Dec. 12, 1950

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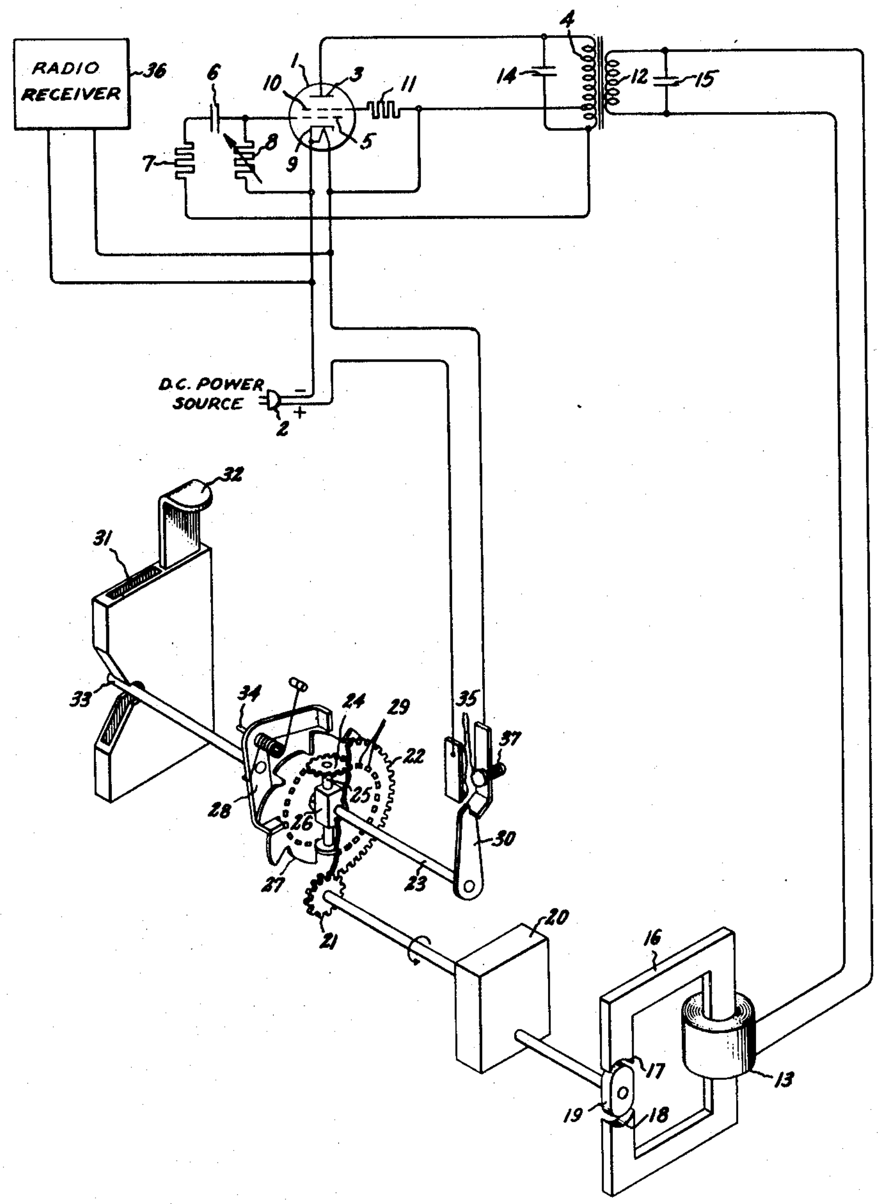
2,534,155

CLOCK TIMER

Filed Oct. 11, 1946



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UNITED STATES PATENT OFFICE

2,534,155

CLOCK TIMER

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Application October 11, 1946, Serial No. 702,731

2 Claims. (Cl. 161—1)

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This invention relates to a clock timer for operation from direct current. More specifically the invention concerns the provision of a simple and accurate electron tube oscillation generator, or direct current to alternating current inverter, for use in providing energy at a predetermined frequency to an alternating current motor in a clock timer.

An object of the invention is to provide a clock timer including an electron tube oscillator, wherein a portion of the tuned circuit of the oscillator comprises the inductance winding of a clock timer motor to be operated by the output of the oscillator.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof may best be understood by reference to the following description taken in connection with the accompanying drawing in which is shown a schematic diagram of a clock timer in accordance with the invention.

Referring now to the drawing, an electronic oscillator is shown comprising electron discharge device 1 furnished with direct current energy from a direct current power source through a conventional plug connector 2. The anode 3 of device 1 is connected during operation to the positive terminal of the source through the upper portion of transformer primary winding 4, and the control electrode 5 is coupled through a filter, comprising condenser 6 and resistor 7 in series, to the lower end of the primary winding, the positive power supply connection being made to a tap near the lower end of the winding. A variable control electrode biasing resistor 8 is connected from the control electrode to cathode 9. A screen electrode 10 may be provided and connected to the positive potential supply terminal through resistor 11. The heater for device 1 is preferably adapted for operation at full line voltage, such as at 117 volts. Secondary winding 12 of the transformer is connected directly across field coil 13 of a single-phase alternating current electric clock motor. The motor is preferably of the permanent-magnet rotor type suitable for alternating current operation. The primary winding 4 of the transformer is shunted by condenser 14, and the secondary winding 12 and motor winding 13 are shunted by condenser 15. The provision of the transformer provides a convenient method of changing the alternating current voltage produced by the oscillator to a different voltage

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which may be required for operation of the motor. The transformer also serves to isolate the motor from the direct current power supply.

With the connections shown, device 1 oscillates at the resonant frequency of the tank circuit comprising the capacitance of condenser 15 in parallel with the combined inductance of motor winding 13, of transformer winding 12, and of the upper portion of winding 4 above the tap. Condenser 14 and the lower portion of transformer primary 4 affects the resonant frequency to an extent determined by the capacitive or inductive reactance thus connected effectively in parallel with the tank circuit. The tank circuit thus formed is effectively in the anode circuit of the oscillator. The frequency of oscillation may be affected to a limited extent by adjustment in the value of resistor 8. Such adjustment will also affect the control electrode bias of device 1.

In order to have self-sustained oscillation of the oscillator, a portion of the energy of oscillations in the anode circuit is fed back to the control electrode, the proportion being dependent upon the inductive coupling of the lower turns of primary winding 4, below the tap, with the upper part of the winding, as well as the values of resistor 7 and condenser 6.

The clock motor described generally above may comprise a magnetic core member 16 and an operating winding 13 providing poles 17 and 18 for cooperation with a permanent magnet armature 19. The poles, of course, may be shaded, if desired, though no shading is shown in the drawing. The rotatable armature is arranged to drive, through a suitable gear reduction unit 20, a gear 21 in engagement with a gear 22 mounted for free rotation about a shaft 23. Gear 22 is adapted to drive shaft 23 through an epicyclic gear mechanism comprising idler gear 24 mounted for free rotation on a shaft 25 formed integrally with block 26. A peripherally notched wheel 27, arranged for free rotation about shaft 23, is held against rotation by a spring-loaded detent and jacking device 28. Accordingly, when gear 21 is rotated in a counterclockwise direction by the clock motor, gear 22 is rotated clockwise, as seen in the drawing, and rolls gear 24, since the teeth of gear 24 mesh with teeth formed by a ring of spaced perforations 29 provided in gear 22. Since member 27 is stationary, block 26 rotates shaft 23, and a switch opening arm 30 of an insulating material mounted to shaft 23 is rotated in a clockwise direction.

Arm 30 may be rotated in a counterclockwise (switch closing) direction by the insertion of coins in slot 31 and the depression of a member 32 adapted to push the coin past lever 33 to move the lever in the direction necessary to cause rotation of the detent and jacking device 28 about shaft 34 in a clockwise direction against spring tension. This motion of device 28 rotates notched wheel 27 one notch in a counterclockwise direction for each coin. Shaft 23 is thus rotated in a counterclockwise direction, since idler gear 24 rolls along stationary gear 22 in line with perforations 29 during the jacking sequence. It will be seen that shaft 23 will be rotated, in response to a rotation of wheel 27 or gear 22, by half of the angle of rotation of the wheel or gear. The device accordingly operates to close switch contacts 35 upon insertion of a coin because of the resultant counterclockwise rotation of arm 30. Closure of these contacts permits power to be supplied to external apparatus, such as a radio receiver 36, as well as to the clock motor through the oscillator circuit associated with electron discharge device 1. The clock motor thus operates, rotating arm 30 at a predetermined rate, since the motor is supplied with alternating current energy from the oscillator until such time as arm 30 has been rotated sufficiently to again open contacts 35. Thereafter, the oscillator, clock motor, and radio receiver remain deenergized until another coin is inserted. Compression spring 37 is conveniently provided to bias contacts 35 toward the closed position, the bias being overcome by arm 30 when it has been rotated sufficiently in the clockwise direction.

The device described is particularly applicable to the control of a radio receiver of the A. C.—D. C. type and may be arranged so that the receiver may be made operative for two or three hours upon the depositing of each 25 cent piece in the coin mechanism. The arrangement shown may accommodate several coins deposited in rapid sequence to provide a proportionately long period of operation, since each coin permits one jacking operation, and each jacking operation provides a predetermined angular displacement of arm 30.

All of the equipment described may be conveniently arranged inside the cabinet of the radio receiver with the exception of the plug connector 2 and the conventional power cord. Although the controlled device is shown in a radio receiver 36, the control system is adaptable to control fans, air conditioners, electric phonographs, electric lights, or any other desired apparatus controllable by actuation of an electric switch. The provision of the transformer, with windings 4 and 12, permits operation of the motor at full rated voltage, which may be, for instance 118 volts, although the direct current voltage of the power supply may be 110 volts or less. This is accomplished by a step-up ratio between the primary and secondary windings. In a similar manner, by using a step-down ratio, a 118 volt alternating current motor could be operated from a direct current source of greater than 118 volts. Any voltage loss in the oscillator is readily compensated for by properly increasing the ratio of primary to secondary windings of the transformer.

While I have shown only certain preferred embodiments of my invention by way of illustration, many modifications will occur to those skilled in the art and I therefore wish to have it understood that I intend, in the appended claims, to cover all such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a coin controlled direct current operated radio receiver, a direct current power source, a switch for said source, an electronic oscillator with a parallel tuned resonant circuit, an alternating current motor comprising an operating inductance winding, means for magnetically isolating said resonant circuit and operating winding for direct current, means for inductively coupling said operating winding to said resonant circuit, a reduction gear assembly for said motor, coin actuated means arranged to drive said assembly to close said switch to provide direct current energy to said receiver and to said oscillator, said switch being arranged for opening by operation of said assembly by said motor to deenergize said receiver and said oscillator.

2. In an electric clock timer for operation from a direct current source of a predetermined voltage, an alternating current clock motor with a single inductive energizing winding, an electronic oscillator comprising an electron discharge device having an anode, a cathode and a control electrode, a transformer having a primary and a secondary winding, said secondary winding being inductively coupled to said energizing winding, a portion of said primary winding being connected in series with said source in circuit between said anode and cathode, regenerative feedback means coupling said control electrode to said primary winding at a point remote from the connection to said source, a capacitor electrically coupled to said windings, whereby said oscillator provides energy to said energizing winding at a voltage determined by the ratio between said transformer windings and at a frequency determined by the net inductive effect of said windings, and said capacitor.

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