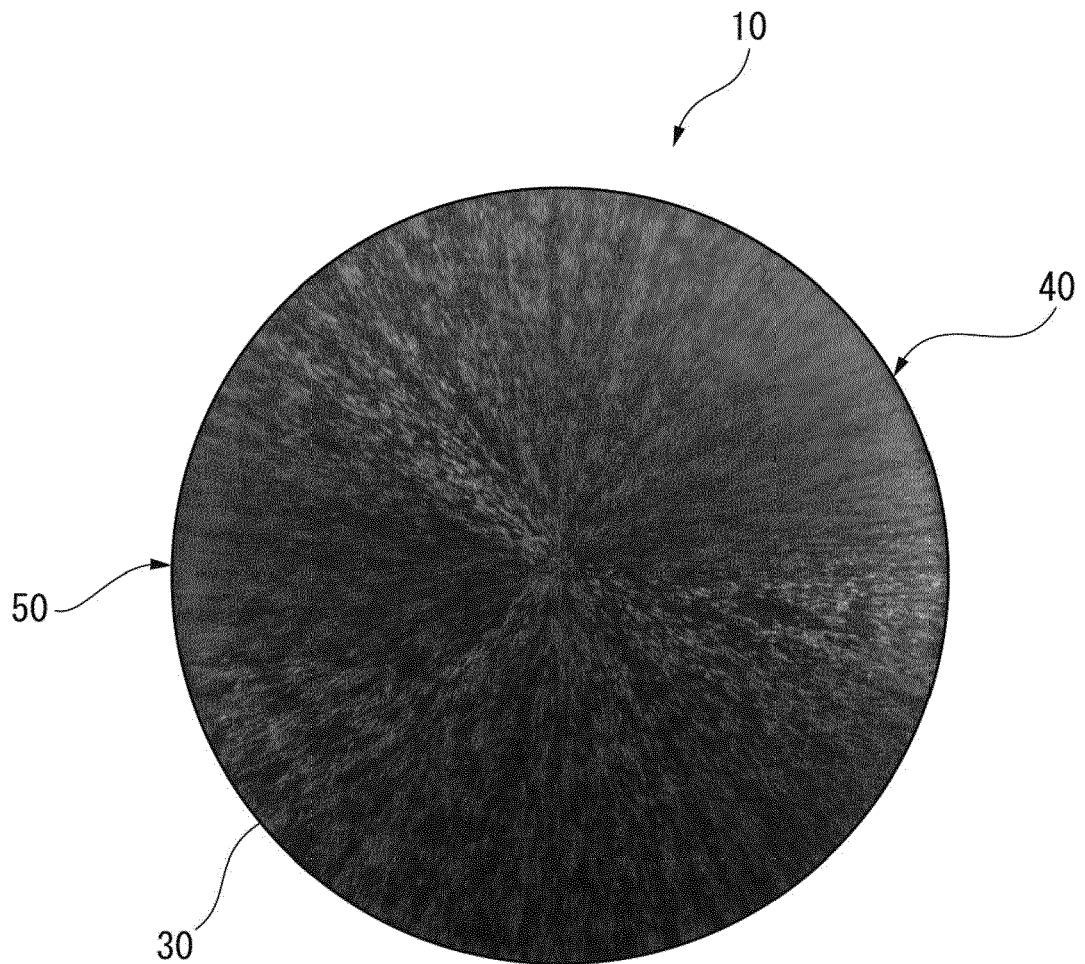


FIG. 4

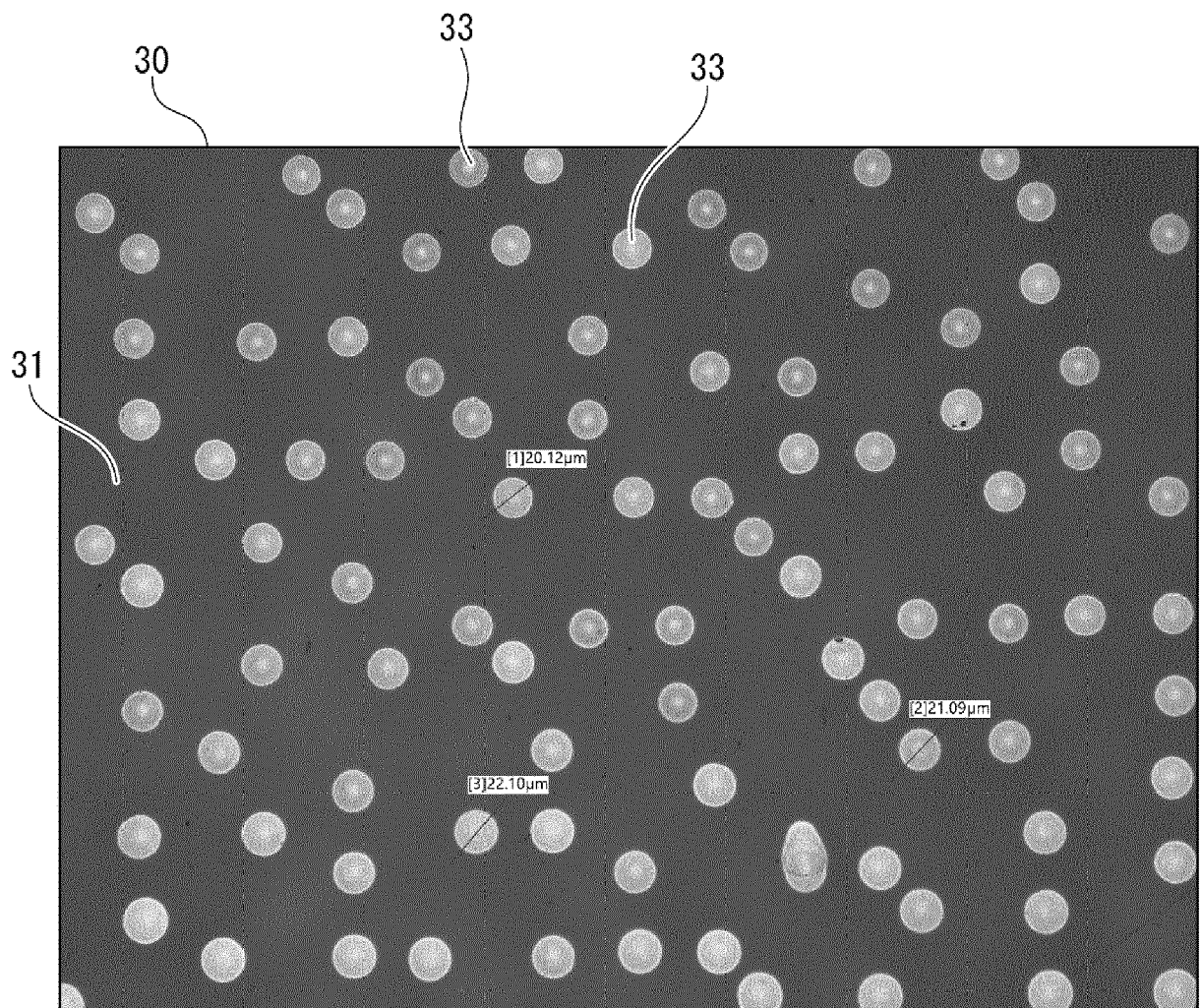


FIG. 5

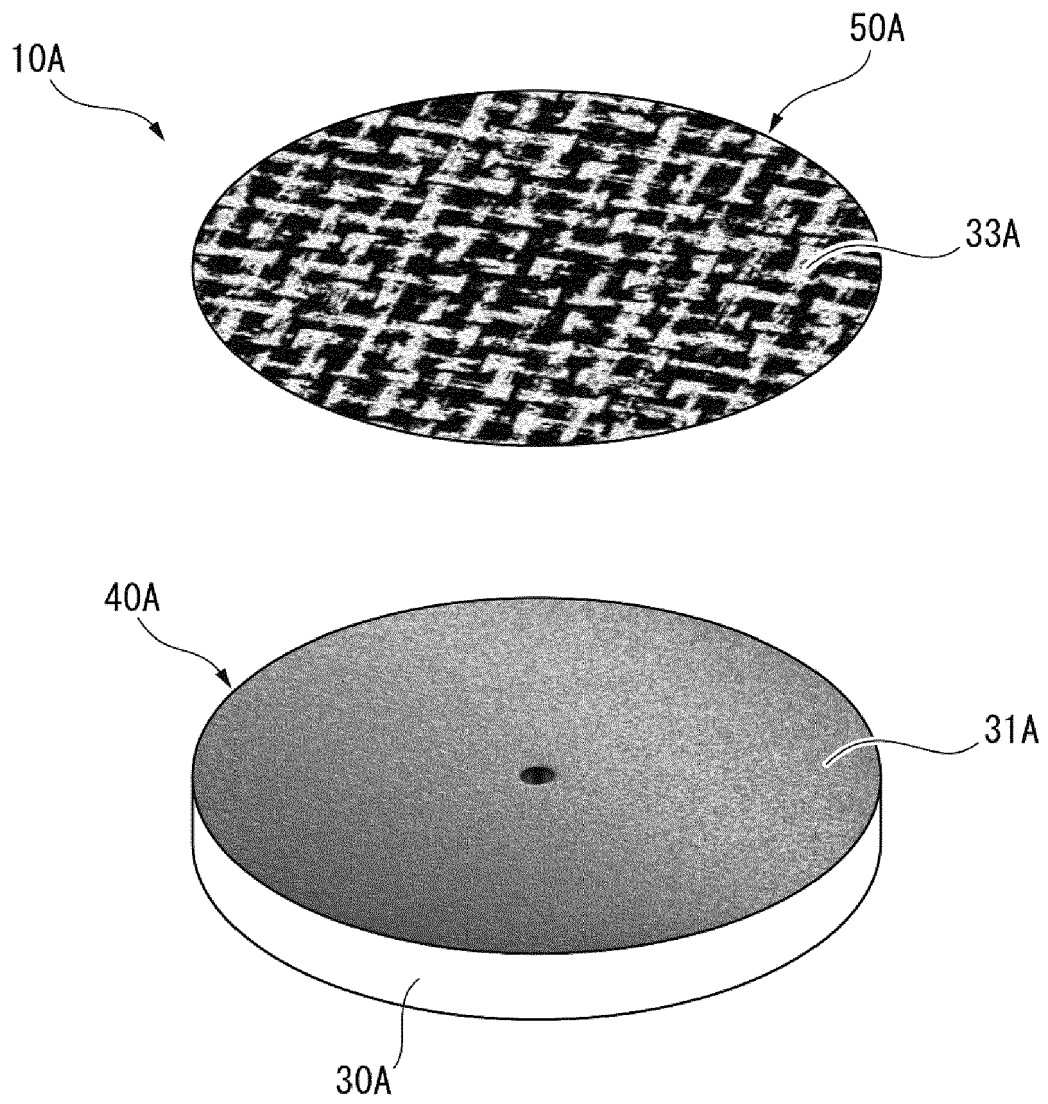


FIG. 6

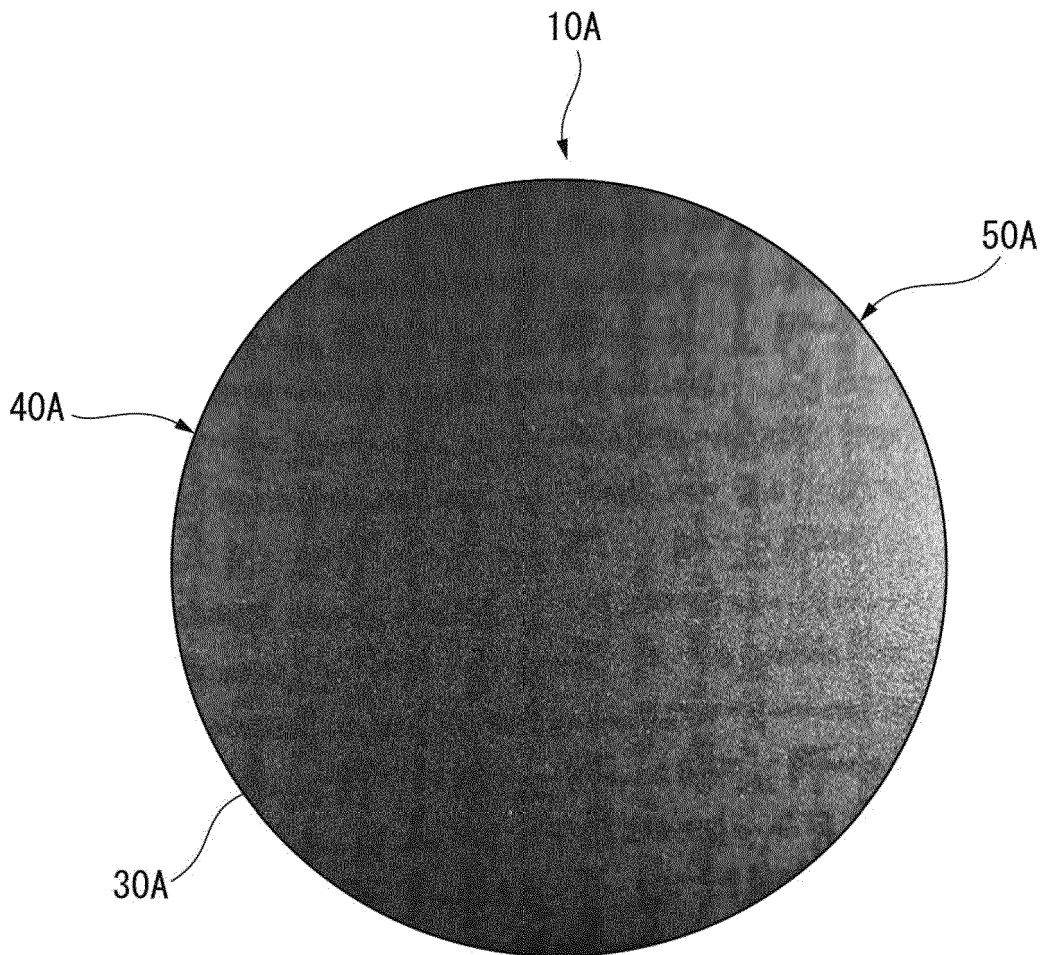


FIG. 7



EUROPEAN SEARCH REPORT

Application Number

EP 24 16 7244

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EPO FORM 1503 03.82 (P04C01)

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X, P	US 2023/297032 A1 (NAKAZAWA TOSHINORI [JP] ET AL) 21 September 2023 (2023-09-21) * paragraph [0014] - paragraph [0075]; figure 6 *	1-11	INV. G04B45/00 G04B19/12 B41J2/01
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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 24 16 7244

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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REFERENCES CITED IN THE DESCRIPTION

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