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(54) DIAL PLATES FOR TIMEPIECES

(71) We, ORIENT WATCH CO. LTD., a Corporation organised under the laws of Japan, of 4-4, Sotokanda 2-chome, Chiyoda-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 relates to dial plates for time-pieces.

Conventional dial plates for timepieces such as a watch, a wrist watch, a bracelet watch, a pendant watch and a finger ring watch have generally comprised a base plate consisting of a brass plate or aluminum plate and colour coating or plating layers applied thereto. A dial plate is one of the externally viable parts of a portable timepiece which is attractive and for which an important aesthetic effect is required. To this end, dial plates of various patterns and colours have been provided for timepieces but the appearance of dial plates has provided only a limited variation in pattern and/or colour. There has also been known a so-called shell-encasing technique in which iridescent flakes of shells are embedded in the lacquer surface layer of an article such as a paper container box or a cake bowl to produce a decorative effect, and various studies have been made in recent years on the application of such technique to portable timepiece dial plates to impart a decorative effect to the dial plates and thereby to enhance the commercial value of the timepieces. However, in the conventional shell-encasing technique an embedding method has in most cases been employed for securing the shell flakes to a substrate and such a method cannot be directly used in the manufacture of portable timepiece dial plates which are required to be as thin as possible. Under the circumstances, a method has been provided in which a thin sheet of shell is laminated on the base plate of a dial plate by means of an adhesive or the like, but this method has had the disadvantage that

any irregularity in application of the adhesive is visible through the laminated shell flake since the shell flake is extremely thin and semi-transparent, resulting in degradation of the aesthetic effect of the shell.

There has also been proposed a dial plate for high grade portable timepieces which is made from a jewel such as ruby or sapphire *per se*. However, such a dial plate is extremely expensive and, in addition, working on the jewel is extremely difficult because of its high degree of hardness. In particular the boring of small holes in the dial plate for implanting index marks or the like is difficult. Therefore, in such a dial plate the time index marks are usually printed on the surface of the dial plate. This printing of the time index marks has proved unsatisfactory not only in that the printed marks are illegible but also in that a variety of index marks cannot be used.

It is therefore the object of the present invention to provide novel dial plates for use in portable timepieces, which are different from and overcome or reduce disadvantages of the conventional dial plates, which are pleasing in appearance and which can be produced by mass production with ease and at a low cost.

The present invention consists in a dial plate for timepieces, comprising a laminate formed of a thin metallic base plate and a thin plate of nacreous or iridescent shell bonded thereto by means of an adhesive, wherein the thin plate of shell is backed by an opaque layer applied to substantially the entire area of the back surface of said thin plate of shell and wherein the adhesive is applied between the opaque layer and the metallic base plate.

According to the present invention there can be obtained dial plates which individually have different patterns and colour hues to each other so that each of the dials has a distinct individuality.

According to one embodiment of the invention there is provided a dial plate which comprises a thin metallic base plate made

from metal such as brass or aluminum and a thin plate of shell laminated on said metallic base plate by means of applying adhesive, the bonding surface (hereinafter referred to as the back surface) of said plate of shell being coated with a non-transparent paint layer, whereby an irregularity, if any, in application of said adhesive is not visible on the front surface of the dial plate and further the colour of said paint layer and the optical refraction of the shell are ingeniously combined to produce a highly variable aesthetic effect. There is also provided a dial plate of the character described above, in which the front surface of said thin plate of shell is coated with a transparent or semi-transparent layer, whereby a unique colour hue and gloss can be imparted to the dial plate. There is also provided a dial plate of the character described above, in which small holes are bored through the laminate of said thin shell plate and said metallic base plate, and separately provided time marks or chapters are attached to the dial plate by feet implanted in said small through-holes.

According to another embodiment of the invention there is provided a dial plate which comprises a thin metallic base plate made from brass or aluminum and a thin plate of a shell laminated on said metallic base plate by means of an adhesive, the bonding surface of said shell plate being plated by electroless plating, whereby an irregularity, if any, in application of said adhesive is not visible on the surface of the dial plate and further the colour hue of said electroless plating and the optical refraction of the shell are ingeniously combined to provide a highly variable aesthetic effect. There is also provided a dial plate of the character described above, in which the front surface of said thin plate of shell is coated with a transparent or semi-transparent layer, whereby a unique variation of colour hue and gloss can be imparted to the dial plate. There is also provided a dial plate of the character described above, in which small holes are bored through the laminate of said thin shell plate and said metallic base plate, and the legs of separately provided time marks are implanted in said small through-holes.

The present invention will be described by way of example hereunder with reference to the accompanying drawings, in which:

Fig. 1 is a top plan view of an embodiment of the dial plate according to the present invention;

Fig. 2 is a vertical sectional view, partially broken away, of the dial plate taken on the line II—II of Fig. 1; and

Fig. 3 is a fragmentary sectional view, partially broken away, of another embodiment of the dial plate according to this invention.

Referring to the drawings, a base plate 1 of the dial plate is made from a thin metallic sheet, such as a brass or aluminum sheet, by punching. The base plate 1 has legs 1a by which the dial plate 1 is secured to the watch movement (not shown). The base plate 1 is provided with a hole or perforation 1b at the centre thereof for receiving the spindles of hour, minute and/or second hands (not shown) of the timepiece therein. A thin plate of shell 2 is superimposed on the base plate 1, which shell plate is obtained by peeling the nacreous layer of a shell by a known method. The thin plate of shell 2 has a disc shape essentially the same as the shape of the base plate 1 and is provided with a hole 2a at the centre thereof in alignment with the hole 1b of the base plate 1. As the materials of the thin plate of shell, the shells of shellfishes such as ear-shells, pearl shells, Mexican shells, black lips, yellow lips and other iridescent shells are suitably used. The plate of shell made from said shells respectively have different optical effects. The back side of the thin plate of shell is coated with an opaque layer 3, such as a paint or lacquer layer, or an electroless plated layer. The opaque layer 3 can be of an optional colour and its colour can be freely selected over a wide range. Further, the back side of the thin plate of shell can be coated not only with a single paint of a certain colour but also with a combination of paints of different colours. On the other hand, where the back side of the thin plate of shell 2 is coated with an electroless plated layer, such an electroless plated layer may be deposited directly on said thin plate of shell. As the metals which can be used for the electroless plated layer there can be mentioned single metals such as nickel, cobalt, copper, silver, gold and platinum, and alloys such as nickel alloys and cobalt alloys. A remarkable decorative effect can be obtained particularly when silver or gold is used. By properly selecting the metal to be used, the colour of the electroless plated layer can be optionally changed. Further, the back side of the thin shell plate can be coated not only with a single plating of a certain colour but also with a combination of platings of different colours.

The thin plate of shell 2 described above is adhered fast to the base plate 1 by means of an adhesive layer 4. As the adhesive, epoxy type adhesives which are widely used can be employed but the adhesive to be used is of course not limited only thereto. Although in the embodiment shown the adhesive layer 4 is provided over the entire area of the outside surface of the base plate 1, it has been revealed, through testing of the actual product, that the provision of the adhesive layer only at several locations on

the base plate 1 is sufficient to prevent disengagement or distortion of the thin plate of shell 2. Reference numeral 5 designates time marks or time index marks provided on the surface of the dial plate, which marks are directly printed on the surface of the thin plate of shell 2.

In the dial plate for portable timepieces, as described above, the opaque coating layer or electroless plated layer 3 is provided on the back surface of the thin plate of shell 2, so that the adhesive layer 4 provided between the surface of the base plate and the thin plate of shell is not visible through said thin plate of shell, and therefore, said thin plate 2 can be directly bonded to the base plate 1.

Thus, when the dial plate is viewed squarely from the front side thereof, an irregularity, if any, in application of the adhesive is not visible through the shell plate as it is covered with the opaque coating layer or electroless plated layer 3 and, therefore, the aesthetic effect of the dial plate is not impaired. Consequently, it is unnecessary to exercise unnecessary care during production of the dial plate and the dial plate can be produced by mass production with ease. The aesthetic effect of the dial plate is brought about by the combined effect of the nacreous colour and optical refraction characteristic of the thin plate of shell 2 and the opaque coating layer or electroless plated layer 3. Thus, a highly colourful dial plate emitting a variety of hues can be obtained. Dial plates for use in portable timepieces are required to be as thin as possible. In this respect, the dial plate can be formed in the shape of a thin plate as a whole, as the plate of shell 2 is adhesively bonded directly to the base plate 1. Namely, in the embodiment shown, the base plate 1 has a thickness of 400 microns and the plate of shell 2 has a thickness from 200 to 250 microns so that the entire thickness of the dial plate may be not greater than 700 microns. This brings about the additional advantage that usual apparatus for producing dial plates for thin portable timepieces can be used as such for the production of the dial plate of this invention.

Fig. 3 shows another embodiment of the dial plate according to this invention. This embodiment is similar to the preceding embodiment in that the thin plate of shell 2 having the back surface thereof coated with the opaque paint layer or electroless plated layer 3 is laminated to the base plate 1 by means of the adhesive layer 4, but is different from the preceding embodiment in that the front surface of said thin plate of shell 2 is also coated with a paint layer 6. The paint layer 6 is formed of a transparent lacquer, semi-transparent lacquer or industrial varnish, and imparts various changes to

the surface gloss of the plate 2 and slightly colours said plate. By properly selecting the coating materials used, an almost infinite number of colour combinations can be obtained. It has been confirmed on the actual dial plate that, by applying the coating 6 in a vignette form, a dial plate having a highly fantastic aesthetic effect can be obtained, and that the paint 6 when applied uniformly on the plate of shell produces an iridescent pattern. It is also effective to apply the paint 6 in such a manner that the depth of colour of the paint is progressively increased toward the peripheral edge from the central portion of the dial plate where the coating layer is transparent. Reference numeral 7 in Fig. 3 designates time marks provided on the front surface of the dial plate, which marks are separately made of such a metal as brass and coated with a plating, and are secured to the dial plate by legs 7a which are extended in small holes, bored through the plate of shell 2 and base plate 1 and fixed therein as by spot welding. The thin plate of shell 2 of the dial plate according to the present invention is lower in hardness than a jewel, such as ruby, and therefore, can be worked relatively easily. The through-holes can be bored therein also by a conventional boring machine. This also facilitates the mass production of the dial plate without adding to the production cost.

As described hereinabove, the dial plates for timepieces exhibit a variety of colours and patterns which are basically created by the nacreous colour possessed by the shell and are variable in an indefinite number of ways in combination with the colour or colours of the paint or paints used in a variety of ways, and which give an impression of quality to the dial plate. In addition, the dial plates can be produced in large quantities at low costs and the product dial plates individually have different aesthetic effects of their own and are individually different. It should be noted that the dial plates of the invention are not necessarily of round shape as shown in the embodiments but may be of square or rectangular or any other irregular shapes, and are of great practical commercial value.

WHAT WE CLAIM IS:—

1. A dial plate for timepieces, comprising a laminate formed of a thin metallic base plate and a thin plate of nacreous or iridescent shell bonded thereto by means of an adhesive, wherein the thin plate of shell is backed by an opaque layer applied to substantially the entire area of the back surface of said thin plate of shell and wherein the adhesive is applied between the opaque layer and the metallic base plate.

2. A dial plate for timepieces, according to claim 1, wherein the front surface of said

the base plate 1 is sufficient to prevent disengagement or distortion of the thin plate of shell 2. Reference numeral 5 designates time marks or time index marks provided on the surface of the dial plate, which marks are directly printed on the surface of the thin plate of shell 2.

In the dial plate for portable timepieces, as described above, the opaque coating layer or electroless plated layer 3 is provided on the back surface of the thin plate of shell 2, so that the adhesive layer 4 provided between the surface of the base plate and the thin plate of shell is not visible through said thin plate of shell, and therefore, said thin plate 2 can be directly bonded to the base plate 1.

Thus, when the dial plate is viewed squarely from the front side thereof, an irregularity, if any, in application of the adhesive is not visible through the shell plate as it is covered with the opaque coating layer or electroless plated layer 3 and, therefore, the aesthetic effect of the dial plate is not impaired. Consequently, it is unnecessary to exercise unnecessary care during production of the dial plate and the dial plate can be produced by mass production with ease. The aesthetic effect of the dial plate is brought about by the combined effect of the nacreous colour and optical refraction characteristic of the thin plate of shell 2 and the opaque coating layer or electroless plated layer 3. Thus, a highly colourful dial plate emitting a variety of hues can be obtained. Dial plates for use in portable timepieces are required to be as thin as possible. In this respect, the dial plate can be formed in the shape of a thin plate as a whole, as the plate of shell 2 is adhesively bonded directly to the base plate 1. Namely, in the embodiment shown, the base plate 1 has a thickness of 400 microns and the plate of shell 2 has a thickness from 200 to 250 microns so that the entire thickness of the dial plate may be not greater than 700 microns. This brings about the additional advantage that usual apparatus for producing dial plates for thin portable timepieces can be used as such for the production of the dial plate of this invention.

Fig. 3 shows another embodiment of the dial plate according to this invention. This embodiment is similar to the preceding embodiment in that the thin plate of shell 2 having the back surface thereof coated with the opaque paint layer or electroless plated layer 3 is laminated to the base plate 1 by means of the adhesive layer 4, but is different from the preceding embodiment in that the front surface of said thin plate of shell 2 is also coated with a paint layer 6. The paint layer 6 is formed of a transparent lacquer, semi-transparent lacquer or industrial varnish, and imparts various changes to

the surface gloss of the plate 2 and slightly colours said plate. By properly selecting the coating materials used, an almost infinite number of colour combinations can be obtained. It has been confirmed on the actual dial plate that, by applying the coating 6 in a vignette form, a dial plate having a highly fantastic aesthetic effect can be obtained, and that the paint 6 when applied uniformly on the plate of shell produces an iridescent pattern. It is also effective to apply the paint 6 in such a manner that the depth of colour of the paint is progressively increased toward the peripheral edge from the central portion of the dial plate where the coating layer is transparent. Reference numeral 7 in Fig. 3 designates time marks provided on the front surface of the dial plate, which marks are separately made of such a metal as brass and coated with a plating, and are secured to the dial plate by legs 7a which are extended in small holes, bored through the plate of shell 2 and base plate 1 and fixed therein as by spot welding. The thin plate of shell 2 of the dial plate according to the present invention is lower in hardness than a jewel, such as ruby, and therefore, can be worked relatively easily. The through-holes can be bored therein also by a conventional boring machine. This also facilitates the mass production of the dial plate without adding to the production cost.

As described hereinabove, the dial plates for timepieces exhibit a variety of colours and patterns which are basically created by the nacreous colour possessed by the shell and are variable in an indefinite number of ways in combination with the colour or colours of the paint or paints used in a variety of ways, and which give an impression of quality to the dial plate. In addition, the dial plates can be produced in large quantities at low costs and the product dial plates individually have different aesthetic effects of their own and are individually different. It should be noted that the dial plates of the invention are not necessarily of round shape as shown in the embodiments but may be of square or rectangular or any other irregular shapes, and are of great practical commercial value.

WHAT WE CLAIM IS:—

1. A dial plate for timepieces, comprising a laminate formed of a thin metallic base plate and a thin plate of nacreous or iridescent shell bonded thereto by means of an adhesive, wherein the thin plate of shell is backed by an opaque layer applied to substantially the entire area of the back surface of said thin plate of shell and wherein the adhesive is applied between the opaque layer and the metallic base plate.

2. A dial plate for timepieces, according to claim 1, wherein the front surface of said



thin plate of shell is provided with a transparent coating layer.

3. A dial plate for timepieces, according to claim 1, wherein the front surface of said thin plate of shell is provided with a semi-transparent coating layer.

4. A dial plate for timepieces, according to any one of claims 1 to 3, wherein said opaque layer is formed by means of an electroless plating process.

5. A dial plate for timepieces, according to any one of claims 1 to 3, wherein said opaque layer is formed by a coating of opaque paint.

6. A dial plate for timepieces, according to any one of claims 1 to 5, provided with time marks wherein the laminate of said thin plate of shell and said base plate has

holes formed therethrough by means of which the time marks having mounting legs are secured to the front surface of said thin plate of shell by inserting said mounting legs into said through-holes.

7. A dial plate for timepieces substantially as described with reference to Figures 1 and 2 of the accompanying drawings.

8. A dial plate for timepieces substantially as described with reference to Figure 3 of the accompanying drawings.

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