

PATENT SPECIFICATION

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(54) TIMEPIECE DIAL

(71) We, KABUSHIKI KAISHA SUWA SEIKOSHA, a Japanese company of 3—4, 4—chome, Ginza, Chuo-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 timepiece dial such, for example, as that of a wristwatch.

According to the present invention, there is provided a timepiece dial comprising a base one surface of which is covered, at least in part, by a transparent film such that light rays reflected from the said surface of the base and from the external surface of the film interfere with each other, whereby the timepiece dial appears to have a colour which changes according to the angle at which the timepiece dial is viewed. For example, the time piece dial may be such that when it is viewed vertically from above, with the light rays normal to the said surfaces, the colour of the base appears to be purple, while when viewed from a different angle, its colour may be royal purple or blue.

As will be appreciated, therefore, the invention enables a timepiece dial to be given a beautiful appearance which cannot be produced by conventional processes, such processes, for example, comprising providing a watch dial with indicia made of brass or aluminium and gilding, painting or printing the watch dial and indicia.

The said film is preferably formed on the base by vacuum evaporation or by sputtering.

The said film may be made of silicon oxide, magnesium fluoride or zinc sulphide but is preferably made of sapphire.

The said surface of the base may either be that of a coating on a base member, e.g. a metallic base member, or may be constituted by a surface of the base member itself.

The said surface of the base preferably has a colour other than white.

The said surface of the base is preferably provided with time indicating indicia, although

such indicia could be provided on the external surface of the said film.

The average thickness of the film preferably does not exceed 20 microns. Moreover, the product of the refractive index and of the average thickness of the film, preferably does not exceed 2000 Å.

The film may be of varying thickness so that the timepiece dial appears to be of varying colour according to the part of the timepiece dial being viewed.

The invention also comprises a timepiece provided with a timepiece dial as set forth above.

The colour produced by the interference between the rays reflected from the said surface of the base and from the external surface of the film depends both upon the refractive index, n , of the film, and its thickness d . Thus, if the film is a single layer film, if the thickness d is measured in microns, and if the timepiece dial is viewed vertically from above, then the colour which will be seen is indicated in the Table below.

TABLE

nd	colour	
Up to 1000 Å	grey	75
1100	yellowish red	
1200	yellowish light red	
1260	purplish light red	
1280	purplish red	
1300	reddish purple	80
1340	purple	
1380	royal purple	
1500	purplish blue	
1800	blue	

Although the colours mentioned above can be obtained by using a transparent thin film of silicon oxide, magnesium fluoride or zinc sulphide, it has been found that a transparent thin film of sapphire is most suitable for the production of a watch dial having a desired hardness.

If the surface of the base onto which the transparent thin film is vacuum evaporated or sputtered is itself of a colour other than

white, e.g. a silver colour, a gold colour or a black colour, then, when the timepiece dial is viewed, it appears to have a colour made up not only of the said silver, gold or black colour, but also of one of the colours mentioned in the Table above. Moreover, if the surface of the dial is formed with radially extending grooves a lattice of grooves or with a spiral groove, or is otherwise patterned, it is possible to have a dial of varying brightness.

Example

A dial member which is chromium plated and which is provided with time-indicating indicia, or which is formed of chromium and painted gold or black, is placed in an evacuated vessel, subjected to a vacuum in excess of 3×10^{-5} Torr. The dial member is placed in the evacuated vessel together with a sapphire member which is spaced from the dial member by a distance of 20 centimetres. The surface of the dial member which has been provided with the time-indicating indicia is arranged perpendicularly to the sapphire member. At the same time a tensioned quartz plate is introduced into the evacuated vessel so that the wavelength of the interfering light rays can be measured. By so doing, the process can be continued until a thickness of sapphire has been evaporated onto the dial member such that the desired colour is obtained.

If the surface of the dial member is arranged otherwise than perpendicularly to the sapphire member, then a dial is produced the thickness of whose thin film of sapphire varies from one part of the dial member to the other. As a result, the colour of the dial also varies from yellow to blue according to the part of the dial member being viewed.

Instead of employing the vacuum technique discussed in the Example, sputtering may be used.

The invention enables a timepiece dial to be produced having a deep colour and good brightness. Moreover, since the dial member may be covered with a transparent thin film of sapphire, the dial may also have excellent corrosion resistance.

WHAT WE CLAIM IS:—

1. A timepiece dial comprising a base one

surface of which is covered, at least in part, by a transparent film such that light rays reflected from the said surface of the base and from the external surface of the film interfere with each other, whereby the timepiece dial appears to have a colour which changes according to the angle at which the timepiece dial is viewed.

2. A timepiece dial as claimed in claim 1 in which the said film is formed on the base by vacuum evaporation or by sputtering.

3. A timepiece dial as claimed in claim 1 or 2 in which the said film is made of silicon oxide, sapphire, magnesium fluoride or zinc sulphide.

4. A timepiece dial as claimed in any preceding claim in which the said surface of the base is that of a coating on a base member.

5. A timepiece as claimed in claim 4 in which the base member is metallic.

6. A timepiece as claimed in any preceding claim in which the said surface of the base has a colour other than white.

7. A timepiece dial as claimed in any preceding claim in which the said surface of the base is provided with time-indicating indicia.

8. A timepiece dial as claimed in any preceding claim in which the average thickness of the film does not exceed 20 microns.

9. A timepiece dial as claimed in any preceding claim in which the product of the refractive index and of the average thickness of the film does not exceed 2000 Å.

10. A timepiece dial as claimed in any preceding claim in which the film is of varying thickness so that the timepiece dial appears to be of varying colour according to the part of the timepiece dial being viewed.

11. A timepiece dial substantially as hereinbefore described.

12. A timepiece provided with a timepiece dial as claimed in any preceding claim.

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