

PATENT SPECIFICATION

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(54) ELECTRONIC TIMEPIECE

(71) We, KABUSHIKI KAISHA DAINI SEIKOSHA, a Japanese Company of 31-1, 6-chome, Kameido, Koto-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 portable electronic timepieces, for example electronic watches.

An electronic timepiece capable of displaying a television picture requires some device to indicate the channel or received frequency of a television signal as in a normal television receiver. However, as an electronic timepiece is of relatively small size, it is difficult to provide a device which indicates a plurality of channels or received frequencies on the periphery of a circular ring rotatable by a channel changing button as in a normal television receiver because of the limited space available. It is impossible to employ an electrical or electronic display device to indicate the channel or received frequency because such display devices required, for example, a lamp to be energised by operation of a rotary on/off switch itself controlled by a channel changing button. The reason why such a display device cannot be employed is because in an electronic timepiece the power source has insufficient capacity to drive continuously the display device.

According to the present invention there is provided an electronic timepiece including; a television receiver for receiving a television signal; a time-keeping circuit; a display device for selectively displaying a television picture under the control of the television receiver and a time indication under the control of the time-keeping circuit; a television channel selector for tuning the television receiver to receive one of a plurality of television channels or television transmission frequencies; and a television

channel indicator comprising a manually rotatable cylindrical body, indicating means provided on the circumferential periphery of the said body, and a window disposed adjacent to the circumferential periphery of said body and being provided with indicia indicative of said plurality of said television channels or television transmission frequencies, the arrangement being such that the position of the indicating means relative to said indicia provides a visual indication of the channel or television transmission frequency to which the television receiver is tuned.

In one embodiment the indicating means comprises a plurality of radially extending projections along a helix drawn on the said circumferential periphery of the body.

In another embodiment the indicating means comprises a plurality of depressions along a helix drawn on the said circumferential periphery of the body.

In the yet further embodiment the indicating means comprises a helical projection formed on the said circumferential periphery of the body. The helical projection may be of a very different colour from the remainder of the body.

In another embodiment the indicating means comprises a helical groove formed in the said circumferential periphery of the body. The helical groove may be of a different colour from the remainder of the body.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:-

Figure 1 is an external view of an electronic timepiece according to the present invention;

Figure 2 is a block diagram of the circuitry of one embodiment of an electronic timepiece according to the present invention; and

Figures 3 to 6 illustrate the alternative forms of television channel indicators for an

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electronic timepiece according to the present invention.

Referring first to figure 1, there is shown an electronic timepiece according to the present invention having a glass watch case 1 provided with an indicator or display device 2 which selectively displays a time indication and a television picture, a frame 3 around the periphery of the display device 2, and a television channel indicator 4 which indicates a channel or received frequency. At the side of the case 1 is a manually operable crown 6 for correcting the time indication, a manually operable crown 7, a manually operable switch button 8 which enables the time indication and the television picture to be selectively displayed by the display device 2, a manually operable crown 9 for selectively varying the television channel indicator 4 and a television channel selector 12 (Figure 2) which selects the channel or television transmission frequency, and a manually operable switch button 10 which energises, for example, a light emitting diode so that the time indication and the television picture can be seen in the dark.

Figure 2 is a block diagram of the circuitry of an embodiment of an electronic timepiece according to the present invention. A receiving circuit 11 receives a television signal, the receiving circuit being tuned by the television channel selector 12. The channel or received frequency to which the receiving circuit 11 is tuned is indicated by the television channel indicator 4. A video signal obtained from the receiving circuit 11 is fed to a video indicating circuit 13. A time indication signal produced by a time-keeping circuit 14 is fed to a time indicating circuit 15. The outputs of the video indicating circuit 13 and the time indicating circuit 15 are selectively fed to the display device 2 via a selecting circuit 16 which is controlled by the switch button 8. Thus the display device 2 selectively displays the time indication and the television picture.

Figure 3 is a side sectional view showing an embodiment of the television channel indicator 4. The crown 9 (Figure 1) is mounted for rotation with the shaft 17, the shaft 17 being connected via gear train (not shown) to the television channel selector 12 by means of which the receiving circuit 11 is tuned to a desired channel or television transmission. A desired channel or television transmission frequency. A pinion 18 is fixed to one end of the shaft 17, the pinion 18 being in mesh with a pinion 20 connected to a cylindrical body 19. Accordingly, the body 19 rotates when the crown 9 is rotated, the angle by which the body 19 rotates being related to the angle of rotation of the crown 9 by the gear ratio of the pinions 18,20.

The body 19 carries axially directed projections 21, 22 at its ends by means of

which projections the body 19 is supported for rotation in fixed structure 23 such as a plate or a case provided inside the case 1. The periphery of the body 19 carries a plurality of radially extending projections 25a to 25g: the projections follow a helix drawn on the periphery of the body 19. A transparent plate 26 enables the body 19 and the projections 25a to 25g to be viewed from the exterior of the electronic timepiece. The plate 26 is provided on the inside or the outside of a window 5 which forms part of the case 1 shown in figure 1. On the plate 26 there is formed, for example, by punting figures or other indicia indicating the possible channels.

As the body 19 rotates upon rotation of the crown 9, the projection 25a to 25g approach the plate 26 in turn. The projection closest to the plate 26 - projection 25d in figure 3 - can be seen through the window 5. Thus the selected channel i.e. the channel to which the receiving circuit 11 is tuned, determined by the television selector 12 is indicated.

The television channel indicator of figure 3 has projections 25a to 25g extending radially from the periphery of the body 19. A second form of the television channel indicator 4 is shown in Figure 4 and this embodiment is a plurality of concave depressions 28a to 28g formed on the periphery of a cylindrical body 27: the depressions following a helix drawn on the periphery of the body. A transparent plate 29 is disposed adjacent to the periphery of the body. A transparent plate 29 is disposed adjacent to the periphery of the body 27. The television channel indicator of Figure 4 operates in the same manner as the television channel indicator of Figure 3.

Figure 5 illustrates a further form of the television channel indicator 4. A cylindrical body 30, rotated by means of the crown 9, has a helical projection 31 on its periphery. A transparent plate 32 has identical and equi-distantly spaced apart recesses 33a to 33g adjacent to the periphery of the body 30. In or adjacent each recess is printed an indication (not shown) corresponding to the respective television channel.

At any given time one of the recesses 33a to 33g - the recess 33d in Figure 5 - will be closer to the helical projection 31 than the other recesses and so helical projection will be visible through this recess thereby indicating a channel selected.

Figure 6 illustrates a yet further form of the television channel selector 4. The periphery of a cylindrical body 34, which is rotated by the crown 9 has a helical concave groove 35 therein. Recesses 37a to 37g are formed on a transparent plate 36 disposed adjacent to the periphery of the body 34. The recesses 37a to 37g are similar to the recesses

33a to 33g of Figure 5. At any given time one of the recesses 37a to 37g - the recess 37d in Figure 6 - will be closer to the helical groove 35 than the other recesses and so the helical groove will be visible through this recess, thereby indicating the channel selected.

The television channel indicator as shown in Figures 5 and 6 are provided with the same type of rotation mechanism i.e. the pinions 18-20 and the gear chain connection with the television channel selector 12 as the television channel indicator as shown in Figures 3 and 4. The helical projection 31 and the helical groove 35 may be of a different colour from the periphery of the respective bodies 30, 34 in order to distinguish them from the remainder of the periphery of the body.

The above embodiments describe electronic timepieces of comparatively small size due, at least in part, to the fact that the television channel indicators are constituted by an elongated cylindrical body. The television channel indicators visually indicate a selected channel and do not require a power supply because they are operated mechanically.

WHAT WE CLAIM IS:-

1. An electronic timepiece including: a television receiver for receiving a television signal; a time-keeping circuit; a display device for selectively displaying a television picture under the control of the television receiver and a time indication under the control of the time-keeping circuit; a television channel selector for tuning the television receiver to receive one of a plurality of television channels or television transmission frequencies; and a television channel indicator comprising a manually rotatable cylindrical body, indicating means provided on the circumferential periphery of the said body, and a window disposed adjacent to the circumferential periphery of

said body and being provided with indicia indicative of said plurality of said television channels or television transmission frequencies, the arrangement being such that the position of the indication of the channel or television transmission frequency to which the television receiver is tuned.

2. An electronic timepiece as claimed in claim 1 in which the indicating means comprises a plurality of radially extending projections along a helix drawn on the said circumferential periphery of the body.

3. An electronic timepiece as claimed in claim 1 in which the indicating means comprises a plurality of depressions along a helix drawn on the said circumferential periphery of the body.

4. An electronic timepiece as claimed in claim 1 in which the indicating means comprises a helical projection formed on the said circumferential periphery of the body.

5. An electronic timepiece as claimed in claim 4 in which the helical projection is a different colour from the remainder of the body.

6. An electronic timepiece as claimed in claim 1 in which the indicating means comprises a helical groove formed in the said circumferential periphery of the body.

7. An electronic timepiece as claimed in claim 6 in which the helical groove is of a different colour from the remainder of the body.

8. An electronic timepiece as substantially herein described with reference to and as shown in the accompanying drawings.

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33a to 33g of Figure 5. At any given time one of the recesses 37a to 37g - the recess 37d in Figure 6 - will be closer to the helical groove 35 than the other recesses and so the helical groove will be visible through this recess, thereby indicating the channel selected.

The television channel indicator as shown in Figures 5 and 6 are provided with the same type of rotation mechanism i.e. the pinions 18-20 and the gear chain connection with the television channel selector 12 as the television channel indicator as shown in Figures 3 and 4. The helical projection 31 and the helical groove 35 may be of a different colour from the periphery of the respective bodies 30, 34 in order to distinguish them from the remainder of the periphery of the body.

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said body and being provided with indicia indicative of said plurality of said television channels or television transmission frequencies, the arrangement being such that the position of the indication of the channel or television transmission frequency to which the television receiver is tuned.

2. An electronic timepiece as claimed in claim 1 in which the indicating means comprises a plurality of radially extending projections along a helix drawn on the said circumferential periphery of the body.

3. An electronic timepiece as claimed in claim 1 in which the indicating means comprises a plurality of depressions along a helix drawn on the said circumferential periphery of the body.

4. An electronic timepiece as claimed in claim 1 in which the indicating means comprises a helical projection formed on the said circumferential periphery of the body.

5. An electronic timepiece as claimed in claim 4 in which the helical projection is a different colour from the remainder of the body.

6. An electronic timepiece as claimed in claim 1 in which the indicating means comprises a helical groove formed in the said circumferential periphery of the body.

7. An electronic timepiece as claimed in claim 6 in which the helical groove is of a different colour from the remainder of the body.

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