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(54) ELECTRONIC TIMEPIECE

(71) We, KABUSHIKI KAISHA SUWA SEIKOSHA, a Japanese Company of 3-4, 4-chome, Ginza, Chuo-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 electronic timepieces.

Conventional so-called world time watches are mechanical and have a circular scale on which is printed names of geographical locations. This circular scale is manually moved relative to hours and minutes hands, so that the local time indication in a given geographical location may be determined.

According to the present invention there is provided an electronic timepiece including a display device consisting of a first portion for displaying a time indication and a second portion for selectively indicating names of geographical locations disposed around the display device and circuit means for causing the first portion to display a time indication corresponding to that of the geographical location indicated by the second portion.

In one embodiment the circuit means is such that the display device is driven on a multiplex system.

Preferably the electronic timepiece includes control means for causing the second portion to selectively indicate a name of a geographical location, the control means including a plurality of manually operable switches, one of which causes the second portion sequentially to indicate the names of geographical locations in a given order and another or the other of which causes the second portion sequentially to indicate the names of geographical locations in an order opposite to said given order.

The display device may be a liquid crystal display device.

In one embodiment the said first portion produces a minutes indication, an hours indication and a date indication.

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

Figure 1 is plan view of one embodiment of an electronic timepiece according to the present invention;

Figure 2 is a block diagram of the electronic timepiece of Figure 1;

and

Figure 3 consists of plan views of another embodiment of an electronic timepiece according to the present invention.

Referring to Figure 1, there is illustrated an electronic timepiece according to the present invention. The electronic timepiece has a segmented display portion 11 for displaying a minutes indication, a segmented display portion 11 for displaying a minutes indication, a segemented display portion 12 for displaying an hours indication, a segmented display portion 13 for displaying a date indication, and a plurality (24 shown) of display elements 14 for selectively indicating the names of geographical locations (not shown). Buttons 15, 16, 17 serve to control operation of the electronic timepiece.

Figure 2 is a block diagram of the electronic timepiece of the Figure 1. An oscillator circuit 20 produces a relatively high frequency standard time signal which is frequency divided by a frequency divider circuit 21. The output signal from the divider circuit 21 is fed to a seconds and minutes counter 23, the output of which is fed to an hours counter 24. The output signal from the hours signal 24 is fed to a date counter 25. A switch controller 22 provides an output which is fed to the counters 23, 24, 25 and to a time difference counter 26. An output from the time difference counter 26 is fed to an adder circuit 27, which also

receives an output from the date counter 25. Output signals from the time difference counter 26, the counter 23, and the adder circuit 27 are fed to a decoder circuit 28 whose outputs drive a display device 29.

The electronic timepiece of Figure 2 operates as follows. The time difference counter 26 causes the display device 29 to indicate one of the plurality of names of geographical locations printed or otherwise provided around the display device *via* the decofder circuit 28. Output signals from the time difference counter 26, the hours counter 24 and the date counter 25 are fed to the adder circuit 27 so that the display device 29 displays a time indication consisting of a minutes indication, hours indication and date indication.

The switch controller 22 is itself controlled by external manually operable switches so that a given name of a geographical location on the periphery of the display device 29 is indicated by one of the display elements 14 (Figures 1) and the display device 29 displays the local time indication in the given geographical location.

A first switch (not shown in Figure 2) may be used to advance the display produced by the display element 14 in the counter clock-wise direction and a second switch (also not shown in Figure 2) may be used to advance the display produced by the display elements 14 in the clock-wise direction. Thus the time indication in a given geographical location may be selected for display by means of the first and second switches. The functioning of the first and second switches may be conditioned by a third switch (not shown). In this type of arrangement the time difference counter 26 may be an up-down counter. The above described electronic timepiece has the advantage that local time indications can be displayed and the corresponding ames of geographical locations can be indicated merely by operation of two switches.

It will be appreciated that the display device 29 must be composed of at least 56 display segments in order to display a date indication, an hours indication and a minutes indication on a 24-hour basis and to indicate the names of geographical locations. These segments must be individually connected to correspond with terminals of an integrated circuit chip (not shown) which contains the timepiece driving circuitry. 56 individual connections are difficult to make and so it is preferable that the display device is driven on a multiplex system. As two or more display segments are connected together scanning electrodes are provided depending upon the number of connections. Since the display elements 14 surround the display portions 11, 12, 13, the wiring of the former does not interfere with the wiring of the latter. A signal converter may be provided between the decoder circuit 28 and the display device 29. In this way an electronic world timepiece, for example an electronic world watch is achieved in which the display device is driven by a multiplex system.

Figure 3 illustrates another embodiment of an electronic timepiece, e.g. a wristwatch according to the present invention. It will be appreciated in Figure 3 that an electronic world timepiece is achieved which is compact and of relatively simple construction.

The display device of an electronic timepiece according to the present invention may be, for example, a liquid crystal display device.

WHAT WE CLAIM IS:–

1. An electronic timepiece including a display device consisting of a first portion for displaying a time indication and a second portion for selectively indicating names of geographical locations disposed around the display device, and circuit means for causing the first portion to display a time indication corresponding to that of the geographical location indicated by the second portion.

2. An electronic timepiece as claimed in claim 1 in which the circuit means is such that the display device is driven on a multiplex system.

3. An electronic timepiece as claimed in claim 1 or 2 including control means for causing the second portion to selectively indicate a name of a geographical location, the control means including a plurality of manually operable switches, one of which causes the second portion sequentially to indicate the names of geographical locations in a given order and another or the other of which causes the second portion sequentially to indicate the names of geographical locations in an order opposite to said given order.

4. An electronic timepiece as claimed in any preceding claim in which the display device is a liquid crystal display device.

5. An electronic timepiece as claimed in any preceding claim in which the said first portion produces a minutes indication, an hours indication, and a date indication.

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

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2. An electronic timepiece as claimed in claim 1 in which the circuit means is such that the display device is driven on a multiplex system.

3. An electronic timepiece as claimed in claim 1 or 2 including control means for causing the second portion to selectively indicate a name of a geographical location, the control means including a plurality of manually operable switches, one of which causes the second portion sequentially to indicate the names of geographical locations in a given order and another or the other of which causes the second portion sequentially to indicate the names of geographical locations in an order opposite to said given order.

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