June 12, 1956 P. HEIKKILA 2,749,704

ELECTRIC CLOCK TIME INDICATING DEVICE

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Fig. 1

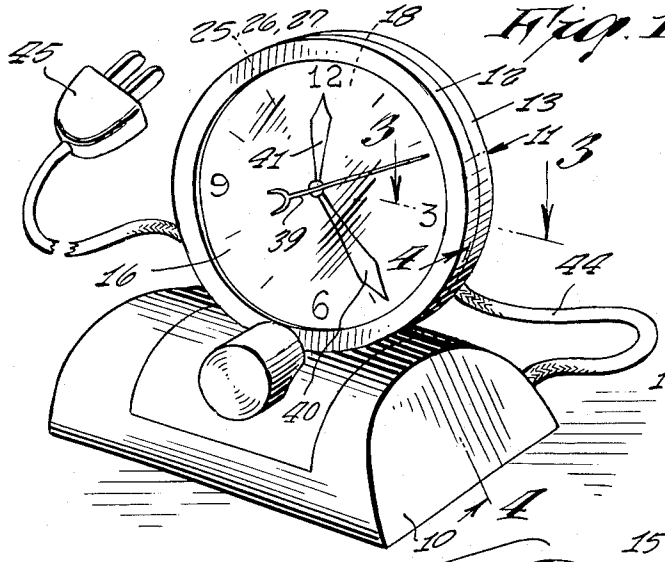


Fig. 3

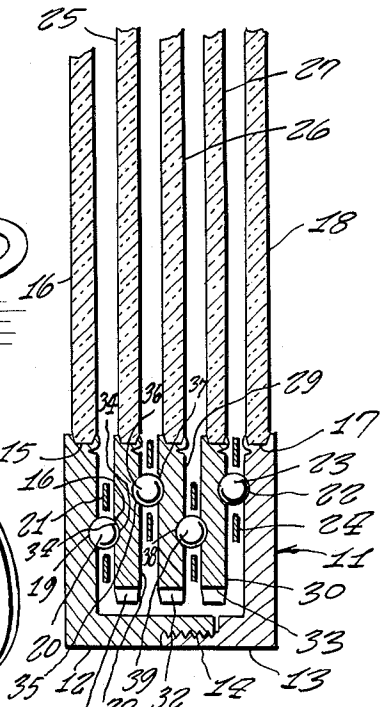


Fig. 2

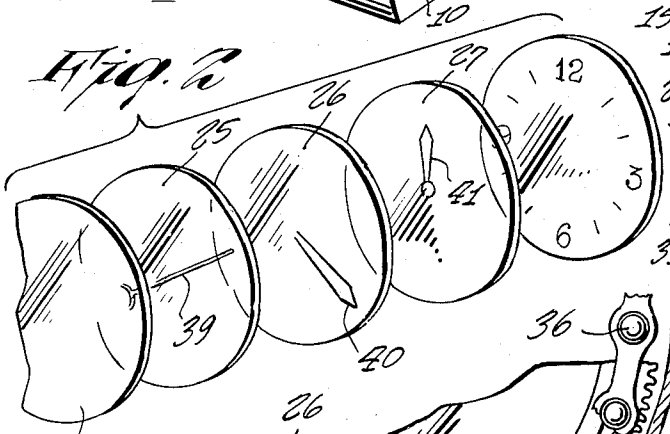
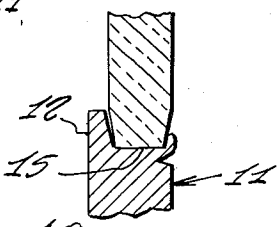


Fig. 5



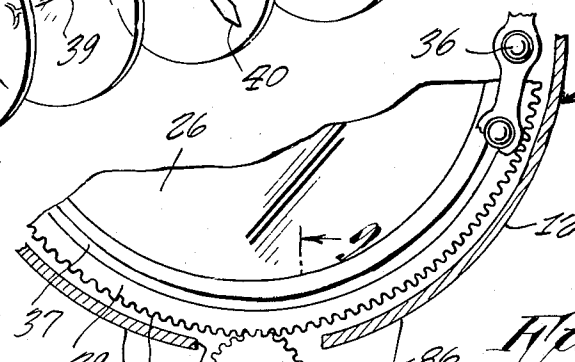


Fig. 4

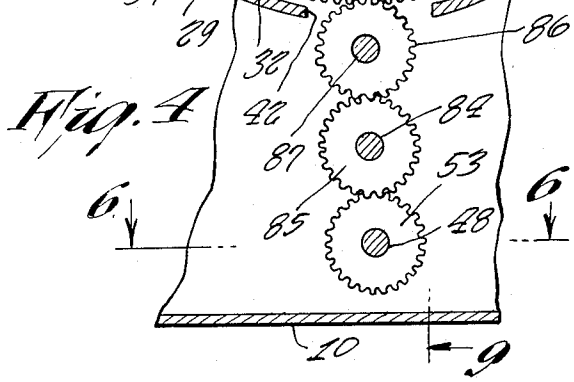
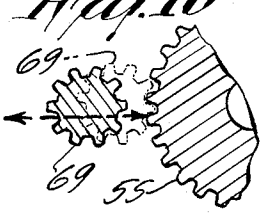


Fig. 10



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Fig. 7

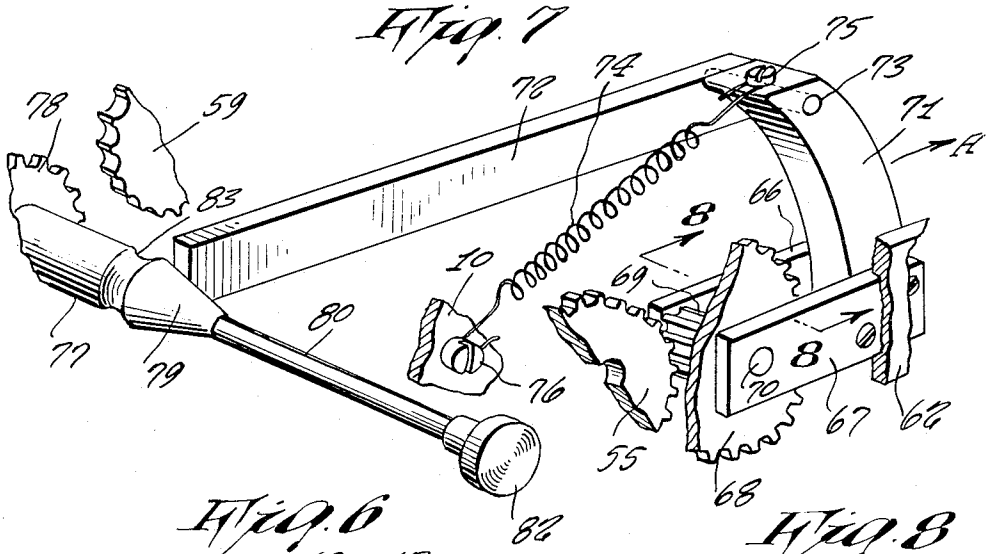


Fig. 6

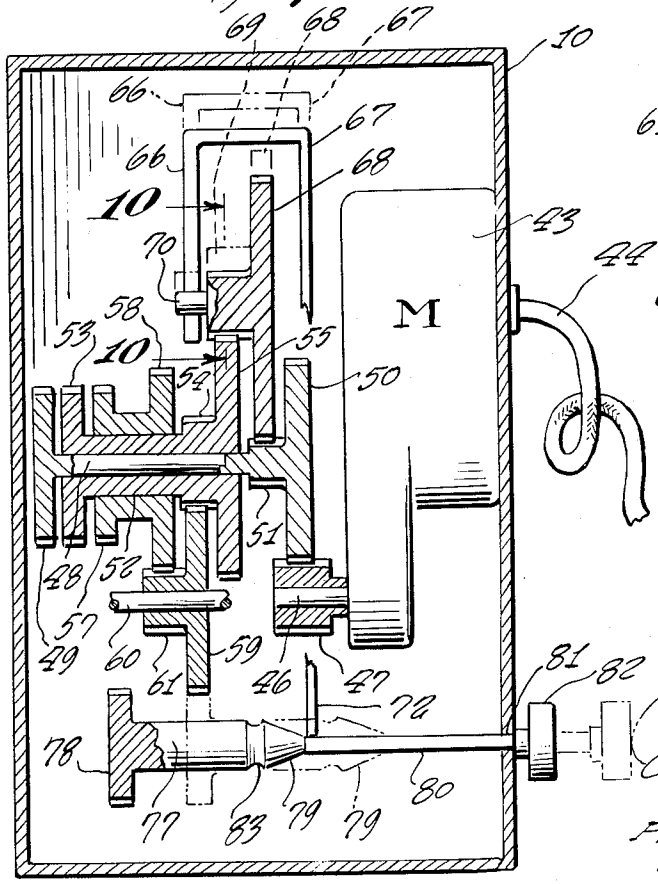


Fig. 8

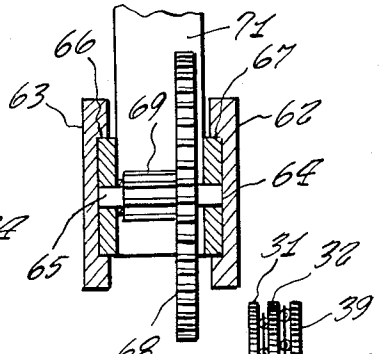
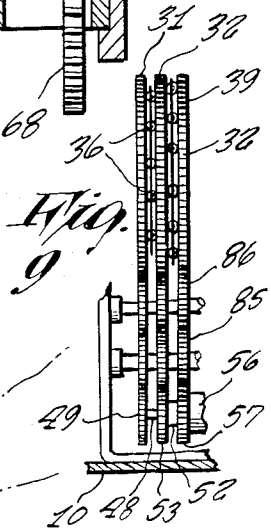


Fig. 9



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ELECTRIC CLOCK TIME INDICATING DEVICE

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1 Claim. (Cl. 58—126)

This invention relates to electric clocks.

It is an object of the present invention to provide in an electric clock novel means for disengaging the hour and minute hands from the motor drive of the clock, said means including manually operable means for setting the clock manually during such disengagement.

It is another object of the present invention to provide an electric clock of the above type wherein a plurality of transparent discs carrying the clock hands and dial are rotated relative to each other whereby to effect the usual functions of an electric clock, novel means being provided for disconnecting the hour and minute gears from the electric motor so as to permit the setting of the clock while the second hand continues to move and the motor functions.

Other objects are to provide an electric clock of the above type which is of simple construction, inexpensive to manufacture, has a minimum number of parts, is easy to use and efficient in operation.

For other objects and a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, in which:

Figure 1 is a perspective view of the invention;

Fig. 2 is an exploded perspective view of the glass discs comprising the face of the clock;

Fig. 3 is a fragmentary transverse sectional view taken along the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary vertical sectional view taken along the line 4—4 of Fig. 1;

Fig. 5 is an enlarged detail of part of the construction shown in Fig. 3;

Fig. 6 is a transverse sectional view taken along the line 6—6 of Fig. 4;

Fig. 7 is a fragmentary perspective view of the clutch mechanism;

Fig. 8 is a vertical sectional view taken along the line 8—8 of Fig. 7;

Fig. 9 is a vertical sectional view taken along the line 9—9 of Fig. 4 and

Fig. 10 is a vertical sectional view taken along the line 10—10 of Fig. 6.

Referring now to the figures, 10 represents a hollow base on which is suitably mounted at the top thereof a circular ring 11 of substantially U-shaped cross section (Fig. 3). The ring 11 comprises a front portion 12 adapted to be screwed into the rear portion 13 as at 14. The inner edge of the front portion 12 is provided with a notch 15 (Fig. 5) into which is snapped a disc 16 of glass while the rear portion 13 is provided with a similar notch 17 into which is snapped a glass disc 18 bearing indicia descriptive of the hours (Fig. 2). The inner face of the front portion 12 (Fig. 3) is provided with a groove 19 within which moves a thrust bearing 20 including the ring 21 while the inner face of the rear portion 13 is similarly provided with a groove 22 within which moves a thrust bearing 23 having the usual ring 24, both for a purpose which will hereinafter become clear.

A second hand glass disc 25, a minute hand glass disc 26 and a hour hand glass disc 27 are disposed intermediate the discs 16 and 18 and are provided around their peripheries with fixedly mounted rings 28, 29 and 30, respectively, provided around their outer peripheries with gear teeth 31, 32 and 33, respectively. The ring 31 is provided with a groove 34 within which moves the thrust bearing 20 on one face and on the other with a groove 35 within which moves a third thrust bearing 36. The ring 29 is similarly provided with a groove 37 within which moves a thrust bearing 36 and on the other face is provided with a groove 38 within which moves a fourth thrust bearing 39. The ring 30 is provided on its outer face with a corresponding groove adapted to receive the thrust bearing 23 and on its inner face with another groove adapted to receive the thrust bearing 39. Thus, the discs 25, 26 and 27 are rotatably mounted within the stationary disc 16 and 18 for independent movement as will hereinafter become clear. By moving the discs 25, 26 and 27 in a manner which will hereinafter become clear, the second hand 39 carried by disc 25, the minute hand 40 carried by disc 26 and the hour hand 41 carried by disc 27 will appear to move about a central imaginary axis in the usual manner of clock constructions although such central driving axis will be nonexistent creating a mystifying effect as to what actually makes the hands move, since the movement of the discs 25, 26 and 27 will be undetectable due to their transparency. The bottom peripheral portion of the ring 11 is provided with an opening 42 (Fig. 4) permitting access to the rings 28, 29 and 30 and more particularly the teeth 31, 32 and 33 thereof.

As shown in Fig. 6, an electric motor 43 is mounted at the bottom of the casing 10 and is connected to a suitable source of power by means of the cord 44 and male plug 45, the motor 43 having a drive shaft 46. A gear 47 is keyed onto the drive shaft 46. A shaft 48 is rotatably mounted in the bottom of the casing 10 parallel to and aligned horizontally with the drive shaft 46, the outer end of shaft 48 remote from motor 43 being integrally formed with a second gear 49 while the inner end of the shaft is integrally formed with a driven gear 50. The gear 50 is in mesh with the driver gear 47 and is integrally formed with a gear 51 of smaller diameter. A minute sleeve 52 is rotatably mounted on shaft 48 and is integrally formed at its outer end with a minute gear 53 adjacent the second gear 49, the sleeve 52 at its other end being formed integrally with a gear 54 and a larger gear 55. An hour sleeve 56 is rotatably mounted on minute sleeve 52 and is integrally formed with an hour gear 57 adjacent minute gear 53, the other end of hour sleeve 56 being formed with a gear 58 of greater diameter than gear 57. A gear 59 is rotatably mounted on a shaft 60, the gear 59 being in mesh with the spur gear 54 of minute sleeve 52, the gear 59 being formed with a spur gear 61 in mesh with the gear 58 of the hour sleeve 56. Thus, rotation of gear 55 to move the minute gear 53 will also rotate the hour gear 57 through the spur gear 54, gear 59, spur gear 61 and gear 58, the gear ratios being such as to provide the usual ratio between the hour and minute revolutions.

A pair of horizontal guides 62 and 63 (Figs. 7 and 8) are provided with tracks 64 and 65, respectively. Slides 66 and 67 move within tracks 65 and 64 in a horizontal direction. The slides 66 and 67 are separated by a gear 68 and a spur gear 69 rotatably mounted on the slides by means of a shaft 70, the gears 68 and 69 being both keyed thereon. An arcuate arm 71 extends upwardly from the ends of slides 66 and 67 remote from gear 68, a link arm 72 being pivotally connected to the upper end of arm 71 by means of pin 73. A spring 74 is connected at one end to the top of arm 71 by means of a screw 75 and at the other end to the housing 10 by means of a screw 76

whereby to normally urge the arm 71 and gear 68 toward gear 55 and the spur gear 69 thereby into mesh with the latter. Thus, the angular rotation of the spur gear 51 is transmitted to gear 68 and then to gear 55 through spur gear 69 whereby to provide the primary drive for the hour and minute gears 53 and 57.

As a means of disengaging the gear 68 and more particularly spur gear 69 thereof from gear 55 and thereby disengaging the hour and minute gears 57 and 53 respectively, so as to permit the setting of the clock without turning off the motor 43 or stopping the second gear 49, a shaft 77 is slidably mounted at the bottom of housing 10 alongside the gear 59 and parallel to the shaft 60, the shaft 77 at its forward end being integrally formed with a gear 68 adapted to mesh with gear 59 when displaced to the dotted line position of Fig. 6. The other end of shaft 77 is conical, as at 79, and is integrally formed with an elongated rod 80 which passes through an opening 81 in the rear wall of housing 10 to terminate in a knob 82 adapted to be pressed by a finger as will hereinafter become clear. An annular groove 83 is provided on shaft 77 adjacent the conical portion 79 while the end of link arm 72 remote from arm 71 extends into sliding contact with the rod 80 as shown in Fig. 6. As the knob 82 is pulled outwardly to the dotted line position, the arm 72 will ride along the cam surface of conical portion 79 which will in effect displace the arm 71 in the direction of the arrow A of Fig. 7 to move the spur gear 69 out of mesh with gear 59 and to so stop the minute gear 53 and hour gear 57. The end of arm 72 will move into groove 83 at the outermost position of knob 82 whereby to temporarily lock the arm 71 in the rotated position. As this occurs, the gear 78 will move into mesh with gear 59, permitting the setting of the hour and minute gears, and thereby discs 26 and 27 by rotation of the knob 82 about the axis of shaft 77. During this the second hand 39 will continue to revolve as will the drive shaft 46 of motor 43. After the hour and minute hands 41 and 40 have been properly set, the knob may be pushed inwardly permitting the arm 72 to move along the cam surface of conical portion 79 and the spring 74 to pull the gear 68 and spur gear thereof 69 back into mesh with gear 55, whereupon the hour and minute gears 53 and 57 will again be engaged to drive the hour and minute discs 26 and 27. This movement will also move gear 78 out of engagement with gear 59.

As a means of transmitting the motion of gears 49, 53 and 57 to the discs 25, 26 and 27, a shaft 84 is rotatably mounted above and in vertical alignment with shaft 48 and has mounted thereon three gears 85, each in mesh with one of the gears 49, 53 and 57, the gears 85 being in turn in mesh with three gears 86 rotatably mounted on a shaft 87 provided above shaft 84, the gears 86 being in turn in mesh with the teeth 31, 32 and 33 of the discs 25, 26 and 27, whereby to move the latter in the desired manner.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claim.

Having thus set forth and disclosed the nature of my invention, what is claimed is:

In an electric clock including second, minute and hour gears, a circular ring of substantially U-shaped cross section, one leg of said U-shaped ring comprising a first stationary ring having a transparent disc secured thereto, the other legs of said U-shaped ring comprising a second stationary ring having a transparent disc carrying a dial secured thereto, a first rotatable ring having a transparent disc carrying a seconds indicator secured thereto, a second rotatable ring having a transparent disc carrying a minutes indicator secured thereto, a third rotatable ring having a transparent disc carrying an hours indicator secured thereto, said first and second and third rotatable rings being disposed respectively within said U-shaped ring between said first and second stationary rings, bearing means permitting independent movement of said first and said second and said third rotatable rings relative to each other and relative to said first and second stationary rings, said bearing means comprising a circular groove in each facing surface of said first stationary ring and said first rotatable ring aligned with each other and forming first circular bearing surfaces adapted to receive a plurality of ball elements therein, a circular groove in each facing surface of said first rotatable ring and said second rotatable ring aligned with each other and spaced radially inwardly from the periphery of each said ring and said first bearing surfaces and forming second circular bearing surfaces adapted to receive a plurality of ball elements therein, a circular groove in each facing surface of said second rotatable ring and said third rotatable ring forming third circular bearing surfaces in radial alignment with said first bearing surfaces and adapted to receive a plurality of ball elements therein, a circular groove in each facing surface of said third rotatable ring and said second stationary ring forming fourth circular bearing surfaces in radial alignment with said second bearing surfaces adapted to receive a plurality of ball elements therein, whereby each rotatable ring is supported at each side by a groove at each side, the groove on one side being spaced radially from the groove on the other side, the periphery of each said rotatable ring being provided with independent drive means.

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