ELECTRONIC SOUND ALARM CLOCK

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ABSTRACT

An electronic sound alarm clock which comprises a clock mechanism, electric power source circuit having a pair of contacts to be closed at a set alarm time, a source voltage controlling means actuated upon closing of the contacts, an oscillator, and an electric signal-acoustic energy converter. Said voltage controlling means is adapted to vary the supplied voltage as the time lapses so that, typically, an intermittent alarm sound is produced. By properly forming the controlling means, various types of alarm sounds which vary as the time lapses may be produced.

7 Claims, 43 Drawing Figures
Fig. 14

Fig. 15A

Fig. 15B

Fig. 15C

Fig. 15D

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Fig. 16
This invention relates to electronic sound alarm clocks.

Those electronic sound alarm clocks which make continuously oscillatory sound of regular amplitude or intermittent oscillatory sound of regular amplitude and regular width have already been well known. Further, it is well known that conventional controlling mechanisms for producing alarm sounds are initiated to operate when a time set for alarming is reached so that the alarm sound substantially at a regular intensity is generated, which sound is retained until the stop switch is thrown in. The present invention relates to an electronic sound alarm clock which comprises a clock mechanism, an electronic source circuit which includes a switch to be closed at a predetermined time by means of said clock mechanism, an electric voltage controlling device for controlling the voltage supplied from said electronic source circuit, an audible frequency oscillating circuit operated by an output from said voltage controlling device and varies its oscillation state as the time lapses, and a converter for converting the electric signals from said oscillating circuit into sound energy.

Principal object of the present invention is to provide an alarm clock which produces an electronic sound of the type that the oscillatory sound or intermittent oscillatory sound appears and disappears at a regular cycle.

The other object of the present invention is to provide an electronic sound alarm clock which produces a sound that becomes stronger as the time lapses.

A further object of the present invention is to provide an electronic sound alarm clock producing the alarm sound which is always higher than a fixed level and becomes after a predetermined period gradually stronger.

Other objects and advantages of the present invention will be made clear upon reading the following descriptions set forth with reference to the accompanying drawings, in which:

FIG. 1 shows a block diagram of an electronic sound alarm clock according to the present invention.

FIG. 2 shows an embodiment of the present invention.

FIGS. 4, 6, 8, 10, 12, 14 and 16 show other embodiments of the invention.

FIGS. 5, 7, 9, 11, 13, and 15 show signal wave forms at respective parts in each of the above embodiments of FIGS. 4 through 14.

FIG. 1 shows a block diagram of the electronic sound alarm clock of the present invention. In the drawing, 1 is a clock mechanism, which performs the closing operation of switch with a reference mechanism upon reaching a desired time. 2 is an electric source circuit having a switch mechanism to be closed by said clock mechanism 1. 3 is an electric voltage controlling device, which is interposed between said electric source circuit and an oscillator at the next stage and is adapted to vary as the time lapses the magnitude of the voltage to be supplied to the oscillator and further to perform such various operations as interrupting the voltage at every regular cycle or after a predetermined time period. 4 is a sound cycle oscillator. 5 is a converter for converting the sound cycles into sound.

A feature of the present invention resides, as shown in the above described block diagram, in that the alarm clock is provided with the voltage controlling device.

FIG. 2 shows an embodiment of the present invention, in which 1 is the clock mechanism, 3 is a D.C. current source, and 7 is a pair of normally opened contacts which is closed for a predetermined time period upon reaching the predetermined alarming time of the clock mechanism 1. An electric voltage controlling device of known nonstable multivibrator 10 having two transistors 8 and 9 is connected to both ends of the electric source 6 through the contacts 7. At output side of the multivibrator 10 is connected, through an amplifying transistor 11, an oscillatory sound generator 12, which comprises a blocking oscillator circuit and an electric signal-sound converter assembled together.

In the above described device, when an alarm set time $t_1$ of the clock mechanism 1 is reached, the contacts 7 are closed and D.C. voltage is supplied from the electric source 6 to the voltage controlling device 10 as shown in FIG. 3A, thereby a voltage $V_{10}$ is generated at an interval of a constant cycle $T$ of, for example, 5 seconds (see FIG. 3B) at output end of the transistor 11. Said transistor 11 is driven at every regular cycle and a voltage of constant cycle interval $T$ is presented to the oscillatory sound generator 12. Said generator 12 operates only when such voltage is given thereto and the blocking oscillator circuit oscillates intermittently. The output signal of the blocking oscillator is obtained as an intermittent oscillatory voltage $V_{12}$ which interrupts and continues at a constant cycle $T$, as shown in FIG. 3C, so that an alarm sound similar to chicken's call will be intermittently produced. The alarm sound will stop when the contacts 7 are opened at the time $t_2$.

According to the above mechanism, the alarm sound of intermittent oscillatory sound at a constant cycle is produced and, therefore, waking-up effect of this mechanism is much larger as compared with conventional alarm sound of continuous oscillatory sound or likely continuous intermittent oscillatory sound.

FIG. 4 shows another embodiment of the present invention. In the drawing, 1 is a clock mechanism, 3 is a D.C. current source, 7 is a switch to be closed and opened by said clock mechanism 1, 13 and 14 are resistors, 15 is a charging and discharging capacitor, 16 and 17 are resistors, 18 and 20 are capacitors, 19 is a transistor, 21 is a transformer, 22 is a crystal speaker, and 23 is a low cycle oscillator circuit.

In the above device, contact piece of the switch 7 under the normal state is in its contacting state to the side of the discharge resistor 14, in which state the charging voltage $V_{15}$ (FIG. 5C) of the capacitor 15 is zero and the low cycle oscillator circuit 23 is not operated, so that no alarm sound is produced. When a previously set time $t_0$ reaches as shown in FIG. 5A, an alarm signal $S_i$ is produced at the clock mechanism, thereby the contact piece of switch 7 is caused to be thrown into the D.C. electric source side and such a D.C. voltage $V_4$ as shown in FIG. 5B will charge the capacitor 15 through the resistor 13 as shown in FIG. 5C. Both terminal voltage $V_{15}$ of the capacitor will become gradually higher and, thus, the sound volume of oscillation sound $S_i$ obtained from the crystal speaker 22 of the low cycle oscillator circuit will
become larger as the time lapses, as in FIG. 5D. As a proper signal $S_2$, as in FIG. 5E, to stop the alarm sound is provided from outside the device at a time point $t_1$, the contact piece of switch 7 is released from the side of D.C. source 16 and switched to the side of discharge resistor 14, so that the electric charge in the capacitor 15 is discharged through the resistor 14 and the capacitor voltage $V_{14}$ is dropped to be zero, thereby the oscillation of low cycle oscillator circuit 23 is interrupted and the generation of alarm sound is stopped.

In the above described embodiment, the alarm sound is thus generated at the moment of the alarm set time reached and its sound volume is automatically made to become gradually larger as the time lapses. Therefore, the stimulus to hearing sense of humans will become stronger according to the lapse of time, so that users will be gradually awakened but not in a shocking manner.

That is, in the above described embodiment, the combination of charging and discharging capacitor 15, discharging resistor 14, charging resistor 13 and switch 7 is forming a unique voltage controlling device of the present invention.

In FIG. 6, there is shown another embodiment of the invention, in which 32 is a D.C. electric source section having at both ends of an A.C. electric source 28 a voltage dropping transformer 29 through a switch 7. At the output end of the transformer 29 is connected a diode 30 so as to obtain a rectified voltage, which is to be smoothed by means of a capacitor 31. 33 is a voltage controlling section connected to the output end of the D.C. source 32. In the section 33, a transistor 37 is connected to both ends of a series circuit of a charging resistor 34 and a capacitor 35, with its emitter to an end through an emitter resistor 36 and with its collector to the other end without through any resistor. The base of the transistor 37 is connected to junction point of the resistor 34 and capacitor 35. Further, a resistor 38 is connected between the emitter and collector of the transistor 37. 39 is a sound cycle oscillating circuit, which comprises a transistor 40, resistors 47 and 48, capacitors 43, 44 and 46, windings 41 and 42, a transformer 49, and a speaker 50. This sound cycle oscillating circuit 39 receives a voltage supplied from both ends of the resistor 36 in the voltage controlling section 33.

In the above described device, the switch 7 is in its OFF state under the normal condition and, thus, the electric source 28 is disconnected. Therefore, the voltage controlling section 33 will not be operated and no alarm sound will be produced. Now, as shown in FIG. 7A, when a previously set time $t_0$ reaches, the switch 7 is caused to be in the ON state by the clock mechanism 1, thereby the electric source 28 is connected and a D.C. voltage $V_1$ as shown in FIG. 7B will appear at the D.C. source section 32. With such voltage $V_1$, the capacitor 35 will be gradually charged with voltage $V_{35}$ as in FIG. 7C. On the other hand, the D.C. voltage $V_1$ will be divided to the resistor 38 and emitter resistor 36. Under the condition when the transistor 37 is in nonconducting state, a voltage of constant level as shown in FIG. 7D will be obtained at both ends of the emitter resistor 36, which voltage is applied to the sound cycle oscillating circuit 39, thereby an alarm sound of constant level $S_0$ is generated (see FIG. 7E).

As the charging of capacitor 35 further advances and the base potential of transistor 37 becomes higher than its emitter potential, the base current will initiate to flow through the transistor 37 and then the emitter current is caused to flow therefrom. Thus, due to the emitter current and a current supplied from the resistor 38, the voltage at both ends of emitter resistor 36 will become larger, as shown in FIG. 7D, as the time lapses and in accordance therewith the alarm sound becomes also larger (see FIG. 7F). When the time $t_2$ reaches, a reset signal $S_2$ to stop the alarm sound (see FIG. 7G) is supplied from the clock mechanism 1, thereby the switch 7 is opened and the D.C. voltage $V_1$ is no more provided, so that there will be no application of electric voltage to the transistor 37. Then, the voltage at both ends of resistor 36 will become lower as the charge accumulated in the capacitor 35 is discharged through the base and emitter of the transistor 37, thereby the alarm sound $S_2$ disappears until next alarm set time reaches.

According to the above described embodiment, an alarm sound of constant level is generated for a predetermined time period as the alarm set time reaches and, thereafter, the sound volume is made to become larger as the time lapses so that the user will be led to smooth waking.

In the above embodiment, the voltage control section 33 is forming the unique voltage control device of the present invention.

FIG. 8 shows a further embodiment of the present invention, in which 1 is a clock mechanism, 6 is a D.C. source, 7 is a pair of contacts, 10 is a nonstable multivibrator which including two transistors 8 and 9, and 27 is a converter for converting sound cycles into acoustic energy, which is provided with a controlling circuit for making output voltage to be higher in accordance with the time lapsing and comprising an amplifying transistor 11, an alarm sound producing device 12 of a combination of a blocking oscillation circuit and a speaker, a charging capacitor 18 and others.

In the device as described above, the contacts 7 are closed when the alarm set time reaches as in FIG. 9A, thereby the nonstable multivibrator 10 is operated and an oscillation voltage of a constant cycle $T$ as shown in FIG. 9B is generated, which voltage is applied to the transistor 11, so that the same will repeat its conductive and nonconductive states periodically. When the transistor 11 is in its conductive state, the capacitor 18 is caused to be charged. At both ends of an emitter resistor 24, on the other hand, a voltage divided from the current source voltage by means of a dividing resistor and the emitter resistor 24 is caused to appear. When the transistor 19 is in its nonconductive state, a voltage of a constant level $V_4$ as shown in FIG. 9D will be obtained as a voltage at both ends of the emitter resistor 24. As the further charging of capacitor 18 advances and a predetermined time $t_2$ reaches, as shown in FIG. 9C, the potential at base of the transistor 19 becomes lower than the emitter potential. Then, a base current initiates to flow through the transistor 24 and an emitter current starts to flow through the transistor 19. The voltage $V_4$ (see FIG. 9D) at both ends of the emitter resistor 24 will be caused to become higher as the time lapses due to the emitter current and a current supplied through the dividing resistor 17, and will
become constant when the charge to the capacitor 18 is completed so that the alarm sound S will maintain a constant volume. When the transistor 11 varies to its nonconductive state, accumulated charge in the capacitor 18 will be rapidly discharged through the emitter resistor 24, so that the base potential of the transistor 19 will be made higher and the base end voltage $V_{bc}$ of the emitter resistor 24 will retain a voltage of dividing ratio to a voltage dividing resistor 25. This operation is repeated until the contacts 7 is opened at the time $t_5$ set in conformity with the cycle T of the nonstable multivibrator. Therefore, the alarm sound S will be generated as shown in FIG. 9E. In the case, in the above described embodiment, when the blocking oscillator circuit of alarm sound generator 12 is substituted by an ordinary oscillating circuit, an alarm sound S as shown in FIG. 9F is generated.

According to the device as described above, the alarm sound is generated intermittently with a regular cycle T and, further, the sound is made to become continuously larger within each of the cycle.

The nonstable multivibrator 10 and front half of the convetor 27 are forming the unique voltage controlling device of the present invention.

In FIG. 10 which showing a further embodiment of the invention, a charging resistor 17 and a capacitor 18 in a series circuit are connected to both ends of the D. C. source 6 through normally opened contacts 7 which is to be closed for a predetermined time period when the alarm set time of a clock mechanism 1 reaches. To the both ends of the above series circuit is connected a transistor 19, of which emitter is connected through a resistor 24 to an end and collector is connected to the other end without any resistor, the base being connected to intermediate point between the resistor 17 and capacitor 18. A further resistor 25 is inserted between the emitter and collector. Thus formed is a voltage controlling section 26. 10 is a monostable multivibrator including transistors 8 and 9, 11 is a transistor, and 12 is a sound cycle oscillator comprising a blocking oscillator circuit and a speaker or the like assembled together. Both ends of the nonstable multivibrator 10 are connected to switch side of the resistor 24 and to emitter side of the resistor 25, respectively.

In the device as described above, when a previously set alarm time $t_1$ reaches as shown in FIG. 11A, the contacts 7 are closed by an operation of the clock mechanism, so that the D. C. source 6 is connected to the controller section 26 and a D. C. voltage $E_5$ is applied thereto. The capacitor 18 will then be charged gradually with this voltage $E_5$ and, at the same time, the voltage is divided by both resistors 24 and 25. A voltage $V_{bc}$ of a constant level as shown in FIG. 11C will be obtained as both end voltage $V_{bc}$ of the resistor 24, which is then applied to the nonstable multivibrator 10. The multivibrator 10 initiates the oscillation of a regular cycle T and, thus, an oscillation voltage $V_{osc}$ as shown in FIG. 11D is obtained. With such voltage, the transistor 11 will be driven, so that the alarm sound generating device 12 will receive a voltage which is in synchronism with the cycle T of said oscillation voltage $V_{osc}$ and dependent on its magnitude, thereby such an alarm sound S as shown in FIG. 11E will be generated. The above descriptions are related to the period of $t_1-t_2$.

When the capacitor 18 is gradually charged and base potential of the transistor 19 is lowered as shown in FIG. 11B so as to be lower than its emitter potential at the time point of $t_6$, the base current starts to flow through the transistor 19 and then the emitter current starts to flow therethrough. The voltage $V_{es}$ at both ends of the emitter resistor 24 will be made to become gradually higher due to the above emitter current and a current supplied from the resistor 25. Thus, the peak values of the oscillation voltage $V_{osc}$ are also made to be higher so that the magnitude of alarm sound S will become gradually higher. The magnitude of alarm sound S will be maximum as the charge of the capacitor 18 is completed and is kept to be constant at the maximum until the time $t_6$ reaches, at which time the contacts 7 are opened and thereby the alarm sound generation is stopped. The charge accumulated in the capacitor 18 is then discharged, so that the same will be set to be ready for next alarm set time to reach.

According to the above described embodiment, the alarm sound of oscillatory sound which appears and disappears at a regular cycle, or of intermittent oscillatory sound which gradually becomes larger is generated as the alarm set time is reached.

In the above described embodiment, further, the controller section 26 are forming the unique voltage controlling device of the present invention in cooperation with each other.

In FIG. 12, there is shown a further embodiment of the present invention, in which 1 is a clock mechanism, 6 is a D.C. source, 7 is a pair of contacts, 19 is a controlling transistor, 24 is a collector resistor, 25 is an emitter resistor, 18 is a charging capacitor inserted between the collector and base of the transistor 19 through the collector resistor 24, 17 is a controlling resistor inserted between the base and emitter of the transistor 19 through the emitter resistor 25, and 12 is an alarm sound generating circuit, utilizing such a circuit including a speaker, oscillator and the like, or simply a buzzer or the like.

When an alarm set time reaches at $t_n$, the clock mechanism 1 operates to close the contacts 7 as shown in FIG. 13A. As the circuit is closed, a charging current will be passed to the capacitor 18 through the resistor 17 and base and emitter of the transistor 19 and through the emitter resistor 25 and the load 12. A part of the charging current to the capacitor 18 is passed through the base of transistor 19 and, thus, the transistor 19 will become conductive. Then, a current flows through the emitter resistor 25 and the load 12 so as to cause the load 12 to be operated, and such an alarm sound S as in FIG. 13D is generated. As the charging of capacitor 18 advances and the terminal voltage $V_{ts}$ grows up as in FIG. 13B, the base potential $E_b$ of the transistor 19 descends from the voltage $E_5$ of the D.C. source 6 as shown in FIG. 13C. Consequently, the transistor 19 will become nonconductive at the time $t_1$, so that the power supply to the load 12 is interrupted and, thus, the alarm sound generation is stopped.

According to the above described embodiment, it is made possible to start the generation of alarm sound when the alarm set time reaches and to stop the generation automatically after predetermined time period.
In the above embodiment, it will be appreciated that the circuit defined in FIG. 12 with a dotted line 60 is forming a unique voltage controlling device of the present invention.

FIG. 14 shows another embodiment of the present invention, in which 1 is a clock mechanism, 6 is a D.C. electric source, 7 is a pair of contacts, 19 is a switching transistor having a load 24 for generating the alarm sound and an emitter resistor 25. The transistor 19 is connected to both ends of the D.C. source 6 through the contacts 7. Further, through the load 24 and between collector and base of the transistor, there is provided a parallel circuit of a charging and discharging capacitor 18 and a variable discharging resistor 52. Through the emitter resistor 25 and between the emitter and base of the transistor, a "SNOOZE" switch 51 is connected. This SNOOZE switch 51 is of the type which closes its contacts momentarily and such the one as a non-lock type push button, a photosensitive switch which operates in response to light application thereto, a pressure-sensitive switch that operates in response to any pressure applied thereto, or the like may be used.

Referring to FIGS. 15A to 15D, when the contacts 7 are closed at an alarm set time $t_o$, the SNOOZE circuit is closed. At this time, the capacitor 18 is in a state in which no electric charge is accumulated at all, since the same has been forming a closed circuit with respect to the discharging resistor 52 for a long time until the alarm set time $t_o$. In response to the closing of snooze circuit as above, however, the capacitor 18 is charged with a current passed thereto through the emitter and base of the transistor 19 and the emitter resistor 25. Then, the potential $E_b$ at the base side of the transistor 19 will be decreased as shown in FIG. 15B. In the case where the snooze switch 51 is not used, the potential $E_b$ which is determined substantially by voltage dividing ratio of the discharging resistor 52, the resistor between the base and emitter of transistor 19, and the emitter resistor 7 will be maintained at the final stage, so that a base current will be passed through the transistor 19 due to a charging current to the capacitor 18 and a current passed through the resistor 52 and thus the transistor 19 will be in its conductive state, whereby a collector current is caused to flow through the load 24 and the alarm sound $S$ will be generated. As the snooze switch 51 is once closed at the time $t_i$ as shown in FIG. 15D under such condition described above, the capacitor 18 will be momentarily charged by the D.C. source 6 and its terminal voltage will reach the source voltage. Then, the base potential $E_b$ of the transistor 19 will become zero so as to be lower than the emitter potential, so that the transistor 19 is returned to interrupting state (nonconductive state), thereby the current supply to the load 24 is stopped and the generation of alarm sound is likely stopped. When the snooze switch 51 is opened at the time $t_o$, next, the electric charge accumulated in the capacitor 18 will begin to discharged through the discharging resistor 52, in accordance with the time constant determined by static capacity of the capacitor 18 and resistive value of the discharging resistor 52, and the base potential $E_b$ of transistor 19 will gradually rise. When this potential $E_b$ reaches the potential $E_d$ at the time $t_o$, the transistor 19 will be again made to be conductive and, thus, the alarm sound $S$ is generated. Such operation will be caused to be repeated by closing momentarily the snooze switch 51, so that when the contacts 7 are closed the alarm sound will be repetitively interrupted at a regular interval which is determined by the time constant represented by the multiplication of the static capacitance of capacitor 18 and the resistive value of discharging resistor 52.

According the above described embodiment, the snooze operation can be performed in a simple manner and the snoozing mechanism which itself can be simplified and minimized in size will perform the operation with less trouble.

It should be noted that, in the above embodiment, the circuitry section defined by a dotted line 61 in FIG. 14 is forming the unique voltage controlling device of the present invention.

A yet further embodiment of the present invention is shown in FIG. 16, in which 1 is a clock mechanism, 6 is a D.C. electric source, 7 is a pair of contacts, and 53 is a "SNOOZE" circuit, which has substantially the same structure with that of FIG. 14 and, thus, the same reference numerals therein show the identical elements to those elements used in FIG. 14. The difference will be that instead of the load 24 of FIG. 14 a resistance 54 is inserted. Further, the output voltage from both ends of the resistor 25 is applied to a nonstable multivibrator 10 at the next stage, the output of which multivibrator is in turn applied to a load 12 through a transistor 11. The last half portion in the above device is substantially the same with that utilized in FIG. 2 and the same reference numerals are showing identical elements. Thus, the present embodiment provides the both of the "SNOOZE" operation as in FIG. 14 and the circuitry operation as in FIG. 2. That is, when the alarm set time reaches the contacts 7 are closed and the alarm sound will be intermittently generated in a continuous manner at a regular cycle. Under such condition, the alarm sound will be stopped as the snooze switch 51 is closed, and when the snooze switch 51 is opened the alarm sound will be caused to be intermittently generated after a certain moment. This operation is repeatedly caused to occur by closing the snooze switch.

In the above embodiment, it will be seen that the snooze circuit 53 and multivibrator 10 are forming in cooperation with each other the unique voltage controlling device of the present invention.

What is claimed is:

1. An electronic sound alarm clock comprising a clock mechanism, an electric source circuit including a pair of contacts to be closed by said clock mechanism at a predetermined time, said electric source circuit providing an output voltage, a voltage controlling means operatively connected to said electric source circuit and responsive to said output voltage for providing an output signal having an amplitude which varies as the time lapses, an oscillator means operably connected to said voltage controlling means and operable in accordance with said varying amplitude of the output signal from the voltage controlling means for producing an oscillating output signal having a frequency in the audible range, which frequency varies as the time lapses, and a converter means for converting said output signal from said oscillator means into acoustic energy.
2. An alarm clock according to claim 1, in which said electric source circuit is provided with a capacitor connected at its both ends through a switch means so as to be charged through a charging resistor, and said voltage controlling means is adapted to apply the voltage at both ends of said capacitor to said oscillator means.

3. An alarm clock according to claim 1, in which said voltage controlling means comprises a control section having an output voltage which rises as the time lapses and a nonstable multivibrator to which said voltage from the control section is applied.

4. An alarm clock according to claim 1, in which said voltage controlling means is adapted to obtain an output voltage of a constant level for a predetermined time period after said contacts are closed and, thereafter, to increase said output voltage as the time lapses.

5. An alarm clock according to claim 4, in which said electric source circuit is provided in a connectable arrangement there with a series circuit of a charging capacitor and a controlling resistor, and said voltage controlling means includes a controlling transistor which receives at its base the variation in potential at a junction point of said capacitor and controlling resistor so that the conduction of said transistor will be controlled.

6. An electronic sound alarm clock comprising a clock mechanism, an electric source circuit including a pair of contacts to be closed by said clock mechanism at a predetermined time, said electric source circuit providing an output voltage, a voltage controlling means operatively connected to said electric source circuit and responsive to said output voltage for providing an output signal having an amplitude which varies as the time lapses, an oscillator means operably connected to said voltage controlling means and operable in accordance with said varying amplitude of the output signal from the voltage controlling means for producing an oscillating output signal having a frequency in the audible range, which frequency varies as the time lapses, and a converter means for converting said output signal from said oscillator means into acoustic energy, said voltage controlling means comprising a parallel circuit of a discharging capacitor and a discharge resistor, a snooze switch connected in series to said parallel circuit, a transistor connected in parallel to said snooze switch with its base and emitter having an emitter resistor, and a load inserted between the collector of said transistor and said capacitor connected at the other end to the base of said transistor.

7. An electronic sound alarm clock comprising a clock mechanism, an electric source circuit including a pair of contacts to be closed by said clock mechanism at a predetermined time, said electric source circuit providing an output voltage, a voltage controlling means operatively connected to said electric source circuit and responsive to said output voltage for providing an output signal having an amplitude which varies as the time lapses, an oscillator means operably connected to said voltage controlling means and operable in accordance with said varying amplitude of the output signal from the voltage controlling means for producing an oscillating output signal having a frequency in the audible range, which frequency varies as the time lapses, and a converter means for converting said output signal from said oscillator means into acoustic energy, said voltage controlling means comprising a parallel circuit of a discharging capacitor and a discharge resistor, a snooze switch connected in series to said parallel circuit, a transistor connected to both ends of the series circuit of said capacitor and snooze switch, with a resistor being connected to the emitter and collector of said transistor, and a nonstable multivibrator adapted to receive the output from said snooze circuit.