

The invention relates to an electric alarm clock wherein the waking time is programmable and which for waking up emits acoustic signals.

Such electric alarm clocks consist, for example, of radio alarm clocks which frequently are additionally equipped with a cassette unit so that it is possible to be woken either by the alarm tone or however by the radio programme or a music cassette. When the waking time has been input, one is woken the next morning with the last volume which has been set. Some difficulties arise, however, with regard to the adjustment of the correct volume in the evening for waking the following morning, as illustrated by the following considerations.

On the one hand, the volume must not be set too low as otherwise the sleeper can oversleep, whereas on the other hand the volume should not be set too high so that the sleeper is suddenly awoken from sleep or even startled. It is known that gentle waking has a beneficial effect on the human psyche and nervous system, while sudden waking by loud noises severely stresses, and can even harm, the psyche and nervous system. Here it is necessary to differentiate between temporary harm, which in such cases generally leads to an upset day, and the far more serious, since insidious, long-term harm. Most peoples living in a natural state, for example the Red Indians, have always been aware of these associations and therefore avoid waking people suddenly and harshly.

The set volume is not, however, optimal for every morning, as unfortunately neither hearing sensitivity nor depth of sleep remain identical from day to day at the waking time. Here many factors are of significance. Thus an initially set volume can be too loud one day, whereas another day it can be responsible for the oversleeping of the individual who is reliant on their radio alarm clock, since the evening beforehand unfortunately it is never

possible to know which volume is precisely correct for waking the following morning.

US-Patent 4 377 345 has disclosed an electric alarm clock, the volume of which is adjustable similarly as in the case of a radio or record player.

DE-OS 30 28 358 has disclosed an electric clock with an alarm device which provides two different alarms - a preliminary alarm and a main alarm - where the volume increases or reduces.

DE-OS 33 04 045 describes a volume control circuit for a radio alarm clock. During the falling asleep phase the volume is gradually reduced. For waking up, the volume increases slowly to a higher value compared to the falling asleep phase. PAJ Vol. 2, No. 61 (E-78) [1817] and PAJ Vol. 6, No. 152 (P-1340) [1030] describe similar electric alarm clocks.

The aim of the invention is now to design an electric alarm clock in such manner that it facilitates gentle and yet reliable waking as well as a waking phase which is substantially individually adjustable.

The invention fulfils this aim in that the time in which the volume increases or reduces from the starting value to the end value is adjustable.

As stated in Sub-Claims 6, 7 or 8, the volume can increase, for example, linearly, logarithmically or exponentially. It can also increase in stepped or sawtooth fashion. Embodiments are possible in which the volume fluctuates, but its mean value increases. Thus, for example, the volume can increase in accordance with a function formed from the sum of a sine curve and a straight line. However, the invention is in no way limited to the described small selection of increase functions.

Since the volume end value can be predetermined, it can always be set such that the volume required for waking is swept through. As a result, on the one hand reliable waking is ensured. However, because the increase in volume also

takes place gradually, on the other hand waking is gentle, since if the volume slowly becomes excessive and unpleasant, the sleeper is already awake and can turn it down to an agreeable level.

A particular advantage of a first exemplary embodiment consists in that the time in which the volume increases from the starting value to the end value is likewise adjustable. In this way it is possible to adjust whether waking is to be more or less gentle. Additionally, in a further exemplary embodiment, the individual using the radio alarm clock can select the most agreeable of several volume increase functions, for example a logarithmic function.

Particularly sensitive or anxious individuals therefore no longer need to worry, on falling asleep, whether they have set the volume of the radio alarm clock too loud or too soft, as they know that they will be awakened gently and nevertheless reliably by the radio alarm clock according to the invention.

Since, however, there are those of a less sensitive disposition who prefer to be awoken quickly by a loud noise, in a further exemplary embodiment of the invention, in addition to the gradual increase in volume, the possibility is also provided of causing the volume to fall from a predeterminable starting value to a predeterminable end value, e.g. a moderate volume, within a predeterminable interval of time. In the case of this method, waking is indeed rapid and reliable, but extremely harsh.

A particular advantage of the invention consists in that it can easily be supplemented to form a device, a so-called sleep inducing device, which is to facilitate falling asleep and promote sleep. For this purpose it is possible to programme the falling asleep time, from which the volume reduces to a predeterminable end value within a predeterminable interval of time.

Particularly suitable for this exemplary embodiment are hi-fi systems with a cassette unit and a CD player as in the

case of hi-fi systems with cassette unit and CD player the possibility can be provided of compiling a music programme for the night. Thus for example, one or two cassettes can be played or, for example in the case of a CD magazine player, tracks from different CDs can be played in a desired sequence and with a predeterminable volume. Thus anyone can compile their own programme of evening music according to their own preferences.

Instead of music or between individual pieces of music, it is also possible to listen to a language instruction cassette during sleep, for example foreign language words which are difficult to learn, to enable these better to be memorised.

Another conceivable exemplary embodiment is that in which the volume is controlled in dependence upon physiological parameters, for example the pulse rate and/or breathing rate. The physiological parameter can be measured by means of an electrode attached to the body of the sleeper, for example the wrist. However, it is necessary to proceed with caution in the selection of music or speech to be listened to during sleep, as despite the sleep state the subconscious takes in these sounds - music or speech - and can be greatly influenced by them.

The last mentioned exemplary embodiments can be used as desired as an alarm clock and sleep-inducing device or merely as an alarm clock or merely as a sleep inducing device.

In another exemplary embodiment, the waking times and the increase or reduction in volume can be programmed for a week, a month or a year. It is also possible to programme these parameters for weekdays and for Sundays and holidays. For this purpose the electric alarm clock is equipped with a calendar. Additionally, the waking times, and the increase and reduction in volume can be programmed for a period of time corresponding to the personal biorhythm or to the phases of the moon. In this case they are periodically

repeated in accordance with the biorhythm or the phases of the moon.

Further developments of the invention comprise the change-over to different international times and automatic change-over to summer time and automatic resetting to normal time by means of the built-in calendar.

Since the volume can be increased or reduced at desired times, it is possible, for example, in the case of a radio alarm clock to listen to the news hourly at normal volume and at the end of the news to switch the volume to a quiet whispered tone or to switch off the radio alarm clock.

In a further development, the electric alarm clock can be connected to warning devices, such as for example smoke or gas warning devices which, on the development of smoke or escape of gas, emit acoustic warning signals. If, on the other hand, for example a rain warning device is connected, on the response of the rain warning device to rain the waking time can be delayed to a later time by a predeterminable interval if the owner of the alarm clock would like to sleep longer in the case of rainy weather. Naturally several different warning devices can be connected simultaneously to the electric alarm clock.

Finally, a further exemplary embodiment of the invention can be used as a time switch which switches on or off electric loads required at the waking time or at predeterminable times before or after the waking time. Thus for example, an electric fan heater can be switched on in a desired room.

All the described embodiments of the electric alarm clock can be embodied in one device.

Radio alarm clocks with or without a cassette unit and hi-fi systems comprising tuner, cassette unit and CD player are particularly suitable for the electric alarm clock according to the invention.

Claims

1. An electric alarm clock wherein the waking time is programmable and which for waking up emits acoustic signals, where the volume of the acoustic signals commences at a predeterminable, lower starting value and increases to a predeterminable end value, characterised in that the time in which the volume increases or reduces from the starting value to the end value is adjustable.
2. An electric alarm clock wherein the waking time is programmable and which for waking up emits acoustic signals, where the volume commences at a predeterminable starting value and reduces to a predeterminable end value, characterised in that the time in which the volume increases or reduces from the starting value to the end value is adjustable.
3. An electric alarm clock as claimed in Claim 1 or 2, characterised in that the falling-asleep time is programmable, from which time onwards the volume reduces to a predeterminable end value.
4. An electric alarm clock as claimed in Claim 3, characterised in that during falling asleep, sleep and/or waking the volume is controlled in dependence upon a physiological value which is obtained by means of an electrode attached to the body of the sleeper.
5. An electric alarm clock as claimed in Claim 1, 2, 3 or 4, characterised in that a hi-fi system on which music programmes can be compiled is provided as alarm clock.
6. An electric alarm clock as claimed in Claim 1, 2, 3, 4, or 5, characterised in that the volume increases or reduces linearly.
7. An electric alarm clock as claimed in Claim 1, 2, 3, 4 or 5, characterised in that the volume increases or reduces logarithmically.



8. An electric alarm clock as claimed in Claim 1, 2, 3, 4 or 5, characterised in that the volume increases or reduces exponentially.
9. An electric alarm clock as claimed in Claim 1, 2, 3, 4, or 5, characterised in that the volume increases or reduces in stepped fashion.
10. An electric alarm clock as claimed in Claim 1, 2, 3, 4 or 5, characterised in that the volume fluctuates, but its mean value increases or reduces.
11. An electric alarm clock as claimed in Claim 10, characterised in that the volume increases or reduces in the manner of an ascending sawtooth curve.
12. An electric alarm clock as claimed in Claim 10, characterised in that the volume increases or reduces in the manner of an ascending sine curve.
13. An electric alarm clock as claimed in one of the preceding claims, characterised in that the electric alarm clock is equipped with a calendar.
14. An electric alarm clock as claimed in one of the preceding claims, characterised in that the waking times and the increase and/or reduction in volume can be programmed for a week, a month or a year.
15. An electric alarm clock as claimed in one of the preceding claims, characterised in that the waking times and the increase and/or reduction in volume can be programmed for weekdays as well as Sundays and holidays.
16. An electric alarm clock as claimed in one of the preceding claims, characterised in that the change-over to summer time and the return to normal time take place automatically.
17. An electric alarm clock as claimed in one of the preceding claims, characterised in that one or more warning devices can be connected, which cause the emission of acoustic signals or change the waking time by a predeterminable time interval.



18. An electric alarm clock as claimed in one of the preceding claims, characterised in that the electric alarm clock has the form of a time switch which switches on or off one or more electric loads at the waking time or at predeterminable times before or after the waking time.

19. An electric alarm clock as claimed in one of the preceding claims, characterised in that the waking times and the increase and/or reduction in volume can be programmed for an interval of time which corresponds to the personal biorhythm or to the phases of the moon and are periodically repeated in accordance with the biorhythm or the phases of the moon.

20. An electric alarm clock as claimed in one of the preceding claims, characterised in that the waking times and the increase and/or reduction in volume can be programmed for several people.

21. An electric alarm clock as claimed in one of the preceding claims, characterised in that the electric alarm clock can be changed to different international times.

