

PATENT SPECIFICATION

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(54) CLOCK HAVING MEANS TO PROJECT TIME INDICIA ON CEILING

(71) We, STANDARD PACKAGING CORPORATION, of 450 Seventh Avenue, New York, N.Y. 10001, United States of America; a Corporation organising and existing under the laws of the State of New York, United States of America, 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:—

The present invention relates to a clock mechanism and is particularly concerned with means for projecting time indicia on a surface.

It is known in the prior art to provide a clock mechanism wherein digital indicia are projected as an image on a surface such as a ceiling of a room. However, in the prior art, the means of providing the digital time indicia has involved separate moving belts for the minutes and hours, and no specific mechanism was available for providing an adjustment for a clear and sharp image. Accordingly, in the prior art, the mechanism was somewhat complex, and the image that was provided was not clear and distinct.

In accordance with the present invention, there is provided a clock mechanism including means for projecting hours and minutes time indicia on a surface comprising a housing, driving means for connection to a power source, means within said housing connected to said driving means for indicating said hours and minutes time indicia comprising a rotatable transparent disc on which said time indicia are provided as a plurality of incremental digital combinations arranged in circular array along the periphery of said disc; a light source for connection to said power source and located within said housing on one side of said disc to pass light therethrough and create an image of one of said time indicia

combinations, and adjustable focusing means located on the other side of said disc to receive said image for projection on the surface.

The invention will be illustrated, by way of example, with reference to the accompanying drawings, wherein.

Fig. 1 is a view in perspective showing the clock of the present invention in operation;

Fig. 2 is a front view of the clock with part broken away to show operative details;

Fig. 3 is an enlarged sectional view taken along line 3-3 of Fig. 2;

Fig. 4 is a detailed view of the reflecting surface and lens mechanism with the elements shown in exploded position;

Fig. 5 is a sectional view with the elements assembled and taken along line 5-5 of Fig. 4; and

Fig. 6 is a view of a portion of a circular disc of the clock on which time indicia are carried.

It will be understood that the accompanying drawings are merely illustrative of the invention, and reference should be made to the following description for a more detailed explanation.

In Fig. 1, a clock 10 is shown positioned on an item of furniture 12 in a room and producing a projected image 132 of the time on a ceiling 14 of the room, and it is to be understood that such projection would be particularly effective in a darkened sleeping room.

In Fig. 2, a more detailed view of the clock is shown which includes a housing comprising flat sides providing a generally square configuration defined by top and bottom sides 16, 18 respectively and left and right sides 20, 22 respectively positioned in respective parallel relationship. However, it is to be understood that the housing can be provided in other shapes, and the shape of the housing does not comprise a critical

feature of the invention.

A stand 24 is attached to bottom side 18 so that the clock 10 can be placed on an item of furniture, such as furniture 12 shown in Fig. 1. It is also generally desirable to attach felt or other soft material 26 to the bottom of stand 24, so that there will be no direct contact between stand 24, which may be formed of metal, and the furniture.

The clock 10 further includes a back side 28 having a top portion 30 formed with a plurality of louvers 32 for a reason to be discussed hereinafter.

The front of the clock 10 includes a transparent face plate 34, which may be formed of glass or plastics, and stationary hours indicia 36 are formed thereon in a circular array. Such hours indicia may comprise each of the numerals 1 to 12, or it may comprise selective numerals 3, 6, 9 and 12, as illustrated in Fig. 1, with the remaining hours indicia shown in ornamental fashion. A front opaque mask element 37 is located rearwardly behind face 34 with its outer periphery coextensive with the outer periphery of face 34. Mask 37 includes a flat section 38 extending vertically inwardly to a folded-over circular edge 39 having a diameter approximately the same as the outer diameter of the circular array of indicia 36 and then extends further as a flat frusto-conical portion 40 angularly inwardly and rearwardly to terminate at a circular opening 41 which has a diameter approximately equal to the inner diameter of the circular array of indicia 36. The hours indicia 36 are stationary figures mounted on an annular area having an inside and outside diameter and it is the purpose of mask 37 to provide a background for these indicia.

Clock 10 includes a conventional drive and gearing mechanism which is shown in the illustrated embodiment as unit 42 connected to a power source (not shown) by means of electric cord 44 which would be plugged into a conventional outlet (not shown). Clock mechanism 42 is understood to include a conventional electric motor and gearing, and connected with unit 42 is a shaft mounted in housing 46 to provide the usual double 12-hour rotation in a 24-hour day.

In addition to the stationary hours indicia 36 there is provided a rotatable hour element mounted on the shaft. This rotatable hour element is shown in the disclosed embodiment as a disc 48, as seen most clearly in Figs. 2 and 3 and as seen in partial detail in Fig. 6. The outer periphery of disc 48 has a diameter approximately equal to the diameter of edge 39, and disc 48 includes an inner portion 50 that is slightly raised (primarily for ornamentation) toward the

front of clock 10.

Located at an intermediate point between portion 50 and mask 37 is an hour indicator which is illustrated as an oval element 52 formed by two symmetrically shaped rearwardly inclined portions attached to posts 58 extending rearwardly and attached to disc 48. Accordingly, it will be appreciated that as disc 48 is rotated, element 52 rotates therewith to indicate the hour.

Located within tubular housing 46 and extending therefrom is a conventional minute shaft 60 to which is attached a minute hand 62 to be rotated by the conventional gearing to provide one complete rotation every hour. Minute hand 62 is formed of two symmetrically shaped rearwardly inclined portions similar to the portions constituting element 52 but somewhat larger, as seen in Figs. 2 and 3. Also mounted within housing 46 and extending therefrom is a conventional shaft 64 for seconds and which is connected through the conventional gearing to provide one complete rotation every minute of a second hand 66.

In the particular embodiment illustrated, an alarm device is also provided, and the setting for the alarm is provided by a hand indicator 70 mounted to rotate with tubular housing 46. The selective operation of hand indicator 70 is provided by turning a knob 72 located at the rear of clock 10 in a conventional manner. Knob 72 is connected to a rod 74 and is horizontally movable to a different position whereby it can provide a selective setting for the hour and minute indicators 52, 62. A knob 76 is also provided at the rear of clock 10 for selective positioning to make the alarm operable.

An important provision of the invention is an image making device, one example of which will now be described. As shown in Fig. 2, and most clearly in Fig. 6, along the outer periphery of disc 48, digital combinations representing time indicia corresponding to positions of the hour and minute indicators are defined. This is provided by forming disc 48 of transparent material 80, such as glass or plastics. An annular opaque film 81 having light transparent sections 82 for the time indicia digital combinations is applied adjacent to the periphery of disc 48. Because of sections 82, light rays passing therethrough will form an image of the time indicia, preferably in five minute increments. For simplicity in the drawings, particularly Fig. 6, the digital indicia 82 are shown in black lines, but it is to be understood that indicia 82 are transparent portions in opaque film 81 through which light can pass.

A divider plate 86 is located approximately midway of clock 10 and extends vertically to be mounted between top side

16 and bottom side 18. Plate 86 provides the mounting on one side for clock mechanism 42 and also provides other mountings as will now be explained.

5 Located to the rear of plate 86 and above clock mechanism 42 is a light bulb 90. Bulb 90 is screwed into a socket (not shown) that is mounted on plate 86. An aperture 92 is formed in plate 86 approximately in line 10 with the center of bulb 90, and this aperture allows light rays to pass therethrough as bulb 90 is energized by current conducted through cord 44.

15 On the front side of divider plate 86 toward the top portion of clock 10 is located a lens and reflecting mechanism 100. Mechanism 100 includes an upper generally annular portion 102 which can be closely fitted within a larger lower generally annular portion 104. In Fig. 4 upper portion 102 is shown as it would appear if completely removed from lower portion 104. A mounting bracket 106 is formed as an integral part of lower portion 104, and bracket 106 20 by means of screws 108 is mounted on divider plate 86. Accordingly, it will be appreciated that lower portion 104 is fixed with respect to clock 10 due to its mounting on plate 86. Lower portion 104 includes a cut-out section 110 facing plate 86, and cut-out section 110 has a configuration such that the upper portion of disc 48 passes therethrough with clearance on each side. It will be appreciated from Fig. 3 35 that cut-out section 110 faces aperture 92 and will receive light rays passing therethrough. The part of lower portion 104 extending toward the front of clock 10 from cut-out portion 110 is formed as an upwardly inclined wall 112 of which the inside has mounted thereon a reflecting surface 114 which can be a mirror or similar reflection device. Wall 112 and surface 114 are positioned at a 45° angle with respect 45 to disc 48 so that the light rays passing horizontally through aperture 92 are reflected from their horizontal path into a vertical path as shown by arrow 116.

50 Upper portion 102 of lens mechanism 100 includes a top part formed as a knob 122 and a lower part formed with a notched edge configuration 120. At an intermediate part of upper portion 102 a convex lens 124 extends across the hollow interior to 55 provide a focus for the indicia image reflected upwardly from surface 114 as shown in Fig. 5, and arrow 116 is coincident with the optical axis of lens 124.

60 On the inside of lower annular portion 104 there is located an abutment element 130 against which the notched edge 120 of upper annular portion 102 bears. Accordingly it will be seen from the assembled lens mechanism 100 65 shown in Fig. 5 that the turning of upper

portion 102 by means of knob 122 causes vertical displacement of upper portion 102 relative to lower portion 104 as edge 120 is cammed along abutment 130. This in turn will change the focus of an image 132 70 as seen in Fig. 1 so that it will be sharply defined even though clock 10 may be moved from room to room where the ceilings have different heights.

75 A switch 140 is provided on the rear side 28 of clock 10 so that bulb 90 can be selectively energized. This will provide the user with the option of having the image projected on the ceiling constantly or merely projected when desired. 80

In operation clock 10 is energized through electric cord 44 so that mechanism 42 is operated in a conventional manner whereby seconds indicator 66, minutes indicator 62 and hours indicator 52 display the time 85 on the front of the clock. As mentioned previously, knob 72 can be positioned in a conventional manner to set the time indicators or it can be further positioned for the alarm setting. A knob 76 can then be set 90 for selective operation of the alarm.

During the operation of clock 10 disc 48 rotates to provide the hours indication, and correlated time indicia 82 will be positioned opposite aperture 92. Accordingly, when 95 a ceiling projection of the time is desired, switch 140 is actuated to energize bulb 90. Light then passes through aperture 92 to form the image of indicia 82 upon reflecting surface 114 from whence it is then directed 100 upwardly through lens 124 to form focused image 132 on the ceiling. As explained previously, switch 140 can be left in the "on" position so that the time indicia presents a continuous display on the ceiling, 105 or the switch 140 can be selectively operated to project image 132 on ceiling 14 for a short time duration. Referring to the louvers 32, it is to be appreciated that heat generated by the operation of bulb 90 is 110 vented therethrough.

A further feature of the invention is to provide a sharp focus of image 132 by means of the adjustment provision for lens 124. For example, if clock 10 is moved to 115 a room where the ceiling is a different height, knob 122 can be selectively operated to move lens 124 vertically to sharpen the image focus.

Although the invention has been described and illustrated for ceiling projection 120 of the time indicia, it is possible to have an image of the time indicia projected laterally or horizontally onto a side wall of the room. This would be provided by positioning lens mechanism 100 on a side wall of 125 the clock and providing corresponding repositioning of aperture 92 and bulb 90. Appropriate correlation of indicia 82 on disc 48 with the hours and minutes indica- 130

tors would also be effected.

WHAT WE CLAIM IS:—

1. A clock mechanism including means for projecting hours and minutes time indicia on a surface comprising a housing, driving means for connection to a power source, means within said housing connected to said driving means for indicating said hours and minutes time indicia comprising a rotatable transparent disc on which said time indicia are provided as a plurality of incremental digital combinations arranged in circular array along the periphery of said disc, a light source for connection to said power source and located within said housing on one side of said disc to pass light therethrough and create an image of one of said time indicia combinations, and adjustable focusing means located on the other side of said disc to receive said image for projection on the surface.
2. A clock mechanism according to claim 1, wherein a divider plate is mounted within said clock housing and separates said disc from said light source, said divider plate extends parallel to said disc and is positioned adjacent thereto, and said divider plate includes an aperture to allow light to pass therethrough from said light source to said time indicia.
3. A clock mechanism according to claim 1 or 2, wherein said light source comprises a light bulb, and said adjustable focusing means includes a reflecting surface and a lens.
4. A clock mechanism according to claim 3, wherein said lens has an optical axis that is parallel to the plane of said disc, and said reflecting surface is positioned at 45° to said optical axis to receive said image for direction along said optical axis.

5. A clock mechanism according to claim 3 or 4, wherein said adjustable focusing means includes an inner annular housing within which said lens is mounted, said inner housing having a top part extending above an upper wall of said clock housing and formed as a rotatable knob.

6. A clock mechanism according to claim 5, wherein said adjustable focusing means includes an outer annular housing fixed within said clock housing and adapted to receive said inner annular housing in sliding and rotatable engagement, said outer annular housing including an internal abutment, and a lower part of said inner annular housing being formed as cam means cooperating with said abutment to effect vertical movement of said inner annular housing relative to said outer annular housing as said knob is rotated to thereby change the focus of said lens.

7. A clock mechanism according to any one of claims 3 to 6, wherein said clock housing includes a back side portion adjacent to said light bulb formed with a plurality of louvers to vent heat created by said light bulb during operation.

8. A clock mechanism according to any one of claims 3 to 7, wherein switch means is provided for selective operation of said light bulb.

9. A clock mechanism substantially as hereinbefore described with reference to and as illustrated with respect to the accompanying drawings.

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2. A clock mechanism according to claim 1, wherein a divider plate is mounted within said clock housing and separates said disc from said light source, said divider plate extends parallel to said disc and is positioned adjacent thereto, and said divider plate includes an aperture to allow light to pass therethrough from said light source to said time indicia.

3. A clock mechanism according to claim 1 or 2, wherein said light source comprises a light bulb, and said adjustable focusing means includes a reflecting surface and a lens.

4. A clock mechanism according to claim 3, wherein said lens has an optical axis that is parallel to the plane of said disc, and said reflecting surface is positioned at 45° to said optical axis to receive said image for direction along said optical axis.

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