H. F. CUNTZ.

DIAL AND MARKING FOR WATCHES AND LIKE ARTICLES.

APPLICATION FILED OCT. 8, 1921.

1,414,628. Patented May 2, 1922.

Fig. 1.

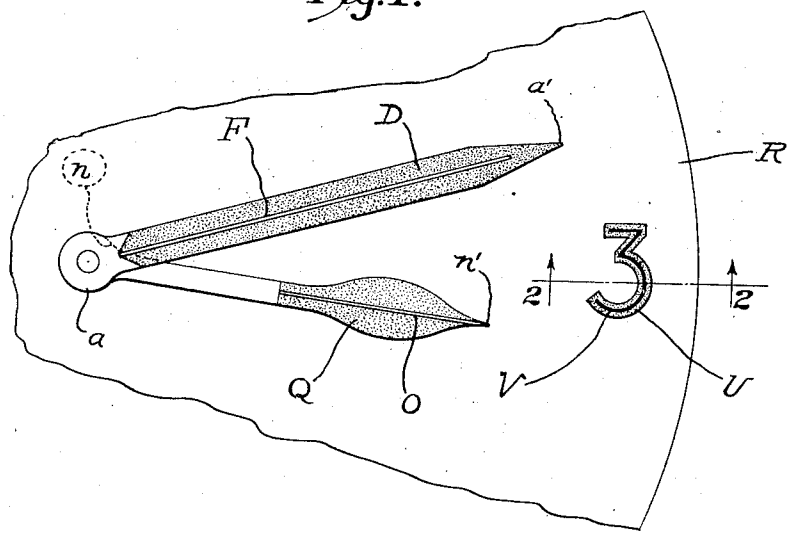


Fig. 2.

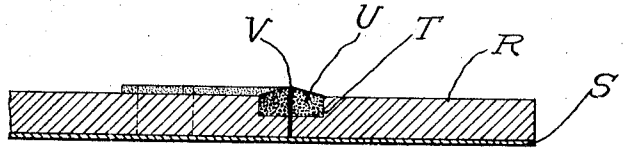


Fig. 3.

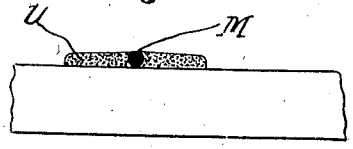
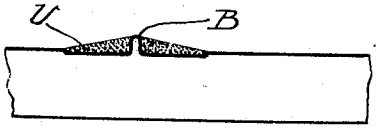


Fig. 4.



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DIAL AND MARKING FOR WATCHES AND LIKE ARTICLES.

1,414,628. Specification of Letters Patent. Patented May 2, 1922.

Original application filed July 2, 1921, Serial No. 482,095. Divided and this application filed October 8, 1921. Serial No. 506,312.

To all whom it may concern:

Be it known that I, HERMANN F. CUNTZ, a citizen of the United States, resident of the city of Hartford, county of Hartford, State of Connecticut, and whose post-office address is No. 7 East 42nd Street, borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Dials and Markings for Watches and like Articles, of which the following is a specification, reference being had to the accompanying drawings, illustrative of particular embodiments of my invention,—this being a division of my application Serial No. 482,095, filed July 2, 1921, allowed October 3, 1921.

This invention relates to the dials for such devices and instruments as watches, gauges, meters and other devices, and particularly the graduations on such dials, and for like or similar devices, as may appear from the following specification. In particular, the invention relates to providing them in a form or construction permitting advantageous equipment with luminous material, so that the indicators or the graduations may be readily visible and readable at night and at the same time affording accurate and easy reading of the graduations or readily discerning of an indicator or indicators and their position with respect to graduations by outside light such as by daylight or when visible by ordinary illumination.

The application of luminous material involving compounds of radio-active and radio-responsive material, has heretofore been practised by embodying such permanently luminous compounds in a recess in the hands of instruments and particularly in watch and clock hands so that a sufficient bulk of the material is held spread over a sufficient area to provide an amount of luminosity to an extent and for a sufficient distance suitable for the particular instruments or case involved; or in some cases the permanently self-luminous compound is spread over the surface of a hand or on a dial with suitable protective covering to keep it in place. A reasonable area is required with a considerable width with respect to the length in a line, intended to be luminous in the dark, sufficient to provide visible luminosity at a distance of a foot or several feet or yards—depending upon the particular use to which the permanently illuminated article is adapted. In view of the relatively larger width or line required for the darktime luminous effect, the indicator, hand, or pointer, and particularly dial figures, markings or the graduation so equipped, are of a greater width than permits accurate reading in the daytime or under conditions of ordinary outside illumination. It, therefore, becomes a problem to provide such devices with permanently luminous material in a manner whereby accurate reading of the time or accurate reading of instruments, as to the registration of pointers with graduations, can be assured, or in any event can become a matter of greater accuracy than has heretofore been the case by day and night.

In the case of pointers for indicators and hands for watches, a broad surface covered with radio-luminous material, backed up by a relatively dark background involves an inaccuracy incident to a broad line compared with a very fine hair line or narrow marker which should be used in ordinary or full illumination for accurate determination of calibration registration. I, therefore, provide a pointer or hand with surface of a relatively sufficient width to carry an ample area of radio-luminous material for the desired degree of visibility in the darkness, but I provide centrally or in the axis of such a pointer or hand, a narrow contrasting line of non-luminous material and of contrasting color with the luminous material in the daytime or when subject to outside illumination. Such central line of non-luminous material provides for accurate reading in the daytime and the provision of such a line on the pointer, calibration, marking of numerals, supplements the art heretofore known by giving to the use of radio-luminous compound on instruments and other devices an assurance of accuracy for ordinary reading by outside light which has not heretofore been the case.

In the case of markings such as numerals or graduations which is the subject-matter of this divisional application, I provide accurate line or lines in the middle, or within the field of a much larger radio-luminous area, thereby supplying a well-defined distinctly readable or discernible daytime marking.

The provision of such distinct non-lu-

minous accurate mark in a marking or dial graduation, or otherwise, involves modifications of structures heretofore used which may be provided in numerous ways but require structural changes in such parts not heretofore known and of which particular embodiments I have herewith illustrated and will now describe in more detail with reference to the accompanying drawings, in which:

Fig. 1 is a plan view of a fragmentary portion of a dial showing a figure with light-time reading medial mark within the field of a self-luminous figure area, with the hands of a time-piece in relative position of use.

Fig. 2 is a cross-section of the dial and dial marking or figure on an enlarged scale, on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view of the figure and dial on the line 2—2 of Fig. 1 showing a modified construction.

Fig. 4 is a sectional view of the figure or dial marking on line 2—2 of Fig. 1 showing a further modified form.

In the embodiment of the medial or day-light reading line in dial figures, characters or other marking, the illustration in Fig. 1 shows such a line for visibility with outside light, as V illustrated in the dial graduation "3." On either side of the non-luminous line V a border of radio-luminous material U is provided of a width which is greater than the line V in the form illustrated. This figure "3" on the dial R provides a broad field of the desired area to assure self-luminosity in amount sufficient to be clearly visible, and the comparatively narrow line V in the field of self-luminous area, is not any broader than necessary to be readily seen by outside light such as in the day time. The radio luminous field U is usually white or of a faint greenish or pink tint and is hardly distinguishable from the white or slightly tinted enamel face usually employed on watch or clock dials, such as R, so that in day-light or ordinary light reading of the figure nothing is seen on the dial R except the central non-luminous line V of a contrasting color, usually black or relatively much darker than the surrounding self-luminous area.

Thus fine line figures can be made in conformity with the usual dimensions of dial markings for day-light visibility, instead of the broad expanse of black letters.

The construction of hands or indicators with luminous material and a medial non-luminous line, is shown in Fig. 1 as superposed on a dial in which the minute hand has the tip a' with the narrow medial non-luminous line F for day reading, flanked on either side by a relatively broad band D of self-luminous, that is radio-luminous material, with the hub a attached to a pivot in the usual form passing through the centre of the dial. The hour hand is of a modified construction with a radio-luminous field broader and of different configuration Q, than the minute hand, in order that the hour hand may be distinguished when reading in the dark from the minute hand. A straight non-luminous medial line O extends through the self-luminous field in a radial direction from the hub n and terminates at the tip n'. These non-luminous medial lines on the hands provide a fine or accurate line of direction recognized by those familiar with instruments, as greatly aiding accuracy in the observation of a moving hand or indicator, when reading an instrument, because the projection of such a line leads the eye accurately to the graduations or dial marking, far better than a broad or irregular sighting line on the hand.

With a graduation mark on the dial other than the "3" shown in the drawing, the fine and desired hair line in the dial marking provides an extremely accurate registration of the line of sight prolonged from the radial non-luminous hair line on the hands, and for reading of dot or a radially positioned dash marking on the dial serves to make such a self-luminous instrument or timepiece just as accurately readable in the day-time as the finely calibrated instruments heretofore in use only for day-light service.

In Fig. 2 the section on enlarged scale shows radio-luminous material U packed into a recess T in the dial, and in the middle of the radio-luminous material the non-luminous line V is the edge of a flange or small rigid wall embedded in the recess. As here shown the upper or visible edge V of this ridge or flange is slightly above the surface of the dial R, and on either side of this central ridge V the radio-luminous material is applied in cavity T, constituting the area U of relatively much greater width than the non-luminous line V. In this form a mixed radio-active and rodio-responsive material forming the self-luminous compound can be embedded and be securely held, and in the application of the compound a tool serving to spread or pack the material in the cavity can scrape the edge of the ridge, thereby clearing the non-luminous line V of surplus material and at the same time laying the self-luminous compound on either side with entire uniformity and evenness. Furthermore, if desired radio-responsive material may be formed in the cavity and scraped off to the uniform height of the ridge V, and thereafter radio-active material dusted onto the surface and packed down onto and into the sub-compound or radio-responsive material, in the manipulation of which the non-luminous line V on the ridge or flange provides a uniform guide in limiting the compression and fixing of the

material. This construction lends itself to facility and uniformity of finish besides providing secure means of holding the self-luminous compound, and holding it uniformly on either side of the non-luminous medial line.

As shown in Fig. 3, the ridge may be a minute bar of hard material suitably secured to the surface of the dial, with the self-luminous mixture embedded on either side, or the radio-responsive material embedded with radio-active material dusted thereon. In either case the medial non-luminous line provided by the ridge or flange M serves to hold the self-luminous material in place and during application it is a limiting guide for the tool serving to spread the mixture or compound, and also a limiting guide when pressure is applied to the compound to firmly secure it in position in the lateral crevices on either side formed by the ridge M and the surface of the dial.

In Fig. 4 the ridge B provides the non-luminous line and as there shown is formed as a flange projecting from the material of the dial surface. Between the ridge B, which limits the depth of compound flanking it on both sides, the luminous compound is spread on either side tapering off to the surface of the dial or to a slight depression forming an opposite retaining ledge for the purpose of adding security for the self-luminous material and to provide a predetermined depth of material at the outer edge of the luminous area, in order to assure the required amount of self-luminous compound to the very edge of the band U in the marking or figure or other graduation.

The light emission from radio-luminous areas is such that with a total area, and with proper width of luminous line in proportion to its length sufficient for the desired legibility in the dark, there will be a light emission substantially the value of the entire area, irrespective of and without any interference by the relatively narrow non-luminous medial line or ridge. That is, in the dark the entire graduation or figure will appear luminous, the light emission bridging the relatively narrow non-luminous line. On the other hand, with outside light as in daylight the luminous material area will be practically invisible on a dial field of similar shade, while the non-luminous medial line when made of contrasting color will be the only visible marking or graduation visible and can be a hair line or as fine a marking as in the graduations or timepiece figures heretofore used for accurate observation, and with no apparent increased breadth in the markings during day-time reading.

The revolutionary development involved in the introduction of readable-in-the-dark watches, clocks, compasses and other indicating instruments and devices, is well-known to have involved at first the serious objection of very broad graduation lines or very large dots or broad figures, in order to provide a sufficient area so that the permanently self-luminous or radio-luminous material would serve the night-reading object. The clumsiness of such structures impeded for years the more general adoption of the day and night reading parts of timepieces and other instruments, and the necessity of providing means so that the same night-visible instruments would be equally readable by day, led to the provision of a border or two borders, one on either side of the self-luminous areas, and in other cases led to the use of a contrasting background. But in all cases this still involved the broad and inaccurate mark or graduation usually white for day reading with its attendant objections, for many classes of timepieces and other devices. The construction herein set forth provides the solution of the difficulty heretofore experienced, and in addition thereto it will be noted that the structures heretofore described have many other advantages. Means are provided assuring uniformity in amount or in the depth of the coating of radio-luminous material, likewise means for more securely holding the material against displacement, as well as providing uniformity throughout the length of the area of the luminous surfaces.

Other advantages will be appreciated in the practice of this invention, facilities in manufacture, as well as economies and speed of production with uniformity of product, add to the value and durability and other characteristics of the finished product.

While various modifications may be made in construction and arrangement, as well as material and use, besides the specific embodiments herein shown and described, my invention is not confined to these specific embodiments nor to details herein shown,—but what I claim and desire to secure by Letters Patent is:

1. A reading part for a timepiece or like article comprising a base, a ridge projecting from said base forming a figure or graduation device, permanently self-luminous compound imbedded on either side of said ridge in the recess formed between the wall of the ridge and the adjacent surface of the base.

2. A figure or numeral for dials and like articles for night and day reading, comprising a base with a projecting ridge of the desired configuration of day reading and radio-luminous compound imbedded in the recesses formed by each side of said ridge and the adjacent base surface.

3. A figure or marking for dials or the like for readability day and night, comprising a radio-luminous compound and means for securing the same, a surface base to which the same is secured and a medial line

formed of non-luminous material within the area of the luminous material surface.

4. A figure or marking for dials or like articles comprising a confined area of radio-luminous material and means for permanently holding the same in position, a single line of non-luminous material of contrasting color of the same configuration as the luminous area and positioned medially between the borders of the luminous area.

5. In a dial for watches or like articles, a recess having a predetermined figure or mark outline, a single ridge or like member medially positioned within the borders of said recess and radio-luminous material imbedded in said recess with its surface adjacent said ridge below the top of said ridge.

6. A figure or marking for dials or like articles for visibility in the dark and light, comprising a non-luminous mark for visibility with external light, a radio-luminous border surrounding and conforming to the non-luminous mark, and providing a self-luminous area on either side of said mark visible in the dark.

7. A figure or marking for dials or like articles for visibility in the dark and light, comprising a non-luminous line of the desired configuration and a border of radio-luminous material on each side having an area of greater extent than the non-luminous line.

8. A figure or marking for dials and like articles for visibility in the dark and light, comprising a base, a figure formed of radio-luminous surfaced material, a projection of said material above the surface, and a non-luminous central line above the plane of the base midway between the borders of said luminous surface.

9. In combination with a dial, a graduation or marking comprising a radio-luminous area and a non-luminous line of the same configuration as the luminous area located medially in the radio-luminous area, said non-luminous line having a width substantially less than the adjacent width of the radio-luminous mark.

10. In combination with a dial, a figure graduation fixedly secured thereon comprising a radio-luminous area forming the contour of said figure and substantially matching the color of the adjacent dial surface, a non-luminous line of contrasting color conforming to the same configuration as the luminous area and medially positioned within said radio-luminous area.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses, this 7 day of October, 1921.

HERMANN F. CUNTZ.

Witnesses:
H. MUCHMORE,
ROBERT B. MCCAGUE.