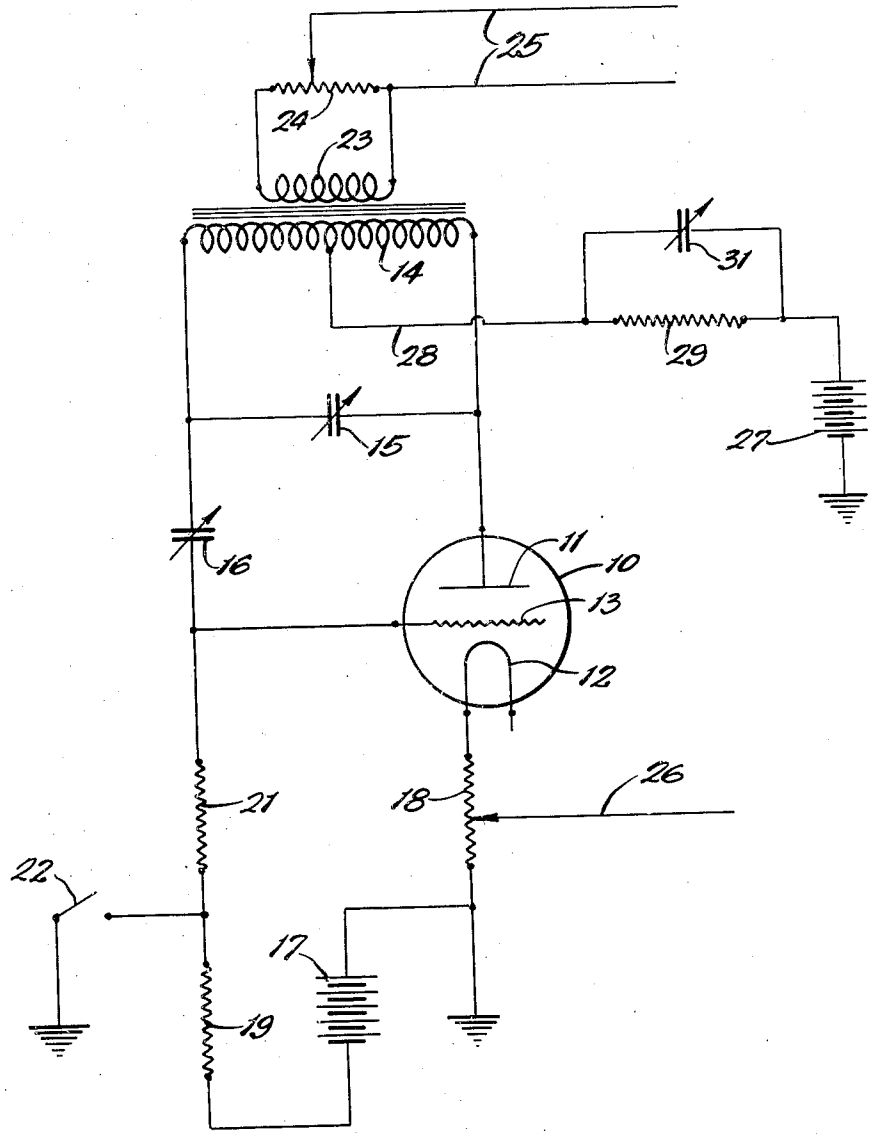
July 19, 1949. E. L. KENT 2,476,607

TONE FREQUENCY OSCILLATOR

Filed Sept. 25, 1946



Inventor:
Earle L. Kent,

By Dawson, Booth and Strangeway,
Attorneys.

Patented July 19, 1949 2,476,607

UNITED STATES PATENT OFFICE

2,476,607

TONE FREQUENCY OSCILLATOR

Earle L. Kent, Elkhart, Ind., assignor to C. G. Conn, Ltd., Elkhart, Ind., a corporation of Indiana

Application September 25, 1946, Serial No. 699,167

8 Claims. (Cl. 250—36)

1

This invention relates to tone frequency oscillators for use in electrical musical instruments and more particularly to the control of the attack and release characteristics of a keyed oscillator.

One of the objects of the invention is to provide a tone frequency oscillator in which the attack and release characteristics can be controlled without interfering with the wave form or tone quality of the oscillations.

Another object is to provide a tone frequency oscillator in which the attack and release characteristics are controlled by a resistor between the anode of the oscillator tube and the B supply.

Still another object is to provide a resistor in which a condenser is connected across the anode resistor to reduce its effective impedance under steady state conditions, thereby to minimize interference with the wave form of the oscillations.

The above and other objects and advantages of the invention will be more readily apparent from the following description when read in connection with the accompanying drawing in which the single figure is a circuit diagram of an oscillator embodying the invention.

The oscillator, as shown, is generally similar to that disclosed in the patent to McKellip et al., Serial No. 2,340,002, in that a single oscillating circuit provides tone frequency currents of different characteristics. In attempting to control the attack and release characteristics of an oscillator of this type, it has been found that the wave form of the tone frequency currents derived from the cathode circuit may be altered to an undesirable extent. According to the present invention, the attack and release characteristics of the oscillator can be easily and simply controlled without affecting the wave form of the derived oscillations.

As shown, the oscillator comprises an electron discharge tube 10 having an anode 11, a cathode 12 and a grid 13. The anode is connected to the grid through a tuned circuit including an inductance winding 14 having a condenser 15 in parallel therewith. A blocking condenser 16 is connected between the grid and the resonant circuit to keep direct voltages out of the grid. The grid is normally biased to cut-off by a suitable C voltage source shown as a battery 17 connected at its positive side to the cathode through a cathode resistor 18 and to the grid through a pair of series resistors 19 and 21. A keying switch 22 is adapted when closed to connect the point between resistors 19 and 21 to ground to remove the bias from the grid so that the tube will conduct. With this construction, when the switch is closed, the

2

circuit will start to oscillate and when the switch is open, the circuit will stop oscillating.

Tone frequency currents of substantially sine wave form may be derived through the resonant circuit through a winding 23 coupled to the winding 14. The winding 23 preferably supplies a potentiometer 24 having connections 25 from one end thereon and from an adjustable contact thereon to suitable amplifying and reproducing apparatus. Tone frequency currents of a different form and higher in harmonics similar to a string tone are derived from the cathode resistor 18 by grounding the lower end of the resistor and connecting a wire 26 thereto through a variable contact. As so far described, the circuit is substantially similar to that of Patent No. 2,340,002 except for the specific method of keying, although the keying arrangement shown in the patent could be employed if desired.

The B supply from anode 11 may be furnished by any suitable source illustrated with a battery 27 grounded at one side and connected at its other side through a circuit 28 to an intermediate point on the winding 14. According to the present invention, the attack and release characteristics of the tube are controlled by inserting a resistor 29 in the connection 28. The resistor causes a transient degenerative condition upon the initiation of anode current which tends to cause the oscillations to build up slowly when the switch 22 is closed and to cause the oscillations to die out slowly when the plate current ceases to flow upon opening of the switch 22. Thus this resistor 29 controls the attack and release characteristics of the tube.

Because the resistor 29 is in circuit all of the time, it tends to reduce the harmonic content of the tone frequency current derived from the cathode resistor 18. According to the present invention, the effect of the resistor 29 on the cathode tone frequency current can be minimized or eliminated by connecting a capacitor 31 across the resistor 29. The capacitor tends to reduce the effective impedance in the circuit under steady state conditions without substantially detracting from the transient effect of the resistor during starting and stopping of the oscillation. Its presence, therefore, minimizes or eliminates the effect of the resistor on the cathode tone frequency currents under steady state conditions. By the use of both the resistor and the condenser, the attack and release characteristics of the oscillator can be controlled as desired without affecting the wave form of the derived oscillations.

While one embodiment of the invention has been shown and described in detail, it will be understood that it is illustrative only and is not intended to be a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. A tone frequency oscillator for electrical musical instruments comprising an electron discharge tube having an anode, a cathode and a grid, means forming an energy transfer path between the anode and the grid, a cathode circuit for the tube, means in the cathode circuit to derive tone frequency current therefrom, and a circuit including a series resistance connecting the anode to a source of B voltage.

2. A tone frequency oscillator for electrical musical instruments comprising an electron discharge tube having an anode, a cathode and a grid, means forming an energy transfer path between the anode and the grid, a cathode circuit for the tube, means in the cathode circuit to derive tone frequency current therefrom, and a circuit including a resistor and a capacitor in parallel connecting the anode to a source of B voltage.

3. A tone frequency oscillator for electrical musical instruments comprising an electron discharge tube having an anode, a cathode and a grid, means forming an energy transfer path between the anode and the grid, means including a switch connected to the tube to start and stop oscillation thereof, a circuit including a source of B voltage connecting the anode and the cathode, means in the circuit between the cathode and said source to derive tone frequency currents therefrom, and a resistor in the circuit between the source and the anode.

4. A tone frequency oscillator for electrical musical instruments comprising an electron discharge tube having an anode, a cathode and a grid, means forming an energy transfer path between the anode and the grid, means including a switch connected to the tube to start and stop oscillation thereof, a circuit including a source of B voltage connecting the anode and the cathode, means in the circuit between the cathode and said source to derive tone frequency currents therefrom, and a resistor and a condenser connected in parallel in the circuit between the source and the anode.

5. A tone frequency oscillator for electrical musical instruments comprising an electron discharge tube having an anode, a cathode and a grid, a resonant circuit connecting the anode to the grid, means including a switch connected to the tube to start and stop oscillation thereof, a cathode circuit including a resistor, means to derive tone frequency currents from the resistor, and a resistor connecting the anode to a source of B voltage.

6. A tone frequency oscillator for electrical musical instruments comprising an electron discharge tube having an anode, a cathode and a grid, a resonant circuit connecting the anode to the grid, means including a switch connected to the tube to start and stop oscillation thereof, a cathode circuit including a resistor, means to derive tone frequency currents from the resistor, and a circuit including a resistor parallel connecting the anode to a source of B voltage.

7. A tone frequency oscillator for electrical musical instruments comprising an electron discharge tube having an anode, a cathode and a grid, a resonant circuit including an inductance winding connecting the anode to the grid, means for deriving tone frequency currents from said circuit, means including a switch connected to the tube to start and stop oscillation thereof, a cathode circuit including an impedance, a connection to the impedance to derive tone frequency currents therefrom, and a resistor connecting a point on the inductance winding intermediate its ends to a source of B voltage.

8. A tone frequency oscillator for electrical musical instruments comprising an electron discharge tube having an anode, a cathode and a grid, a resonant circuit including an inductance winding connecting the anode to the grid, means for deriving tone frequency currents from said circuit, means including a switch connected to the tube to start and stop oscillation thereof, a cathode circuit including an impedance, a connection to the impedance to derive tone frequency currents therefrom, and a circuit including a resistor and a condenser in parallel connecting an intermediate point on the inductance winding to a source of B voltage.

EARLE L. KENT.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,340,002	McKellip et al.	Jan. 25, 1944