

PATENT SPECIFICATION

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(54) DIAL ASSEMBLY

(71) We, KABUSHIKI KAISHA DAINI SEIKOSHA, a Japanese Company of 31-1, 6-chome, Kameido, Koto-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns a dial assembly adapted for use in a timepiece such, for example, as a wrist watch.

According to the present invention, there is provided a dial assembly adapted for use in a timepiece and provided with time-indicating or calendar indicia, the dial assembly comprising a face member; a base member adapted to be secured to a movement or other part of a timepiece; a middle member disposed between the face member and the base member; at least a part of the middle member being visible from the obverse side of the dial assembly; the face, middle, and base members being laminar members, or having laminar portions, of similar shape which are aligned with each other; and means for preventing relative rotary movement between the face, middle and base members.

Thus in such a dial assembly materials of widely different sorts may be employed to achieve a variety of novel decorative effects. The dial assembly can moreover be such as to be adapted to protect the timepiece from stray magnetic fields, without affecting the appearance of the dial assembly.

Thus the face member may be transparent, semi-transparent or otherwise translucent.

Alternatively, the face member may have at least one cut-out portion through which the middle member may be viewed. In this case the face member may be made of metal or other opaque material.

At least a portion of the face member may be coated on its obverse or reverse

side with fluorescent or luminous paint which is visible from the obverse side of the dial assembly.

Alternatively, at least a portion of the face member may be provided on its obverse and/or reverse side with a resin film provided with patterning which is visible from the obverse side of the dial assembly.

The face member may be provided on its obverse or reverse side with an indented pattern or with indentations which is or are visible from the obverse side of the dial assembly. Thus the face member may be provided with indentations in which are disposed luminous or fluorescent material constituting indicia.

The dial assembly may be provided with calendar indicia, the face member being provided with magnifying means through which the calendar indicia may be viewed.

The face member may be provided with time-indicating indicia. Thus these indicia may be provided on the obverse side of the translucent face member, the reverse side of the latter being provided with an opaque coating in alignment with said indicia. The middle member may have a colour or other decorative contrast to the face member.

The said decorative contrast may for example arise by reason of the fact that the middle member is provided with a photograph or printed material.

The middle member may be coated, at least in part, with fluorescent or luminous paint, or, alternatively, may be translucent.

The middle member may if desired be made of coloured paper, cloth or timber.

At least a part of the middle and/or base member may be made of magnetic material.

The face member may be mounted within a mounting ring, e.g. of metal or plastics material.

A sheet of temperature-sensitive liquid

2

crystal material may be mounted on or constitute at least a part of the face member. Moreover, the middle member may be made of another sheet of temperature-sensitive liquid crystal material whose temperature sensitivity is different from that of the said sheet which is mounted on or constitutes the face member.

At least a part of the base member may be visible from the obverse side of the dial assembly (e.g. because the face and middle members are partially cut away or are translucent), and in this case the base member may be luminous.

The invention also comprises a timepiece (e.g. a wrist watch) provided with a dial assembly as set forth above.

Spacer members may be provided beneath the face and/or middle members so as to ensure that the total thickness of the dial assembly has a predetermined value.

The invention is illustrated merely by way of example, in the accompanying drawings, in which:—

Figure 1 is a broken-away cross-sectional view of a wrist watch provided with a dial assembly according to the present invention, and

Figure 2 is an exploded perspective view of the dial assembly of Figure 1, and

Figures 3 and 4 are exploded perspective views of modified dial assemblies according to the present invention.

In Figure 1 there is shown a wrist watch having a watch movement 11 which is mounted and housed within a movement locating ring 12. The movement locating ring 12 is secured to and mounted within an outer case member 13 which is secured to and closed by a case back 14. The movement locating ring 12 and case member 13 are annular members in the sense that they are ring-like, although they are not necessarily circular or even curved in plan. A watch glass 15, e.g. of inorganic glass, is mounted within a shoulder 16 of the case member 13 and sealed thereto.

Mounted above and supported by the watch movement 11 is a dial assembly which is circular in plan and which comprises a face dial 21, a middle dial 22 and a base dial 23, the base dial 23 being secured by pins 24 to the watch movement 11. The dials 21, 22, 23 are laminar members, or have laminar portions, of similar shape which are aligned with each other.

The base dial 23 has an integral peripheral flange 25 having two diametrically spaced apart notches 26 therein. The face dial 21 is provided with two diametrically spaced apart lugs 30 which are mounted in the notches 26, while the middle dial 22, which is disposed between the face dial 21 and the base dial 23, is provided with two diametrically spaced apart lugs 31 which

are also mounted in the notches 26. The mounting of the lugs 30, 31 in the notches 26 prevents rotation of the dials 21, 22 in the base dial 23.

If the total thickness of the face dial 21, middle dial 22 and base dial 23 is below a predetermined value, the assembly of dials 21 to 23 is built up to the required thickness by means of at least one disc-shaped spacer member 32 which may be disposed between the middle dial 22 and base dial 23 as shown and/or may be disposed between the face dial 21 and the middle dial 22.

The constructions shown in Figures 3 and 4 are generally similar to that of Figure 2 and for this reason will not be described in detail. In the Figure 3 construction, however, the face dial 21 is replaced by a face dial 21a which, instead of being provided with the lugs 30, is provided with recesses 33. Moreover, the middle dial 22 is replaced by a middle dial 22a which, instead of being provided with the lugs 21, is provided with recesses 34. The notches 33, 34 are aligned with notches 26a of a base dial 23a, and material (not shown) is introduced into the notches 33, 34, 26a. This material then acts to key the structure together, whereby to prevent rotation of the face dial 21a and middle dial 22a in the base dial 23a.

In the Figure 4 construction, the dial assembly is square in plan and comprises a square face dial 21b, a square middle dial 22b, and a square base dial 23b, the latter being provided with a peripheral flange 37 and with pins 38 for securing the base dial 23b to the watch movement 11. Due to the square shape of the parts concerned, the dials 21b, 22b cannot rotate within the dial 23b.

The face dials 21, 21a, 21b may carry printing e.g. of time-indicating indicia. They may have cut-out portions (not shown) which may in themselves constitute time-indicating indicia or in which may be mounted members constituting such indicia. Alternatively, the face dials 21, 21a, 21b may be etched to provide time-indicating indicia. The face dials 21, 21a, 21b may be constituted by transparent, partially transparent or translucent plates which may be coloured or colourless.

For example, the face dials 21, 21a, 21b may be made of stained glass or patterned glass plate.

Moreover the face dials 21, 21a, 21b may be coated with a thin film of a resin and this film may then be printed with a pattern, the patterned coating being translucent.

Alternatively, the face dials 21a, 21b, 21c may be made of metal or other opaque material and may be provided with an aperture or apertures through which a portion of the middle dial 22, 22a, 22b may

be viewed. The face dials 21, 21a, 21b may have their reverse sides covered with fluorescent or luminous paint and may have their obverse sides provided with abbreviated or otherwise simplified characters and with marks or names either by printing or by painting.

Additionally, the face dials 21, 21a, 21b may be provided with a calendar window having an enlarging lens through which calendar indicia (not shown) may be viewed.

The middle dial 22, 22a, 22b may be made of a sheet of coloured paper, a photograph, photo-etched material, timber, printed material, or phosphorescent material, having a centrally disposed hole. The middle dial may be translucent and/or have one or more punched out windows therein.

The base dial 23, 23a, 23b may be made of luminous material, e.g. by painting a metal dial with luminous paint.

A very large number of different combinations of dials is possible in the dial assembly of the present invention, as indicated by the following Examples.

EXAMPLE A

In this Example, the dial assembly comprises (a) a face dial 21, 21a, 21b having simplified characters, marks or names printed on a surface of a plate which is made of colourless and transparent or semi-transparent material, (b) a middle dial 22, 22a, 22b constituted by a sheet of coloured paper, cloth or wood, or by a photograph or printed material, and (c) a base dial.

EXAMPLE B

In this Example, the dial assembly comprises (a) a face dial having simplified characters, marks or names printed on the obverse surface of a plate which is made of partially transparent material, the reverse surface of the plate being coated with paint, at the printed portions of the plate, so as to prevent the underlying middle and base dials from being viewed through the printed portions. The dial assembly of the Example also comprises a middle dial (b) and a base dial (c) as in Example A.

EXAMPLE C

In this Example, the dial assembly comprises (a) a face dial constituted by a plate of metallic or otherwise opaque material which is punched out in one or more portions so as to enable one to see, from the obverse of the dial assembly, the middle dial (and possibly also the base dial) lying below it, simplified characters, marks or names being printed on the surface of the said plate. The dial assembly of this Example also comprises a middle dial (b) and a base dial (c) as in Example A.

EXAMPLE D

In this Example, the dial assembly comprises (a) a face dial having fluorescent

paint or luminous paint coated on at least a part of its obverse or reverse surface and may be constituted by either transparent material or by opaque material having one or more punched out portions. The dial assembly of this Example also comprises a middle dial (b) and a base dial (c) as in Example A.

EXAMPLE E

In this Example, the dial assembly comprises the face dial (a) of Example C, the middle dial (b) of Example A except that a window is punched therein, and the base dial (c) of Example A.

EXAMPLE F

In this Example, the dial assembly comprises a face dial having a thin film of resin coated thereon, the resin film being printed with a stained pattern and being bonded to the obverse or reverse surface of a plate made of colourless and transparent or semi-transparent material, the printed resin film being translucent. The dial assembly of this Example also comprises a middle dial constituted by a plate coated with luminous or fluorescent paint, and a base dial.

EXAMPLE G

In this Example, the dial assembly comprises a face dial (a) as in Example C or Example D, except that the face dial is provided with an indented pattern. The dial assembly of this Example, also comprises a middle dial (b) and a base dial (c) as in Example A.

EXAMPLE H

In this Example, the dial assembly comprises a face dial (a) constituted by a plate whose surface is provided with abbreviated markings, and whose surface is cut, printed or otherwise decorated. The dial assembly of this Example also comprises a middle dial (b) and a base dial (c) as in Example A.

EXAMPLE I

In this Example, the dial assembly comprises a face dial (a) having a calendar window provided with an enlarging lens or lenses mounted on the obverse and/or reverse surface of the face dial. The dial assembly of this Example also comprises a middle dial (b) and a base dial (c) as in Example A.

EXAMPLE J

In this Example, the dial assembly comprises a face dial (a) having an indented section provided on its obverse or reverse surface, luminous or other paint being painted onto it so as to penetrate deeply into the interior of the face dial e.g. to serve as indicia. The dial assembly of this Example also comprises a middle dial (b) and a base dial (c) as in Example A.

EXAMPLE K

In this Example, the dial assembly comprises a face dial (a) as in any of the pre-

vious Examples, and a middle dial (b) which may be as in any of the previous Examples or may incorporate a magnetic material or materials, the middle dial being
 5 given a surface treatment prior to receiving a colour treatment such as painting. In this Example, the dial assembly also comprises a base dial (c), made from a magnetic material or materials e.g. the Fe-N Alloy
 10 sold under the Trade Mark "Permalloy", pure iron, and iron alloys; this construction being useful in magnetism-resistant watches.

EXAMPLE L

In this Example, the dial assembly comprises a face dial (a) as in any of Examples A to I, the face dial (a) being mounted within a metallic or plastics ring. In this Example, the dial assembly also comprises a middle dial (b) which may be the same
 20 as in any of Examples A to I, and a base dial (c) provided with a window through which indicia indicating the day of the week and the date of the month, or other calendar indicia, may be viewed.

EXAMPLE M

In this Example, the dial assembly comprises a face dial (a) comprising a sheet of temperature-sensitive liquid crystal material which is pasted or otherwise secured to a
 30 part or parts of a middle dial (b), and a base dial (c). The middle dial (b) is constituted by a temperature-sensitive liquid crystal sheet whose temperature sensitivity is different from that employed in the face
 35 dial.

EXAMPLE N

In this Example, the dial assembly comprises a face dial (a) made of a transparent material into which is introduced materials for decorative or time indicative purposes.
 40 The dial assembly of this Example also comprises a middle dial (b) and a base dial (c) as in Example A.

The dial assemblies of the present invention may have a greater range of decoration than heretofore and may be adapted to protect the timepiece from stray magnetic fields. The putting together of the base dial, middle dial and face dial, moreover,
 45 is very simple.

WHAT WE CLAIM IS:—

1. A dial assembly adapted for use in a timepiece and provided with time-indicating or calendar indicia, the dial assembly comprising a face member; a base member adapted to be secured to a movement or other part of a timepiece; a middle member disposed between the face member and the base member, at least a part of the middle member being visible from the obverse side of the dial assembly; the face, middle and base members being laminar members, or having laminar portions, of similar shape which are aligned with each other; and
 65 means for preventing relative rotary move-

ment between the face, middle and base members.

2. A dial assembly as claimed in claim 1 in which the face member is translucent.

3. A dial assembly as claimed in claim 1 in which the face member is transparent.

4. A dial assembly as claimed in claim 1 in which the face member has at least one cut-out portion through which the middle member may be viewed.

5. A dial assembly as claimed in claim 4 in which the face member is opaque.

6. A dial assembly as claimed in claim 2 or 3 in which at least a portion of the face member is coated on its obverse or reverse side with fluorescent or luminous paint which is visible from the obverse side of the dial assembly.

7. A dial assembly as claimed in any of claims 1-5 in which at least a portion of the face member is provided on its obverse and/or reverse side with a resin film provided with patterning which is visible from the obverse side of the dial assembly.

8. A dial assembly as claimed in any preceding claim in which the face member is provided on its obverse or reverse side with an indented pattern or with indentations which is or are visible from the obverse side of the dial assembly.

9. A dial assembly as claimed in claim 8 in which the face member is provided with indentations in which are disposed luminous or fluorescent material constituting indicia.

10. A dial assembly as claimed in any preceding claim in which the dial assembly is provided with calendar indicia, the face member being provided with magnifying means through which the calendar indicia may be viewed.

11. A dial assembly as claimed in any preceding claim in which the face member is provided with time-indicating indicia.

12. A dial assembly as claimed in claims 2 and 11 in which the indicia are provided on the obverse side of the face member, the reverse side of the latter being provided with an opaque coating in alignment with said indicia.

13. A dial assembly as claimed in any preceding claim in which the middle member has a colour or other decorative contrast to the face member.

14. A dial assembly as claimed in claim 13 in which the said decorative contrast arises by reason of the fact that the middle member is provided with a photograph or printed material.

15. A dial assembly as claimed in any preceding claim in which the middle member is translucent.

16. A dial assembly as claimed in claim 13 or 14 in which the middle member is coated, at least in part, with fluorescent or luminous paint.



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vious Examples, and a middle dial (b) which may be as in any of the previous Examples or may incorporate a magnetic material or materials, the middle dial being
5 given a surface treatment prior to receiving a colour treatment such as painting. In this Example, the dial assembly also comprises a base dial (c), made from a magnetic material or materials e.g. the Fe-N Alloy
10 sold under the Trade Mark "Permalloy", pure iron, and iron alloys, this construction being useful in magnetism-resistant watches.

EXAMPLE L

15 In this Example, the dial assembly comprises a face dial (a) as in any of Examples A to I, the face dial (a) being mounted within a metallic or plastics ring. In this Example, the dial assembly also comprises
20 a middle dial (b) which may be the same as in any of Examples A to I, and a base dial (c) provided with a window through which indicia indicating the day of the week and the date of the month, or other calendar indicia, may be viewed.

EXAMPLE M

25 In this Example, the dial assembly comprises a face dial (a) comprising a sheet of temperature-sensitive liquid crystal material which is pasted or otherwise secured to a
30 part or parts of a middle dial (b), and a base dial (c). The middle dial (b) is constituted by a temperature-sensitive liquid crystal sheet whose temperature sensitivity is different from that employed in the face
35 dial.

EXAMPLE N

In this Example, the dial assembly comprises a face dial (a) made of a transparent material into which is introduced materials
40 for decorative or time indicative purposes. The dial assembly of this Example also comprises a middle dial (b) and a base dial (c) as in Example A.

The dial assemblies of the present invention may have a greater range of decoration than heretofore and may be adapted to protect the timepiece from stray magnetic fields. The putting together of the base dial, middle dial and face dial, moreover,
50 is very simple.

WHAT WE CLAIM IS:—

1. A dial assembly adapted for use in a timepiece and provided with time-indicating or calendar indicia, the dial assembly comprising a face member; a base member adapted to be secured to a movement or other part of a timepiece; a middle member disposed between the face member and the base member, at least a part of the middle member being visible from the obverse side of the dial assembly; the face, middle and base members being laminar members, or having laminar portions, of similar shape which are aligned with each other; and
65 means for preventing relative rotary move-

ment between the face, middle and base members.

2. A dial assembly as claimed in claim 1 in which the face member is translucent.

3. A dial assembly as claimed in claim 1 70 in which the face member is transparent.

4. A dial assembly as claimed in claim 1 in which the face member has at least one cut-out portion through which the middle member may be viewed. 75

5. A dial assembly as claimed in claim 4 in which the face member is opaque.

6. A dial assembly as claimed in claim 2 or 3 in which at least a portion of the face member is coated on its obverse or reverse side with fluorescent or luminous paint which is visible from the obverse side of the dial assembly. 80

7. A dial assembly as claimed in any of claims 1-5 in which at least a portion of 85 the face member is provided on its obverse and/or reverse side with a resin film provided with patterning which is visible from the obverse side of the dial assembly.

8. A dial assembly as claimed in any 90 preceding claim in which the face member is provided on its obverse or reverse side with an indented pattern or with indentations which is or are visible from the obverse side of the dial assembly. 95

9. A dial assembly as claimed in claim 8 in which the face member is provided with indentations in which are disposed luminous or fluorescent material constituting indicia.

10. A dial assembly as claimed in any 100 preceding claim in which the dial assembly is provided with calendar indicia, the face member being provided with magnifying means through which the calendar indicia may be viewed. 105

11. A dial assembly as claimed in any preceding claim in which the face member is provided with time-indicating indicia.

12. A dial assembly as claimed in claims 2 and 11 in which the indicia are provided 110 on the obverse side of the face member, the reverse side of the latter being provided with an opaque coating in alignment with said indicia.

13. A dial assembly as claimed in any 115 preceding claim in which the middle member has a colour or other decorative contrast to the face member.

14. A dial assembly as claimed in claim 13 in which the said decorative contrast 120 arises by reason of the fact that the middle member is provided with a photograph or printed material.

15. A dial assembly as claimed in any preceding claim in which the middle mem- 125 ber is translucent.

16. A dial assembly as claimed in claim 13 or 14 in which the middle member is coated, at least in part, with fluorescent or luminous paint. 130

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17. A dial assembly as claimed in any preceding claim in which at least a part of the middle and/or base member is made of magnetic material.
- 5 18. A dial assembly as claimed in any preceding claim in which the face member is mounted within a mounting ring.
19. A dial assembly as claimed in any preceding claim in which a sheet of temperature-sensitive liquid crystal material is mounted on or constitutes at least a part of the face member.
- 10 20. A dial assembly as claimed in claim 19 in which the middle member is made of another sheet of temperature-sensitive liquid crystal material whose temperature sensitivity is different from that of the said sheet which is mounted on or constitutes the face member.
- 15 21. A dial assembly as claimed in any preceding claim in which at least a part of the base member is visible from the obverse side of the dial assembly.
22. A dial assembly as claimed in claim 21 in which the base member is luminous.
- 25 23. A dial assembly as claimed in any preceding claim in which the middle member is made of coloured paper, cloth or timber.
24. A dial assembly substantially as hereinbefore described with reference to and as shown in the accompanying drawings.
- 30 25. A timepiece provided with a dial assembly as claimed in any preceding claim.

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