

PATENT SPECIFICATION

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(54) DISPLAY DEVICE

(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 display devices and, in particular, although not so restricted, to liquid crystal display devices for timepieces.

According to one aspect of the present invention, there is provided a display device having a plurality of segments which, when selectively energised, will display a numeral or character, each segment being a liquid crystal display element, one segment consisting of a plurality of portions permanently electrically connected together to be energised as a unit, the said portions being separate from one another and each having a border with the same adjacent segment.

A plurality of segments may each consist of a plurality of said portions.

Preferably there are seven or nine segments.

The segments may be arranged so that selective energisation thereof will enable any one of the numerals 0 to 9 to be displayed.

Thus said at least one segment and said some adjacent segment may be arranged so that, in operation, they are not energised when the numerals 1, 4 and 7 are displayed.

According to a further aspect of the present invention there is provided a timepiece having a display device as recited above.

The invention is illustrated, merely by way of example, in the accompanying drawing, in which:—

Figure 1 illustrates a conventional display device; and

Figure 2 illustrates one embodiment of a display device according to the present invention.

Referring to the drawings and first to

Figure 1, there is illustrated a conventional display device having seven segments *a* to *g*. Each segment is a liquid crystal element. By selectively energising the segments any one of the numerals 0 to 9 can be displayed. However, in view of the hexagonal shape of each segment, the clarity of the numeral display sometimes falls short of that which is desired. For example, the form of the numeral 2 is so stylistic that it is often misinterpreted by the user. Furthermore, the form of the numerals displayed by the conventional display device is not particularly pleasing to the eye.

Figure 2 shows one embodiment of a display device according to the present invention. The display device has seven segments *a'* to *g'* which, unlike the segments of the conventional display device, are not all of the same shape. Each segment is a liquid crystal display element. The segment *e'* is composed of three portions *e₁*, *e₂*, *e₃* which are separate from one another, which are electrically connected together to be energised as a unit and each of which has a border with the adjacent segment *d'*. In view of the shape of the segments *a'* to *g'*, the clarity of the numerals displayed, especially the numerals 0, 2, 3, 5, 6, 8 and 9, is better than the form of the numerals displayed by the conventional display device. Furthermore, the form of the numerals displayed is more pleasing to the eye than the form of the numerals displayed by the conventional display device. For example, to display the numeral 2 the segments *a'*, *b'*, *g'*, *e'* and *d'* are energised and the form of the numerals so displayed is not as stylistic as the numeral displayed by energising the segments *a*, *b*, *g*, *e* and *d* of the conventional display device. The segment *e'* and *d'* will not be energised when the numerals 1, 4 and 7 are displayed.

The display device according to the present invention can be used not only to display numerals, but also may be used to display other characters, for example letters. Thus the applications of a display

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device according to the present invention are many and varied, for example, it may be used in, for example, timepieces and calculating machines.

It will be understood that the display device may have more than seven segments, for example, it may have nine segments. Furthermore, two or more segments each of which may consist of a plurality of portions having a border with a given segment.

WHAT WE CLAIM IS:—

1. A display device having a plurality of segments which, when selectively energised, will display a numeral or character each segment being a liquid crystal display element, one segment consisting of a plurality of portions permanently electrically connected together to be energised as a unit, the said portions being separate from one another and each having a border with the same adjacent segment.

2. A display device as claimed in claim 1 in which a plurality of segments each consist

of a plurality of said portions.

3. A display device as claimed in claim 1 or 2 in which there are seven or nine segments.

4. A display device as claimed in any preceding claim in which the segments are arranged so that selective energisation thereof will enable any one of the numerals 0 to 9 to be displayed.

5. A display device as claimed in claim 4 in which said at least one segment and said same adjacent segment are arranged so that, in operation, they are not energised when the numerals 1, 4 and 7 are displayed.

6. A display device substantially as herein described with reference to and as shown in Figure 2 of the accompanying drawings.

7. A timepiece having a display device as claimed in any preceding claim.

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of a plurality of said portions.

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