

"ALARM TIMEPIECE"

This invention concerns an alarm timepiece and, although the invention is not so restricted, it concerns more particularly an alarm timepiece of the kind having an electronic buzzer.

Such a buzzer has previously had a piezo-electric element
5 fixed to a frame so as to be parallel to the bottom of the latter. This has meant that when such a buzzer has been installed in a small timepiece such as a wrist watch, it tends to occupy considerable space. If an attempt is made to solve this problem by providing the diaphragm with a small diameter, the resultant
10 resonant frequency of the diaphragm will be high and consequently the buzzer will not produce adequate sound. Moreover, if the buzzer is installed in a wrist watch in the conventional manner, it is necessary to provide the frame of the watch with sound emitting openings which are disposed in a position such that,
15 in use, the openings will be occluded by the wrist of the user.

According therefore to the present invention, there is provided an alarm timepiece whose alarm comprises a diaphragm which extends obliquely with respect to a rear wall of the case of the timepiece, the diaphragm being mounted in a compartment
20 which also contains a movement of the timepiece, the said compartment occupying a portion only of the space within said case, the said rear wall forming part of the periphery of the compartment.

Preferably the diaphragm extends from the said rear wall
25 or means secured thereto, to a side wall of the timepiece,

or to means secured to the said side wall, the side wall also forming part of the periphery of the compartment. At least one sound-emitting aperture may be provided in at least one of said rear and side walls.

5 At least the central portion of one of said rear and side walls is preferably unapertured. In this case, the timepiece is preferably a wrist watch, the said central portion being in use adapted to contact the wrist of the user.

10 Preferably, the sound-emitting aperture or apertures is or are disposed adjacent the junction of the rear side walls.

The diaphragm is preferably secured to a piezo-electric element, means being provided for effecting oscillation of the piezo-electric element at the alarm time.

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

Figure 1 is a cross-sectional view of an alarm wrist watch according to the present invention, the view being taken on the line I-I of Figure 2,

20 Figure 2 is an underneath plan view of the wrist watch shown in Figure 1, and

Figure 3 is a cross-sectional view showing an embodiment of a known piezo-electric buzzer.

25 In Figure 3 there is shown a known piezo-electric buzzer having a diaphragm 14 to which there is attached a piezo-electric element 13. The buzzer 13, 14 is fixed on a frame 16 so as to define therewith a resonance

space 17. The sound within the resonance space 17 is emitted through an aperture or apertures 15 in a bottom wall 16a of the frame 16, the bottom wall 16a being parallel to the diaphragm 14 and being adapted to form part of a case of a wrist watch.

When a piezo-electric buzzer as shown in Figure 3 forms part of a small timepiece such as a wrist watch, there are difficulties, due to the limited space, in arranging the buzzer 13, 14 parallel to the bottom 16a of the frame 16. If an attempt is made to solve this problem by reducing the diameter of the diaphragm 14 as much as possible, then the resultant resonant frequency of the diaphragm 14 will be high and the sound emitted through the aperture or apertures 15 will therefore be insufficient.

Furthermore, since the bottom wall 16a constitutes the rear wall of the wrist watch, this will, in use, be contacted by the wrist of the user with the result that the aperture or apertures 15 will be occluded and the alarm sound will not be easily audible. If, on the other hand, the aperture or apertures 15 are provided in a side wall of the wrist watch, it is necessary to make the resonance space 17 unduly large, which is disadvantageous so far as space-saving is concerned.

In Figures 1 and 2, therefore, there is shown an embodiment of an alarm wrist watch according to the present

invention which is adapted to overcome the problems discussed above.

The wrist watch of Figures 1 and 2 comprises a watch frame 1 having a rear wall 1a and a side wall 1b. Mounted within the watch frame 1 is an inner frame 2 which supports a timepiece movement (not shown). The inner frame 2 supports on its rear surface a printed circuit board 3 which is spaced from the rear wall 1a so as to define a compartment 4 within which there are disposed movement effecting means (not shown) for moving hands (not shown) of the wrist watch, such movement effecting means comprising a gear train (not shown) and the like. The said hands are moved by the movement effecting means over a dial plate 7 which is secured to the front surface of the inner frame 2. The dial plate 7 is visible through a glass or other transparent cover 6, the cover 6 being held in position within a bezel 5 which is secured to the watch frame 1.

A diaphragm 8, which extends obliquely with respect to the rear wall 1a, extends from a projection 9, which is mounted internally of and secured to or integral with the rear wall 1a, to a shoulder 1c which forms part of the side wall 1b, the diaphragm 8 being secured to the projection 9 and shoulder 1c. The diaphragm 8, which is mounted within the compartment 4, forms a resonance space 8a with the rear wall 1a and the side wall 1b, three sound-emitting

apertures 1d being provided at a position at which the rear wall 1a merges with the side wall 1b. This position, however, is provided externally of the unapertured central portion 1e of the rear wall 1a, the central portion 1e being the portion of the rear wall 1a which, in use, contacts the wrist of the user. Consequently, the sound-emitting apertures 1d will not be occluded by the wrist of the user. The diaphragm 8 is secured to a piezo-electric element 12.

Since the diaphragm 8 extends obliquely with respect to the rear wall 1a, space can be saved, thereby enabling the diaphragm 8 to be suitably spaced from electronic parts such as a quartz-crystal oscillator 10 and an IC (integrated circuit) 11 all of which are fixed on the printed circuit board 3. As will be appreciated, the printed circuit board 3 and the components 10, 11 secured thereto, provide for the oscillation of the piezo-electric element 12 at the alarm time.

The construction illustrated permits the use of a relatively large diameter diaphragm 8 which therefore ensures that the effective sound which can be produced is as great as possible.

Furthermore, as indicated above, since the sound-emitting apertures 1d will not be occluded by the wrist of the user even when the watch is worn, there will be efficient emission of the alarm sound. Moreover, the construction is such that the resonance space 8a may be larger than would otherwise

be possible, thereby enabling the resonance frequency to be decreased and thereby permit the sound produced by the buzzer to be increased.

5 Although Figures 1 and 2 show the invention applied to a wrist watch, it should be clearly understood that the present invention is also applicable to a small clock.

10 The construction of the present invention thus permits better use to be made of the space available within a timepiece since the oblique disposition of the diaphragm 8 with respect to the rear wall la of the timepiece enables the other components of the timepiece to be arranged and accommodated more efficiently. Furthermore, as explained above, the diaphragm 8 may be made larger than would otherwise be possible so as to produce a correspondingly greater sound. The construction is also such as to enable 15 the sound-emitting apertures to be disposed at the junction of the rear wall and side walls without the necessity to provide an unduly large timepiece.

C L A I M S

1. An alarm timepiece whose alarm comprises a diaphragm which extends obliquely with respect to a rear wall of the case of the timepiece, the diaphragm being mounted in a compartment which also contains a movement of the timepiece, the said
5 compartment occupying a portion only of the space within said case, the said rear wall forming part of the periphery of the compartment.
2. An alarm timepiece as claimed in claim 1 in which the diaphragm extends from the said rear wall, or means secured
10 thereto, to a side wall of the timepiece, or to means secured to the said side wall, the side wall also forming part of the periphery of the compartment.
3. An alarm timepiece as claimed in claim 2 in which at least one sound-emitting aperture is provided in at least one
15 of said rear and side walls.
4. An alarm timepiece as claimed in claim 3 in which at least the central portion of one of said rear and side walls is unapertured.
5. An alarm timepiece as claimed in claim 4 in which
20 the timepiece is a wrist watch, the said central portion being in use adapted to contact the wrist of the user.
6. An alarm timepiece as claimed in claim 4 or 5 in which the sound-emitting aperture or apertures is or are disposed adjacent the junction of the rear and side walls.



7. An alarm timepiece as claimed in any preceding claim in which the diaphragm is secured to a piezo-electric element, means being provided for effecting oscillation of the piezo-electric element at the alarm time.

5 8. An alarm timepiece substantially as hereinbefore described with reference to and as shown in Figures 1 and 2 of the accompanying drawings.
