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SOUND GENERATOR

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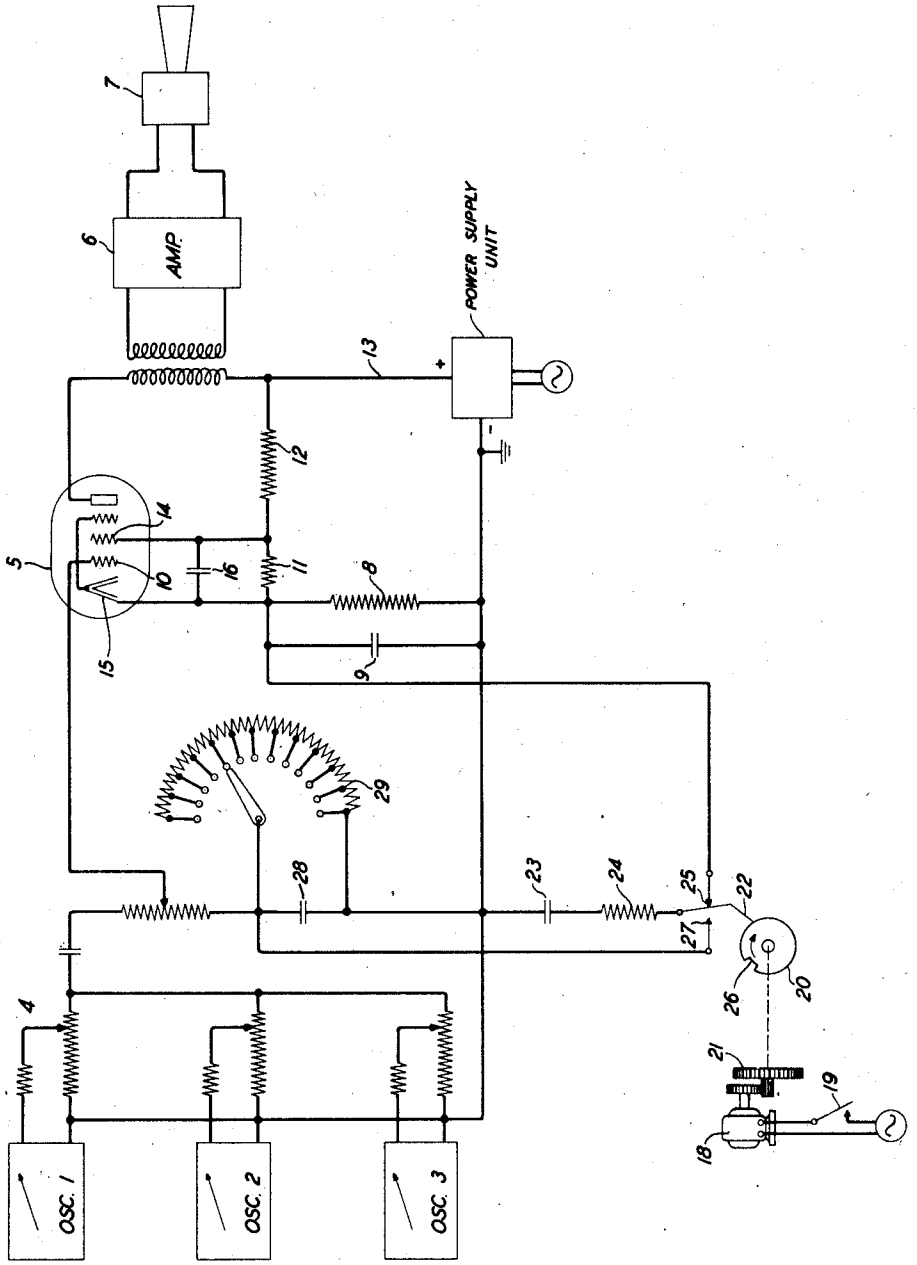

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SOUND GENERATOR

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2 Claims. (Cl. 177—7)

This invention relates to sound generators and the object of the invention is to produce by electrical means a sound simulating the tone of a bell or other percussion device.

According to the invention, voltages are generated at the more important frequencies of the desired tone and impressed on the input circuit of an amplifying and reproducing system. One of the tubes of the amplifying system is normally biased to cut-off but is suddenly unblocked at desired intervals to pass the tone frequencies. The normal bias is progressively restored between successive unblockings thereby producing a series of sounds which decay between "strikes" in the manner characteristic of percussion type signals.

In the preferred embodiment, a condenser normally connected to a suitable source of charging potential is momentarily connected at the desired intervals by means of suitable automatic timing mechanism to a second condenser in the input circuit to charge the latter condenser to a voltage which opposes the blocking bias and suddenly reduces it to a low value which permits the amplifying system to function. By means of a variable resistor connected across the condenser, its discharge time can be adjusted to vary the time required for the amplifier to restore to its blocked condition.

The signal frequencies will ordinarily be generated by a few vacuum tube oscillators or other devices which may be rich in harmonics but many other frequency components are added by the amplifier since during an appreciable part of the time it is unblocked, it will be operating on the non-linear portion of its characteristic. It is, therefore, possible with the circuit to simulate complex percussion sounds with relatively few signal generators.

These and other features of the invention will be more clearly understood from the following detailed description and the accompanying drawing of a system according to the invention.

In the drawing the sources 1, 2, 3 of signal frequency current may be of any known type such as vacuum tube oscillators of variable frequency. The outputs from these sources are combined in any desired proportions in the mixing circuit 4 which is shown as of the conventional parallel type. The combined signal is impressed on the grid of the tube 5, the output circuit of which is coupled to an amplifier 6 of any desired number of stages and a loudspeaker 7 or other receiving device.

The tube has the usual cathode biasing resistor 8 and by-pass condenser 9, but in this case the grid 10 is normally biased to such a high negative value that the plate current is cut off. This is conveniently accomplished by means of bleeder resistors 11, 12 connected between the cathode and the plate supply lead 13. These resistors are proportional with respect to resistor 8 so that the potential drop in resistor 8 provides the necessary bias voltage and resistors 11 and 12 are proportioned with respect to each other to provide at their junction point the proper potential for the screen grid 14 which is by-passed to the cathode 15 by a condenser 16 in the usual manner.

With the circuit in the condition shown it will therefore be clear that although signal potential is being applied to the grid 10, no signal is reproduced until the tube 5 is unblocked by the timing mechanism 17. This mechanism may comprise a motor 18 controlled by a switch 19 and driving a cam 20 through a suitable reduction gear mechanism 21. The cam 20 has a follower 22 which in the position shown connects a condenser 23 through a resistor 24 and contact 25 to the cathode end of resistor 8 which is a convenient source of charging potential for the condenser.

As the cam rotates and the follower 22 drops into the notch 26, breaks contact 25 and makes contact 27, thereby connecting the charged condenser 23 to the condenser 28 in the grid circuit of the tube 5. The upper plate of the latter condenser is, therefore, suddenly charged to a positive potential which opposes the biasing potential due to the resistor 8 and reduces the effective value of the grid bias. With the reduction of grid bias the tube suddenly becomes conductive and the signal potentials on the grid 10 are repeated and reproduced in the loudspeaker 7.

Since the notch 26 extends over only a relatively small part of the cam, contact 27 is closed only momentarily after which the condenser 23 is again connected to contact 25 to be recharged. The charge transferred to condenser 28 meanwhile is being dissipated in the resistor 29 thereby progressively reducing the voltage of the condenser and increasing the negative bias on the grid 10 until the tube 5 is again blocked. For the mechanism shown this cycle will be repeated once for each revolution of the cam and obviously the striking period may be varied as desired by proper choice of motor speed and reduction gearing or by providing additional notches in the cam.

The resistor 24 in series with the condenser 23

has been found very advantageous in producing uniformity in the volume level of successive strikes presumably because of variations in the contact resistance between the follower 22 and the contacts 25 and 27. The capacities of the condensers 23 and 28 must, of course, be chosen so that for the particular conditions of operation, the voltage across the condenser 28 will be of the proper value to reduce the grid bias of the tube 5 to the desired minimum value. In the circuit shown the blocking bias developed across resistor 8 is about 15 volts, the resistor 24 has a value of 50,000 ohms, the condensers 23 and 28 are of 1.0 and 0.2 microfarad capacity respectively, the resistor 29 is 5.0 megohms with .5 megohm steps and the cam 20 is rotated at 88 revolutions per minute. This circuit gives an initial voltage of 12 volts across the condenser 28 so that the grid bias is reduced to the normal value of 3 volts.

By varying the number and frequency of the oscillators and the various other circuit constants described a system of this type is capable of producing percussion sounds of a wide variety of tonal qualities which may be used for signaling, as bell chimes or for any other purpose. While the invention has been described for purposes of illustration with reference to a particular system, the circuit is capable of various modifications within the scope of the following claims.

What is claimed is:

1. In a sound generating system, a source of alternating current, a receiver, an amplifier having an input circuit connected to the source and an output circuit connected to the receiver, a first condenser in the input circuit, a discharge circuit of variable resistance for the condenser, means for normally biasing the amplifier with a potential which blocks transmission through the system, a second condenser, a fixed resistance and means for automatically and at predetermined intervals charging the second condenser from the biasing potential through the fixed resistance and transferring from the second condenser to the first condenser through the fixed resistance uniform charges to unblock the amplifier.

2. In a signaling system, a plurality of vacuum tube oscillators, a mixing circuit for the oscillators, a signal receiver, an amplifier having an input circuit connected to the mixing circuit and an output circuit connected to the receiver, a source of potential for the amplifier, means for deriving from the source a potential for biasing the amplifier to cut-off, a condenser in the input circuit of the amplifier, a variable resistance forming a discharge path for the condenser, means for periodically charging the condenser to a known potential to reduce the bias on the amplifier to its normal value comprising a resistor and a second condenser and motor-operated contacts for charging the second condenser through the resistor and transferring a portion of the charge through the resistor to the condenser in the input circuit.

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